3GPP RAN WG2 Meeting #125 R2-2401590

Athens, Greece, February 26th – March 1st, 2024

Agenda Item: 7.7.4

Source: InterDigital (Rapporteur)

Title: Input on remaining proposals not related to RACH-less HO

Document for: Discussion, Decision

# Introduction

This document is intended address remaining issues not related to RACH-less HO proposed in the 7.7.4 agenda item, as per the following email discussion:

* [Post125][302][NR-NTN Enh] 38.321 CR (Interdigital)
* Scope: draft a MAC CR for other aspects than RACH-less HO, with meeting agreements/based on discussion on aspects marked for post meeting discussion
* Intended outcome: Agreed CR

This includes the following proposals (Note: other proposals submitted to 7.7.4 will be addressed in a long lost meeting discussion on RACH-less HO in [POST125][024]):

* [R2-2400810](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2400810.zip): Proposals 1-4
* [R2-2401281](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401281.zip): Proposal 2

Please note the following deadlines:

* Deadline for input to this discussion document: **March 6th 2024, 10:00 UTC**
* Deadline for agreed CR (in R2-2401590): **March 7th 2024, 21:00 UTC**

To support the questions within this document, corresponding text proposals have been provided in [R2-2400810](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2400810.zip) and [R2-2401281](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401281.zip). Depending on the feedback provided, some or all of these TPs will be used as baseline to incorporate input into the general corrections CR.

# Rel-18 NTN: Corrections to MAC

## Signalling completion of the satellite switch with re-sync

One potential issue for indicating completion of the satellite switch with resync is identified in [R2-2400810](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2400810.zip), described in the contribution as follows:

“*For both soft and hard switch procedure, if there is no immediately UL data transmission NW does not know when exactly UE has completed the switch, whether the switch is successful, or when to start to schedule UE from the new satellite. Although the aim is to perform a lower-layer switch without L3 involvement, NW should be aware of UE’s intra-cell inter-satellite mobility for NW control in RRC\_CONNECTED as there is a satellite switch. Therefore, UE should inform NW the completion of satellite switch with resync and unchanged PCI. Due to the nature of lower layer switch, it is appropriate to inform the completion in MAC procedure.”*

**Question 1a) Do you agree UE reports in MAC the completion of satellite switch with resync and unchanged PCI?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

[R2-2400810](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2400810.zip) further describes a possible solution for indicating completion of satellite switch with resync based on the existing MAC procedure:

“*One simple solution based on the existing MAC procedure is to make UE report TA to the new satellite as a signal of satellite switch completion. In the current TA report procedure, TAR is triggered due to upper layer indication or TA difference to the last report is larger than an offset, and scheduling request for TAR is configurable* [See Section 5.4.8 of TS 38.321]*. To signal the completion of satellite switch, TAR can be triggered towards the new satellite regardless of the TA difference to the last report or upper-layer configuration on TA report*.”

**Question 1b) Do you agree that if indication of uplink synchronization is received after indication of uplink synchronization loss due to satellite switch with re-synchronization, TA report is triggered (i.e., to indicate completion of re-sync procedure)?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

To support a TAR-based indication of satellite switch with re-sync completion from Q1a/Q1b, [R2-2400810](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2400810.zip) further notes that the following changes to SR may also be necessary/useful:

“*In Rel-17, only if configured, SR can be triggered when there is no UL grant to accommodate the TAR. If* [Question 1] *is agreeable, another issue is whether the triggered the TAR can directly triggered SR, regardless of timeAdvanceSR. We think the SR should be triggered for TAR to inform the completion of satellite switch, if TAR has not been sent after the switch.*“

**Question 1c) Do you agree that if indication of uplink synchronization is received after indication of uplink synchronization loss due to satellite switch with re-synchronization, and the UE has not reported Timing Advance value after satellite switch with re-synchronization, SR is triggered if there is no UL grant for the triggered TAR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## HARQ buffer handling during satellite switch with re-sync

In current specification, upon indication of UL synchronization loss from upper layers the UE will follow the same procedure (including flushing HARQ buffers) whether it was due to R17 sync loss or R18 satellite switch with re-sync. In [R2-2401281](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401281.zip), the following issue regarding flushing HARQ buffers is noted:

“*According to the current MAC specification, UE will flush all HARQ buffers* [during satellite switch with resync]*. In Rel-17, UE should flush all the HARQ buffers because the network does not know when the UE lost the uplink synchronization and there is a time gap between when the uplink synchronization is lost and when the uplink synchronization is resumed due to the acquisition of SIB19.*

*However, in unchanged PCI case, since the cell is not changed and the network knows when the UE loses the uplink synchronization and there is no time gap between when the uplink synchronization is lost and when the uplink synchronization is resumed, the network can still retransmit the UL/DL data for soft combination. If the UE flush all HARQ buffers, it will lead to decreasing of the transmission efficiency. Therefore, in this case, UE is not supposed to flush HARQ buffers.*”

**Question 2) Do you agree that upon indication of UL synchronization loss due to satellite switch with re-synchronization, UE doesn’t flush the HARQ buffers?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Conclusions

<To be generated based on company input>

# References

1. [R2-2400810](file:///C:\Users\wattsdy\OneDrive%20-%20InterDigital%20Communications,%20Inc\3GPP\RAN2\125%20Athens\Review\tdocs_125\R2-2400810.zip) – Corrections on NTN MAC issues Samsung
2. [R2-2401281](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125/Docs/R2-2401281.zip) – Discussion on MAC behaviours related to RACH-less HO and unchanged PCI Huawei, HiSilicon