**3GPP TSG-RAN WG4 Meeting #104-eR4-2214509**

Electronic Meeting, 15th Aug. – 26th Aug., 2022

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **2433** | **rev** | **1** | **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:*** | CR on test case for handover with PSCell from NR SA to EN-DC with sequential processing | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh2-Perf | | | | |  | ***Date:*** | | | 2022-8-06 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | The core requirements for HO with PSCell has been completed, and the corresponding test cases are not defined, thus it is necessary to introduce the test case for verifying the delay requirements for handover with PSCell from NR SA to EN-DC with sequential processing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the test case for verifying the delay requirements for handover with PSCell from NR SA to EN-DC with sequential processing when the SMTC of target unknown PSCell is present in RRCConnectionReconfiguration and the target PSCell is in FR2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The test case for verifying the delay requirements for handover with PSCell from NR SA to EN-DC with sequential processing is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.7.3.1.x1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

#### << Start of Change #1>>

#### A.7.3.1.x1 Handover with PSCell from SA to EN-DC; unknown FR2 target cell

##### A.7.3.1.x1.1 Test Purpose and Environment

This test is to verify the PSCell addition delay requirements specified in clause 6.1.5.2 for handover with PSCell from NR SA to EN-DC with sequential processing when the SMTC of target unknown PSCell is present in RRCConnectionReconfiguration and the target PSCell is in FR2.

##### A.7.3.1.x1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.x1.2-1. The PSCell addition delay are tested by using the parameters in table A.7.3.1.x1.2-2-6.

The test scenario comprises of three carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2 and cell 3. Starting T2, cell 2 and cell 3 become detectable and the UE receives a RRC signalling including handover with PSCell command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover with PSCell is sent to the UE.

The test system shall send a RRC message to the UE to trigger HO (Cell 2) with PSCell (Cell 3) during period T2, after UE has reported Event B2. The point in time at which the RRC message implying HO (Cell 2) with PSCell (Cell 3) is received at the UE antenna connector defines the start of period T3. The test system shall observe the UE sends PRACH to the PSCell (Cell 3) during period T3.

Table A.7.3.1.x1.2-1: Handover with PSCell from NR SA to EN-DC test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: LTE FDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target PCell: LTE TDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target PCell: LTE FDD  Target PSCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |
| 4 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target PCell: LTE TDD  Target PSCell: NR 120 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.7.3.1.x1.2-2: General test parameters for handover with PSCell from NR SA to EN-DC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Value | Comment |
| RF Channel Number | |  | 1, 2, 3 | Three radio channels are used for this test. One for FR1 source PCell, second for E-UTRA target PCell and third for target NR PSCell |
| Initial | Active PCell |  | Cell1 | PCell on RF channel number 1. |
| Condition | Neighbour cell |  | Cell2, Cell3 | Neighbour cell on RF channel number 2 and 3. |
| Final  Condition | Active PCell |  | Cell2 | E-UTRA PCell on RF channel number 2. |
| Active PSCell |  | Cell3 | PSCell on RF channel number 3. |
| Neighbour Cell |  | Cell1 | RF channel number 1 |
| NR measurement quantity | |  | SS-RSRP |  |
| E-UTRAN measurement quantity | |  | RSRP |  |
| b2-Threshold1 | | dBm | As specified in Table A.6.3.1.4-3 | Absolute NR SS-RSRP threshold for event B2 |
| b2-Threshold2EUTRAN | | dBm | -98 | Absolute E-UTRAN RSRP threshold for event B2 |
| Hysteresis | | dB | 0 |  |
| TimeToTrigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  | OFF | Non-DRX test |
| Access Barring Information | | - | Not sent | No additional delays in random access procedure |
| PRACH configuration on cell3 | |  | FR2 configuration 2 | Captured in A.3.8.3.2 |
| Time offset between cell 1 and 2 | |  | 3 ms | Asynchronous cells |
| Gap pattern configuration Id | |  | 0 | As specified in Table 9.1.2-1 started before T2 starts |
| Cell-individual offset for cells on RF channel number 2 | | dB | 0 | Individual offset for cells on primary component carrier. |
| Cell-individual offset for cells on RF channel number 3 | | dB | 0 | Individual offset for cells on carrier frequency of cell3. |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 | During this time the cell 2 and cell 3 shall be known. |
| T3 | | s | 1 | During this time the UE perform HO with PSCell addition. |

Table A.7.3.1.x1.2-3: Cell specific test parameters for Cell 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Configuration | Cell 1 | | |
|  | |  |  | T1 | T2 | T3 |
| RF channel number | |  | 1, 2 | 1 | | |
| Duplex mode | |  | 1, 2 | FDD | | |
| BWchannel | | MHz | 1, 2 | 10: NRB,c = 52 (FDD) | | |
| PDSCH reference measurement channel | |  | 1, 2 | SR.1.1 FDD | | |
| CORSET reference channel | |  | 1, 2 | CR.1.1 FDD | | |
| TRS configuration | |  | 1, 2 | TRS.1.1 FDD | | |
| OCNG patternNote1 | |  | 1, 2 | OP.1 | | |
| BWP | Initial DL BWP |  | 1, 2 | DLBWP.0.1 | | |
|  | Dedicated DL BWP |  |  | DLBWP.1.1 | | |
|  | Initial UL BWP |  |  | ULBWP.0.1 | | |
|  | Dedicated UL BWP |  |  | ULBWP.1.1 | | |
| SMTC configuration | |  | 1, 2 | SMTC.1 | | |
| SSB configuration | |  | 1, 2 | SSB.1 FR1 | | |
| b2-Threshold1 | | dBm | 1, 2 | -96 | | |
| EPRE ratio of PSS to SSS | | dB | 1, 2 | 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\_DMRS | |  |  |  | | |
| EPRE ratio of OCNG DMRS to SSS | |  |  |  | | |
| EPRE ratio of OCNG to OCNG DMRS | |  |  |  | | |
| *Noc*Note2 | | dBm/15 KHz | 1, 2 | -100 | -104 | -100 |
| *Noc*Note2 | | dBm/SCS | 1, 2 | -100 | -104 | -100 |
| Ês/Noc | | dB | 1, 2 | 12 | 0 | -4 |
| Ês/IotNote3 | | dB | 1, 2 | 12 | 0 | -4 |
| SS-RSRPNote3 | | dBm/SCS | 1, 2 | -88 | -104 | -104 |
| IoNote3 | | dBm/9.36 MHz | 1, 2 | -59.78 | -73.04 | -70.59 |
| Propagation condition | |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix | |  | 1, 2 | 1x2 Low | | |
| 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 *Noc* to be fulfilled.  Note 3: Ês/Iot, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | |

Table A.7.3.1.x1.2-4: Cell specific test parameters for Cell 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Configuration | Cell 2 | | |
|  |  |  | T1 | T2 | T3 |
| RF channel number |  | 1, 2 | 2 | | |
| Duplex mode |  | 1, 2 | FDD | | |
| TDD special subframe configurationNote1 |  | 4, 5, 6 | 6 | | |
| TDD uplink-downlink configurationNote1 |  | 4, 5, 6 | 1 | | |
| BWchannel | MHz | 1, 2 | 10 MHz: NRB,c = 50 | | |
| PRACH ConfigurationNote2 |  | 1, 2 | 4 | | |
| PDSCH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.3 FDD | | |
| PCFICH/PDCCH/PHICH parameters:  DL Reference Measurement ChannelNote3 |  | 1, 2 | 10 MHz: R.6 FDD | | |
| OCNG PatternsNote3 |  | 1, 2 | 10 MHz: OP.10 FDD | | |
| PBCH\_RA | dB | 1, 2 | 0 | | |
| PBCH\_RB |  |  |  | | |
| PSS\_RA |  |  |  | | |
| SSS\_RA |  |  |  | | |
| PCFICH\_RB |  |  |  | | |
| PHICH\_RA |  |  |  | | |
| PHICH\_RB |  |  |  | | |
| PDCCH\_RA |  |  |  | | |
| PDCCH\_RB |  |  |  | | |
| PDSCH\_RA |  |  |  | | |
| PDSCH\_RB |  |  |  | | |
| OCNG\_RANote4 |  |  |  | | |
| OCNG\_RBNote4 |  |  |  | | |
| NocNote5 | dBm/15kHz | 1, 2 | -98 | | |
| Ês/Noc | dB | 1, 2 | -Infinity | 8 | 78 |
| Ês/IotNote6 | dB | 1, 2 | -Infinity | 78 | 78 |
| RSRPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| SCH\_RPNote6 | dBm/15kHz | 1, 2 | -Infinity | -90 | -90 |
| IoNote6 | dBm/9MHz | 1, 2 | -67.21  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) | -58.57  +10log(NRB,c/100) |
| Propagation Condition |  | 1, 2 | AWGN | | |
| Antenna Configuration and Correlation Matrix Note7 |  | 1, 2 | 1x2 Low | | |
| Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].  Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].  Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.  Note 4: 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 5: 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 6: Ês/Iot, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]. | | | | | |

Table A.7.3.1.x1.2-5: Cell specific test parameters for Cell 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Config | Test | | |
|  |  |  | T1 | T2 | T3 |
| E-UTRA Channel Number |  | 1,2 | 1 | | |
| NR Channel Number |  | 1,2 | 2 | | |
| Duplex Mode |  | 1,2 | TDD | | |
| TDD configuration |  | 1,2 | TDDConf.3.1 | | |
| BWchannel | MHz | 1,2 | 100: NRB,c = 66 | | |
| Data RBs allocated |  | 1,2 | 48 | | |
| Initial BWP Configuration |  | 1,2 | DLBWP.0.1  ULBWP.0.1 | | |
| Dedicated BWP Configuration |  | 1,2 | DLBWP.1.1  ULBWP.1.1 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| PDSCH/PDCCH TCI state |  | 1,2 | TCI.State.2 | | |
| PDSCH Reference measurement channel |  | 1,2 | SR.3.3 TDD | | |
| RMSI CORESET Reference Channel |  | 1,2 | CR.3.2 TDD | | |
| Dedicated CORESET Reference Channel |  | 1,2 | CCR.3.7 TDD | | |
| OCNG Patterns |  | 1,2 | OP.3 | | |
| SSB configuration |  | 1,2 | SSB.2 FR2 | | |
| SMTC configuration |  | 1,2 | SMTC.2 | | |
| PDSCH/PDCCH subcarrier spacing | kHz | 1,2 | 120 | | |
| TRS Configuration |  | 1,2 | TRS.2.1 TDD | | |
| CSI-RS configuration for CSI reporting |  | 1,2 | CSI-RS.3.1 TDD | | |
| reportConfigType |  | 1,2 | periodic | | |
| reportQuantity |  | 1,2 | cri-RI-PMI-CQI | | |
| CSI reporting periodicity | slot | 1,2 | 40 | | |
| CSI reporting offset | slot | 1,2 | 4 | | |
| EPRE ratio of PSS to SSS | dB | 1,2 | 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 |  | 1,2 | AWGN | | |

Table A.7.3.1.x1.2-6: OTA related test parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Cell 3 | | |
| T1 | T2 | T3 |
| Angle of arrival configuration |  | Setup 2a according to clause A.3.15.2.1 | | |
| Assumption for UE beamsNote 6 |  | Rough | | |
| Ês Note2 | dBm/SCS | -Infinity | -81 | |
| SSB\_RPNote2, Note 4 | dBm/SCS | -Infinity | -81 | |
| BB Note 2, Note 7 | dB | -Infinity | 4.88 | |
| IoNote 2, Note 4 | dBm/95.04 MHz | N/A | -56.41 | |
| Note 1: Void  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: Void  Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone  Note 5: Void  Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 7: 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. | | | | |

##### A.7.3.1.x1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 3 less than 692 ms from the beginning of time period T2.

The rate of correct PSCell addition observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms, where:

RRC procedure delay = 50 ms and is specified in clause 12 in TS 38.331 [2].

Tprocessing is as defined as 50ms in the test.

Tsearch\_HO is as defined as 80ms in the test.

Tsearch\_PSCell is as defined as 480ms in the test.

T∆ is defined as 20ms in the test.

TPSCell\_ DU is defined as 10ms in the test.

This gives a total of 692 ms.

#### << End of Change #1>>