**3GPP TSG-RAN WG4 Meeting #111 R4-2407354**

**Fukuoka, Japen, May 20 – 24, 2024**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **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 for performance part of R18 NR mobility further enhancement part 2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_Mob\_enh2-Perf | | | | |  | ***Date:*** | | | 2024-04-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | RAN4 agreed to introduce test case for conditional handover including target MCG and candidate SCG with CHO only. RAN4 also agreed that UE can skip the corresponding legacy CHO test case in R16 (approvced WF R4-2403548 in RAN4#110)  **Issue 2-2: whether test case for CHO-only is needed**  Agreement:   * Introduce one single new test case for CHO-only, selected from existing CHO test case. * UE capable of R18 enhanced CHO configuration only needs to pass the new R18 test case, i.e. legacy CHO test case in R16 can be skip.   However, when CHO-only test was introduced in RAN4#110bis, the above test applicability is missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Following agreement in RAN4#110, add test applicability to allow UE to skip corresponding CHO test case which was introduced in R16. Changes are highlighted in yellow on top of the big CR. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Intra-frequency CHO is redundantly tested twice. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.6.3.3.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 CHANGES>>**

#### A.6.3.3.X2 NR conditional handover including target MCG and candidate SCG from FR1-FR1 NR-DC to FR1-FR1 NR-DC with complementary conditional handover configuration

##### A.6.3.3.X2.1 Test Purpose and Environment

This test verifies the requirement for conditional handover when the UE is configured with target MCG and candidate SCG for CPC in FR1 NR-DC and additionally configured with a complementary CHO configuration in FR1. The test verifies that the UE makes the correct decision to proceed with CHO without CPC in case CHO condition is met without CPC condition being met, meanwhile verifying the conditional handover delay requirement in section 6.1.4.2.

For UE which can pass test case defined in clause A.6.3.3.X2, test case defined in clause A.6.3.3.1 can be skipped and corresponding test requirements are deemed to be fulfilled.

##### A.6.3.3.X2.2 Test Parameters

Supported test configurations are shown in table A.6.3.3.X2.2-1. Both conditional handover delay and interruption length are tested by using the parameters in table A.6.3.3.X2.2-2, and A.6.3.3.X2.2-3.

The test consists of two successive time periods, with time durations of T1 and T2 respectively.

At the start of time duration T1, the UE is connected to cell 1 (source PCell) and cell 2 (source PSCell). The UE may not have any timing information of cell 3 (target PCell) and cell 4 (target PSCell).

TE shall configure a condition implying conditional handover to cell 3 with a condition implying conditional PSCell change to cell 4 during T1, at a time earlier than TRRC before the beginning of T2. Additionally, the TE shall configure a complementary condition only implying conditional handover to cell 3.

At the start of T2, cell 3 becomes detectable. UE meets the handover condition during T2.

**Table A.6.3.3.X2.2-1: Intra-frequency conditional handover from FR1 to FR1 test configurations**

|  |  |
| --- | --- |
| **Config** | **Description** |
| 1 | Source cells (PCell and PSCell): NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  Target cells (PCell and PSCell): NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cells (PCell and PSCell): NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  Target cells (PCell and PSCell): NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cells (PCell and PSCell): NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  Target cells (PCell and PSCell): NR 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.6.3.3.X2.2-2: General test parameters Intra-frequency conditional handover from FR1 to FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cells |  | PCell: Cell 1  PSCell: Cell 2 |  |
|  | Neighbouring cells |  | Cell 3, Cell 4 |  |
| Final condition | Active cells |  | PCell: Cell 3  PSCell: Cell 4 |  |
| A3-Offset in condition for PCell | | dB | -10 |  |
| A4-Offset in condition for PSCell | | dB | -120 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration index | |  | FR1 PRACH configuration 1 | As specified in table Table 6.3.3.2-3 in TS 38.211 [6] |
| Time offset between cells | |  | 3 μs | Synchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤2 |  |

**Table A.6.3.3.X2.2-3: Cell specific test parameters for FR1-FR1 CHO (Cell 1 and Cell 3)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 1 | | Cell 3 | |
|  | | |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | 1 | | 1 | |
| Duplex mode | | Config 1 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| DRx Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | |
|  | | Config 3 |  | SR2.1 TDD | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | |
|  | | Config 3 |  | CR2.1 TDD | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC Configuration | | |  | SMTC.1 | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | |
| Config 3 | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
| Config 3 | 30 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
| Config 3 | 30 kHz | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| 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) | | |  |  | | | |
| Note2 | | | dBm/15kHz | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | |
|  | Config 3 | |  | -95 | | | |
|  | | | dB | 4 | 4 | -Infinity | 5 |
|  | | | dB | 4 | 4 | -Infinity | 5 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | -94 | -Infinity | -93 |
|  | Config 3 | | dBm/SCS | -91 | -91 | -Infinity | -90 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | -64.59 | -70.05 | -63.85 |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | -58.49 | -63.94 | -57.75 |
| Propagation condition | | | - | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

**Table A.6.3.3.X2.2-4: Cell specific test parameters for FR1-FR1 CPC (Cell 2 and Cell 4)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Cell 2 | | Cell 4 | |
|  | | |  | T1 | T2 | T1 | T2 |
| NR RF Channel Number | | |  | 2 | | 2 | |
| Duplex mode | | Config 1 |  | FDD | | | |
|  | | Config 2,3 |  | TDD | | | |
| TDD configuration | | Config 1 |  | Not Applicable | | | |
|  | | Config 2 |  | TDDConf.1.1 | | | |
|  | | Config 3 |  | TDDConf.2.1 | | | |
| BWchannel | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| BWP BW | | Config 1 | MHz | 10: NRB,c = 52 | | | |
|  | | Config 2 |  | 10: NRB,c = 52 | | | |
|  | | Config 3 |  | 40: NRB,c = 106 | | | |
| DRx Cycle | | | ms | Not Applicable | | | |
| PDSCH Reference measurement channel | | Config 1 |  | SR.1.1 FDD | | | |
|  | | Config 2 |  | SR.1.1 TDD | | | |
|  | | Config 3 |  | SR2.1 TDD | | | |
| CORESET Reference Channel | | Config 1 |  | CR.1.1 FDD | | | |
|  | | Config 2 |  | CR.1.1 TDD | | | |
|  | | Config 3 |  | CR2.1 TDD | | | |
| TRS configuration | | Config 1 |  | TRS.1.1 FDD | | | |
|  | | Config 2 |  | TRS.1.1 TDD | | | |
|  | | Config 3 |  | TRS.1.2 TDD | | | |
| OCNG Patterns | | |  | OP.1 | | | |
| SMTC Configuration | | |  | SMTC.1 | | | |
| SSB Configuration | | Config 1,2 |  | SSB.1 FR1 | | | |
| Config 3 | SSB.2 FR1 | | | |
| PDSCH/PDCCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
| Config 3 | 30 kHz | | | |
| PUCCH/PUSCH subcarrier spacing | | Config 1,2 | kHz | 15 kHz | | | |
| Config 3 | 30 kHz | | | |
| PRACH configuration | | |  | FR1 PRACH configuration 1 | | | |
| BWP configuration | | Initial DL BWP |  | DLBWP.0.1 | | | |
|  | | Dedicated DL BWP |  | DLBWP.1.1 | | | |
|  | | Initial UL BWP |  | ULBWP.0.1 | | | |
|  | | Dedicated UL BWP |  | ULBWP.1.1 | | | |
| 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) | | |  |  | | | |
| Note2 | | | dBm/15kHz | -98 | | | |
| Note2 | Config 1,2 | | dBm/SCS | -98 | | | |
|  | Config 3 | |  | -95 | | | |
|  | | | dB | 4 | 4 | -Infinity | 5 |
|  | | | dB | 4 | 4 | -Infinity | 5 |
| SSB\_RP | Config 1,2 | | dBm/SCS | -94 | -94 | -Infinity | -93 |
|  | Config 3 | | dBm/SCS | -91 | -91 | -Infinity | -90 |
| IoNote3 | Config 1,2 | | dBm/  9.36MHz | -64.59 | -64.59 | -70.05 | -63.85 |
|  | Config 3 | | dBm/  38.16MHz | -58.49 | -58.49 | -63.94 | -57.75 |
| Propagation condition | | | - | 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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | | | |

##### A.6.3.3.X2.3 Test Requirements

TRRC + TEvent\_DU occurs during T1 as the conditional handover condition for cell becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 3 less than Tmeasure + Tinterrupt + TCHO\_execution = 800 +62 +10=872ms from the start of T2 and the interruption during T2 shall not exceeed Tinterrupt=Tprocessing + TIU + T∆ + Tmargin =40+20+2 = 62ms.

The UE shall not send PRACH to Cell 4.

**<<END OF CHANGES>>**