**3GPP TSG-RAN WG4 Meeting # 98-e *R4-2103662***

**Electronic Meeting, 25 Jan -05 Feb, 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.133** | **CR** | **7031** | **rev** | **1** | **Current version:** | **16.8.0** |  |
|  |
| *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:***  | Test cases for TDD-TDD inter-frequency DAPS handover |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | LTE\_feMob-Perf |  | ***Date:*** | 2021-2-1 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Define the test cases for TDD-TDD inter-frequency DAPS |
|  |  |
| ***Summary of change:*** | The following test cases for inter-frequency DAPS are defined:* TDD – TDD intra-band inter-frequency synchronous DAPS handover
* TDD – TDD inter-band inter-frequency synchronous DAPS handover
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|  |  |
| ***Consequences if not approved:*** | The specification is not completed. |
|  |  |
| ***Clauses affected:*** | A.5.1.x |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS36.521-3 |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |

#### <Start of Change 1>

### A.5.1.x E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover

#### A.5.1.x.1 Test Purpose and Environment

This test is to verify the requirement for the TDD – TDD Intra-band Inter-frequency sync DAPS handover specified in clause 5.7.2.4. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA TDD cell on the same band as given in tables Table A.5.1.x.1-1, Table A.5.1.x.1-2 and Table A.5.1.x.1-3. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.5.1.x.1-1: General test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number |  | 1, 2 | Two TDD carriers on the same band are used |
| Channel Bandwidth (BWchannel) | MHz | 10 |  |
| A3-Offset | dB | -4 |  |
| Hysteresis | dB | 0 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | DRX\_L | As specified in clause A.3.3 |
| CP length |  | Normal |  |
| Special subframe configuration |  | 6 | For both cell1 and cell2.As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration |  | 1 | For both cell1 and cell2.As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells |  | 6 μs | synchronous cells |
| Gap pattern configuration Id |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | s | 5 |  |
| T2 | s | ≤5 |  |
| T3 | s | 1 |  |
| T4 | ms | 20 |  |
| T5 | ms | 100 |  |

Table A.5.1.x.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number |  | 1 | 2 |
| BWchannel | MHz | 10 | 10 |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH\_RA | dB | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
|  | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
|  Note 2 | dBm/15 kHz | -98 |
|  | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -91 | -91 | -infinity | -91 | -91 | -91 | -91 |
| 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

#### A.5.1.x.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50ms (Dhandover1) from the beginning of time period T3. During Dhandover1 the interruptionon Cell 1 shall not exceed 5ms (Tinterrupt1).

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

NOTE: The handover delay Dhandover1 can be expressed as: Dhandover1 = TRRC\_procedure + TIU + 20 ms.

The UE shall complete to release Cell 1 less than 20ms ((Dhandover2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed 5ms (Tinterrupt2).

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

*Tinterrupt2* = 5 ms in the test; Tinterrupt2 is defined in clause 5.7.2.1.2.

This gives a total of 20 ms.

#### <End of Change 1>

#### <Start of Change 2>

### A.5.1.x E-UTRAN TDD – TDD Inter-band Inter-frequency sync DAPS handover

#### A.5.1.x.1 Test Purpose and Environment

This test is to verify the requirement for the TDD – TDD Inter-band Inter-frequency sync DAPS handover specified in clause 5.7.2.4. Both handover delay and interruption length are tested.

The test scenario comprises of one E-UTRA TDD cell and one E-UTRA TDD cell on the different band as given in tables Table A.5.1.x.1-1, Table A.5.1.x.1-2 and Table A.5.1.x.1-3. PDCCHs indicating new transmissions shall be sent continuously to ensure that the UE would not enter the DRX state. The test consists of five successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively.

Before the start of T1, the UE is connected to Cell 1 (source PCell) on radio channel 1 but is not aware of Cell 2 (neighbour cell) on radio channel 2. During T1, the UE shall not have any timing information of Cell 2.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A3 is configured for neighbour cell (Cell 2), and the UE is configured with the measurement gaps (gap pattern ID # 0). Starting T2, Cell 2 becomes known to the UE. During T2, the UE shall report Event A3. After receiving the Event A3, the test system shall send a RRC message implying DAPS handover to the UE.

The start of T3 is the instant when the last TTI containing the RRC message implying DAPS handover to Cell 2 (target PCell) is sent to the UE. During T3, the UE shall be continuously scheduled on Cell 1 and shall be able to perform random access to Cell 2. After the RACH procedure is completed, the test system shall send a RRC message to the UE to release Cell 1 (source cell) on radio channel 1.

The start of T4 is the instant when the last TTI containing the RRC message implying source cell release is sent to the UE. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell.

Table A.5.1.x.1-1: General test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| PDSCH parameters |  | DL Reference Measurement Channel R.0 TDD | As specified in clause A.3.1.1.2 |
| PCFICH/PDCCH/PHICH parameters |  | DL Reference Measurement Channel R.6 TDD | As specified in clause A.3.1.2.2 |
| Initial conditions | Active cell |  | Cell 1 | Cell 1 is on RF channel number 1 |
| Neighbouring cell |  | Cell 2 | Cell 2 is on RF channel number 2 |
| Final condition | Active cell |  | Cell 2 |  |
| E-UTRA RF channel number |  | 1, 2 | Two TDD carriers on the different band are used |
| Channel Bandwidth (BWchannel) | MHz | 10 |  |
| A3-Offset | Db | -4 |  |
| Hysteresis | Db | 0 |  |
| TimeToTrigger | s | 0 |  |
| Filter coefficient |  | 0 | L3 filtering is not used |
| DRX |  | DRX\_L | As specified in clause A.3.3 |
| CP Length |  | Normal |  |
| Special subframe configuration |  | 6 | For both cell1 and cell2.As specified in table 4.2-1 in TS 36.211 |
| Uplink-downlink configuration |  | 1 | For both cell1 and cell2.As specified in table 4.2-2 in TS 36.211 |
| PRACH configuration |  | 4 | As specified in table 5.7.1-2 in TS 36.211 |
| Access Barring Information | - | Not sent | No additional delays in random access procedure |
| Time offset between cells |  | 33 μs | synchronous cells |
| Gap pattern configuration Id |  | 0 | As specified in Table 8.1.2.1-1 started before T2 starts |
| T1 | s | 5 |  |
| T2 | s | ≤5 |  |
| T3 | s | 1 |  |
| T4 | ms | 20 |  |
| T5 | ms | 100 |  |

Table A.5.1.x.1-2: Cell specific test parameters for E-UTRAN TDD – TDD Intra-band Inter-frequency sync DAPS handover test case

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| E-UTRA RF Channel number |  | 1 | 2 |
| BWchannel | MHz | 10 | 10 |
| OCNG Patterns defined in A.3.2.2.1 (OP.1 TDD) and in A.3.2.2.2 (OP.2 TDD) |  | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD | OP.2 TDD | OP.2 TDD | OP.2 TDD | OP.1 TDD | OP.1 TDD | OP.1 TDD |
| PBCH\_RA | dB | 0 | 0 |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PCFICH\_RB | dB |
| PHICH\_RA | dB |
| PHICH\_RB | dB |
| PDCCH\_RA | dB |
| PDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1  | dB |
|  | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
|  Note 2 | dBm/15 kHz | -98 |
|  | dB | 4 | 4 | 4 | 4 | 4 | -Infinity | 7 | 7 | 7 | 7 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -94 | -91 | -91 | -infinity | -91 | -91 | -91 | -91 |
| 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: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. |

#### A.5.1.x.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 50 ms (Dhandover1) from the beginning of time period T2. During Dhandover1 the interruptionon Cell 1 shall not exceed 1ms (Tinterrupt1).

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

NOTE: The handover delay Dhandover1 can be expressed as: Dhandover1 = TRRC\_procedure + TIU + 20 ms.

The UE shall complete to release Cell 1 less than 16ms ((Dhandover2) from the beginning of time period T4. During Dhandover2, the interruptionon Cell 2 shall not exceed 1ms (Tinterrupt2).

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

NOTE: The handover delay Dhandover2 can be expressed as: TRRC\_procedure + Tinterrupt2, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

*Tinterrupt2* = 1 ms in the test; Tinterrupt2 is defined in clause 5.7.2.1.2.

This gives a total of 16 ms.

#### <End of Change 2>