**3GPP TSG-RAN4 Meeting #111 *R4-2410385***

**Fukuoka, Japan, 20 – 24 May, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **-** | **rev** | **-** | **Current version:** | **18.5.0** |  |
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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 |  | Core Network |  |

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| ***Title:***  | draftCR on requirements for satellite switch with re-sync |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
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| ***Work item code:*** | NR\_NTN\_enh-Core |  | ***Date:*** | 2024-04-23 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***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 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | 1. Known cell is not applicable for soft satellite switch.
2. The wording for the definition of Tfirst\_SSB is unclear.
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| ***Summary of change:*** | 1. Remove known cell case for soft satellite switch.
2. Update the wording for the definition of Tfirst\_SSB
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| ***Consequences if not approved:*** | Requirements for satellite switch with re-sync are not fully correct. |
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| ***Clauses affected:*** | 6.1C.3.2.2, 6.1C.3.2.3 |
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|  | **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 ...  |
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| ***Other comments:*** | The draftCR is based on the baseline Big CR from moderator. |
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| ***This CR's revision history:*** |  |

<Start of Change 1>

##### 6.1C.3.2.2 Interruption time for hard satellite switch with re-sync

The interruption time is the time between *t-service* and the time the UE starts transmission of the new PRACH for RACH-based case or first UL transmission on PUSCH for RACH-less case if the UE only supports the feature for hard satellite switch and the *hardSatelliteSwitch-Resync-NTN-r18* is enabled.

When intra-frequency hard switch to NR SAN cell is commanded,

the interruption time shall be less than Tinterrupt

 Tinterrupt = Tsearch + TIU + Tprocessing + T∆ + Tmargin ms

Otherwise, no interruption time requirement is applied.

Where:

- Tsearch is the time required to search the target NR SAN cell assuming the target cell is not already known when UE starts synchronizing with target satellite. If the target cell Es/Iot ≥ -2 dB, then Tsearch = [Tfirst\_SSB] ms. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

- T∆ is same as the one defined in section 6.1C.2.2.2.1.

- Tprocessing is time for UE processing. Tprocessing can be up to 10 ms.

- Tmargin is time for SSB post-processing. Tmargin can be up to 2ms.

- TIU is the interruption uncertainty in acquiring the first UL transmission resource, which can be a configured grant based PUSCH, dynamic grant based PUSCH, SR on PUCCH, according to NW configuration and scheduling, or PRACH if TA timer is not running and there is no PUCCH SR

- Tfirst\_SSB is the time to the end of the first complete SSB burst of target satellite, the location of which is determined by the periodicity and location of SSB of the source satellite, the ssb-TimeOffset and the difference between propagation delay of the serving satellite and the target satellite counted from the [SSB-TimeOffset reference point as defined in 38.331 [2]] to UE.

UE is allowed to skip measurements for other cells and satellites than the target satellite and source satellite from *T-service* until the satellite switch completion.

6.1C.3.2.3 Satellite switch delay for soft satellite switch with re-sync

The Satellite switch delay is from *t-serviceStart* to the time instance for the first UL transmissionon of the new PRACH for RACH-based case if TA timer is not running and there is no PUCCH SR or configured grant based PUSCH, dynamic grant based PUSCH, SR on PUCCH for RACH-less based case, if the UE supports the feature for soft satellite switch and the *softSatelliteSwitch-Resync-NTN-r18* is enabled.

When intra-frequency soft switch to NR SAN cell is commanded,

the satellite switch time shall be less than Tsoft\_switch

 Tsoft\_switch = max(*t-service*-*t-seviceStart*, Tsearch + T∆ + Tmargin) + TIU + Tprocessing ms

Where:

- Tsearch is the time required to search the target NR SAN cell assuming the target cell is not already known when the handover command is received by the UE. If the target cell Es/Iot ≥ -2 dB, then Tsearch = Tfirst\_SSB ms. Regardless of whether DRX is in use by the UE, Tsearch shall still be based on non-DRX target cell search times.

- T∆ is same as the one defined in section 6.1C.2.2.2.1.

- Tprocessing is same as the one defined in section 6.1C.2.2.2.1.

- Tmargin is same as the one defined in section 6.1C.2.2.2.1.

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- TIU is the interruption uncertainty in acquiring the first UL transmission resource, which can be a configured grant based PUSCH, dynamic grant based PUSCH, SR on PUCCH, according to NW configuration and scheduling, or PRACH if TA timer is not running and there is no PUCCH SR

- Tfirst\_SSB is is the time to the end of the first complete SSB burst of target satellite, the location of which is determined by the periodicity and location of SSB of the source satellite, the ssb-TimeOffset and the difference between propagation delay of the serving satellite and the target satellite counted from [SSB-TimeOffset reference point as defined in 38.331 [2]] to UE.

During the time period from *t-seviceStart* to *t-service*, scheduling restriction as defined in clause 9.2C.5.3 is allowed, with the exception that the locations of SSB symbols of target satellite where scheduling restriction applies are determined by the periodicity and location of SSB of the source satellite, the ssb-TimeOffset and the difference between propagation delay of the serving satellite and the target satellite counted from the [SSB-TimeOffset reference point as defined in 38.331 [2]] to UE.

UE is allowed to skip measurements for other cells and satellites than the target satellite and source satellite from *t-seviceStart* to the satellite switch completion.

The requirement in this clause applies and UE is required to keep the connection (DL and UL) with the source NGSO satellite, under the following conditions:

* SSBs from the two satellites are spaced apart from each other at least by 1 OFDM symbol in the time domain at UE Rx side.

<End of Change 1>