**3GPP TSG-RAN2 Meeting #114-e R2-210xxxx**

**Online, May 19 – 27, 2021**

**Agenda Item: 9.1.4**

**Source: Huawei, HiSilicon**

**Title: Report of email discussion [351] NB-IoT RLF measurements (Huawei)**

**Document for: Discussion and decision**

# Introduction

This document is the report of the email discussion “[Post113bis-e][351][NBIOT/eMTC R17] NB-IoT RLF measurements (Huawei)”, as indicated below:

* [post113bis-e][351][NBIOT/eMTC R17] NB-IoT RLF measurements (Huawei)

Scope: Taking into account the reply LS from RAN4, discuss only the following 4 questions:

1. What is/are the triggering condition(s) for measurements to start (RSRP, out of sync, other)?
2. What does the network need to configure (parameters/assistance info) to the UE and how (dedicated/broadcast)?
3. What information (if any) is needed to be sent by the UE to the NW?
4. What is the trigger to perform re-establishment (legacy, early RLF, other)?

Intended outcome: Report to the next meeting

Deadline: long

# Discussion

## Triggering condition(s) for measurements to start

The following proposals for triggering measurements are made in contributions [2] - [8]:

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| Tdoc | Proposals |
| R2-2103014 [2] | Proposal 1: After UE has sent RAI it should not trigger neighbour cell measurements. |
| R2-2103241[4] | Proposal 2: If multiple triggers (e.g., a configured threshold of RSRP/RSRQ, T310) are applied to trigger neighbour cell measurement before RLF, the neighbour cell measurement would be triggered whichever the configured threshold of RSRP/RSRQ is met or T310 starts. |
| R2-2103320[5] | Proposal 3: The serving cell quality can be used as the triggering condition. |
| R2-2103394[6] | Proposal2: The neighbor cell measurement could be triggered based on the below two options:  • Option1, the neighbour cell measurement could be trigger when the serving cell channel quality is lower than a threshold.  • Option2, the neighbour cell measurement could be triggered after n number of consecutive "out-of-sync" indications for Pcell is detected. |
| R2-2103486[7] | Proposal 4: Consider a combination of the following criteria for starting the measurements:  • “the serving cell quality is lower than a threshold” and “the serving cell has decreased more than a threshold over a given time”  • n consecutive "out-of-sync" indications for PCell is detected  Proposal 5: Define a criteria for stopping the measurements once started. |
| R2-2103925[8] | Proposal 2 From a RAN2 perspective the UE should perform the measurement only during T310. |

In the reply LS [1], RAN4 indicated:

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| * From RAN4 point of view:   + UE starts performing the neighbour cell measurements when the serving cell quality deteriorates   + There should be mechanism to stop the neighbour cell measurement.   + It is up to RAN2 to decide the triggering condition for starting and stopping the neighbor cell measurements |

Trigger(s) to start the measurements:

The following triggers and conditions are mentioned in the above documents:

1. After UE has sent RAI it should not trigger neighbour cell measurements [2]
2. The serving cell channel quality is lower than a threshold [4], [5], [6] and [8]
3. The serving cell has decreased more than a threshold over a given time [8]
4. T310 starts [4]
5. after n number of consecutive "out-of-sync" indications for Pcell is detected [4], [6] and [8]
6. other

Q1a: Companies are requested to indicate for each option listed above, whether it should be considered or not in the triggering condition(s). Please indicate whether some options should be combined with other and any other comments as deemed necessary.

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| **Company** | **for each option a…e**  **yes/no** | **Detailed comments** |
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Trigger(s) to stop the measurements (as per RAN4 LS):

Q1b: Companies are requested to provide comments whether a trigger to stop the measurement as suggested by RAN4 should be defined or not. Please provide additional comments as necessary.

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| **Company** | **yes/no** | **Detailed comments** |
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## Network configuration

The following proposals for triggering measurements are made in contributions [3] - [9]:

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| Tdoc | Proposals |
| R2-2103191 [3] | Proposal 1: Network assistance information for connected mode measurements should be supported. FFS Parameters of network assistance.  Proposal 3: Network assistance information for early measurements should support inclusion of selected system information parameters for faster re-establishment. FFS selected subset of system information parameters. |
| R2-2103241[4] | Proposal 2: If multiple triggers (e.g., a configured threshold of RSRP/RSRQ, T310) are applied to trigger neighbour cell measurement before RLF, the neighbour cell measurement would be triggered whichever the configured threshold of RSRP/RSRQ is met or T310 starts. |
| R2-2103320[5] | Proposal 4: Network provides measurement configuration, e.g., the neighbor frequency, neighbor cells and triggering conditions via dedicated RRC signaling. |
| R2-2103394[7] | Proposal3: The neighbour cell measurement could follow the parameter such as the frequency priority information configured in SIB for cell reselection, it is UE implementation which cell is selected as the target cell. |
| R2-2103486[8] | Proposal 7: NW configures the criteria to start / stop the measurements. |

The following configuration / assistance information are mentioned in the above documents:

a) Assistance information for connected mode measurements [3], [5] and [7]

b) Selected system information parameters for faster re-establishment [3]

c) Configuration of the criteria to start / stop the measurements [5], [7] and [8]

d) other

Q2: Companies are requested to indicate for each option listed above, whether it should be considered or not in the triggering condition(s). Please indicate whether the information should be provided via broadcast or dedicated signalling and any additional comments as deemed necessary.

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| **Company** | **for each option a…d**  **yes/no** | **Detailed comments** |
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## UE assistance information

The following proposals for UE assistance are made in contributions [3] - [9]:

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| Tdoc | Proposals |
| R2-2103191[3] | Proposal 2: Adaptation of triggering condition for connected mode measurements should be considered. |
| R2-2103320[5] | Proposal 5: Some information, such as the measured cell in idle mode, can be sent from UE to the network. |
| R2-2103394[7] | Proposal4: The assistant information including the candidate neighbour cell information could be reported to help eNB deliver the UE context to several neighbor eNB. |
| R2-2103486[8] | Proposal 6: UE informs the eNB when it starts/stops measurements requiring gaps. |

The following assistance information from the UE are mentioned in the above documents:

a) Assistance information for adaptation of triggering condition for connected mode measurements [2]

b) Measured cell(s) in idle mode [5]

c) The candidate neighbour cell [7]

d) Indication when UE starts/stops measurements requiring gaps [8]

f) other

Q3: Companies are requested to indicate for each option listed above, whether the information should be reported or not. Please provide any additional comments as deemed necessary.

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| **Company** | **for each option a…f**  **yes/no** | **Detailed comments** |
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## Trigger to perform re-establishment

The following proposals for triggering measurements are made in contributions [3] - [9]:

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| Tdoc | Proposals |
| R2-2103014[2] | Proposal 2: After UE has sent RAI it should not trigger early RLF. |
| R2-2103320[5] | Proposal 1: It’s suggested not to support earlier declaration of RLF, e.g., with introduction of T312. |
| R2-2103486[8] | Proposal 8: Agree on introducing early RLF. Details to be discussed. |
| R2-2103925[8] | Proposal 3 RAN2 to discuss the usefulness of fast RLF for NB-IOT |

The following triggers to perform RRC Connection re-establishment are mentioned in the above documents:

a) After UE has sent RAI it should not trigger early RLF [2]

b) Early RLF [8]

c) legacy RLF

d) other

Q4: Companies are requested to indicate for each option listed above, whether the trigger/condition should be supported or not. Please provide any additional comments as deemed necessary.

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| **Company** | **for each option a…d**  **yes/no** | **Detailed comments** |
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# Conclusion

TBD

# Reference

1. R4-2105800 Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state, RAN4, April 2021

1. [R2-2103014](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103014.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103014.zip) Condition for NB-IoT connected mode neighbour cell measurement Qualcomm Incorporated

1. [R2-2103191](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103191.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103191.zip) Signalling procedure for connected mode measurements support for reestablishment time reduction Nokia

1. [R2-2103241](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103241.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103241.zip) Further discussion on the corresponding measurement before RLF Spreadtrum Communications

1. [R2-2103320](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103320.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103320.zip) RAN2 aspects of measurement in connected mode ZTE Corporation, Sanechips

1. [R2-2103394](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103394.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103394.zip) Neighbor cell measurements triggering before RLF Lenovo, Motorola Mobility

1. [R2-2103486](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103486.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103486.zip) Neighbour cell measurements in RRC\_CONNECTED Huawei, HiSilicon

1. [R2-2103925](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103925.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_113bis-e/Docs/R2-2103925.zip) Discussion on Fast RLF Recovery procedures in NB-IoT Ericsson

# Participants

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| --- | --- | --- |
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