**3GPP TSG-RAN WG2 Meeting #115 electronic draftR2-2108837**

Online, August, 2021

Agenda Item: 10.7

Source: Session Chair (Huawei)

Title: <draft> Report NB-IoT breakout session

Document for: Approval

## General

Please see the following TDocs for e-meeting guidance:

[R2-2106900](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2106900.zip) Agenda for RAN2#115-e Chairman agenda Late

Time Schedule
Please refer to the latest schedule in the RAN2 inbox on the public 3GPP servers.

## List and Status of Offline Email Discussions

The deadlines refer to the deadline for providing company comments unless stated otherwise.

* [AT115-e][300][NBIOT/eMTC] Organisational Brian’s Session (Session Chair)

 **Scope:** Comments to session notes. Kick-off and management of email discussions for NB-IoT session. Coordination issues. Other organisational issues and announcements.

 **Intended outcome:** Approval of Report from NB-IoT session.

 **Deadline:** EOM

 **Status:** started

* [AT115-e][301][NBIOT/eMTC R17] RLF measurements (Huawei)

 Scope: Progress on the open items from the summary document

 Intended outcome: Report in R2-2108971

 Deadline: Monday 23rd, 1200 UTC.

* [AT115-e][302][NBIOT/eMTC R17] carrier selection (Ericsson)

 Scope: Progress the above proposals

 Intended outcome: report in R2-2108972

 Deadline: Monday 23rd, 1200 UTC.

* [AT115-e][303][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE)

 Scope: Produce set of agreeable proposals

 Intended outcome: Report in R2-2108973

 Deadline: Monday 23rd, 1200 UTC.

## 4.1 NB-IoT corrections Rel-15 and earlier

Documents in this agenda item will be handled in a break out session. Common NB-IoT/eMTC parts treated jointly with 4.2.

## 7.3 Additional enhancements for NB-IoT

(NB\_IOTenh3-Core; leading WG: RAN1; REL-16; started: Jun 18; Completed: June 20; WID: RP-200293)

Documents in this agenda item will be handled in a break out session

Some sub-items in 7.2 and 7.3 may be treated jointly.

### 7.3.1 General and Stage-2 Corrections

Including incoming LSs etc

### 7.3.2 UE-group wake-up signal (WUS) Corrections

UE group wake Up signal for MTC and NB-IoT is treated jointly under this Agenda Item.

### 7.3.3 Transmission in preconfigured resources corrections

Transmission in preconfigured resources for MTC and NB-IoT is treated jointly under this Agenda Item.

### 7.3.4 Other NB-IoT Specific corrections

NB-IoT specific topics

## 9.1 NB-IoT and eMTC enhancements

(NB\_IOTenh4\_LTE\_eMTC6-Core; leading WG: RAN1; REL-17; WID: RP-211340)

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

Email max expectation: 4 threads

### 9.1.1 Organizational

### 9.1.2 NB-IoT neighbor cell measurements and corresponding measurement triggering before RLF

Focus on:

Details of the criteria and configuration for starting measurements

Whether any further information needs to be provided by the NW

Whether any assistance information from UE is needed.

If/how to support “early” RLF

[R2-2107122](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107122.zip) Consideration on neighbour cell measurement in RRC connected state Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107429](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107429.zip) Open issues on connected mode measurements for RLF Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107761](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107761.zip) Remaining issues on connected mode measurement ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core [R2-2105314](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2105314.zip)

[R2-2107810](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107810.zip) Network assistance information for Re-establishment time reduction Nokia, Nokia Shanghai Bell discussion Rel-17

[R2-2107811](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107811.zip) On the open aspects for connected mode measurements for RLF enhancements Nokia, Nokia Shanghai Bell discussion Rel-17

[R2-2107869](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107869.zip) Triggering cell selection early Huawei, HiSilicon, MediaTek Inc., Spreadtrum Communications, Lenovo, Motorola Mobility, Fraunhofer, Novamint, CMCC, China Unicom, Reliance Jio discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2108390](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108390.zip) Discussion on connected mode measurement in NB-IoT Ericsson discussion

[R2-2108843](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108843.zip) Summary of AI 9.1.2 NB-IoT neighbor cell measurements (Huawei) Huawei discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

**Proposal 1:** [To agree] The configuration of the criteria for starting the measurements include a serving cell NRSRP threshold.

* QC thinks this goes along with p3.

**Proposal 11:** [To agree] Configuration of an alternative shorter T310 timer that the UE uses when the criteria for performing connected mode measurements is fulfilled is supported. Need for other conditions is FFS.

* Sequans think T310 can be configured with dedicated signalling. HW think eNB does not know whether UE is mobile so should not always configure. ZTE agree and think the dedicated parameter could be used.
* Ericsson wonders how eNB knows how to provide the configuration. HW thinks it would be cell specific
* Ericsson thinks that for HetNet the trigger for shorter timer is based on measurement reports etc. and wonders whether the NW can provide the correct conditions for using the new timer. Huawei thinks that the gain is that UE will select a new cell much more quickly.
* Huawei thinks that we have NB-IoT mobile UEs but no mobility support, it has to be improved and this shortens the time to select a new cell.
* QC agrees with Ericsson and ZTE, and wonder why the existing dedicated signalling can’t be used.
* Huawei thinks the eNB doesn’t know when the UE is mobile so cannot know when to configure the shorter timer with dedicated signalling.
* Ericsson think we may be able to introduce a capability for configuring the second timer.
* Nokia thinks the timer is not useful for this scenario.
* Fraunhofer thinks this proposal will be useful to improve NB-IoT mobility. QC would like to improve NB-IoT mobility but think there is not much gain when this timer can already be configured by dedicated signalling. Huawei think the complexity of the timer is low compared to the measurements themselves, and many devices are kept in connected mode for long periods.
* Huawei thinks it would be optional for the NW to configure.

Support: Huawei, HiSilicon, MediaTek Inc., Spreadtrum Communications, Lenovo, Motorola Mobility, Fraunhofer, Novamint, CMCC, China Unicom, Reliance Jio (9)

Not support: Ericsson, ZTE, Nokia, QC, Sequans, Thales (6)

**Proposal 2:** [To discuss] Whether to have separate criteria for intra- and inter-frequency neighbour cells or separate criteria for intra- and inter-frequency neighbour measurements.

**Proposal 3:** [To discuss] The configuration of the criteria for starting the measurements optionally includes SSearchDeltaP and TSearchDeltaP parameters to enable relaxed monitoring.

* Ericsson wonders whether L1 filtering is enough to address the serving cell variance, and whether this imposes restrictions to UE removing UE flexibility. QC thinks we are introducing a threshold to require measurements, if we leave to implementation nothing needs to be specified. Nokia also think hysteresis would suffice.
* Ericsson wonders whether the values would be different than idle mode.
* ZTE thinks the NRSRP threshold is needed and this delta threshold may be useful to avoid unnecessary measurement
* Huawei think that p1 alone does not satisfy the agreement from the last meeting. QC agree.

**Proposal 4:** [To discuss] The conditions where the UE is not required to perform measurements are specified. No additional configuration is needed.

**Proposal 5:** [To discuss] The configuration of the criteria for starting the measurements is provided via broadcast signalling.

**Proposal 6:** [To discuss] Provision of additional information regarding which cells/carriers to be considered is not supported. It is up to UE implementation to choose and prioritize carrier/cell list for measurement.

**Proposal 7:** [To discuss] Provision of minimum system information for the target cell(s) to minimise the delay for system information acquisition is not supported.

**Proposal 8:** [To discuss] Indication from the UE that it starts/ stops performing measurement is not supported.

**Proposal 9:** [To discuss] Report of the cells measured in RRC\_IDLE to assist measurement configuration is not supported.

**Proposal 10:** [To discuss] Report of information about connected measurements during the RRC Connection re-establishment procedure for network optimisation is not supported.

**Proposal 12:** [To discuss] Whether OFF period of DRX is used for the neighbour cell measurement under scenario B, D and E.

**Proposal 13:** [To discuss] Support for connected mode measurement is optional without capability signalling.

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| Agreements:* The configuration of the criteria for starting the measurements include a serving cell NRSRP threshold. FSS how to address variance (as agreed last meeting)
* It is useful to have a shorter T310 timer for UEs supporting this enhancement, but FFS whether this is best achieved with the existing dedicated signalling or based on a new condition
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* [AT115-e][301][NBIOT/eMTC R17] RLF measurements (Huawei)

 Scope: Progress on the open items from the summary document

 Intended outcome: Report in R2-2108971

 Deadline: Monday 23rd, 1200 UTC.

### 9.1.3 NB-IoT carrier selection based on the coverage level, and associated carrier specific configuration

Focus on details of the remaining 2 sub-options and selection of one of the options:

For option 1, whether DRX can be part of the carrier selection criteria

For option 1, upon cell change, whether to fallback or to select carrier based on previously determined CEL

For both options whether there is a report from the UE to suggest a carrier or provide a metric report

For both options whether to use a hysteresis/longer averaging/timer on measured NRSRP

[R2-2107123](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107123.zip) Support for NB-IoT carrier selection based on the coverage level Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107124](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107124.zip) Signalling for coverage-based paging carrier selection Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107207](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107207.zip) Discussion on details of paging carrier selection options MediaTek Inc. discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107370](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107370.zip) Further discussion on enhanced paging carrier selection Spreadtrum Communications discussion Rel-17

[R2-2107391](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107391.zip) Further discussion on enhanced paging carrier selection NEC Corporation discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107430](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107430.zip) Paging carrier selection Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107762](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107762.zip) Remaining issues on CEL-based paging carrier selection ZTE Corporation, Sanechips discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core [R2-2105317](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2105317.zip)

[R2-2107812](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107812.zip) Further analysis on solution for coverage level based paging carrier selection Nokia, Nokia Shanghai Bell discussion Rel-17

[R2-2108391](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108391.zip) Paging Carrier Selection Ericsson discussion

[R2-2108828](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108828.zip) Summary of AI 9.1.3 NB-IoT carrier selection Ericsson discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

Proposal 1 For option1, DRX should be part of the carrier selection criteria. RAN2 to discuss how to combine the DRX criteria with CE level criteria.

* Huawei would like to understand what case this has benefit. ZTE think that option 1 can allow this. QC thinks there is no problem to have this, it allows the flexibility to configure different DRX.
* Huawei wonders what UE would select based on, QC thinks the UE specific DRX cycle would be used. Huawei think this would not be useful. Nokia thinks splitting based on coverage already allows configuring DRX different between carriers, and adding this to the selection criteria just adds complexity.

Proposal 2 Support carrier specific DRX configurations, including carrier specific defaultPagingCycle, nB, and ue-SpecificDRX-CycleMin.

* QC wonders why we would have different minimum UE specific DRX cycle per carrier if we don’t have p1. Huawei think we would have a diffferent DRX cycle for a carrier with a different Rmax, this could be per coverage level or per carrier. Ericsson agree with Huawei in general but can agree that the default paging cycle may not make sense, it would be more straightforward to ensure UE specific DRX is supported to support this feature.

Proposal 3 For option 1, upon cell change, FFS is needed to choose from Alt 1 and Alt 2.

Proposal 4 Confirm the WA: UE metric for determining carrier suitability and selection is based on measured NRSRP.

Proposal 5 FFS whether to use a hysteresis/longer averaging/timer for UE metric based on NRSRP.

Proposal 6 For both options, there is no need to introduce UE report.

Proposal 7 UE capability for Rel-17 paging carrier selection should be introduced.

Proposal 8 Selection of option 1c and option 2a should be based on

a) DRX support for carrier selection criteria

b) Load balance or UE redistribution

c) Paging carrier selection upon cell change

d) Specification impact, Paging Formula, Complexity (different rules) in selecting a carrier by UE

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| Agreements* Support coverage or carrier specific DRX configurations, FFS details.
* UE capability for Rel-17 paging carrier selection should be introduced
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* [AT115-e][302][NBIOT/eMTC R17] carrier selection (Ericsson)

 Scope: Progress the above proposals

 Intended outcome: report in R2-2108972

 Deadline: Monday 23rd, 1200 UTC.

### 9.1.4 Other

Includes WI objectives led by other WGs.

Includes resubmission of [R2-2106603](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2106603.zip) Report of [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE), ZTE

[R2-2107431](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107431.zip) L2 buffer size calculations for eMTC and NB-IoT enhancements Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107763](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107763.zip) Remaining issues on 14 HARQ and 1736bits TBS for eMTC ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107764](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107764.zip) Remaining issues on 16QAM for NB-IoT ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2107996](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2107996.zip) Report of [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other ZTE (email discussion rapporteur) discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core [R2-2106603](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2106603.zip)

[R2-2108392](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108392.zip) Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson discussion [R2-2106078](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2106078.zip)

[R2-2108742](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2108742.zip) Total L2 Buffer Size for NB-IoT and LTE-M UEs Ericsson discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core [R2-2106158](file:///D%3A%5Cworkfiles%5C%5CRAN%5CRAN2%5CRAN2_114-e%5CDocs%5CR2-2106158.zip)

[R2-2109030](file:///D%3A%5Cworkfiles%5CRAN%5CRAN2%5CRAN2_115-e%5Cdocs%5CR2-2109030.zip) Summary of AI 9.1.4 NB-IoT/eMTC Other (ZTE)

* **[AT115-e][303][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE)**

 Scope: Produce set of agreeable proposals

 Intended outcome: Report in R2-2108973

 Deadline: Monday 23rd, 1200 UTC.