3GPP TSG-RAN WG2 Meeting #114 Electronic darft R2-2106535

Online Meeting, May 19 – 27 2021

**Agenda item: 8.11.6**

**Source: CATT**

**Title: [AT114-e][108][NTN] UE location aspects (CATT)**

**WID/SID: NR\_NTN\_solutions-Core**

**Document for: Discussion and Agreement**

# 1 Introduction

This document is to continue the email discussion:

* [AT114-e][108][NTN] UE location aspects (CATT)

Final scope: Continue the discussion on the expected granularity of the coarse UE location information and, depending on the outcome, on the need of an LS to other groups

Final intended outcome: Summary of the offline discussion with e.g.:

* + - List of proposals for agreement (if any)
    - List of proposals to be postponed to the next meeting

Final deadline (for companies' feedback): Wednesday 2021-05-26 1400 UTC

Final deadline (for rapporteur's summary in R2-2106535): Wednesday 2021-05-26 1600

Proposals marked "for agreement" in R2-2106535 not challenged until Thursday 2021-05-27 0600 will be declared as agreed via email by the session chair (for the rest the discussion will continue in the next meeting).

This email continues the discussion on the expected granularity of the coarse UE location information and, depending on the outcome, on the need of an LS to other groups.

# 2 Contact Information

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| Respondents to the email discussion are kindly asked to fill in the following table. Company | Contact: Name (E-mail) |
| Huawei, HiSilicon | Tangxun (tangxun@huawei.com) |
| Samsung | Nishith Tripathi (nishith.t@samsung.com) |
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# 3 Discussion

## 3.1 The expected granularity of the coarse UE location information

At the online meeting #114-e, companies agree that

Agreements via email - from offline 108:

1. RAN2 will work on a solution to ensure that the CGI constructed by NG-RAN corresponds to a fixed geographical area with a size comparable with a cell for TN including connected mode and initial access.

There are candidate solutions to support this requirement that the CGI constructed by NG-RAN corresponds to a fixed geographical area with a size comparable with a cell for TN are discussed as well during the online session.

**Proposal 2:** The possible mechanism can be options for further discussion, if there is the need to ensure (for both the earth-fixed and earth-moving cell cases) that the CGI constructed by NG-RAN corresponds to a fixed geographical area with a size comparable with a cell for TN:[17]

* + - **gNB finalizes CGI mapping by retrieving the UE’s coarse location info directly from UE**
    - **gNB reports Earth-Fixed Virtual Cells**
    - **Earth-Fixed Hierarchical Regions**
    - **gNB finalizes CGI mapping by using V2X-like zone ID provided by UE**
    - **UE report the CGI of detected TN cell as assistance information**

**Proposal 2a:** RAN2 to discuss if there is a need to send LS to SA3 to check what granularity of UE location (i.e., 500m, 1 km, 5 km, 10 km etc) can be exposed to gNB.[17]

Option 1 (gNB finalizes CGI mapping by retrieving the UE’s coarse location info directly from UE) got the highest support during the email discussion. Some company suggest that the UE’s coarse location info should be checked by SA3 because gNB is not permitted to get UE’s accurate geographical location info unless the security authority.

During the online session, some companies don’t think this is necessary to send this LS, because typical cell size as in rural area would be sufficient to meet the agreement: the CGI constructed by NG-RAN corresponds to a fixed geographical area with a size comparable with a cell for TN.

All our candidate solutions above are based on the UE’s coarse location information. So it is necessary to discuss the expected granularity of the coarse UE location information at first.

There are few options of expected granularity of the coarse UE location information:

* **Option 1:** typical TN cell size as in rural area, e.g. radius 2~5km
* **Option 2**: smaller granularity: radius 500m~1km
* **Option 3**: larger granularity: radius10km

**Question 1: What’s the expected granularity of the coarse UE location information to meet the agreement from offline 108? Please specify the reasons or comments if any.**

Note: Please focus on the expected granularity of the coarse UE location in order to support the CGI constructed by NG-RAN corresponds to a fixed geographical area with a size comparable with a cell for TN including connected mode and initial access.

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| Company | Option 1/2/3/others | Comments |
| Huawei, HiSilicon | 1 or 3 | We don’t think we need an exact number for the upper boundary, as TN cell size is a general principle. And in rural cases we have larger cell size than urban cases. |
| Samsung | Others | There is no need for an exact number, because the RF propagation environment and capacity requirements dictate a typical TN cell size (rural, suburban, urban). The operator can define its own layout of virtual/logical cells based on the environment and specific situations (e.g., finer granularity to detect country border crossing and regular size deep inside the country per topology). |
| ZTE | 1 or 3 | Agree with others that TN cell size is a general principle and no exact number is needed for now. |
| Apple | Option 1 | Option 3 is preferred less but is also ok. The SA2 LS response mentions TN granularity and it is ok to just stick with it. There is no need to go below that as there are no known issues. With proper planning, even country border issues can be solved using TN like granularity. |
| OPPO | 1 or 3 | Agree with Huawei and ZTE. |
| Xiaomi | 1 or 3 |  |
| Qualcomm | Option 1 + Option 3 | If smaller granularity than typical TN cell size is needed for UE location reporting (e.g. Option 2), it needs to be confirmed by SA3.  For example, cell spilling over international boundary may require UE to report smaller granularity of UE location. |
| Nokia | 1 and 3 | The question asking for exact number is slightly weird. We agree with preceding comments that it would differ for different environments. |
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**Question 2: Do you think there is a need of an LS to other groups (e.g. SA3/SA3LI) on the expected granularity of the coarse UE location information? Please specify the reasons or comments if any.**

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| Company | Yes/ No | Comments |
| Huawei, HiSilicon | No | TN cell size is already clear. We can consider radius 10km as an working assumption if needed. |
| Samsung | No | For Proposal 2, we have a minor edit. “The gNB finalizes CGI mapping by retrieving the UE’s coarse or GNSS-based location info directly from UE” [Note: The UE may determine the ID of the virtual/logical cell or the gNB determines the ID of the virtual/logical cell based on the Ue-reported GNSS-based location.] |
| ZTE | No | We discuss the candidate solutions in RAN2 first. If we conclude on a solution which requires a exact number of the granularity to design the ASN.1, a LS can be sent to other WGs for confirmation.  For now, no need to send LS. |
| Apple | No | It is already clear from the earlier reponse that TN like granularity is needed. We already have various proposals in RAN2 to obtain that level of granularity. So we can discuss in RAN2 and then go back to other groups as needed. Also the other groups can come back to us if they find TN like granularity is not sufficient. |
| OPPO | No |  |
| Xiaomi | No | According to pervious LS, we think the TN cell size requirement is confirmed by SA2. |
| Qualcomm | Yes only for option 2 | It would be good to confirm what would be the range for smallest granularity of UE location that can be exposed without privacy issue.  It is to note that this is not only about exposing location to gNB but also to other parties outside the network. |
| Nokia | No | We believe SA3 will provide us the answer as companies commented already for Q1. Thus, no point in sending the LS with such question. |
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**Summary:**

# 4 Conclusion

This section summarizes the discussion and reports the following proposals:

*Proposals for easy agreements:*

**Proposal 1:**

*Proposals for further discussion:*

**Proposal 2:**

# 5 References

1. R2-2104730 Reply to LS on UE location aspects in NTN (S2-2103550; contact: Thales) SA2 LS in Rel-17 5GSAT\_ARCH To:RAN2 Cc:SA3-LI, RAN3, SA3, CT1
2. R2-2102679\_ S3i210282 Reply LS on UE location aspects in NTN Tencastle
3. TS 38.305 User Equipment (UE) positioning in NG-RAN V16.3.0
4. TS 37.355 LTE Positioning Protocol (LPP) V16.4.0
5. S2-2101667 23.502 CR2482 (Rel-17, 'B'): Network selection for NR satellite access Nokia, Nokia Shanghai Bell, Qualcomm Incorporated
6. S2-2101666 23.501 CR2547 (Rel-17, 'B'): Network selection for NR satellite access Nokia, Nokia Shanghai Bell
7. TS 23.502 Procedures for the 5G System (5GS); Stage 2 V16.7.1
8. TS 23.273 5G System (5GS) Location Services (LCS); Stage 2 V16.3.0
9. R2-2104854 Discussion on reply LSs on UE location aspects in NTN CATT discussion Rel-17 NR\_NTN\_solutions-Core
10. R2-2105924 Understanding on the UE location aspects in NTN ZTE corporation, Sanechips discussion Rel-17 NR\_NTN\_solutions-Core
11. R2-2105435 UE positioning methods for NTN Qualcomm Incorporated discussion Rel-17 NR\_NTN\_solutions-Core
12. R2-2105558 Discussion on location service for NTN Xiaomi discussion
13. R2-2105935 NTN location reporting aspects Ericsson discussion NR\_NTN\_solutions-Core
14. R2-2106072 Area Management in an NTN Samsung Research America and Thales discussion
15. R2-2105610 Discussion on decoupled cell ID Huawei, HiSilicon discussion Rel-17 NR\_NTN\_solutions-Core
16. R2-2105117 Satellite cell ID mapping to earth fixed locations for efficient cell selection and cell reselection in NTN Apple discussion Rel-17 NR\_NTN\_solutions-Core
17. R2-2106527 Summary of [AT114-e][108][NTN] UE location aspects (CATT) CATT