**3GPP TSG-RAN WG4 Meeting # 97-e R4-2017096**

**Electronic Meeting, 2-13 Nov., 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | 1187 | **rev** | 1 | **Current version:** | **16.5.0** |  |
|  |
| *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:***  | Intra-band Inter-frequency sync DAPS handover test in SA for FR1 |
|  |  |
| ***Source to WG:*** | Intel Corporation |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh-Perf |  | ***Date:*** | 2020-10-08 |
|  |  |  |  |  |
| ***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:*** | Intra-band inter-frequency sync DAPS handover test in SA for FR1 is missing. |
|  |  |
| ***Summary of change:*** | 1. Introduce intra-band inter-frequency DAPS handover test in SA for FR1.The test is designed based on email discusison in RAN4#95e, i.e. section 4.5 in R4-2009020. |
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| ***Consequences if not approved:*** | Intra-band inter-frequency DAPS handover test in SA for FR1 would be still missing. |
|  |  |
| ***Clauses affected:*** | A.3.19, A.6.3.1.9, A.6.3.1.10 |
|  |  |
|  | **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

#### A.6.3.1.9 Intra-band inter-frequency synchronous DAPS handover test in SA for FR1

##### A.6.3.1.9.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency synchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.9.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.9.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.9.2-2, and A.6.3.1.9.2-3.

The test consists of three successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The test scenario comprises of two carriers and one cell on each carrier Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. Cell 1 shall send an RRC message implying DAPS handover to cell 2. The RRC message from Cell1 implying handover shall be sent to the UE during period T2, after the UE has reported Event A3.

During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission.At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell. And the test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.9.2-1: Intra-band inter-frequency synchronous DAPS handover in SA for FR1 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex modeTarget cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex modeTarget cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex modeTarget cell: 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.6.3.1.9.2-2: General test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | dB | 0 |  |
| 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. |
| Time offset between cells |  | 0 μs | Synchronous cells |
| T1 | s | 5 |  |
| T2 | s | ≤5 |  |
| T3 | s | 1 |  |
| T4 | ms | 10 + Tinterrupt2 | Tinterrupt2­ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5 |
| T5 | ms | 100 |  |

Table A.6.3.1.9.2-3: Cell specific test parameters for intra-band inter-frequency synchronous DAPS handover test in SA for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number |  | 1 | 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 configuraiton | 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 | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
|  | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
| SSB\_RP | Config 1,2 | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -90 | -90 | -90 | -90 |
| Config 3 | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -87 | -87 | -87 | -87 |
| IoNote3 | Config 1,2 | dBm/9.36MHz | -61.41 | -61.41 | -61.41 | -61.41 | -61.41 | -70.05 | -61.41 | -61.41 | -61.41 | -61.41 |
| Config 3 | dBm/38.16MHz | -55.31 | -55.31 | -55.31 | -55.31 | -55.31 | -63.94 | -55.31 | -55.31 | -55.31 | -55.31 |
| Propagation condition | - | AWGN | 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.6.3.1.9.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause Tinterrupt1 interruption to cell 1. Tinterrupt1 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause Tinterrupt2 interruption to cell 1. Tinterrupt2 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

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

#### A.6.3.1.10 Intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

##### A.6.3.1.10.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra-band inter-frequency asynchronous DAPS handover requirements specified in clause 6.1.3.2.

##### A.6.3.1.10.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.10.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.10.2-2, and A.6.3.1.10.2-3.

The test consists of three successive time periods, with time durations of T1, T2, T3, T4 and T5 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2. The test scenario comprises of two carriers and one cell on each carrier Gap pattern ID gp0 as specified in Table 9.1.2-1 is configured before T2 in the test case.

Starting T2, Cell 2 becomes known to the UE. Cell 1 shall send an RRC message from Cell1 implying DAPS handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3.

T3 is defined as the end of the last TTI containing the RRC message implying DAPS handover.During T3 UE shall be able to perform random access to cell 2. Cell 1 is continuously scheduled in DL during T3. DL schedule and UL feedback to cell 1 shall be avoided when UE is required to perfrom DL reception or UL transmission in PRACH procedure in cell 2, except preamble transmission.At the end of T3 cell 2 shall send an RRC message implying cell 1 release command.

T4 is defined as the end of the last TTI containing the RRC message implying DAPS handover. Cell 2 is continuously scheduled in DL during T4. During T4, the UE shall perform source cell release.

Starting T5, the UE shall stops to send CSI report to the source cell. Andthe test system shall observe the periodic reporting of CSI for cell 1 during T5.

Table A.6.3.1.10.2-1: Intra-band inter-frequency asynchronous DAPS handover in SA for FR1 test configurations

|  |  |
| --- | --- |
| Config | Description |
| 1 | Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex modeTarget cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations |

Table A.6.3.1.10.2-2: General test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Value | Comment |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| A3-Offset | dB | 0 |  |
| 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. |
| Time offset between cells |  | 10 μs | Asynchronous cells |
| T1 | s | 5 |  |
| T2 | s | ≤5 |  |
| T3 | s | 1 |  |
| T4 | ms | 10 + Tinterrupt2 | Tinterrupt2­ is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5 |
| T5 | ms | 100 |  |

Table A.6.3.1.10.2-3: Cell specific test parameters for intra-band inter-frequency asynchronous DAPS handover test in SA for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Cell 1 | Cell 2 |
| T1 | T2 | T3 | T4 | T5 | T1 | T2 | T3 | T4 | T5 |
| NR RF Channel Number |  | 1 | 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 |
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| PDSCH/PDCCH subcarrier spacing | Config 1,2 | kHz | 15 kHz |
| Config 3 | 30 kHz |
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| Config 3 | 30 kHz |
| PRACH configuration  |  | FR1 PRACH configuration 1 |
| BWP configuraiton | 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 | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
|  | dB | 8 | 8 | 8 | 8 | 8 | -Infinity | 8 | 8 | 8 | 8 |
| SSB\_RP | Config 1,2 | dBm/SCS | -90 | -90 | -90 | -90 | -90 | -Infinity | -90 | -90 | -90 | -90 |
| Config 3 | dBm/SCS | -87 | -87 | -87 | -87 | -87 | -Infinity | -87 | -87 | -87 | -87 |
| IoNote3 | Config 1,2 | dBm/9.36MHz | -61.41 | -61.41 | -61.41 | -61.41 | -61.41 | -70.05 | -61.41 | -61.41 | -61.41 | -61.41 |
| Config 3 | dBm/38.16MHz | -55.31 | -55.31 | -55.31 | -55.31 | -55.31 | -63.94 | -55.31 | -55.31 | -55.31 | -55.31 |
| Propagation condition | - | AWGN | 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.6.3.1.10.3 Test Requirements

The UE shall start to transmit the PRACH to cell 2 less than 72 ms from the beginning of time period T3.

During T3 UE is allowed to cause Tinterrupt1 interruption to cell 1. Tinterrupt1 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-2. When UE is transmitting PRACH preamble to cell 2, interruption to cell 1 is allowed.

During T4 UE is allowed to cause Tinterrupt2 interruption to cell 1. Tinterrupt2 is defined in clause 6.1.3.2.2 Table 6.1.3.2.2-5.

UE shall finish cell 1 release in T4 and shall not send any CSI reports to cell 1 during T5.

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

End of Change