**3GPP TSG-RAN WG2 Meeting #117 electronic draftR2-2203517**

**Online, 21st February – 3rd March, 2022**

Agenda Item: 10.7

Source: Session Chair (Interdigital)

Title: [draft] Report NB-IoT breakout session

Document for: Approval

## General

Please see the following TDocs for e-meeting guidance:

[R2-2202101](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202101.zip) Agenda for RAN2#117-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.

* [AT117-e][300][NBIOT/eMTC] Organisational Brian’s Session (Session Chair)

**Status**: Started

 **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

* [AT117-e][301][NBIOT/eMTC R17] Carrier Selection (ZTE)

**Status**: Started

 **Scope:** Progress and converge on remaining open issues.

 **Intended outcome:** Report in R2-2203575,

 **Deadline:** Friday 25th February 1200 UTC

* [AT117-e][304][NBIOT R15] DRX active time after Scheduling Request or SPS BSR (Huawei)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203571, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

* [AT117-e][305][NBIOT R15] 2 HARQ processes and HARQ RTT timer (Ericsson)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203572, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

* [AT117-e][306][NBIOT R16] Random access on multicarrier (CMCC)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203573, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

* [AT117-e][307][NBIOT/eMTC R17] Reply LS to RAN3 on coverage based carrier selection (Nokia)

**Status**: Started

 **Scope:** draft the reply LS to indicate agreements

 **Intended Outcome:** Approved LS in R2-2203582

 **Deadline:** Friday 25th February 1200 UTC

* [AT117-e][308][NBIOT/eMTC R17] 36.331 CR (Qualcomm)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203577

 **Deadline:** EOM (likely continued post meeting)

* [AT117-e][309][NBIOT/eMTC R17] 36.306 CR (ZTE)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203578

 **Deadline:** EOM (likely continued post meeting)

* [AT117-e][310][NBIOT/eMTC R17] 36.300 CR (Huawei)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203579

 **Deadline:** EOM (likely continued post meeting)

* [AT117-e][311][NBIOT/eMTC R17] 36.302 CR (Huawei)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203580

 **Deadline:** EOM (likely continued post meeting)

* [AT117-e][312][NBIOT R16] PUR Response Window (Qualcomm)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203574, and revised CR (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

* [AT117-e][313][NBIOT/eMTC R17] 36.304 CR (Nokia)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203581

 **Deadline:** EOM (likely continued post meeting)

## 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.

[R2-2203214](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203214.zip) Correction to DRX active time after a Scheduling Request or a SPS BSR has been sent in NB-IoT Huawei, HiSilicon CR Rel-15 36.321 15.11.0 1528 - F NB\_IOTenh2-Core

[R2-2203215](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203215.zip) Correction to DRX active time after a Scheduling Request or a SPS BSR has been sent in NB-IoT Huawei, HiSilicon CR Rel-16 36.321 16.6.0 1529 - A NB\_IOTenh2-Core

* [AT117-e][304][NBIOT R15] DRX active time after Scheduling Request or SPS BSR (Huawei)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203571, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

[R2-2203571](file:///C%3A%5C%5CUsers%5Cbrian.martin%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5CRAN2%5CRAN2_117_e%5CDocs%5CR2-2203571.zip) Report of [AT117-e][304][NBIOT R15] DRX active time after Scheduling Request or SPS BSR (Huawei)) Huawei

**Observation 1**: SPS BSR is already covered by the specification

**Proposal 1:** RAN2 to confirm that SR using a dedicated NPRACH reource does not involve a RACH procedure and that C-DRX is applicable

* ZTE has double-checked and agree with this.

**Proposal 2:** RAN2 to discuss whether the change for SR using a dedicated NPRACH resource would be acceptable for Rel-17.

* QC thinks we would need a NW configuration as well as capability.
* Huawei agrees it would not be worth adding in Rel-17, it should be Rel-15 or nothing. Without this it does make the feature not so good.
* QC think if we have this we would have to ensure the CR is mandatory for the feature, and this is an optimisation to a frozen release. Ericsson agrees.
* Huawei think it is more of a correction than optimisation but can agree it is not an essential one.
* Not pursued

[R2-2203480](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203480.zip) Discussion on enabling 2 HARQ processes and HARQ RTT timer in NB-IoT Ericsson discussion NB\_IOTenh-Core

[R2-2203486](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203486.zip) Clarification on CDRX and two HARQ interaction for NB-IoT Ericsson CR Rel-14 36.321 14.13.0 1530 - F NB\_IOTenh-Core

[R2-2203495](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203495.zip) Clarification on CDRX and two HARQ interaction for NB-IoT Ericsson CR Rel-15 36.321 15.11.0 1531 - A NB\_IOTenh-Core

[R2-2203496](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203496.zip) Clarification on CDRX and two HARQ interaction for NB-IoT Ericsson CR Rel-16 36.321 16.6.0 1532 - A NB\_IOTenh-Core

* [AT117-e][305][NBIOT R15] 2 HARQ processes and HARQ RTT timer (Ericsson)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203572, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

[R2-2203572](file:///C%3A%5C%5CUsers%5Cbrian.martin%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5CRAN2%5CRAN2_117_e%5CDocs%5CR2-2203572.zip) Report for [AT117-e][305][NBIOT R15] 2 HARQ processes and HARQ RTT timer Ericsson

Proposal 1 RAN2 confirms that when multiple HARQ processes are configured, an HARQ process may be scheduled in the DL/UL while its corresponding DL/UL HARQ RTT timer is running if the UE is in active time due to another HARQ process.

Proposal 2 The discussion document is noted and the related CRs are not pursued.

- Huawei think this is a configuration issue in NW. ZTE thinks this has been discussed before and concluded that UE can’t monitor in the partial search space, so NW doesn’t schedule in this case.

- Ericsson think the proposal is not that UE should monitor during partial search space, just that the second HARQ process could be scheduled. Huawei thinks it amounts to the same thing, UE can only do one thing at a time. QC thinks the UE could receive PDCCH for the second HARQ process while timer is running for the first.

- Huawei think that this is a configuration issue, and even in case of this configuration it’s an optimisation.

* Check p1 offline [CB]

## 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 documents in 7.2 and 7.3 may be treated jointly.

[R2-2202633](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202633.zip) Discussion on the issue for random access on multicarrier for NB-IoT CMCC discussion Rel-16 NB\_IOTenh3-Core

[R2-2202634](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202634.zip) Solution for random access issue on multiCarrier in NB-IoT CMCC draftCR Rel-16 36.331 16.7.0 F NB\_IOTenh3-Core

[R2-2202635](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202635.zip) Solution for random access issue on multiCarrier in NB-IoT CMCC draftCR Rel-16 36.321 16.6.0 F NB\_IOTenh3-Core

* [AT117-e][306][NBIOT R16] Random access on multicarrier (CMCC)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203573, and revised CRs (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

[R2-2203573](file:///C%3A%5C%5CUsers%5Cbrian.martin%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5CRAN2%5CRAN2_117_e%5CDocs%5CR2-2203573.zip) Offline discussion on the issue for Random Access on multicarrier for NB-IoT CMCC

(7/8)Proposal 1: The current implementation solutions to address the UL interference in non-anchor carrier would cause unnecessary UL resources waste for UEs in anchor carrier, e.g., increasing the UL repetition numbers configured for the anchor carrier or using smaller RSRP threshold to shrink the coverage of anchor carrier.

(4/8)Proposal 2: To solve the uplink interference issue, introduce a new RSRP threshold list for each non-anchor carrier for random access to determine the UE’s CE level on non-anchor carrier.

* ZTE, HW are fine with this. HW thinks it could be optional for the UE.
* QC thinks it could be solved by NW deployment, this would also solve for legacy UEs. Sequans agree.
* CMCC thinks it is useful to optimise for new UEs, it wont impact legacy UEs negatively. Without a solution the legacy UEs are negatively impacted.
* Nokia thinks UE can already escalate coverage level during Msg1 transmission, so does the threshold reallly need to be statically configured, and also the edge of coverage/last coverage level needs increased repetitions. Huawei thinks in this case the last coverage level may not be configured. QC thinks that unless we solve the deep coverage then the problem may not be solved. Huawei thinks this carrier may not configure the last coverage level.
* ZTE thinks the NW deployment solution can help some UEs but only at the expense of others.
* Mediatek agree with QC, and even if we do have a new solution the implementation solution is still required.
* CMCC thinks PRACH is a bottleneck, if we increase repetition number for Msg1 it affects RACH capacity. The implementation solution does not work well.
* QC thinks the proposed solution may cause other problems, we would need to consider this. CMCC thinks the solution does not force UEs from coverage level 1 to 2. Nokia agrees with QC. HW, ZTE don’t agree with QC and Nokia comments, the solution doesn’t cause the problems claimed.
* Ericsson thinks we would need p2 and p4, so it impacts NW and UE and would be OK with this.

(5/7)Proposal 3: No specification impact to deduce NRSRP measurement results for the non-anchor carrier, i.e., it can be either deduced by using nrs-PowerOffsetNonAnchor or measured by the UE on this non-anchor carrier.

(5/7)Proposal 4: Exclude the carriers with worse CEL than the anchor carrier when building the list of NPRACH resources. Then the selection mechanism is as per legacy. Capture a single sentence in MAC in section 5.1.2.

Proposal 5: If the solution is agreeable, RAN2 to check the CRs during the second week.

* Continue the offline discussion, how solution works and look at CR [cb]

[R2-2203724](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203724.zip) Correction to pur-ResponseWindowTimer and removal of pur-ResponseWindowSize Qualcomm Incorporated, Huawei, HiSilicon CR Rel-16 36.321 16.6.0 1534 - F NB\_IOTenh3-Core, LTE\_eMTC5-Core Late

* Agreed
* [AT117-e][312][NBIOT R16] PUR Response Window (Qualcomm)

**Status**: Started

 **Scope:** Discussion of whether correction is needed, and work on the CRs.

 **Intended outcome:** Report in R2-2203574, and revised CR (if needed – Tdocs can be allocated if necessary).

 **Deadline:** Thursday 24th February 1200 UTC

[R2-2203574](file:///C%3A%5C%5CUsers%5Cbrian.martin%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5CRAN2%5CRAN2_117_e%5CDocs%5CR2-2203574.zip) Report on [AT117-e][312][NBIOT R16] PUR Response Window (Qualcomm) Qualcomm

* noted

## 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: 1 tdocs

### 9.1.1 Organizational

LS in

36.300 running CR (Huawei)

36.331 running CR (Qualcomm)

36.304 running CR (Nokia)

36.306 running CR (ZTE)

[R2-2202124](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202124.zip) LS on Coverage-Based Carrier Selection (R3-221162; contact: Nokia) RAN3 LS in Rel-17 To:RAN2

* Noted
* We aim to reply ASAP
* [AT117-e][307][NBIOT/eMTC R17] Reply LS to RAN3 on coverage based carrier selection (Nokia)

Status: Started

 **Scope:** draft the reply LS to indicate agreements

 **Intended Outcome:** Approved LS in R2-2203582

 **Deadline:** Friday 25th February 1200 UTC

[R2-2202427](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202427.zip) Introduction of NB-IoT/eMTC Enhancements Qualcomm Incorporated CR Rel-17 36.331 16.7.0 4760 - B NB\_IOTenh4\_LTE\_eMTC6-Core

* Revised in in R2-2203577
* [AT117-e][308][NBIOT/eMTC R17] 36.331 CR (Qualcomm)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203577

 **Deadline:** EOM (likely continued post meeting)

[R2-2202743](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202743.zip) 36306 running CR for NB-IoT eMTC ZTE Corporation, Sanechips CR Rel-17 36.306 16.7.0 1841 - B NB\_IOTenh4\_LTE\_eMTC6-Core

* Revised in in R2-2203578
* [AT117-e][309][NBIOT/eMTC R17] 36.306 CR (ZTE)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203578

 **Deadline:** EOM (likely continued post meeting)

[R2-2203216](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203216.zip) Introduction of Rel-17 enhancements for NB-IoT and eMTC Huawei, HiSilicon CR Rel-17 36.300 16.7.0 1354 - B NB\_IOTenh4\_LTE\_eMTC6-Core

* Revised in in R2-2203579
* [AT117-e][310][NBIOT/eMTC R17] 36.300 CR (Huawei)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203579

 **Deadline:** EOM (likely continued post meeting)

[R2-2203217](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203217.zip) Introduction of Rel-17 enhancements for NB-IoT and eMTC Huawei, HiSilicon CR Rel-17 36.302 16.1.0 1211 - B NB\_IOTenh4\_LTE\_eMTC6-Core

* Revised in in R2-2203580
* [AT117-e][311][NBIOT/eMTC R17] 36.302 CR (Huawei)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203580

 **Deadline:** EOM (likely continued post meeting)

[R2-2203581](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203581.zip) Introduction of Rel-17 enhancements for NB-IoT and eMTC Nokia CR Rel-17 36.304 16.6.0 0844 - B NB\_IOTenh4\_LTE\_eMTC6-Core

* Revised in in R2-2203581
* [AT117-e][313][NBIOT/eMTC R17] 36.304 CR (Nokia)

**Status**: Starts Monday 28th February

 **Scope:** Update and work on the CR, include latest agreements

 **Intended Outcome:** Agreed CR in R2-2203581

 **Deadline:** EOM (likely continued post meeting)

### 9.1.2 Open Issues

Outcomes of:

[Pre117-e][301][NBIOT/eMTC R17] NB-IoT carrier selection (ZTE)

[Pre117-e][302][NBIOT/eMTC R17] Capabilities open issues (Huawei)

[Pre117-e][303][NBIOT/eMTC R17] Other open issues (Ericsson)

[R2-2202739](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202739.zip) Report of [Pre117e-301] Carrier selection open issues ZTE Corporation, Sanechips report Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core Late

**Proposals for easy agreement:**

Proposal 1: RAN2 introduces a new ue-SpecificDRX-CycleMin parameter which is configured per coverage level.

Proposal 2a: Same rules, e.g., to wait [xx] seconds or avoid paging carrier switching in PTW would be applied no matter UE selects legacy paging carrier or coverage-based paging carrier.

* Ericsson think this is OK as long as it happens between 2 consecutive paging occasions

Proposal 3: CQI report in Msg5 is conditionally mandatory for R17 UE that supports Rel-17 paging carrier selection. No other UE report is supported.

* QC think this report only provides a short term view and may not be suitable for longer term configuration of paging carrier, the report is not intended for this purpose and have a serious concern with this. Nokia thinks this report is not essential. Sequans, Thales agree with QC.
* Ericsson think this is better than nothing. Huawei thinks it is useful for eNB, and it is not the only information that can be used.
* Sequans think it can be supported and configured but conditionally mandatory is not necessary.

Proposal 4: RAN2 use the way of extending PCCH-ConfigList-NB to provide the R17 paging carrier list configuration in SIB.

Proposal 5a: It’s RAN2 assumption that the assigned information to UE in dedicated signaling also need to be delivered to core network and sent back to eNB in next paging.

Proposal 5b: UEPagingCoverageInformation RRC container is used to deliver the assigned information to UE in dedicated signaling to core network and sent back to eNB. A response LS to RAN3 would be sent as early as possible.

Proposal 6: It’s suggested to refine a previous agreement as below:

• In SIB, coverage specific nB is supported, e.g., a common nB value is configured for the R17 paging carrier(s) with same Rmax (npdcch-NumRepetitionPaging) coverage level.

**Proposal for further discussion:**

Proposal 2b: RAN2 discuss and make choice in the following options for reducing paging carrier switching:

• Option 1: For the case with eDRX configuration, just to simply specify that UE does not switch paging carrier within a PTW. For the case without eDRX configuration, a timer is specified to reduce paging carrier switching.

• Option 2: Only one timer is specified to reduce paging carrier switching in all the cases, e.g., regardless of whether UE is in PTW.

Proposal 2c: This timer in Option 1 or Option 2 in Proposal 2b can be started after UE selects legacy paging carrier or coverage-based paging carrier. UE is allowed to switch paging carrier if timer expires.

Proposal 2d: The length of the timer in Option 1 or Option 2 in Proposal 2b is configurable. RAN2 further discuss what’s the unit of the timer: DRX cycle or seconds?

|  |
| --- |
| Agreements* RAN2 introduces a new ue-SpecificDRX-CycleMin parameter which is configured per coverage level.
* Same rules, e.g., to wait a certain period of time or avoid paging carrier switching in PTW would be applied no matter UE selects legacy paging carrier or coverage-based paging carrier.
* RAN2 use the way of extending PCCH-Config-NB to provide the R17 paging carrier list configuration in SIB.
* It’s RAN2 assumption that the assigned information to UE in dedicated signaling also need to be delivered to core network and sent back to eNB in next paging.
* UEPagingCoverageInformation RRC container is used to deliver the assigned information to UE in dedicated signaling to core network and sent back to eNB. A response LS to RAN3 would be sent as early as possible.
 |

* [AT117-e][301][NBIOT/eMTC R17] Carrier Selection (ZTE)

**Status**: Started

 **Scope:** Progress and converge on remaining open issues.

 **Intended outcome:** Report in R2-2203575

 **Deadline:** Friday 25th February 1200 UTC

[R2-2202745](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202745.zip) ASN.1 issue and RAN3 impact of carrier selection ZTE Corporation, Sanechips discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2203218](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203218.zip) Report of [Pre117-e][302][NBIOT/eMTC R17] Capabilities open issues (Huawei) Huawei, HiSilicon report Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core Late

[R2-2203384](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203384.zip) Report on [Pre117-e][303][NBIOTeMTC R17] Other open issues (Ericsson) Ericsson report Rel-17 Late

### 9.1.3 Other