3GPP TSG-RAN WG2 Meeting #114-e R2-21xxxxx

Online, 19 – 27th of May 2021

**Agenda item: 8.10.3.2**

**Source: ZTE corporation, Sanechips**

**Title: Report from [Post113bis-e] [101] [NTN] cell reselection (ZTE)**

**WID/SID: NR\_NTN\_solutions-Core - Release 17**

**Document for: Discussion and Decision**

# 1 Brief scope of the paper

This document aims at collecting companies’ views regarding the Rel-17 NTN cell re-selection:

* [Post113bis-e] [101] [NTN] cell reselection (ZTE)

Scope: Discuss cell selection/reselection for NR NTN, also based on contributions for AI 8.10.3.2 at RAN2#113bis-e

Intended outcome: email discussion summary

Deadline: Long (May 10th)

The following sections elaborate on the topics listed in the scope above and the rapporteur would like to highlight:

* Only topics raised by at least two companies are covered in this email discussion considering the limited time before next meeting.
* Proposals on ephemeris format and provisioning are not covered in this email as there is not enough progress in RAN1 which would be helpful to RAN2 discussion.

# 2 Discussion

## 2.1 Timing info assisted cell reselection

The following agreements have been made in RAN2#113e with several FFS left:

*The information on when a cell is going to stop serving the area and/or the timing information (e.g. timer or absolute time) about new upcoming cell is supported at least in Earth-fixed NTN scenario. FFS if both types of information are needed. FFS if this is known from system information and/or the ephemeris.*

In various TDocs submitted to RAN2#113bis-e [1][2][4][6][7] [10] [11] [14] [16], understanding on the need and the usage of the information on when a cell is going to stop serving the area and/or the timing information has been shared to address the FFS left above.

### Need of the timing information

Firstly, companies are asked to express their views on what kind of timing information is needed to assist cell reselection in NTN:

1. The timing information on when a cell is going to stop serving the area (including serving cell and neighbor cells)
2. The timing information about new upcoming cell (i.e. the time when a new upcoming cell starts to be available)
3. Both a) and b)

Also the following options have been proposed on the applicable scenarios of the timing info to assist cell reselection:

a) Earth fixed scenario only

b) Both earth fixed and moving scenarios

Companies are encouraged to choose the preferable timing information, the applicable scenarios for the chosen one and justify their selection.

**Question 1: What kind of timing information is needed to assist cell reselection in NTN, a), b) or c)? And what is the applicable scenario for the chosen timing info, earth fixed only or both earth fixed and earth moving?**

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| **Company** | **Option** | **Applicable scenarios** | **Comments** |
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### Usage of the timing information

On the usage of the timing information when a cell is going to stop serving the area at UE side, the following options have been proposed:

1. Decide when to perform measurement on neighbor cells [1] [4] [6] [11] [16]
2. Decide the target cell for reselection [6] [16]
3. Decide when to perform cell reselection [10] [11]
4. Other

Companies are encouraged to choose one or more from the options above and justify their selection.

**Question 2: If companies understand that the timing info when a cell is going to stop serving the area is need (i.e. answer a/c to question 1), among all the options listed above, what is the preference on the usage of such info at UE side during cell reselection?**

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| **Company** | **Option** | **Comments**  (Companies answering d) are invited to provide more details in this column) |
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On the usage of the timing information about new upcoming cell (i.e. the time when a new upcoming cell starts to be available), the following options have been proposed:

a) Decide when to perform measurement on neighbor cells [6]

b) Decide the target cell for reselection [6] [14]

c) Other

Companies are encouraged to choose one or more from the options above and justify their selection.

**Question 3: If companies understand that the timing information about new upcoming cell (i.e. the time when a new upcoming cell starts to be available is need (i.e. answer b/c to question 1), among all the options listed above, what is the preference on the usage of such info at UE side during cell reselection?**

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| **Company** | **Option** | **Comments**  (Companies answering c) are invited to provide more details in this column) |
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### Provisioning the timing information

The following options have been proposed on how to provide the timing information to UE:

1. System information [7]
   * 1. Only for earth fixed scenario [6] [16]
2. RRCRelease message [6]

c) Other

**Question 4: How the timing information is provided to UE?**

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| **Company** | **Option** | **Comments**  (Companies answering c) are invited to provide more details in this column) |
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## 2.2 Ephemeris/Location assisted cell reselection

The following agreements have been made in RAN2#111e with several FFS left for ephemeris based cell reselection:

*Satellite/HAPS ephemeris based cell selection and reselection should be defined for NTN (FFS what the term satellite/HAPS ephemeris actually means). FFS when this ephemeris based cell selection / reselection can be used. FFS whether UE location (and/or other information) based cell selection and reselection should be introduced for NTN.*

In various TDocs submitted to RAN2#113bis-e [1] [4] [6] [11] [16], UE location assisted cell reselection have been proposed. Companies are invited to share their preference on whether to support location assisted cell reselection in NTN.

**Question 5: Do companies support to introduce location assisted cell reselection in NTN?**

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| **Company** | **Yes/No** | **Comments** |
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Similar to the discussion happened for location based CHO, we need to understand what the term “location” actually implies and what kind of quantity needs to be considered during cell reselection. It can be at least one of the following:

1. Distance between the UE and the satellite [11] [16]
2. Distance between the UE and the cell centre (of either the serving cell or the neighbor cell) [1] [11] [14] [16]
3. other

Companies are encouraged to choose one or more from the options above and justify their selection.

**Question 6: If companies support to introduce location assisted cell reselection in NTN (i.e. answer “Yes” to Question 5), what kind of quantity needs to be considered, a), b) or c)?**

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| **Company** | **Option** | **Comments**  (Companies answering c) are invited to provide more details in this column) |
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Further details on how to use the location information to assist cell reselection have also been shared by the proponents and we have the following options to consider:

a) UE use the location information to decide when to perform measurement on neighbor cells [4] [11]

b) UE use the location information to decide the target for cell reselection

* + 1. Among the N best cells ranked based on R-criterion, UE re-select to the cell with shortest distance [1] [11]
    2. Only cells with distance shorter than a threshold will be considered as candidates for re-selection. [11]
    3. Cells with shorter distance are biased in cell ranking based on R criterion. [11] [14]

c)other

Companies are encouraged to choose one or more from the options above and justify their selection.

**Question 7: On usage of the location information to assist cell reselection, which option(s) are preferred, a), b) or c)?**

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| **Company** | **Option** | **Comments**  (Companies answering c) are invited to provide more details in this column) |
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## 2.3 Network type and/or scenario indication for neighbor cells

The following agreement has been made on the network type indication at RAN2#113e:

*RAN2 thinks that a UE needs to know whether the network is a TN or NTN no later than SIB1 reception*

In various TDocs submitted to RAN2#113bis-e [1] [5] [10], there has been interest in an explicit indication for network type (e.g. TN vs NTN) and /or network scenario (e.g. earth moving vs earth fixed, GEO/ LEO /HAPS).

Since this email discussion focus on cell reselection in NTN, companies are invited to show their preference on whether there is need to indicate network type and/or scenarios explicitly for neighbor cells to assist cell reselection.

**Question 8: Is there a need to introduce explicit network type (e.g. NTN vs TN) indication for neighbor cells to assist cell reselection?**

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| **Company** | **Yes/No** | **Comments** |
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**Question 9: Is there a need to introduce explicit network scenario (e.g. earth moving vs earth fixed, GEO/ LEO /HAPS) indication for neighbor cells to assist cell reselection?**

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| **Company** | **Yes/No** | **Comments** |
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## 2.4 Other issues

If companies understand there are also other issues need to be discussed but have not covered by the above questions, please list them below. Note that the issues listed in this chapter might not necessarily result in proposals to be discussed as part of the report of this email discussion.

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| **Company** | **Issues or comments** |
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# 3 Conclusions

Based on the views expressed in the previous sections, we propose the following:

*To be added*

# 4 List of referenced documents

[1] R2-2102741 Discussion on idle/inactive mode procedures in NTN OPPO discussion Rel-17 NR\_NTN\_solutions-Core

[2] R2-2102825 On Cell-Reselection in NR-NTN MediaTek Inc. discussion R2-2100260

[3] R2-2102826 On Soft-switch based Tracking Area Updates in NR-NTN MediaTek Inc. discussion

[4] R2-2102953 Leftover issues on IDLE and inactive mode CATT discussion

[5] R2-2103077 Cell Reselection, System Information, and Paging Enhancements for an NTN Samsung Research America discussion

[6] R2-2103135 Cell selection and reselection enhancements for NTN Xiaomi discussion

[7] R2-2103245 Issues on cell selection and reselection in NTN Spreadtrum Communications discussion Rel-17 NR\_NTN\_solutions-Core

[8] R2-2103408 Ephemeris provision and network type indication for NTN Lenovo, Motorola Mobility discussion Rel-17

[9] R2-2103461 PLMN separation for NTN & TN ASUSTeK discussion Rel-17 NR\_NTN\_solutions-Core R2-2101755

[10] R2-2103597 Idle mode enhancement in NTN Sony Europe B.V. discussion Rel-17 NR\_NTN\_solutions-Core

[11] R2-2103631 WF for cell reselection in NTN Huawei, HiSilicon, BT Plc, CAICT, China Telecom discussion Rel-17 NR\_NTN\_solutions-Core

[12] R2-2103837 Cell Selection And Cell Reselection Solutions for Non Terrestrial Networks Apple, British Telecom discussion NR\_NTN\_solutions-Core

[13] R2-2103838 Considerations on ephemeris database and parameter distribution to UEs in Non Terrestrial Networks Apple discussion NR\_NTN\_solutions-Core

[14] R2-2103965 Cell reselection in NTN InterDigital discussion Rel-17 NR\_NTN\_solutions-Core

[15] R2-2103966 Ephemeris in NTN InterDigital discussion Rel-17 NR\_NTN\_solutions-Core

[16] R2-2104066 Further consideration on cell selection and reselection in NTN ZTE corporation, Sanechips discussion Rel-17 NR\_NTN\_solutions-Core

[17] R2-2104147 NTN indication and idle mode enhancements Convida Wireless discussion

[18] R2-2104149 NTN Cell (re)selection and idle mode enhancements Convida Wireless discussion

[19] R2-2104210 Understanding on the newly introduced Access Technology identifier for NTN ZTE corporation, Sanechips discussion Rel-17 NR\_NTN\_solutions-Core

# Contact information

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