

3GPP TSG-RAN # 102

Edinburgh UK, December 11-15

RP-233948

Agenda Item: 9.1.2.3

Title: Response to questions of **RP-233795** on "**What is Notification/Alert in NTN?**"

Source: Hughes, Thales, Terrestar, OQ Technology, TTP, Gatehouse, Lockheed Martin,
Airbus, Inmarsat, Viasat, OmniSpace, SES

Questions Raised by DT in RP-233795

- Why is this particular to NTN, as this has never been proposed to 3GPP for TN ?
- Which scenario do we need to address precisely? {(rural) out of coverage} ?
- What is the message type and payload size ?
 - Just a bit to indicate a missed paging ?
 - Vector information pointing user to better coverage ?
- Which entity decides on the sending of the message ?
- Which entity decides on the content of the message ?
- What is the expected UE behavior if “out of coverage of an NTN cell” ? (today UEs are in “any cell selection state” as defined in 38.304)
- The overall concept of NTN Notification / Alert is far from being clear in 3GPP ! We suggest an initial study defining requirements in SA1, studying Architecture impacts in SA2 and after that studying technical realization in RAN WGs (RAN1/2/3)

Question 1: Why is this particular to NTN, as this has never been proposed to 3GPP for TN ?

Most candidate NTN features such as the ongoing downlink/uplink enhancements for Rel-19 evolution in RAN can be applicable to TN and similarly for robust notification/alert. However Robust Notification Alert is more important and specific to NTN given that:

- ❖ Satellite communication systems (NTN) are designed to provide a limited link margin to prevent excessive space segment cost while maximizing throughput. In case of Mobile Terminated calls, there will be insufficient link margin when UE is placed in pockets, backpacks, in vehicles, boats, buildings etc., or when there is blockage. As a results, users may experience poor reception conditions and thus will miss calls and messages, which can be especially detrimental for public safety or emergency purpose paging messages.
- ❖ Currently, similar notification alert is already in use in mobile satellite communications, by Thuraya for their handheld UE – it is called “high-penetration alert” capability (<https://globalcomsatphone.com/wp-content/uploads/pdf/store/thuraya-xt-user-guide.pdf>)
- ❖ NTN connectivity will be used more for critical and reliable communication where TN is not available. In general, reachability to users in coverage with low SNR within NTN is critical for consumer acceptance. It is important to ensure that paging messages are successfully received by the destined users. All mechanisms that can enhance reachability are important. Therefore, enhancement to deliver paging calls and messages to achieve desired service availability is more needed in NTN.

Question 2: Which scenario do we need to address precisely? {(rural) out of coverage} ?

- ❖ Satellites are the last resort when out of TN coverage.
- ❖ Please refer to RP-230272 on “Paging Alert Channel for NR NTN Downlink Coverage Enhancement “ RAN#99

Question 3: What is the message type and payload size ?

- **Just a bit to indicate a missed paging ?**
 - ❖ Most companies think at this stage - it's too early to discuss content size
 - ❖ In principle, it is not enough to notify a specific UE using just ONE bit.
- **Vector information pointing user to better coverage ?**
 - ❖ User typically can get to some place that has LOS of the satellite (e.g. open areas or out of building or vehicles).
Note: Vector information pointing is out of scope at this stage

Question 4: Which entity decides on the sending of the message ?

- ❖ Robust Notification Alert is a 3 steps decision procedure – i) normal paging fails ii) switch to robust paging iii) user decide to move to better SNR area
- ❖ It is proposed/desirable that RAN initiate the robust notification alert but it is subject to study.
 - Note: Possibly by a time-out mechanism after several regular paging signal was unsuccessful to reach the user.

Question 5: Which entity decides on the content of the message ?

- ❖ The detailed design of the procedure will be defined during the normative work including the signaling details (i.e message content/size and the number of repetitions)

Question 6: What is the expected UE behavior if “out of coverage of an NTN cell” ? (today UEs are in “any cell selection state” as defined in 38.304)

- ❖ UE is assumed to continue camping on the same cell.
- ❖ At this stage, “Cell selection reselection” is out of scope of the robust notification alert.

The overall concept of NTN Notification / Alert is far from being clear in 3GPP ! We suggest an initial study defining requirements in SA1, studying Architecture impacts in SA2 and after that studying technical realization in RAN WGs (RAN1/2/3)

- ❖ Robust Notification Alert is a simple 3 steps procedure – i) NW normal paging fails (UE cannot detect SSB) ii) NW switch to robust paging iii) user decide to move to better SNR area
- ❖ The robust notification alert is downlink only -- it is up to RAN to initiate the notification procedure. The detailed design of the procedure will be defined during the normative work including the signaling details (i.e message content/size and the number of repetitions)
- ❖ The intent is to limit the impact to the architecture/procedure in the Core Network, however the timer and message feedback to CN related to paging procedure may be impacted.
- ❖ Note: This feature could be highly beneficial for NTN. But it could also be applicable to TN.

Thank you !