3GPP RAN WG2 Meeting #126 R2-2406103

Fukuoka, Japan, May 20th – May 24th 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** | **1858** | **rev** | **2** | **Current version:** | **18.1.0** |  |
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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 | **X** | Core Network |  |

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| ***Title:***  | Corrections for Non-terrestrial Networks |
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| ***Source to WG:*** | InterDigital |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_NTN\_enh-Core |  | ***Date:*** | 2024-06-06 |
|  |  |  |  |  |
| ***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:*** | In current specification, upon indication of uplink synchronization loss from upper layers UE will flush all HARQ buffers regardless of the cause of synchronization loss.The following was agreed in RAN2#125bis:* *During satellite switch with re-synchronization, UE doesn’t flush the HARQ buffers.*
* *Use the TP in R2-2402774 as a baseline for updating MAC CR*

Modifications are needed to reflect the newly differentiated HARQ buffer handling during uplink synchronization loss vs. uplink synchronization loss due to satellite switch with re-synchronization.Furthermore, parameter names are updated based on latest version of the TS 38.331 specification, the FR1 restriction is removed from the timing advance MAC CE as per agreement in RAN2#125, and PDCCH monitoring is corrected for the NTN scenario to account for DRX after initial UL transmission in CG-based RACH-less HO. |
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| ***Summary of change:*** | Modifications are introduced to prevent flushing all HARQ buffers during uplink synchronization loss due to satellite switch with re-synchronization, parameter names are updated, the FR1 restriction is removed from the timing advance MAC CE, and PDCCH monitoring behaviour after initial UL transmission in CG-based RACH-less HO is corrected to follow DRX for the NTN scenario |
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| ***Consequences if not approved:*** | The UE will unnecessarily flush the HARQ buffers during a satellite switch with re-synchronization, which is contrary to agreed behaviour, there will be a mismatch of parameter names between TS 38.321 and TS 38.331, use of the Timing Advance MAC CE may be restricted in the FR2 scenario, and UE may incorrectly monitor PDCCH during CG-based RACH-less HO in the NTN scenario |
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| ***Clauses affected:*** | 5.2a, 5.33, 6.1.3.56, 6.2.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |

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| ***This CR's revision history:*** | R2-2405374 – initial version of CR including changes to clause 5.2aR2-2405754 – Updated CR version including changes to 5.2a and 6.2.1 |

<<<<<<<<<<<<<<<<<<<< Change begins >>>>>>>>>>>>>>>>>>>>

## 5.2a Maintenance of UL Synchronization

The MAC entity shall for each Serving Cell:

1> if an indication of uplink synchronization has been received from upper layers (see clauses 5.2.2.6 and 5.7.19 of TS 38.331 [5]):

2> if indication of uplink synchronization is received after indication of uplink synchronization loss due to satellite switch with re-synchronization (see clause 5.7.19 of TS 38.331 [5]):

3> set NTA value (as defined in TS 38.211 [8]) to zero for PTAG;

3> indicate to lower layers a Differential Koffset with value zero.

2> allow uplink transmission on the Serving Cell.

1> if an indication of uplink synchronization loss is received from upper layers (see clause 5.2.2.6 and 5.7.19 of TS 38.331 [5]):

2> if uplink synchronization loss is due to satellite switch with re-synchronization (see clause 5.7.19 of TS 38.331 [5]):

3> not perform any uplink transmission on the Serving Cell.

2> else:

3> flush all HARQ buffers;

3> not perform any uplink transmission on the Serving Cell.

NOTE: The MAC entity suspends all UL operations (e.g. stop RACH, SR, and UL HARQ operation) after receiving the indication of an uplink synchronization loss and resumes the operation when receiving an indication of uplink synchronization.

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## 5.33 RACH-less initial UL transmission

The initial uplink transmission of a RACH-less handover procedure can be performed either using a dynamic uplink grant or a configured uplink grant Type 1 preallocated by RRC, if configured.

When *rach-LessHO* is configured, the MAC entity shall:

1> if *cg-RACH-less-Configuration* is configured:

2> select a configured uplink grant for initial uplink transmission according to clause 5.8.2;

2> perform initial uplink transmission in the first available CG occasion for RACH-less handover according to clause 5.8.2;

2> monitor the PDCCH as specified in clause 5.7 and TS 38.213 [6].

1> else:

2> if *tci-StateID* is configured in *rach-lessHO*:

3> indicate to lower layers the TCI state information included in *tci-StateID*.

2> else if *dg-beam* is configured in *rach-lessHO*:

3> indicate to lower layers the SSB index included in *dg-beam*.

2> monitor the PDCCH as specified in TS 38.213 [6].

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#### 6.1.3.56 Timing Advance Report MAC CE

The Timing Advance Report MAC CE is identified by MAC subheader with LCID as specified in Table 6.2.1-2. It has a fixed size and consists of two octets defined as follows (Figure 6.1.3.56-1):

- R: Reserved bit, set to 0;

- Timing Advance: Except for ATG in FR1, the Timing Advance field indicates the least integer number of slots, using subcarrier spacing of 15 kHz, greater than or equal to the Timing Advance value (see TS 38.211 [8], clause 4.3.1).

For ATG in FR1, the Timing Advance field indicates the least integer number of symbols greater than or equal to the Timing Advance value (see TS 38.211 [8], clause 4.3.1). The symbol duration is based on the subcarriers spacing the UE is currently configured with. In this release of the specification, only 15 kHz and 30 kHz SCS are applicable and only values 1 … 56 are used.

The length of the field is 14 bits.



Figure 6.1.3.56-1: Timing Advance Report MAC CE

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Table 6.2.1-2c: Values of LCID for UL-SCH when the LX field is set to 1

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| Codepoint | Index | LCID values |
| 0 | (216 + 320) | CCCH of size 48 bits for an eRedCap UE  |
| 1 | (216 + 321) | CCCH of size 64 bits for an eRedCap UE |
| 2 | (216 + 322) | CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK, except for an (e)RedCap UE |
| 3 | (216 + 323) | CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK, except for an (e)RedCap UE |
| 4 | (216 + 324) | CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK of a RedCap UE |
| 5 | (216 + 325) | CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK of a RedCap UE |
| 6 | (216 + 326) | CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK of an eRedCap UE |
| 7 | (216 + 327) | CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK of an eRedCap UE |
| 8 to 63 | (216 + 328) to (216 + 383) | Reserved |
| NOTE 1: The MAC entity may use the code point corresponding to a given feature or feature combination in Table 6.2.1-2c only if network indicates support for the corresponding feature or feature combination.NOTE 2: CCCH of size 48 bits and CCCH of size 64 bits are referred to as CCCH and CCCH1, respectively, in TS 38.331 [5].NOTE 3: For UE capable of PUCCH repetition of Msg4 HARQ-ACK, the MAC entity uses the code points corresponding to PUCCH repetition of Msg4 HARQ-ACK if *numberOfMsg4HARQ-ACK-Repetitions* is configured, and if *rsrp-ThresholdMsg4HARQ-ACK* is configured, the RSRP of the downlink pathloss reference is less than *rsrp-ThresholdMsg4HARQ-ACK.* |

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