**3GPP TSG RAN WG2 #124 *R2-23xxxxx***

**Chicago, USA, 13 – 17 Nov, 2023**

**Source:** Nokia

**Title:** Report of  [Post123bis][304][IoT-NTN Enh] 36.304 running CR (Nokia)

**Agenda Item:** 7.6.1

**Document for:** Discussion and decision

# Introduction

This document captures the outcome of the following email discussion:

**[Post123bis][304][IoT-NTN Enh] 36.304 running CR (Nokia).**

This e-mail discussion aims to endorse the running CR and any pending issues and related proposals for agreement in RAN2-124.

For the running CR, companies can provide the comments directly to the initial version uploaded in the folder. The remaining open issues are discussed in this document for company views and conclusions.

1. Contact Information

To make it easier to find the contact delegate for potential follow-up questions, delegates are encouraged to provide their contact information in the following table:

|  |  |  |
| --- | --- | --- |
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| Samsung | Jonas Sedin | j.sedin@samsung.com |
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# Editor Notes and FFS

**RSS Feature applicability for IoT-NTN cell reselection measurement triggering**

Based on the comments received in earlier version of running CR following EN is maintained in the running CR until now. In Rapporteur understanding, RSS based measurements is UE capability and optional feature for terrestrial IoT. This feature is also applicable for IoT-NTN with difference that UE can indicate the capability for the same for IoT-NTN specific capability. IoT-NTN network can also enable in its network if NW wants to reduce the time taken for network synchronisation using RSS. There was no explicit agreement about disabling or non applicability of this feature for IoT-NTN.

If NW only transmit RSS and UE is capable of RSS measurements the serving cell condition check will be only based on receive level and quality measurements are not applicable. This behaviour is also applicable for IoT-NTN as exception on this behaviour is not agreed for IoT-NTN. Hence we propose to remove this EN

Editor Note: FFS whether RSS-based measurement condition check is applicable for IoT-NTN.

**Q1: Can the EN related to modified UE behaviour for RSS-based measurements be removed ? Companies can indicate their answer and additional comments here.**

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| --- | --- | --- |
| **Company** | **Answer** | **Further comments** |
| Apple | Yes | The principle in RAN2 is we do not explicitly exclude any combination between features. Thus it should not be excluded to support RSS measurement over IoT NTN. |
| Samsung | Remove EN and the introduced spec-text related to RSS | First of all, since we are specifically introducing spec text to support it, we think that it should be discussed whether RSS and location-based measurement initiation is useful or not. We do not agree that it needs to explicitly be agreed to **not** support it in order to **not** introduce it.  We are not certain it is useful to combine these features because the main reason of RSS is to re-synchronize, and using it for cell reselection is not the main purpose, even if possible.  Fine if other companies really insist that this is useful, but we prefer to remove the EN and remove the associated RSS-based spec text introduced. |
| Ericsson | Yes | Agree with Apple. RSS has not been discussed in RAN2 scope but should be supported in NTN. If companies are unsure, we can discuss next meeting. |
| Qualcomm |  | May be ok unless we identify issues. |
| vivo | Yes |  |
| Xiaomi | Yes |  |
| Huawei, HiSilicon | Yes | We think RSS is by default supported in IoT NTN.  Since RSS can also be used for neighbour cell measurements, combining it with location-based measurement initiation is useful.  The Editor’ Note can be removed. |
| ZTE | Yes | Agree with Apple. |

New System Information Block SIBXX is introduced in Rel-18 to provide additional ephemeris-related information that can be used by UE during cell selection for fast acquisition and measurements of target cells. In rapporteur understanding, usage of the additional information in SIBXX is meant to have improved cell reselection time and only impacts RAN4 requirements. TS36.304 specifies the usage of parameters that impact the cell reselection algorithm only. If there is an impact to cell-reselection procedure due to SIBXX those can be captured.

**Q2: Do companies see impact to cell-reselection procedure in IDLE mode due to additional parameters of SIBXX ? If yes indicate the same here.**

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| --- | --- | --- |
| **Company** | **Answer** | **Further comments** |
| Apple | See comments | I think at least some sentence should be added to mention that t-ServiceStart of neighbour satellite can be used for UE to initiate measurement. It could be captured in measurement procedure.  As we commented in running CR, TS36.300 running CR already mentions t-ServiceStart of neighbor cell can be used for idle measurement. |
| Samsung | No | Not at this point. |
| Ericsson | Yes | Assuming RAN4 requirements for neighbour cell measurements are similar to NR NTN, SIBXX is necessary to perform measurements and cell reselection within an NTN system. From TS 38.300, “For a UE in Idle/Inactive mode it's up to UE implementation whether to perform NTN neighbour cell measurements on a cell indicated in SIB4 but not included in SIB19.” |
| Qualcomm | No | No impact to cell reselection. Question is not about measurement. |
| vivo | No |  |
| Xiaomi | No |  |
| Huawei, HiSilicon | No |  |
| ZTE | Yes | As we comment for the running CR, something may be captured as below:  If t-Service is present in *SystemInformationBlockType3* of the serving cell, UE shall perform intra-frequency, inter-frequency or inter-RAT measurements, before the time t-Service regardless whether the serving cell fulfils Srxlev > SIntraSearchP and Squal > SIntraSearchQ, or Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ. The exact time to start measurements before *t-Service* is upon the *t-ServiceStartNeigh* for the corresponding neighbour satellite if it is present in *SystemInformationBlockTypeXX* or up to UE implementation. UE shall perform measurements of higher priority inter-frequencies or inter-RAT frequencies regardless of the remaining service time of the serving cell. |

Rapporteur Summary

**Rapporteur Summary**

* As per company views the EN related to RSS dependency can be removed.
* From Rapporteur view TS36.304 captures the cell reselection procedure including ranking and priority of neighbour-cells. Based on the comments received there is no specific changes needed to these aspects. We can discuss the need to capture whether UE can skip the neighbour cell measurements which are not linked to SIBXX in RAN2.

# Other open issues.

* Idle mode procedure impacts for discontinuous coverage enhancements: RAN2 has already sent LS to SA2 on the discontinuous coverage enhancement solution defined in SA2 and any additional impacts for idle mode procedures to be considered in AS. For this issue RAN2 can await for SA2 LS Response for further action.
* In RAN2-123bis, RAN2 concluded to include frequency information in SIB32 to improve the cell selection on return in in-coverage. This feature can be captured in stage-2 specification without specific changes to 36.304.

**Q3: Do company agree to the way forward proposed for above open issues related to idle mode procedures and impacts to 36.304 ?**

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| --- | --- | --- |
| **Company** | **Answer** | **Further comments** |
| Apple | OK |  |
| Samsung | Yes to wait for SA2, no to only Stage 2 impact on freq info in SIB32 | Too early to make any conclusions at this point. And we should really stop making decision to only capture things in Stage 2 without knowing the solution or the impact. It is causing a lot of issues and degrades the quality of the spec. |
| Ericsson | 1st OK  2nd NOK | We see impact in TS 36.304. |
| Qualcomm | No | 36.304 just refers to SIB32 which seems sufficient for UE to consider whatever information is available in SIB32. |
| vivo | We are fine with the Bullet 1 and have no strong view on Bullet 2. |  |
| Xiamo | Yes for Bullet 1  No for Bullet 2 | We think the UE behaviour on how to use the frequency information in SIB32 should be specified in SIB32. |
| Huawei, HiSilicon | ok |  |
| ZTE | No | * For #1 bullet, based on companies’ contributions, we think it’s crystal clear that both UE and core NW would refer to the description in TS 36.304 to determine the start of PH and PTW. Moreover, the alignment between (end of) Unavailability Period and PH/PTW is important for UE’s paging performance. So even there is no SA2 confirmation, we RAN2 still can discuss this issue and solution. * For #2 bullet, we agree with Xiaomi, e.g., stage-2 change may be not enough and at least RRC change is needed. |

**Q4: Also indicate any other open issue to be handled in next meeting related to idle mode procedures related to mobility enhancements and DC enhancements features.**

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| **Company** | **Answer** | **Further comments** |
| Apple | OK |  |
| Qualcomm | UE assisted release in moving cell. | Network does not know NB-IoT UE location. As we sent LS to SA2 but we are not sure we will have any solution for NB-IoT UE location.  So it means network cannot predict UE’s service duration in moving cell. |
| ZTE | Unavailability Period related assistance information provided from AS layer to NAS layer | SA2 has agreed UE and CN can negotiate the Unavailability Period Duration (if available) and Start of Unavailability Period parameters. However, it’s easy to understand, in UE side, the first-hand information about discontinuous coverage should be the one obtained through SIB32 by the UE. So we think before negotiation with CN, NAS layer needs to acquire Unavailability Period related assistance information from AS layer, e.g., via kind of AS-NAS layer interaction. NAS layer can directly make use of this information or re-process it.  In AS layer, we can just define such parameter as the Unavailability Period related assistance information, but at least in this R18, the details about how to generate it can be left to UE implementation. |

**Rapporteur Summary:**

As per company views expressed here, for paging-related impacts RAN2 can wait for SA2 LS Response. Handling of frequency information in SIB32 can be specified as part of SIB32 reception in 36.331 or it can be referred in TS36.304. Further discussion needed on this. The additional issue indicated related to UE-assisted release is to be handled as part of TS36.331 as it involves connected mode operation. So we propose to consider this issue based on contribution related to the connected mode issue.

# Conclusion

Based on the company views expressed in the above discussion , we propose the following.

**Proposal 1 (4/5) : The following EN can be removed in TS36.304.**

Editor Note: FFS whether RSS-based measurement condition check is applicable for IoT-NTN.

**Proposal 2 (4/5) : No update is needed in 36.304 related to cell reselection aspects in TS36.304 due to the introduction of SIBXX. RAN2 to discuss the need to capture the following UE behavior in TS36.304.**

“For a UE in Idle/Inactive mode it's up to UE implementation whether to perform NTN neighbor cell measurements on a cell indicated in SIB4 but not included in SIB19.”

**Proposal 3: RAN2 to wait for SA2 LS response to conclude on paging-related impacts in RAN2 specification**

**Proposal 4: RAN2 to discuss how to capture frequency information in SIB32 for cell selection in DC scenario. Whether to capture the changes as part of the SIB32 reception or in TS36.304 to be decided.**