**3GPP TSG-RAN WG4 Meeting #94-e *R4-2002223***

**Online, 24th February – 6th March, 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **0511** | **rev** | **1** | **Current version:** | **16.2.0** |  |
|  |
| *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:***  | CR on DAPS handover requirements |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh-Core |  | ***Date:*** | 2020-03-03 |
|  |  |  |  |  |
| ***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:*** | A draft CR [R4-1915604] has been technically endorsed in RAN4 meeting #93. Based on the draft CR, the DAPS handover requirements has been defined for FR1-FR1, FR1-FR2 and FR2-FR1 seperately. |
|  |  |
| ***Summary of change:*** | 1. To define DAPS handover requirements
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|  |  |
| ***Consequences if not approved:*** | The DAPS handover requirements will be missing. |
|  |  |
| ***Clauses affected:*** | 6.1.3 |
|  |  |
|  | **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 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.

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.

##### 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 a [TBD] 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) |
|
| 0 | 1 | [1] |
| 1 | 0.5 | [2] |
| 2 | 0.25 | [TBD] |
| 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 no larger than the BWP of source cell.Note 3: The power imbalance between source cell and target cell shall be within [TBD] dB. |

*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.*

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)** |
| 0 | 1 | 1 + TSMTC\_duration  |
| 1 | 0.5 | 2 + TSMTC\_duration  |
| 2 | 0.25 | 4 + 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, 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) |
|
| 0 | 1 | [1] |
| 1 | 0.5 | [2] |
| 2 | 0.25 | [TBD] |
| 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: The power imbalance between source cell and target cell shall be within [TBD] dB. |

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)** |
| 0 | 1 | 1 + TSMTC\_duration  |
| 1 | 0.5 | 2 + TSMTC\_duration  |
| 2 | 0.25 | 4 + 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.

##### 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 a [TBD] 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.

##### 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 a [TBD] 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>