3GPP TSG-RAN WG4 Meeting # 104-e R4-2211843

Electronic Meeting, August 15 – August 26, 2022

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **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:*** | Draft CR on TC for HO with PSCell from NR-SA to EN-DC with parallel processing and known FR2 PSCell in TS38.133 R17 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_RRM\_enh2-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***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 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 TC for HO with PSCell from NR-SA to EN-DC with parallel processing and known FR2 PSCell is missing in TS38.133. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduce the TC for HO with PSCell from NR-SA to EN-DC with parallel processing and known FR2 PSCell. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The TC for HO with PSCell from NR-SA to EN-DC with parallel processing and known FR2 PSCell is missing in TS38.133. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Section A.7.3.1.x2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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.7.3.1.x2 HO with PSCell from FR1 NR-SA to EN-DC with known E-UTRA PCell and known FR2 PSCell

##### A.7.3.1.x2.1 Test purpose and environment

The purpose of this test is to verify that the delay of HO with PSCell from FR1 NR-SA to EN-DC with known E-UTRA PCell and known FR2 PSCell are within the requirements stated in clause 6.1.5.2.2 of TS 36.133 [15] for the case when the E-UTRA PCell and FR2 PSCell are known by the UE at the time of handover with PSCell.

Supported test configurations are shown in A.7.3.1.x2.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.7.3.1.x2.1-2, cell-specific parameters in A.7.3.1.x2.1-3, A.7.3.1.x2.1-4, A.7.3.1.x2.1-5 and OTA parameters in A.7.3.1.x2.1-6 below. The test consists of three successive time periods with duration of T1, T2, and T3. There are three carriers each with one cell. Before the test starts the UE is connected to Cell 1 (source FR1 PCell) on radio channel 1 (FR1 PCC) and is aware of Cell 2 (target E-UTRA PCell) on radio channel 2 and Cell 3 (FR2 target PSCell) on radio channel 3. The UE is monitoring both cell 2 and cell 3 before receives a RRC message implying handover with PSCell. 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 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

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.x2.1-1: Supported test configurations for FR2 PSCell

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | Source FR1 PCell: NR FDD, SSB SCS 15kHz, data SCS 15 kHz, 10 MHz bandwidth  Target PCell: LTE FDD,  Target PSCell: NR TDD, SSB SCS 120 kHz, data SCS 120 kHz, BW 100 MHz |
| 2 | Source FR1 PCell: NR FDD, SSB SCS 15kHz, data SCS 15 kHz, 10 MHz bandwidth  Target PCell: LTE TDD,  Target PSCell: NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz |
| Note: The UE is only required to be tested in one of the supported test configurations | |

Table A.7.3.1.x2.1-2: General Test Parameters for HO with PSCell

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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.x2.1-3: 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.x2.1-4: 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.x2.1-5: 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.x2.1-6: 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.x2.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 137 msNote1 into T3.

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

Note1: The PSCell addition delay can be expressed as follows as specified in clause 6.1.5.2:

DHOwithPSCell\_PSCell = TRRC\_delay + Tprocessing + Tsearch\_HO + Tsearch\_PSCell + T∆ + TPSCell\_ DU + 2 ms

Where:

TRRC\_delay = 50ms

Tprocessing = 45ms

Tsearch\_HO = 0 ms

Tsearch\_PSCell = 0 ms

T∆ = 20ms

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

End of Change 1