**3GPP TSG-RAN WG2 Meeting #118 electronic *R2-22xxxxx***

**Online, May 9 – 20th, 2022**

**Agenda Item: 6.10.1.1**

**Source: Thales**

**Title: Summary of [AT118-e][112][NTN] Stage-2 CR (Thales)**

**Document for: Discussion and Decision**

# Introduction

This document aims to summarize the following discussion.

* [AT118-e][112][NTN] Stage-2 CR (Thales)

 Scope: continue the discussion on the Stage-2 CR, also considering Stage-2 text proposals in submitted contributions

 Intended outcome: Agreeable Stage-2 CR

 Deadline (for companies' feedback): Thursday 2022-05-19 12:00 UTC

 Deadline (for final CR in R2-2206202): Friday 2022-05-20 08:00 UTC

Status: On going

This offline discussion aims at consolidating a CR for TS 38.300 as outcome of RAN2#118-e.

* 1st round: deadline form responses: Friday 13th May 16:00 UTC
* 2nd round: deadline form responses: TBD

# 1st round discussion

## 2.1 Chapter 16.14.8 UE location aspects

*In R2-2204627, it is proposed to resolve the current EN as follow:*

~~Editor's note: Upon network request, after AS security in connected mode is established, a UE can report coarse UE location information (X most Significant Bits of its GNSS coordinates with accuracy around 2km level) to the NG-RAN without receiving any prior explicit user consent. if "user consent" is available at the UE, the UE will report the coarse UE location information. Else, the UE will respond "no coarse GNSS location available". Periodic location reporting can be configured by gNB to obtain UE location update of mobile UEs in RRC\_CONNECTED.~~ *~~This proposed text may be updated upon SA3 feedback~~*~~.~~

Upon network request, after AS security in connected mode is established, a UE can report coarse UE location information (the most Significant Bits of its GNSS coordinates corresponding to an accuracy around 2km level) to the NG-RAN without receiving any prior explicit user consent. if "user consent" is available at the UE, the UE will report the coarse UE location information. Else, the UE will respond "no coarse GNSS location available". Periodic location reporting can be configured by gNB to obtain UE location update of mobile UEs in RRC\_CONNECTED.

**Question 2.1: Do companies agree with the above proposed change or have further suggestions ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Thales | Agree |  |
| Qualcomm | Disagree | There is no need of coarse UE location. There is already mechanism for UE to report full GNSS coordinates to network after AS security is established. This is already supported by Rel-17 NTN UEs. That’s what matters from RAN2 perspective and RAN2 specification point of view.The user consent issue is not RAN2 issue. We should not be doing unnecessary changes until LS reply is received from SA3. |
| LG | Agree |  |
| Ericsson | Disagree | We agree with QC.We propose to remove the Editor’s note and 16.14.8. |
| Apple | Agree with some comments | We are mostly OK with the current text. Perhaps instead of saying user consent explicitly, we can reuse the text from the agreement in the last meeting and replace “If user consent is available at the UE…” with “If the UE does not or cannot provide coarse GNSS coordinates…”  |
|  |  |  |

**[Rapporteur summary]:**

2 companies agree while 2 companies disagree (of which 1 suggests to not be doing unnecessary changes until LS reply is received from SA3).

Apple suggests to revise the text as follow:

* Upon network request, after AS security in connected mode is established, a UE can report coarse UE location information (the most Significant Bits of its GNSS coordinates corresponding to an accuracy around 2km level) to the NG-RAN without receiving any prior explicit user consent. If the UE does not or cannot provide coarse GNSS coordinates the UE will respond "no coarse GNSS location available". Else, the UE will report the coarse UE location information. ~~if "user consent" is available at the UE, the UE will report the coarse UE location information. Else, the UE will respond "no coarse GNSS location available".~~ Periodic location reporting can be configured by gNB to obtain UE location update of mobile UEs in RRC\_CONNECTED.

Moderator suggests to wait LS reply is received.

QC may clarify what mechanism already exists (at AS level) for UE to report full GNSS coordinates to network after AS security is established.

## Satellite Access Node

*In [3] R2-2204628, it is proposed the following*

*Proposal 2.2.1: Add in clause “3.1 Abbreviations” the following definition:*

* SAN Satellite Access Node

**Question 2.2.1: Do companies agree with the above proposal or have further suggestions ?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Thales | Agree |  |
| Qualcomm | Agree |  |
| LG | Agree |  |
| Ericsson | Disagree | This is not needed in stage 2spec. SAN is not used in the stage 2, nor in RAN2 nor RAN3 specs.  |
| Apple | Disagree | Since the WI is closed, we are really reluctant to add a new definition. |
|  |  |  |

*Proposal 2.2.2: Add in clause “3.2 Definitions” the following definition:*

* **Satellite Access Node:** node providing NR user plane and control plane protocol terminations towards NTN capable UE, and connected via the NG interface to the 5GC. It encompass a transparent NTN payload on board a NTN platform, a gateway and gNB functions.

**Question 2.2.2: Do companies agree with the above proposal or have further suggestions ?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Thales | Agree |  |
| LG | Agree |  |
| Ericsson | Disagree | This is not needed in stage 2spec. SAN is not used in the stage 2, nor in RAN2 nor RAN3 specs. |
| Apple | Disagree | Similar view as Ericsson |
|  |  |  |

*Proposal 2.2.3 Replace the figure B.4-1: NTN based NG-RAN in clause “B.4 Example implementation of Non-Terrestrial Networks” by*



**Question 2.2.3: Do companies agree with the above proposal or have further suggestions ?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Thales | Agree |  |
| Qualcomm | Agree |  |
| LG | Agree |  |
| Ericsson | Strongly disagree | SAN is used by RAN4 for specific purposes, they can define it as they like.With this change, the gNB disappears completely from stage 2 NTN, which is of course totally \_not\_ acceptable. Further the Informative annex B.4 shall be aligned with the normative 16.14.This figure was very difficult to agree to in the first place. |
| Apple | Disagree | We don’t really understand how this clarifies stage-2 spec. |
|  |  |  |

**[Rapporteur summary]:**

3 companies agree while 2 other disagree on the basis that SAN is used by RAN4 for specific purposes, they can define it as they like.

This change is rejected.

## 2.3 Chapter 16.14.2 User Plane aspects

*In [4] R2-2205999, it is proposed to add Uplink time synchronization reference point definition as follow*

**Impact on timing aspects**:

To accommodate the long propagation delays, several NR timings involving DL-UL timing interaction are enhanced by the support of two scheduling offsets: $K\_{offset}$and $k\_{mac}$ as illustrated in Figure 16.14.2-x:

- $K\_{offset}$ is the RTT between the UE and the uplink time synchronization reference point (RP). It corresponds to the sum of the service link RTT and the common TA if indicated.

- $K\_{mac}$ is the RTT between the RP and the gNB.

DL and UL are frame aligned at the uplink time synchronization reference point with an offset given by $N\_{TA,offset}$.

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**Figure 16.14.2-x Timing relationship parameters**

The timing relationships that need to be modified for NTN using Koffset are summarized as follows:

*Proposal 2.3: Add Uplink time synchronization reference point in clause “16.14.2 User Plane aspects” the following definition:*

**Question 2.3: Do companies agree with the above proposal or have further suggestions ?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Thales | Disagree | Some companies (i.e. Oppo) had raised concerns about this figure in a previous email discussion [POST117-e][109][NTN] Stage 2 CR (Thales). |
| Ericsson | Disagree | The figure is incorrect. We see these problems with it:• Koffset shall be replaced by TTA • Commnn TA shall be Common TA • Move RP closer to GW and make clear that common TA is between NTN payload and RP• Remove Kmac• Remove “=Common TA+K\_mac”Like this figure being discussed for IoT NTN: Further, the text needs to be updated. We propose:DL and UL are frame aligned at the uplink time synchronization reference point (RP) with an offset given by $N\_{TA,offset}$.To accommodate the long propagation delays in NTN, several timing relationships are enhanced by Common TA and two scheduling offsets: $K\_{offset}$ and $K\_{mac}$ illustrated in Figure 23.21.2.1-1:- $Common TA$ is a configured offset that corresponds to half the the RTT between the RP and the NTN payload.- $K\_{offset}$ is a configured scheduling offset that approximately corresponds to the sum of the service link RTT and the common.- $K\_{mac}$ is a configured offset that approximately corresponds to the RTT between the RP and the eNB. |
| Sequans | Agree (with update discussed in Stage2 IOT NTN) | (Proponent) The point is to have the uplink time synchronization reference point (RP) clearly defined (as it is referred to in RRC spec). We used latest agreed IOT NTN stage 2 as a baseline but indeed it is not accurate.We agree with Ericsson corrections except for\* eNB which should be **gNB**.\* sum of the service link RTT and the common **TA**If there is no consensus on figure/details, we think the bare minimum would be to keep the sentence" DL and UL are frame aligned at the uplink time synchronization reference point (RP) with an offset given by $N\_{TA,offset}$."to understand what the uplink time synchronization reference point (RP) means. |
| Apple | Agree with Sequans update | It is good to align the figure with the one used for IoT NTN  |
| Qualcomm | Agree with Sequans update |  |

**[Rapporteur summary]:**

A fair majority of companies are interested to add these clarifications and align with stage 2 text of IoT-NTN. However the proposed illustration by Sequans should be simplified since it bears some errors. The intent would be to illustrate the Reference Point.

A possible next text proposal will be discussed in the 2nd round.

# 2nd round discussion

## 3.1 Timing aspects in Chapter 16.14.2 User Plane aspects

Based on 1st round discussion, the following TP is proposed for agreement:

**“Impact on timing aspects**:

DL and UL are frame aligned at the uplink time synchronization reference point (RP) with an offset given by $N\_{TA,offset}$.

To accommodate the long propagation delays, several NR timing relationships involving DL-UL timing interaction are enhanced by the support of a Common TA and two scheduling offsets: $K\_{offset}$and $k\_{mac}$. illustrated in Figure 16.14.2-x:

-    $Common TA$ is a configured offset that corresponds to the RTT between the Reference Point (RP) and the NTN payload.

-    $K\_{offset}$ is a configured scheduling offset that approximately corresponds to the sum of the service link RTT and the common TA.

-    $K\_{mac}$ is a configured offset that approximately corresponds to the RTT between the RP and the gNB.

The timing relationships that need to be modified for NTN using Koffset are summarized as follows:



**Figure 16.14.2-x Illustration of the Reference point**

The timing relationships that need to be modified for NTN using Koffset are summarized as follows:”

**Question 3.1: Do companies agree with the above text proposal (changes in red wrt existing TS 38.300 text)**

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| **Company** | **Agree/Disagree** | **Comments/Suggestions** |
| Intel | partially agree | In Figure 16.14.2-x, we suggest to also show $K\_{mac} between RP and gNB$.If it’s a common understanding, we suggest to add description of RP, i.e., RP can be considered as a gateway in figure B.4-1. |
| Apple | Agree but | We need to distinguish between configured offsets (like K\_offset) and physical quantities (like service link RTT) in the figure. Our suggestion is to just show the physical quantities since the text clarifies how these are related to configured offsets. |
| Ericsson | Agree | We think Kmac shall not be in the figure, as it is a RRN configured on a subframe level, thus the RTT between RP and gNB is most likely not equal to Kmac.We think the current figure does show the physical quantities, as the RP is exactly defined by the Common TA. For TTA you could argue that there is a small offsets between the sum of Service link RTT and TTA, but we think the figure is sufficient for stage 2. |
| Sequans | Agree |  |
| OPPO | Agree with comment | We also suggest to show K\_mac between RP and gNB in figure. And before using TTA in the figure, it would be better to add some wording to introduce the meaning of TTA firstly.$K\_{offset}$ is a configured scheduling offset that approximately corresponds to TTA, i.e. the sum of the service link RTT and the common TA. |
| Huawei, HiSilicon | Agree |  |

## 3.2 Clean-up of stage 3 details in the stage2 text

As requested by the TS 38.300 rapporteur, we are invited to remove Stage-3 level details.

**Therefore, all companies are invited to highlight (with comments in bubble) all stage 3 details in the “draft R2-2206202\_NR-NTN Stg2 CR\_v00.docx” (separate document).**

## 3.3 EN’s resolving in chapter 16.14 of TS 38.300

Based on RRC related email discussion outcomes

**Question 3.3.1: In Chapter 16.14.3.1 Mobility in RRC\_IDLE and RRC\_INACTIVE, how should the EN be resolved**

Editor's note: Non-NTN capable UE can be prevented from accessing an NTN cell in Rel-17. FFS how.

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| **Company** | **Comments/Suggestions** |
| Intel | According to the latest agreement made in offlne-111, i.e., “NTN UE follows the legacy cellBarred for TN access and consider the cell is not allowed for NTN access if cellBarredNTN is not present.”, Non-NTN capable UE can be prevented from accessing an NTN cell by legacy cellBarred indication. |
| Ericsson | Agree with intel suggestion to remove EN and add “Non-NTN capable UE can be prevented from accessing an NTN cell by legacy cellBarred indication”.  |
| OPPO | Agree to remove this EN |
| Huawei, HiSilicon | Agree to just remove this EN. But there is no clear agreement about which IE is used to bar non-NTN UE yet before adding anything.  |

**Question 3.3.2:** In Chapter 16.14.3.2.1 Handover, how should the EN be resolved ?

Editor's note: FFS details for NTN-TN hand-over impact on RRC procedure.

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| **Company** | **Comments/Suggestions** |
| Intel | Since it’s more of the stage-3 details, we can remove this EN directly. |
| Apple | Agree with Intel |
| Ericsson  | Agree w Intel. |
| OPPO | Agree with Intel. |
| Huawei, HiSilicon | Agree with Intel |

**Question 3.3.3:** In Chapter 16.14.3.2.2 Conditional Handover, , how should the EN be resolved ?

Editor's note: FFS details for NTN-TN CHO impact on RRC procedure.

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| **Company** | **Comments/Suggestions** |
| Intel | Since it’s more of the stage-3 details, we can remove this EN directly. |
| Apple | Agree with Intel |
| Ericsson | Agree w Intel. |
| OPPO | Agree with Intel. |
| Huawei, HiSilicon | Agree with Intel |

# 3rd round discussion

Based on SA3 response, UE location aspects will be further discussed in the 3rd round.

# 4. Summary and Proposals

# 5. References

1. 3GPP TS 38.300 “NR; NR and NG-RAN Overall description; Stage-2”, v17.0.0
2. R2-2204627 Support of UE location in Non-Terrestrial Networks THALES
3. R2-2204628 SAN for NTN based NG-RAN THALES
4. R2-2205999 Correction to NR NTN epoch time definition Sequans Communications

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