**3GPP TSG-RAN2 Meeting #114-e draftR2-2106477**

**Online, 19th – 27th , May 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:

[R2-2104700](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2104700.zip) Agenda for RAN2#114-e Chairman agenda

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.

* [AT114-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

* [AT114-e][301][NBIOT/eMTC R17] NB-IoT Carrier Selection (Ericsson)

 **Scope:** Discussion of open points as per the summary document in [R2-2106466](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106466.zip).

 **Intended outcome:** Report in [R2-2106601](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106601.zip)

 **Deadline:** Monday May 24 1200 UTC

 **Status:** closed

* [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE)

 **Scope:** Discussion of open points in agenda item 9.1.4.

 **Intended outcome:** Report in [R2-2106603](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106603.zip)

 **Deadline:** Monday May 24 1200 UTC

 **Status:** closed

* [AT114-e][303][NBIOT/eMTC R16] PUR Corrections (ZTE)

 **Scope:** Discussion of CRs in [R2-2106214](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106214.zip) and [R2-2106277](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106277.zip). Poll for support and initial comments to CRs.

 **Intended outcome:** Report in [R2-2106604](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106604.zip)

 **Deadline:** Monday May 24 1200 UTC

 **Status:** closed

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## 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.

[R2-2106214](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106214.zip) Add ack-NACK-NumRepetitions for PUR-Config-NB ZTE Corporation, Sanechips CR Rel-16 36.331 16.4.0 4679 - F NB\_IOTenh3-Core

* Revised in R2-2106605
* [Post114e][304][NBIOT/eMTC] Add ack-NACK-NumRepetitions for PUR-Config-NB (ZTE)

Scope: Review the CR taking the changes made during offline as a baseline for further checking.

 Intended outcome: Agreed CR in R2-2106605

 Deadline: short

[R2-2106277](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106277.zip) MAC clarifications for PUR ZTE Corporation, Sanechips, MediaTek Inc. CR Rel-16 36.321 16.4.0 1524 - F LTE\_eMTC5-Core, NB\_IOTenh3-Core

* Revised in R2-2106606
* [Post114e][305][NBIOT/eMTC R16] MAC clarifications for PUR (ZTE)

 Scope: Review the CR taking the changes made during offline as a baseline for further checking.

 Intended outcome: Agreed CR in R2-2106606

 Deadline: short

* [AT114-e][303][NBIOT/eMTC R16] PUR Corrections (ZTE)

 **Scope:** Discussion of CRs in [R2-2106214](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106214.zip) and [R2-2106277](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106277.zip). Poll for support and initial comments to CRs.

 **Intended outcome:** Report in [R2-2106604](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106604.zip%22%20%5Co%20%22https%3A//www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106604.zip)

 **Deadline:** Monday May 24 1200 UTC

[R2-2106604](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106604.zip) Report of [AT114-e][303][NBIOT/eMTC R16] PUR Corrections (ZTE), ZTE

* Agree on the intention of both CRs - can take the changes made during offline as a baseline for further checking.

### 7.3.4 Other NB-IoT Specific corrections

NB-IoT specific topics

# 9 Rel-17 EUTRA Work Items

## 9.1 NB-IoT and eMTC enhancements

(NB\_IOTenh4\_LTE\_eMTC6-Core; leading WG: RAN1; REL-17; WID: RP-201306)

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

Email max expectation: 4 threads

### 9.1.1 Organizational

[R2-2104706](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2104706.zip) LS on Agreements Related to Support of a maximum DL TBS of 1736 bits as a Rel-17 optional UE capability (R1-2103942; contact: Sony) RAN1 LS in Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core To:RAN2

* Taken into account in offline# 302
* Noted

[R2-2104725](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2104725.zip) Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state (R4-2105800; contact: Huawei) RAN4 LS in Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core To:RAN2

* Taken into account in the email discussion #351 after last meeting
* noted
* [Post114-e][306][NBIOT/eMTC R17] Capture the agreements (Ericsson)

Scope: Update the agreements document.

 Intended outcome: Endorsed report in R2-2106602

 Deadline: short

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

Including outcome of [Post113bis-e][351][NBIOT/eMTC R17] NB-IoT RLF measurements (Huawei)

[R2-2105661](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105661.zip) Report of email discussion [351] NB-IoT RLF measurements (Huawei) Huawei report Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core Late

Proposal 1.1: RAI (option a) is not considered in the criteria to start measurements.

Proposal 1.2: The variance of the serving cell quality (option c) is not considered in the criteria to start measurements.

Proposal 1.3: The criteria to start measurements is based on the serving cell quality (option b). FFS whether a number of out-of-sync (option e) is also considered.

Proposal 1.4: RAN2 to continue discussing whether we need a criteria to stop the measurements, or whether it is enough to only specify when UE shall do measurements.

* Ericsson wonders whether this assumes a threshold configured by the NW. ZTE thinks this is covered by proposal 2-3
* QC thinks the serving cell quality is the obvious way but wonders how the threshold would be set, for example UE in deep coverage may always need to measure. ZTE thinks maybe we need multiple thresholds. QC thinks a UE always in deep coverage shouldn’t need to perform the measurement all of the time so threshold alone is not enough.
* Nokia thinks the configuration would be set by dedicated signalling according to the current coverage and are not sure how a common threshold could work for all coverage levels. HW think dedicated signalling is not needed, and there is no reporting needed for idle mode measurements so don’t see the need here.
* Sequans thinks that change of quality is a more useful indicator since the main use-case is for mobile UEs. QC agrees.
* HW agrees that only the serving threshold is not enough, so could be combined with either something like relaxed monitoring or out-of-sync counting.
* ZTE thinks we should try to keep it simple and use just one criteria
* Nokia, QC thinks that if we use out-of-sync this would impact RLM and recovery

Proposal 2-1: Provision of assistance information for connected mode measurements is supported. Details of which assistance information needs to be discussed.

* Huawei thinks whitelist could be useful. ZTE also think some information may be useful to reduce the number of target cells to measure.
* QC wonders how the NW would know what neighbours would be good candidates. HW think the eNB could list the immediate neighbours to help UE with re-establishment.

Proposal 2-2: Provision of selected system information parameters for faster re-establishment is not supported.

* Nokia and Sequans think for 2-2 some information for RA on the target would be useful and prefer not to exclude now. QC has some concerns and think that this would be challenging.

Proposal 2-3: Configuration of the criteria to start the measurements is supported.

Proposal 3: Provision of assistance information by the UE is not supported.

* QC thinks this may be necessary for the feature to work well.

Proposal 4.1: Legacy RLF is supported

Proposal 4.2: RAN2 to discuss support of ‘early’ RLF.

Proposal 4.3: If ‘early’ RLF is supported, it should not be triggered if RAI has been sent.

* Huawei clarify that “early RLF” doesn’t mean the same thing as LTE, it may just be a shorter RLF timer.
* ZTE thinks legacy RLF is enough, and don’t think 8 seconds RLF timer is not the usual case. QC agree with ZTE and don’t see the additional benefit, NW can configure using dedicated signalling. Nokia thinks benefit analysis is missing. Thales agree.
* Huawei thinks we have seen the use case which is also supported by operators, and think 8 seconds is a common case. Mediatek thinks that if a smaller timer is configured we can still benefit, the chance of RLF recovery during the last part of T310 is low.
* QC is concerned that speeding up the RLF may cause problems elsewhere.
* Ericsson think this also depends how long the UE performs measurements and think gain vs. pain may need more analysis.
* Huawei thinks there is not enough gain if we cannot trigger earlier RLF. Mediatek agree.
* Ericsson thinks the RLF timer is set assuming NB-IoT UEs are stationary, and for mobile UEs a different timer may be suitable but this could already be done with subscription information. HW think the issue is exactly that we have only one parameter and the system is designed for stationary UEs.

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| Agreements* The criteria to start measurements is based on a combination of serving cell quality threshold (option b) and variance of the serving cell quality (option c)
* Configuration of the criteria to start the measurements is supported.
	+ FFS whether any further information needs to be provided by NW
* FFS whether any assistance information from UE is needed.
* FFS if/how to support ‘early’ RLF.
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[R2-2105224](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105224.zip) Analysis on connected mode signalling procedure changes for Re-establishment time reduction Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2105314](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105314.zip) Remaining issues for measurement in connected mode ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105543](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105543.zip) Discussion on the remaining issue of reestablishment-time-reduction Spreadtrum Communications discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105657](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105657.zip) Triggering RLF cell selection before T3010 expiry Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105828](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105828.zip) Neighbor cell measurements triggering before RLF Lenovo, Motorola Mobility discussion Rel-17

[R2-2105918](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105918.zip) Consideration on neighbour cell measurement in RRC connected state Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2106080](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106080.zip) Discussion on connected mode measurement in NB-IoT Ericsson discussion Rel-17

[R2-2106289](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106289.zip) Measurement before radio link failure MediaTek Inc. discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

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

Focus on the following points for each of the solution options:

How does NW configure/enable (dedicated, broadcast signalling?)

How does UE select carrier, based on what criteria and metrics?

What happens upon cell change?

What happens upon coverage change?

Details of the fallback carrier(s).

[R2-2106466](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106466.zip) Summary of NB-IoT AI 9.1.3 carrier selection based on coverage level Ericsson

* [AT114-e][301][NBIOT/eMTC R17] NB-IoT Carrier Selection (Ericsson)

 **Scope:** Discussion of open points as per the summary document in [R2-2106466](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106466.zip).

 **Intended outcome:** Report in [R2-2106601](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106601.zip)

 **Deadline:** Monday May 24 1200 UTC

[R2-2106601](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106601.zip) [AT114-e][301][NBIOT/eMTC R17] NB-IoT Carrier Selection (Ericsson), Ericsson

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| Agreements* Rel-17 paging carriers and the legacy paging carriers should be exclusive.
* RAN2 assumes S1AP/NGAP update is not needed.
* Carrier selection criteria does not include power boosting or service
* FFS: For option 1, whether DRX can be part of the carrier selection criteria
* Rel-17 paging carrier configuration is provided in broadcast signalling.
* Select between the following sub-options:
* Option 1c: Network enables UE to select a Rel-17 paging carrier by providing the coverage information (CEL/Rmax) for the carrier selection to the UE in dedicated signalling
* Option 2a: NW indicates the carrier to use explicitly via dedicated signalling based on information determined within the NW.
	+ FFS for both options whether there is a report from the UE to suggest a carrier or provide a metric report
* Working assumption: UE metric for determining carrier suitability and selection is based on measured NRSRP. FFS whether to use a hysteresis/longer averaging/timer
* For option 1, upon cell change, FFS:
* Alt 1: based on previously determined CEL and broadcasted paging carrier configuration in the new cell.
* Alt 2: UE needs to perform fallback mechanism.
* For option 2, upon cell change, UE needs to perform fallback mechanism.
* Whenever the R17 coverage based carrier criteria is met, UE uses the R17 coverage based carrier, otherwise UE should use the fallback mechanism
* For both options, fall back carrier is legacy paging carrier based on UE\_ID
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[R2-2105225](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105225.zip) Further analysis on paging carrier selection options Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2105317](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105317.zip) Further discussion on CEL-based paging carrier selection ZTE Corporation, Sanechips discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core R2-2103321

[R2-2105544](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105544.zip) Further discussion on enhanced paging carrier selection and NPRACH carrier selection Spreadtrum Communications discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105642](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105642.zip) Simplified Static solution THALES discussion

[R2-2105658](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105658.zip) Clarification on Paging carrier selection Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105659](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105659.zip) Guildelines for the design of coverage based paging carrier selection Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105919](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105919.zip) Considerations on the two paging carrier selection schemes Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2106076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106076.zip) Analysis of Rmax based solution and carrier-based solution Ericsson discussion Rel-17

[R2-2106198](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106198.zip) Carrier selection enhancement MediaTek Inc. discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2106380](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106380.zip) Network configuration for paging carrier selection Nokia Solutions & Networks (I) discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6

### 9.1.4 Other

Includes WI objectives led by other WGs.

[R2-2105318](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105318.zip) Further discussion on 16QAM for NB-IoT ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core R2-2103321

[R2-2105363](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105363.zip) Further discussion on 14 HARQ and DL TBS of 1736bits for eMTC ZTE Corporation, Sanechips discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2105660](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105660.zip) Support of DL TBS of 1736 bits for HD-FDD Cat. M1 Ues Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2106078](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106078.zip) Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson discussion Rel-17

[R2-2106158](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106158.zip) Total L2 Buffer Size for NB-IoT and LTE-M UEs Ericsson discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

* [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE)

 **Scope:** Discussion of open points in agenda item 9.1.4.

 **Intended outcome:** Report in [R2-2106603](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106603.zip)

 **Deadline:** Monday May 24 1200 UTC

[R2-2106603](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106603.zip) Report of [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE), ZTE

* Not treated due to lack of time
* Resubmit the report to the next meeting