**3GPP TSG-RAN WG3 #111-e R3-210971**

**25 January – 4 February 2021**

**Online**

Agenda Item: 20.2.2

Source: Nokia (moderator)

Title: Summary of email Discussion on Registration Update and Paging Handling

Document for: Approval

# Introduction

**CB: # 26\_NTN\_RegUpdate\_Paging**

**QC**

**WA (pending further work on ULI aspects): the cells in the Recommended Cells for Paging IE correspond to earth fixed cells (as in ULI).**

**Assuming that cells in the Recommended Cells for Paging IE are based on the mapping required for ULI, further enhancement of paging optimization functionality is not required in rel-17.**

**CATT**

**similar paging optimization mechanism as LTE and NR Rël-15 could be reused, by using of the UE location info (GNSS info) as the assistance info**

**Nok**

**no need for RAN3 to discuss the enhancement to registration procedure, unless requested by SA2/CT1/RAN2**

**ZTE**

**If the AMF is able to get the UE location from LMF, UE location based paging could be considered for NTN**

**- Anything needed in addition to current registration and paging? If no consensus, leave status quo**

**- WA needed to align assumptions with ULI? (as per 0364)**

(Nok - moderator)

Summary of offline disc R3-210971

The discussion has two phases:

Phase 1: Enhancements for NTN Registration Update and Paging

Phase 2: TBD

The deadline for Phase 1 is Wednesday, Jan 27th, 24:00 UTC. This allows us to have some further discussion based on the 1st round feedback and discuss intermediate stage in Thursday online session. We might be able to already achieve some agreements at this stage.

The deadline for Phase 2 is the same as for all email discussions, i.e., Tuesday, Feb 2nd, 12:00 UTC.

# For the Chairman’s Notes

Propose the following:

**Agree following proposals:**

**Proposal 1: The existing Paging mechanism can be reused for NTN, and no need for enhancement on paging.**

…

**Continue discussion on following:**

# Discussion

## Paging

Contribution ([1][3]) propose to reuse current Paging (including Paging optimization), considering RAN3 already agreed the cell ID reported to CN corresponds to a fixed geographical area. For example, if the cells in the *Recommended Cells for Paging* IE correspond to fixed geographical area (as in ULI), the gNB can use this information to decide which radio cells shall page the UE.

Contribution ([2]) propose to consider the UE location information (UE GNSS info) to page the UE. gNB provide the UE location info to CN in Step 3 of below figure. When AMF send the PAGING to gNB, the PAGING message includes the UE location information (UE GNSS info) in Step 5. The gNB consider the received UE location information to determine the cells to page the UE.



**Figure 1. UE location based paging in NTN**

Contribution ([4]) also propose to use UE location information for Paging, but prefer AMF gets the UE location information from LMF by the location services, and the detailed procedure for getting the UE location information from LMF is FFS.

So two solutions are proposed:

* Solution 1: reuse current Paging mechanism without enhancement in Rel-17, based on the working assumption (pending further work on ULI aspects) that the cells in the *Recommended Cells for Paging* IE correspond to fixed geographical area (as in ULI).
* Solution 2: Enhance the current Paging mechanism by introducing the UE location information (UE GNSS info) as the assistance info in UE CONTEXT RELEASE COMPLETE message and PAGING message.
* Solution 2bis: AMF gets the UE location info via location service, and provides it in the PAGING message. FFS on how AMF know the UE location information.

**Q1: Please share your view on the two solutions above, e.g. the preferred solution.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Nokia | Solution 1Solution 2 is to page the UE in a specific geographical area, but this can already be supported by Solution 1 by using the cell ID corresponds to fixed geographical area. There is no clear benefit for Solution 2.  |
| CATT | As been discussed before, the legacy paging optimization mechanism applies for GEO and LEO with earth fixed cell scenario. The key issue is it’s not applied for earth moving cell scenario.Solution 1 leverages the existing paging enhancement mechanism, by using the geographical fixed CGI (pending to the discussion of fixed CGI) in the recommended cell list. Solution 1 requires the paged gNB to map the geographical fixed CGI to the real coverage of it’s serving cells to decide which cell(s) to page the UE.Solution 2bis, whether and how AMF could get the UE location info for a IDLE UE is FFS, we understand AMF could not get the UE location info for a UE in RRC Idle mode.Solution 2, the legacy paging optimization mechanism is also reused, with little enhancement to include the UE location info in the assistance info.If NG-RAN could get the accurate UE location info, it could provide it as the assistance info to AMF, AMF just store it and include it in the PAGING message to the recommended gNBs. Then the gNB could decide which cell(s) to page the UE according to the accurate UE location info. Compared to the solution 1, gNB may be able to further reduce the scope of paging by using the UE location info. We see the option 2 has limited spec impact, and could have no impact to the 5GC. Above all, we prefer to go for option 2. |
| Huawei | Unless further clarification, we do not try to solve an issue here, nothing is broken, the solution 1 work anyway. Based on CB25, the AMF should indicate fixed geo. Cell ID to gNB, it is enough for paging, extra information makes complex the gNB task.Whether we need to take benefit of the UE-GNSS capable to improve the Paging should be evaluate when we will know when and how the UE-GNSS capable provides location information to the gNB.  |
| ZTE | For solution 2, as discussed in last meeting, the gNB gets the UE location information directly could be a kind of invasion of user’s privacy. Therefore, we proposed the alternative way (solution 2bis) to get the UE location information by the AMF via LMF/location service. However, the problem of solution 2bis mentioned by CATT should be further considered. If the problem really exists, we think the enhancement may not needed. |
| Intel | Solution 1 appears to be sufficient |
| Qualcomm | At this point we also think solution 1 is fine for rel17. We don’t see how 2bis works and for 2, we think the gain with respect to solution 1 does not seem enough to justify as discussed in [1] (basically if the Uu cells are earth fixed, there is no problem, and if they are moving, the system can leverage the existing fixed cell grid which has to be configured anyway, with small penalty in terms of paging load vs knowing the exact location). |
| Apple | Solution 1 would be enough . There is no justification currently or use case on why solution 2 or 2-bis are needed.  |
|  |  |
|  |  |
| EricssonSolution 1Rakuten MobileSolution 1Thales | Solution 1 should be sufficient for the time being. The network can use the knowledge of the last known UE location (obtained during last connection) to define in which geographical area to page the UE and then progressively extend the paging area. |

**Summary:**

* 8 out of 10 companies commented the existing Paging mechanism can be reused for NTN, and no need for enhancement on paging.

**Potential Proposal:**

**Proposal 1: The existing Paging mechanism can be reused for NTN, and no need for enhancement on paging.**

## Other issues/enhancements

**Q2: Please list other issues/enhancements that should be considered? Please include assessment of expected benefit, impact on specification, implementation, other WGs.**

# Part II…[if needed]

If needed

# References

1. R3-210364, Paging optimization in NTN (Qualcomm Incorporated)
2. R3-210471, (TP for BL CR for TS 38.300) Support of location based paging for NTN (CATT)
3. R3-210493, Discussion on Registration Update and Page Handling (Nokia, Nokia Shanghai Bell)
4. R3-210805, Further Discussion on Paging Enhancement for NTN (ZTE)