**3GPP TSG- Meeting #**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *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 | **X** | Core Network |  |

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| ***Title:***  |  |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | RAN WG4 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***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 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:*** | Tbd and errors in specification |
|  |  |
| ***Summary of change:*** | Remove the note specifying power imbalance between source cell and target cell shall be within TBD dBRemove editors note : “Editor’s Note: FFS on the interruption requirement when the relationship between CBW of target and source cell is different the relationship between BWP of target and source cell.”Add “. It is assumed that the CBW of target cell is not larger than the CBW of source cell” to address this editor’s note Added definition of intrafrequency and interfrequency DAPS HOAdded interruption requirements for 60kHz SCSAdd interruption requirements for async intrafrequency and async intraband interfrequency DAPS HOAdd definitions of sync DAPS HO thresholdDelete editors note “Editor’s note : The exact definition of synchronous / asynchronous DAPS handover are FFS.” |
|  |  |
| ***Consequences if not approved:*** | Incomplete daps handover requirements |
|  |  |
| ***Clauses affected:*** | 6.1.3.2.2, 6.1.3.3.2, 6.1.3.4.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Further changes from endorsed R4-2005307 are shown with highlighting and author “Further changes” |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

### 6.1.3 NR DAPS Handover

#### 6.1.3.1 Introduction

The requirements in this clause are applicable to DAPS handover to change the NR PCell to another NR cell.

#### 6.1.3.2 NR FR1 - NR FR1 DAPS Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR1 cell to NR FR1 cell. A DAPS handover is intra-frequency if the centre frequency of the SSB of the source cell and the centre frequency of the SSB of the target cell are the same, and the subcarrier spacing of the two SSBs are also the same.

Note: For intra-frequency DAPS handover, no requirement applies if active DL and UL BWP of target cell is not confined within the active DL and UL BWP of the source cell respectively.

Note: For inter-frequency DAPS handover, no requirements applies if the BWP of target cell is overlaped with the BWP of source cell in frequency domain.

An FR1 DAPS handover is synchronous if it meets the conditions in table 6.1.3.2-1, otherwise it is asynchronous

**Table 6.1.3.2-1, : Sync condition for FR1 synchronous DAPS handover**

|  |  |  |
| --- | --- | --- |
| Type of handover | Maximum receive timing difference between source and taget cell (µs) for sync DAPS handover | Maximum transmit timing difference between source and taget cell (µs)Note 1 sync DAPS handover |
| IntrafrequencyNote 1,2,3 | 3µs or 6µs | 5.21 µs or 7.6 µs  |
| Intraband interfrequency Note 1,2,3 | 3µs or 6µs | 5.21 µs or 7.6 µs |
| Interband interfrequency | 33 µs | 34.6 µs |
| Note 1 : If the receive time difference exceeds the cyclic prefix length of that SCS, demodulation performance degradation is expected for the first symbol of the slot.Note 2: A UE is not expected to transmit in the uplink earlier than NRX-TX after the end of the last received downlink symbol in the same cell where NRX-TX=26500Tc.. Note 3: A UE is not expected to receive in the downlink earlier than NTX-RX after the end of the last transmitted uplink symbol in the same cell where NTX-RX=26500Tc. |

##### 6.1.3.2.1 DAPS handover delay

Procedure delays for the procedure that can command a DAPS handover are specified in TS 38.331 [2].

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover1 seconds from the end of the last TTI containing the RRC command when UE is configured with dual active protocol stack handover.

 Dhandover1 = TRRC\_procedure + Tsearch + TIU + Tprocessing + T∆ + Tmargin ms

Where:

TRRC\_procedure is the maximum RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tsearch, TIU, Tprocessing, T∆ and Tmargin are defined in clause 6.1.1.2.2.

After successful RACH procedure of the target cell, when the UE receives an RRC message implying source cell release command, the UE shall accomplish the release actions specified in TS 38.331 [2] within Dhandover2.

Dhandover2 = TRRC\_procedure+ Tinterrupt2

Where:

Dhandover2 is the RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tinterrupt2 is defined in clause 6.1.3.2.2.

##### 6.1.3.2.2 Interruption time

During Dhandover1, the UE is allowed an interruption of up to Tinterrupt1 on source cell.

For FR1-to-FR1 intra-frequency handover, Tinterrupt1 is specified in Table 6.1.3.2.2-1.

Table 6.1.3.2.2-1: Tinterrupt1 for FR1-to-FR1 intra-frequency DAPS HO

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length (ms) | Interruption length X (slotsNote 1), synchronous DAPS HO | Interruption length X (slotsNote 1), asynchronous DAPS HO |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2 | 0.25 | 4 | 5 |
| Note 1: The same SCS of source cell and target cell is assumed.Note 2: It is assumed that the BWP of target cell is not larger than the BWP of source cell. It is assumed that the CBW of target cell is not larger than the CBW of source cellNote 3: Void |

For FR1-to-FR1 intra-band inter-frequency handover, Tinterrupt1 is specified in Table 6.1.3.2.2-2.

**Table 6.1.3.2.2-2:** **Tinterrupt1 for FR1-to-FR1 intra-band inter-frequency DAPS HO**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **NR Slot length (ms)** | **Interruption length (slotsNote 1)** synchronous DAPS HO | Interruption length X (slotsNote 1), asynchronous DAPS HO |
| 0 | 1 | 1 + TSMTC\_duration  | 2+ TSMTC\_duration |
| 1 | 0.5 | 2 + TSMTC\_duration  | 3+ TSMTC\_duration |
| 2 | 0.25 | 4 + TSMTC\_duration  | 5+ TSMTC\_duration |
| Note 1: The same SCS of source cell and target cell is assumed.Note 2: TSMTC\_duration is the longest SMTC duration between source cell and target cell.Note 3: Void |

For FR1-to-FR1 inter-band handover, Tinterrupt1 is specified in Table 6.1.3.2.2-3.

Table 6.1.3.2.2-3: Tinterrupt1 for FR1-to-FR1 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR Slot length (ms) of source cell** | **Tinterrupt1 (slots)** |
| **Sync** | **Async** |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2  | 0.25 | 5 | 5 |

During Dhandover2, the UE is allowed an interruption of up to Tinterrupt2 on target cell.

For FR1-to-FR1 intra-frequency handover, Tinterrupt2 equals to 2ms when the BWP of target cell is smaller than the BWP of source cell, and Tinterrupt2 is specified in Table 6.1.3.2.2-4 when the same BWP is used for target cell and source cell.

Table 6.1.3.2.2-4: Tinterrupt2 for FR1-to-FR1 intra-frequency DAPS HO

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length (ms) | Interruption length X (slotsNote 1) synchronous DAPS HO | Interruption length X (slotsNote 1), asynchronous DAPS HO |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2 | 0.25 | 4 | 5 |
| Note 1: The same SCS of source cell and target cell is assumed.Note 2: It is assumed that the BWP of target cell is the same as the BWP of source cell.Note 3: Void |

For FR1-to-FR1 intra-band inter-frequency handover, Tinterrupt2 is specified in Table 6.1.3.2.2-5.

**Table 6.1.3.2.2-5:** **Tinterrupt2 for FR1-to-FR1 intra-band inter-frequency DAPS HO**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **NR Slot length (ms)** | **Interruption length (slotsNote 1)** synchronous DAPS HO | Interruption length X (slotsNote 1), asynchronous DAPS HO |
| 0 | 1 | 1 + TSMTC\_duration  | 2+ TSMTC\_duration |
| 1 | 0.5 | 2 + TSMTC\_duration  | 3+ TSMTC\_duration |
| 2 | 0.25 | 4 + TSMTC\_duration  | 5+ TSMTC\_duration |
| Note 1: The same SCS of source cell and target cell is assumed.Note 2: TSMTC\_duration is the longest SMTC duration between source cell and target cell.Note 3: It is assumed that source cell and target cell are synchronous. |

For FR1-to-FR1 inter-band handover, Tinterrupt2 is specified in Table 6.1.3.2.2-6.

Table 6.1.3.2.2-6: Tinterrupt2 for FR1-to-FR1 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR slot length (ms) of target cell** | **Tinterrupt2 (slots)** |
| **Sync** | **Async** |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2  | 0.25 | 5 | 5 |

#### 6.1.3.3 NR FR2- NR FR1 DAPS Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR2 cell to NR FR1 cell.

An FR2-FR1 DAPS handover is synchronous if it meets the conditions in table 6.1.3.3-1, otherwise it is asynchronous

**Table 6.1.3.3-1, : Sync condition for FR2-FR1 DAPS handover**

|  |  |  |
| --- | --- | --- |
| Frequency Range of the pair of carriers | Maximum receive timing difference between source and taget cell (µs) for sync DAPS handover | Maximum transmit timing difference between source and taget cell (µs)Note 1 sync DAPS handover |
| Between FR1 and FR2 | 25  | 26.1  |
|  |

##### 6.1.3.3.1 DAPS handover delay

Procedure delays for the procedure that can command a DAPS handover are specified in TS 38.331 [2].

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover1 seconds from the end of the last TTI containing the RRC command when UE is configured with dual active protocol stack handover.

 Dhandover1 = TRRC\_procedure + Tsearch + TIU + Tprocessing + T∆ + Tmargin ms

Where:

TRRC\_procedure is the maximum RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tsearch, TIU, Tprocessing, T∆ and Tmargin are defined in clause 6.1.1.3.2.

After successful RACH procedure of the target cell, when the UE receives an RRC message implying source cell release command, the UE shall accomplish the release actions specified in TS 38.331 [2] within Dhandover2.

Dhandover2 = TRRC\_procedure+ Tinterrupt2

Where:

Dhandover2 is the RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tinterrupt2 is defined in clause 6.1.3.3.2.

##### 6.1.3.3.2 Interruption time

During Dhandover1, the UE is allowed an interruption of up to Tinterrupt1 on source cell.

For FR2-to-FR1 inter-band handover, Tinterrupt1 is specified in Table 6.1.3.3.2-1.

Table 6.1.3.3.2-1: Tinterrupt1 for FR2-to-FR1 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR slot length (ms) of source cell** | **Tinterrupt1 (slots)** |
| **Sync** | **Async** |
| 2  | 0.25 | 5 | 5 |
| 3 | 0.125 | 9 | 9 |

During Dhandover2, the UE is allowed an interruption of up to Tinterrupt2 on target cell.

For FR2-to-FR1 inter-band handover, Tinterrupt2 is specified in Table 6.1.3.3.2-2.

Table 6.1.3.3.2-2: Tinterrupt2 for FR2-to-FR1 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR slot length (ms) of target cell** | **Tinterrupt2 (slots)** |
| **Sync** | **Async** |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2  | 0.25 | 5 | 5 |

#### 6.1.3.4 NR FR1- NR FR2 DAPS Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR1 cell to NR FR2 cell.

An FR1-FR2 DAPS handover is synchronous if it meets the conditions in table 6.1.3.4-1, otherwise it is asynchronous

**Table 6.1.3.4-1, : Sync condition for FR1-FR2 DAPS handover**

|  |  |  |
| --- | --- | --- |
| Frequency Range of the pair of carriers | Maximum receive timing difference between source and taget cell (µs) for sync DAPS handover | Maximum transmit timing difference between source and taget cell (µs)Note 1 sync DAPS handover |
| Between FR1 and FR2 | 25  | 26.1  |
|  |

##### 6.1.3.4.1 DAPS handover delay

Procedure delays for the procedure that can command a DAPS handover are specified in TS 38.331 [2].

When the UE receives a RRC message implying handover, the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover1 seconds from the end of the last TTI containing the RRC command when UE is configured with dual active protocol stack handover.

 Dhandover1 = TRRC\_procedure + Tsearch + TIU + Tprocessing + T∆ + Tmargin ms

Where:

TRRC\_procedure is the maximum RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tsearch, TIU, Tprocessing, T∆ and Tmargin are defined in clause 6.1.1.5.2.

After successful RACH procedure of the target cell, when the UE receives an RRC message implying source cell release command, the UE shall accomplish the release actions specified in TS 38.331 [2] within Dhandover2.

Dhandover2 = TRRC\_procedure+ Tinterrupt2

Where:

Dhandover2 is the RRC procedure delay as specified in clause 12 in TS 38.331 [2].

Tinterrupt2 is defined in clause 6.1.3.4.2.

##### 6.1.3.4.2 Interruption time

During Dhandover1, the UE is allowed an interruption of up to Tinterrupt1 on source cell.

For FR1-to-FR2 inter-band handover, Tinterrupt1 is specified in Table 6.1.3.4.2-1.

Table 6.1.3.4.2-1: Tinterrupt1 for FR1-to-FR2 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR slot length (ms) of source cell** | **Tinterrupt1 (slots)** |
| **Sync** | **Async** |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2  | 0.25 | 5 | 5 |

During Dhandover2, the UE is allowed an interruption of up to Tinterrupt2 on target cell.

For FR1-to-FR2 inter-band handover, Tinterrupt2 is specified in Table 6.1.3.4.2-2.

Table 6.1.3.4.2-2: Tinterrupt2 for FR1-to-FR2 inter-band DAPS HO

|  |  |  |
| --- | --- | --- |
|  | **NR slot length (ms) of target cell** | **Tinterrupt2 (slots)** |
| **Sync** | **Async** |
| 2  | 0.25 | 5 | 5 |
| 3 | 0.125 | 9 | 9 |

<End of Change 1>