**3GPP TSG-RAN WG3 #112-e R3-212792**

**17 – 28 May 2021**

Title: [DRAFT] Reply LS on UE location aspects in NTN

Response to: LS on UE location aspects in NTN (R3-211418/R2-2102055)

Work Item: NR\_NTN\_solutions-Core, 5GSAT\_ARCH

Source: Qualcomm Incorporated [to be RAN3]

To: RAN2, SA2, SA3-LI, SA3, CT1

Cc:

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Attachments: None

**1. Overall Description:**

RAN3 would like to thank RAN2 for the received LS on UE location aspects in NTN, and also SA2 and SA3-LI for their replies already received.

Regarding the questions posed in the LS:

* **Question: RAN2 would like to ask RAN3, SA3-LI and SA2 to confirm whether the current functionality identified above is sufficient for use in Non-Terrestrial Networks including initial registration procedure.**

**Answer from RAN3**:

RAN3 understands from the RAN2 response that only the serving NTN Uu cell ID (broadcast cell ID of the serving cell) and the broadcast TAC(s) would be available at initial access. The UE’s accessed NTN Uu cell would be reflected in information (Earth fixed CGI) provided in the User Location Information (ULI) in the INITIAL UE MESSAGE (and other uplink messages before AS security). As a consequence, RAN3 assumes that at initial access the gNB is typically not able to provide in the ULI a CGI (Earth fixed) with location granularity similar to the ULI provided in TN, and that this is acceptable at system level.

Regarding NNSF (and e.g. country selection), RAN3 understands that there may be cases where the NG-RAN is not able to select the correct CN at access without more precise location information, and this would need to be corrected later by the NG-RAN or the CN. Minimizing the number of actions (e.g. by providing some level of additional location information at access) seems useful, if at all possible, and RAN3 would like to ask RAN2 to check such feasibility.

After AS security is setup, RAN3 understands from the RAN2 LS that the NG-RAN will be able to obtain the UE’s location information (e.g. GNSS information or other methods), and thereby construct a CGI in ULI satisfying accuracy requirements comparable to those for TN.

**Question 1: RAN3 would like RAN2 to confirm whether the gNB will be able to acquire UE location information (e.g. based on GNSS or other methods) after AS security, and also to confirm whether it is possible to provide any level of UE location information (i.e. finer than NTN Uu cell accuracy) before AS security.**

In addition to the above, RAN3 would like to draw RAN2’s attention to the scenario in which a RRC\_CONNECTED UE moves across a country border but remains in the same NTN cell. To enable triggering of the N2-based Handover to change the AMF, RAN3 agreed that the gNB is expected to know when the UE moves across the country border (to some reasonable level of precision), in case the serving NTN cell serves more than one country. This is linked to a requirement in TS 23.502. RAN3 assumes that this scenario may be covered by functionality needed for CGI mapping.

**Question 2: RAN3 welcomes any feedback from RAN2 on whether the functionality for acquisition of UE location information may be used in the described case (i.e. to trigger inter-AMF handover when crossing country borders).**

RAN3 has also considered the related question of TAC reporting in the ULI, taking into account RAN2’s agreement to support broadcast of multiple TACs per PLMN in a cell [see LS in R2-2104377]. RAN3 sees at least two possible ways to set the TAC sent to the CN in ULI, i.e.:

1. The broadcast TAC in the serving cell
2. A location-based TAC (e.g. based on actual geographic location of the UE and CGI/TAC configuration)

The first option may not be possible with soft TAC update, but the second option may result in intermittent inconsistency between the TAC in ULI and the UE’s Registration Area. However RAN3 assumes that it is up to SA2/CT1 to decide whether one or both should be supported.

**Question 3: RAN3 requests SA2 and CT1 to provide any feedback on above options, and whether one or both should be supported.**

Additionally during initial access, it is possible that the geographical area mapped to the reported CGI in ULI may span over the area of multiple TACs, due to lack of sufficiently accurate location information for the UE. RAN3 would also like to confirm whether the 5GC will consider this as a valid ULI.

**Question 4: RAN3 requests SA2 to confirm that it is acceptable as a possible configuration that the CGI contained in the ULI may represent a geographical area spanning multiple TACs at initial access.**

**2. Actions:**

**To RAN WG2, SA WG2, SA WG3-LI, SA WG3 and CT WG1**

**ACTION:** RAN3 kindly asks the above groups to take the above information into account, and provide any feedback if needed, and RAN WG2, SA WG2 and CT WG1 to provide feedback on the questions raised in this LS.

**3. Date of Next RAN3 Meetings:**

RAN3#113-e 16-27 August 2021 Electronic meeting