**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](file:///D:\workfiles\RAN\RAN2\RAN2_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](file:///D:\workfiles\RAN\RAN2\RAN2_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](file:///D:\workfiles\RAN\RAN2\RAN2_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

[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

* [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](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106604.zip)

**Deadline:** Monday May 24 1200 UTC

[R2-2106604](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106604.zip) Report of [AT114-e][303][NBIOT/eMTC R16] PUR Corrections (ZTE), ZTE

**Proposal 1: To introduce parameter *ack-NACK-NumRepetitions* for *PUR-Config-NB*.**

**Proposal 1a: The CR in [R2-2106214] is revised with taking into account the following comments:**

* For the change in ASN.1, the comma after “OPTIONAL,” should be removed.
* To introduce *pur-PhysicalConfig-v16xy* to include the new parameter *ack-NACK-NumRepetitions-r16* for *PUR-Config-NB*.
* In the field description of *ack-NACK-NumRepetitions*, besides the definition of the parameter, to add “If this field is absent and no value was configured via *pur-Config*, the value of *ack-NACK-NumRepetitions* used for reception of this *RRCConnectionRelease-NB* is used” to address the case that this parameter is absent.
* The cover page needs to be improved accordingly.

**Proposal 2: The following corrections/clarifications can be agreed:**

* To clarify that before NTA is updated upon reception of RAR with TAC, it should be stored as a temporary NTA. Such temporary NTA should be restored if the RA procedure ultimately fails.
* To clarify PUR TAT should directly start or restart when RAR provides TAC and the RA procedure is successful.
* To handle the duplicated description of “*apply the Timing Advance Command…*” upon reception of TAC MAC CE in both 5.2 and 5.4.7.2 existing text.
* To clarify HARQ process ID in PUR is zero.

**Proposal 2a: The CR in [R2-2106277] is revised with taking into account the following comments:**

* UE can directly restart the PUR TAT when RA procedure is successful.
* In 5.2, to exclude PUR case from the description of “*apply the Timing Advance Command…*” upon reception of TAC MAC CE.
* To move the new change of storing NTA as temporary NTA from 5.4.7.2 to 5.2. And the condition is changed to “*if the UE is configured with pur-Config (see TS 36.331 [8]) and if a NTA has been stored or maintained*”.
* In the new change upon considering the Random Access procedure unsuccessfully completed, it should set the NTA to the stored temporary NTA, not the other way around.
* The cover page needs to be improved accordingly.

### 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

### 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. |

[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](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106601.zip)

**Deadline:** Monday May 24 1200 UTC

[R2-2106601](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106601.zip) [AT114-e][301][NBIOT/eMTC R17] NB-IoT Carrier Selection (Ericsson), Ericsson

Proposal 1 Rel-17 paging carriers and the legacy paging carriers should be exclusive.

Proposal 2 S1AP/NGAP update is not needed.

Proposal 3 support DRX based paging carrier selection

Proposal 4 For both options, NW configuration for Rel-17 paging carriers is indicated in broadcast signalling.

Proposal 5 For option 1, RAN 2 to 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 1d: Network explicitly confirms a suggested paging carrier based on a UE report.**

**Proposal 6 For option 2, RAN 2 to select Option 2a: NW provides the carrier explicitly via dedicated signalling based on information determined within the NW.**

Proposal 7 For both options, UE metric for determining carrier suitability and selection is based on one of the alternatives:

* Alt 1: measured NRSRP.

Proposal 8 For option 1, upon cell change: RAN2 to discuss

* Alt 1: based on previously determined CEL and broadcasted paging carrier configuration in the new cell.
* Alt 2: UE needs to perform fallback mechanism.

Proposal 9 For option 2, upon cell change, UE needs to perform fallback mechanism.

Proposal 10 For both options, upon coverage change within the cell:

* When radio condition remains or gets better, UE should remain on the current paging carrier.
* When radio condition deteriorates, UE should adopt to fallback mechanism.

Proposal 11 For both options, fall back carrier should be configured as:

* Alt 1: legacy paging carrier based on UE\_ID

[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](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106603.zip)

**Deadline:** Monday May 24 1200 UTC

[R2-2106603](file:///D:\workfiles\RAN\RAN2\RAN2_114-e\docs\R2-2106603.zip) Report of [AT114-e][302][NBIOT/eMTC R17] NB-IoT/eMTC Other (ZTE), ZTE

**Proposal 1: Confirm the working assumption: The support of 16-QAM uses separate UE capabilities for DL and UL.**

**Proposal 2: 16QAM is configured via dedicated signaling separately for UL and DL.**

**Proposal 3: The working assumption that the L2 buffer size is 12000 bytes for the UE supporting 16-QAM cannot be confirmed. The L2 buffer size is 16000 bytes for the UE supporting 16-QAM.**

**Proposal 4: Working assumption: From RAN2 perspective, 16QAM related channel quality reporting in Msg3 is not supported.**

**Proposal 5: Confirm the working assumption: No change to current L2 buffer size requirement for HD-FDD Cat M1 UEs supporting 14 HARQ processes in DL.**

**Proposal 6: The table 4.1A-1 in TS 36.306 for DL Category M1 needs to be updated to indicate 1736 bits TBS and 43008 soft channel bits.**

**Proposal 7: Max DL TBS of 1736 bits can be supported for PUR. FFS signaling details.**

**Proposal 8: Max DL TBS of 1736 bits is not supported for EDT.**