3GPP RAN WG2 Meeting #130 R2-25xxxxx

Malta, Malta May 19th – 23rd, 2025

Agenda Item: 8.9.1

Source: Huawei, HiSilicon

Title: RRC open issues for IoT NTN

Document for: Discussion, Decision

# Introduction

The following document includes a list of open issues according to the following email discussion:

* [Post129bis][310][R19 IoT NTN] RRC CR (Huawei)

Scope: discuss the running RRC CR and create list of open issues

Intended outcome: Endorsed CR and list of open issues

Deadline: long

**NOTE: This open issue list document mainly collects the critical issues that need to be solved in order to finalize the RRC running CR and the issues related to enhancements which are proposed by multiple companies. For other issues, it can be discussed based on individual company’s contribution. Meanwhile, in order to make the way forward easier, the proposed solutions are kept general and the details can be further discussed once there is consensus or majority support for one direction.**

Companies are invited to provide feedback on open issue list by: May 6th 10:00 UTC

# Remaining open issues for RRC

### Store and Forward Satellite operation

**Open issue RRC-1:****How to indicate the time information for the transition from normal mode to S&F mode.**

**Issue description:**

During the RAN2#129bis, the following agreements regarding the transition from normal mode to S&F mode was made:

* **We introduce an indication in system information for the normal mode to S&F mode transition, at least for NAS use. FFS on the details (e.g. whether we can link this to other existing information). The information on transition time for the normal mode to S&F mode transition is sent from AS to NAS, and we inform CT1 about this in the LS**

Since the details are still FFS, the time information for the transition from normal mode to S&F mode hasn’t been captured in the RRC running CR. Based on the contributions, the following options are proposed on how the time information is indicated:

**Option 1:** It is up to NW implementation to set the legacy t-Service as the transition time from normal mode to S&F mode.

**Option 2:** Introduce a new indication for the transition time from normal mode to S&F mode for the S&F UEs.

**Option 3:** Using the agreed time information in SIB31 for both directions of transition. UE determines which direction it is based on whether the S&F indication is present.

**Q1: Companies are invited to provide feedback regarding the above open issue and possible proposed resolution:**

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| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| Huawei, HiSilicon | Option 1 | 1. Option 1 gives the flexibility to allow legacy UEs to start measuring the neighbour cells before switching to the S&F mode **in case the NW thinks that legacy UE is not suitable to be served by S&F mode**, e.g., due to delay sensitive services or possible rejections by the CN when initiating NAS procedure in S&F mode. NW can also choose to set the t-Service to the stop serving time of S&F mode in case it wants serve the legacy UEs in S&F mode. However, in Option 2 and Option 3, since legacy UEs cannot recognize the newly introduced indication in Rel-19, the UEs cannot start measurement of the neighbour timely when the serving cell switches to the S&F mode. Requiring the NW to release all UEs to realize this will lead to signaling overhead. 2. Reuse of t-Service to indicate the stop of normal mode will not cause any issue as in legacy there is only normal mode and the stop of normal mode equals to the stop of serve time. Note that in legacy, for earth moving cell case, t-Service refers exactly to the time when feederlink becomes unavailable, which is the switching time from normal to S&F mode in Rel-19. So this is aligned with legacy behavior. 3. For the stop time of S&F mode, we can refer to a new indication or reuse the time indication in SIB31 agreed by RAN2. |
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**RRC-2: Whether to introduce additional assistance information for the neighbour cells, e.g., the operation mode and/or mode transmission time.**

**Issue description:**

Some companies believe it is beneficial to let the UE know about the operation mode/ mode transmission time of the upcoming neighbour cells.

**Q2: Companies are invited to provide feedback regarding the above open issue:**

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| --- | --- | --- | --- |
| **Company** | **operation mode** | **mode transmission time** | **Other comments** |
| Huawei, HiSilicon | Yes | No | **Operation mode**:  One possible benefit is that if one satellite performs S&F operation but is not in the provided NAS list, the UE doesn’t have to try to access this satellite since there is no UE context on this satellite. Otherwise, it will be provided in the NAS list. UE power can be saved in this case.  **Mode transmission time:**  UE only needs to know the operation mode after the satellites covers this area and once the satellites becomes the serving satellite, UE will know the mode transmission time from system information. |
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**RRC-3: Whether to prioritize frequency(ies)/cell(s) corresponding to the satellite(s) indicated in the MME-configured satellite list during cell reselection procedure.**

**Issue description:**

During the RAN2#129bis, the above issue was discussed but no consensus was reached:

* **Come back in the next meeting (the proponents could show the possible spec impact if we decide to go in this direction)**

Since this is an FFS issue and some proposed solutions may have impact to RRC spec, it is beneficial to collect more views from companies.

It was proposed that UE may prioritize frequency(ies)/cell(s) corresponding to the satellite(s) indicated in the MME-configured satellite list and in case of that, a frequency list and/or cell list associated with each satellite ID (indicated by the MME) are provided to the UE in system information.

**Q3: Companies are invited to provide feedback on whether a frequency list and/or cell list associated with each satellite ID (indicated by the MME) are provided to the UE in system information:**

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| --- | --- | --- |
| **Company** | **Yes/No?** | **Other comments** |
| Huawei, HiSilicon | See comments | This may depend on the following two aspects:   1. Whether there is a good way for the UE to prioritize the frequency related to the satellite indicated by the MME without affecting the reselection to the satellite with normal operation and the reselection to the TN cell. 2. Whether the legacy linkage between satellite ID and frequency is sufficient |
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**RRC-4: Whether/how to reduce the paging monitoring for an S&F UE to save power consumption.**

**Issue description:**

Some companies believe it is beneficial to let the UE know whether there will be any paging expected from one satellite.

**Q4: Companies are invited to provide feedback on whether to reduce the paging monitoring for an S&F UE to save power consumption:**

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| **Company** | **Yes/No** | **Other comments** |
| Huawei, HiSilicon | Yes | If there is no paging expected, UE can skip paging monitoring the whole time during which the satellite covers this area and UE will only access in case there is uplink service. This would be very beneficial for the power saving of the IoT UEs. |
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### UL capacity enhancement

For this sub-topic, the main impact to RRC is the resource configuration signalling design which needs to wait for RAN1 reply. Also, to avoid the duplicated discussion with MAC open issue list, no open issue is listed here for now.

### PWS support for NB-IoT

**RRC-5: Whether to allow skipping reading SIB1-NB to shorten the latency of PWS acquisition.**

**Issue description:**

During RAN2#128, the following FFS was left:

* **We will extend the existing ETWS/CMAS notification RRC procedures for eMTC to NB-IoT. FFS if SIB1-NB acquisition is needed**

Some companies believe it is beneficial to allow the UE to skipping reading SIB1-NB to shorten the latency of PWS acquisition.

**Q5: Companies are invited to provide feedback on whether to allow the UE to skipping reading SIB1-NB to shorten the latency of PWS acquisition:**

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| **Company** | **Yes/No** | **Other comments** |
| Huawei, HiSilicon | Yes | In order to satisfy the latency requirement of PWS delivery, allowing the UE to skip reading SIB1-NB is beneficial in case the UE has stored the scheduling information of PWS SIBs. |
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**RRC-6: Whether to allow UE to receive and assemble PWS segments from different cells during mobility.**

**Issue description:**

During re-selection from the source cell to the target cell, UE may already have received some of the PWS segments from the source cell. Then the issue is after re-selection, whether UE can keep the received PWS segments from the source cell and assemble them with the PWS segments received from the target cell, or the UE should always discard the old segments from the source cell.

**Q6: Companies are invited to provide feedback on whether to allow UE to receive and assemble PWS segments from different cells during mobility:**

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| **Company** | **Yes/No** | **Other comments** |
| Huawei, HiSilicon | Yes | This is beneficial to avoid extra latency of receiving PWS messages during mobility. Otherwise, since UE may miss some segments from the target cell after the re-selection, it will need to wait for the next SI period to be able to assemble all the segments. So, it is better to allow UE to keep the segments from the source cell if the source cell and the target cell belongs to the same PWS area. |
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# Other identified open issues

Companies are invited to describe any other identified open issues not currently included within this document (**only essential issues or issues proposed by multiple companies will be listed in the conclusion part**)

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| **Company** | **Other identified open issues? (please describe)** |
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# Conclusions

*<To be filled after companies have provided feedback to the proposed resolutions for simple issues only. Please include the number of supporting companies (e.g., 18/20]) in brackets within the proposal>*

The following proposals have been provided based on feedback to the above document:

[Proposals for easy agreement]

*<List all proposals with consensus and/or may be easily agreed based on Rapporteur’s opinion>*

[Proposals for discussion]

*<List all proposals which will likely require further online/offline discussion to resolve>*

# References

1. R2-2502983 Report from Break-out session on NR-NTN and IoT-NTN SessionChair (ZTE)