3GPP TSG-RAN WG4 Meeting # 100-e R4-21xxxxx

Electronic Meeting, August 16-27, 2021

**Agenda item:** 11.8.4

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [100-e][241] NB\_IOTenh4\_LTE\_eMTC6\_RRM

**Document for:** Information

# Introduction

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: Discuss the identified issues on neighbour cell measurements in connected mode before RLF for Rel-17 NB-IoT.
* 2nd round: Keep discussion on remaining issues.

# Topic #1: Neighbour cell measurements in connected mode before RLF or NB-IoT

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2114088 | Ericsson | **Proposal #1: RAN4 to postpone the discussions on exact section numbering until more progress is reached on the detailed requirements.**  **Proposal #2: When the target frequency carrier is different from the serving carrier, the maximum interval between two occasions shall be less than 5 seconds and the minimum length of measurement occasion shall be at least 400 ms for normal coverage.**  **Proposal #3: The work on defining the CONNECTED mode neighbor cell measurement requirements can be deprioritized from RAN4’s perspective.**  **Proposal #4: The UE shall support neighbour cell measurements on at least same number of carriers in CONNECTED mode as in IDLE mode.**  **Proposal #5: The conditions related to when the neighbor cell measurements can be performed without gaps and causing interruptions as agreed in [3] shall be taken into account when defining the requirements.** |
| R4-2114148 | Huawei, Hisilicon | **Observation 1: The serving cell could be in normal coverage and enhanced coverage.**  **Observation 2: The available time for neighbour cell measurement is limited which is from the point when the triggering conditions are met (channel quality deterioration) until the RLF is triggered.**  **Observation 3: The typical implementation is to find cell in good conditions within the limited time before RLF.**  **Observation 4: The time to detect/measure a cell in enhanced coverage is much more than that in normal coverage, which may result in all available time before RLF is wasted to find a cell in enhanced coverage that UE has not chance to found cells in good conditions.**  **Observation 5: Even a cell in enhanced coverage cell is found, UE should not be forced to only access to this cell without searching other cells in good conditions in RRC Re-establishment.**  **Proposal 1: RAN4 to define RRM requirements for neighbour cell measurement before RLF of a cell in normal coverage (Case#1/3) and it is up to UE implementations of neighbour cell measurement of a cell in enhanced coverage (Case#2/4).**  **Observation 6: Different from the gap-based measurement, the actual measurement occasion (duration and periodicity) could not be guaranteed for neighbour cell measurement of NB UE.**  **Observation 7: The minimum length of a measurement occasion and maximum interval shall be considered when defining the RRM requirements for neighbour cell measurement on carrier frequency which is different from the serving cell.**  **Proposal 2: When the target frequency carrier is different from the serving carrier, the maximum interval between two occasions shall be less than 5 seconds and the minimum length of a measurement occasion shall be at least 400 ms for normal coverage.**  **Proposal 3: For neighbour cell measurement in connected state, UE shall be able to monitoring at least the carrier which is same as the serving carrier and at least two carriers which are different from the serving carrier. Then detection/measurement delay shall be scaled by the number of carriers.** |
| R4-2114201 | Qualcomm Incorporated | **Observation 1: Evaluation of serving cell quality in connected mode for the purpose of triggering neighbor cell measurements could be modeled after radio link monitoring or on after cell re-selection in idle mode.**  **Proposal 1: RAN4 should wait for further progress in RAN2 regarding the mechanism for triggering neighbor cell measurements in connected mode.**  **Proposal 2: RAN4 should prioritize requirements for intra-frequency neighbor cell measurements in connected mode regardless of whether the serving frequency is anchor carrier or non-anchor carrier.**  **Proposal 3: It would be beneficial for the UE to measure neighbor cells detected in idle mode continuously (at least once every 5 seconds) during connected mode so that it can maintain a set of known candidate cells. Detection of new cells in connected mode would not be precluded.** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

**Issue 1-1-1: General**

* Proposals
  + Option 1: RAN4 to postpone the discussions on exact section numbering until more progress is reached on the detailed requirements. (Ericsson P1)
  + Option 2: The conditions related to when the neighbour cell measurements can be performed without gaps and causing interruptions as agreed in [3] shall be taken into account when defining the requirements. (Ericsson P5)
* Recommended WF
  + Agree on Option 1 AND option 2?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-1** |
| Ericsson | We support recommend WF to agree on option 1 and 2. |
| Huawei | Support option 1 and 2, which should be considered when define the corresponding requirements when issues are concluded. |

**Issue 1-1-2: Conditions on neighbour cell measurement when the target carrier is different from the serving carrier**

* Proposals
  + Option 1: When the target frequency carrier is different from the serving carrier, the maximum interval between two occasions shall be less than 5 seconds and the minimum length of measurement occasion shall be at least 400 ms for normal coverage. (Ericsson P2, Huawei P2)
* Recommended WF
  + Agree on Option 1?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-2** |
| Ericsson | Option 1 is agreeable. |
| Huawei | Support option 1. |

**Issue 1-1-3: Neighbour cell measurements of a cell in enhanced coverage**

* Proposals
  + Option 1a: The work on defining the CONNECTED mode enhanced coverage neighbor cell measurement requirements can be deprioritized from RAN4’s perspective. (Ericsson P3)
  + Option 1b: RAN4 to define RRM requirements for neighbour cell measurement before RLF of a cell in normal coverage (Case#1/3) and it is up to UE implementations of neighbour cell measurement of a cell in enhanced coverage (Case#2/4). (Huawei P1)
* Recommended WF
  + Discuss above option 1a and 1b.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-3** |
| Ericsson | In option 1b, it is not clear to us what it means if enhanced coverage measurements are up to UE implementation. In our view, if enhanced coverage measurements are supported then the requirements should be clear and specified. We support option 1a where normal coverage work is prioritized and enhanced coverage work can be done if time allows in the WI. |
| Huawei | We would like to further clarify option 1b here which is a bit unclear. As analysed in our paper, neighbour measurement of a target cell in enhanced coverage is not a very typical scenarios for this this feature. As the cell search time is very long as agreed in past meeting, the conditions to measure a cell in enhanced overage will much more critical and stricter. For instance, it should be guaranteed that the available measurement occasion should be very long as the searching time and measurement time is much longer than NC case. And the overall time duration shall be guaranteed to be very long (triggered 🡪 RLF). So we think it is not very typical case to be considered.  Thus, we are fine with option 1a with some minor clarification to make it clear as follows:  The work on defining requirements for CONNECTED mode neighbour cell measurement **of a target cell in enhanced coverage** can be deprioritized from RAN4’s perspective. |

**Issue 1-1-4: Intra-frequency and inter-frequency measurement.**

* Proposals
  + Option 1: RAN4 should prioritize requirements for intra-frequency neighbor cell measurements in connected mode regardless of whether the serving frequency is anchor carrier or non-anchor carrier. (Qualcomm P2)
* Recommended WF
  + Discuss on option 1 and clarify the intra-frequency and inter-frequency measurement with anchor and non-anchor carrier.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-4** |
| Ericsson | The conditions for the UE to measure on both intra- and inter-frequency carriers were discussed in R4-2105800. We think both type of measurements are feasible as observed in R4-2105800, and RAN4 should define requirements for both. Thus option 1 is not agreeable to us. |
| Huawei | We think it is also related to multiple carrier operations discussed in issue 1-1-5. We support UE shall be able to measure both intra-f and inter-f carrier for neighbour cell measurement. The detailed numbers are to be discussed in 1-1-5.  One thing to be clarified. From our understanding, neighbour cell measurement in connected mode, intra-frequency means the target cell is on a carrier which is same as the operating carrier in connected mode, which could be anchor or non-anchor carrier. |

**Issue 1-1-5: Multiple carriers for neighbour cell measurements.**

* Proposals
  + Option 1a: The UE shall support neighbour cell measurements on at least same number of carriers in CONNECTED mode as in IDLE mode. (Ericsson P4)
  + Option 1b: For neighbour cell measurement in connected state, UE shall be able to monitoring at least the carrier which is same as the serving carrier and at least two carriers which are different from the serving carrier. Then detection/measurement delay shall be scaled by the number of carriers. (Huawei P3)
* Recommended WF
  + Discuss option 1a and 1b.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-5** |
| Ericsson | We support option 1a, where the number of carriers in CONNECTED is reused form corresponding number in IDLE mode. |
| Huawei | Option 1a and 1b are actually the same.1 “intra-frequency” carrier and 2 “inter-frequency” carriers, which is same as IDLE mode.  So we suggest to rephrase option 1a and 1b as follows:  The UE shall support neighbour cell measurements on at least same number of carriers in CONNECTED mode as in IDLE mode, including the carrier which is same as the serving carrier and at least two carriers which are different from the serving carrier. Then detection and measurement delay shall be scaled by the number of carriers |

**Issue 1-1-6: Triggering of neighbour cell measurements.**

* Proposals
  + Option 1: RAN4 should wait for further progress in RAN2 regarding the mechanism for triggering neighbour cell measurements in connected mode. (Qualcomm P1)
* Recommended WF
  + Agree on option 1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-6** |
| Ericsson | We are fine to wait until further RAN2 progress. |
| Huawei | Support option 1. |

**Issue 1-1-7: Known cell in IDLE mode.**

* Proposals
  + Option 1: It would be beneficial for the UE to measure neighbour cells detected in idle mode continuously (at least once every 5 seconds) during connected mode so that it can maintain a set of known candidate cells. Detection of new cells in connected mode would not be precluded. (Qualcomm P3)
* Recommended WF
  + Discuss option 1 and the potential impact on neighbour cell measurement.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | **Issue 1-1-7** |
| Ericsson | What is the expected specification impact of option 1? Option 1 is already possible and we don’t see any specification impact due to this option. For example, the UE may already search for a particular cell that were detected in IDLE mode, and this can be up to UE implementation. |
| Huawei | We share the similar views as Ericsson. In legacy requirements, there is no neighbour cell measurement, thus the known cell conditions already cover the case that the cell is detected during IDLE mode before entering Connected mode. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| Huawei, HiSilicon | Zhongyi Shen | [shenzhongyi3@huawei.com](mailto:shenzhongyi3@huawei.com) |
| Ericsson | Santhan Thangarasa | santhan.thangarasa@ericsson.com |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)