**3GPP TSG-RAN WG2 Meeting #116 electronic draftR2-2111297**

Online, November, 2021

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:

R2-2109300 Agenda for RAN2#116-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.

* [AT116-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

* [AT116-e][301][NBIOT R15R16] NB-IoT minor corrections (Huawei)

 **Scope:** Agreement of CRs in [R2-2110471](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110471.zip) and [R2-2110472](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110472.zip).

 **Intended outcome:** Phase 1: Poll for support and comments with report in [R2-2111391](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111391.zip). Phase 2: Agreed CRs (TBD).

 **Deadline:** Phase 1: Wed 3 Nov, 1200 UTC, Phase 2: TBD depending on comments.

* [AT116-e][302][NBIOT R16] Random access on multiCarrier in NB-IoT (CMCC)

 **Scope:** Discuss issues in [R2-2110240](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110240.zip). Agreement of CRs in [R2-2110241](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110241.zip) and [R2-2110762](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110762.zip).

 **Intended outcome:** Phase 1: Poll for support and comments with report in [R2-2111392](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111392.zip). Phase 2: Agreed CRs (TBD)

 **Deadline:** Phase 1: Wed 3 Nov, 1200 UTC, Phase 2: TBD depending on comments.

* [AT116e][303][NBIOT/eMTC] RLF measurements (Qualcomm)

 Scope: Conclude the FFS on RLF measurements

 Intended outcome: Report in R2-2111393

 Deadline: Monday 8 Nov 1200 UTC

* [AT116e][304][NBIOT/eMTC] NB-IoT carrier selection (ZTE)

 Scope: Clarify option 1c details including cell change. Decide between option 1c and 2a.

 Intended outcome: Report in R2-2111394 and decision between 1c and 2a.

 Deadline: Monday 8 Nov 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.

[R2-2110471](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110471.zip) Correction to NB-IoT measurements Huawei, HiSilicon CR Rel-16 36.300 16.6.0 1348 - F NB\_IOT-Core, TEI16

* [AT116-e][301][NBIOT R15R16] NB-IoT minor corrections (Huawei)

 **Scope:** Agreement of CRs in [R2-2110471](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110471.zip) and [R2-2110472](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110472.zip).

 **Intended outcome:** Phase 1: Poll for support and comments with report in [R2-2111391](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111391.zip). Phase 2: Agreed CRs (TBD).

 **Deadline:** Phase 1: Wed 3 Nov, 1200 UTC, Phase 2: TBD depending on comments.

[R2-2111391](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111391.zip) [AT116-e][301][NBIOT R15R16] NB-IoT minor corrections (Huawei)

* The contents of the CR in R2-2110471 is agreed. The CR can be merged to TS 36.300 rapporteur CR in R2-2110805. (Offline-205)
* The intention of the CR in R2-2110472 is agreed.
* Agree on a CR revised with the following two changes, adding description of description of *npdsch-ConfigDedicated* field and moving description of additionalTxSIB1-Config to the top of the table.

## 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.

* [AT116-e][302][NBIOT R16] Random access on multiCarrier in NB-IoT (CMCC)

 **Scope:** Discuss issues in [R2-2110240](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110240.zip). Agreement of CRs in [R2-2110241](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110241.zip) and [R2-2110762](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110762.zip).

 **Intended outcome:** Phase 1: Poll for support and comments with report in [R2-2111392](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111392.zip). Phase 2: Agreed CRs (TBD)

 **Deadline:** Phase 1: Wed 3 Nov, 1200 UTC, Phase 2: TBD depending on comments.

[R2-2111392](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111392.zip) Offline discussion on the issue for Random Access on multicarrier for NB-IoT, CMCC

* QC thinks it was not clear that this is also an UL issue, thinks the DL is like this by design and it is not clear we need to do anything as the existing specification already allows to correct the issue. CMCC think the UL issue would be due to neighbour cell interference differing per carrier on the current cell. Nokia thinks the repetitions should be designed for the worst interference carrier so this can also be solved by implementation.
* Ericsson wonder if this is standalone deployment only? CMCC thinks the issue has been detected for the standalone case. Ericsson agrees with the problem but would like time to check how this can be solved. QC also think we need to check particularly for the UL, and whether the proposed solutions introduce other problems.
* ZTE thinks some of the issues can be addressed by deployment but there could also be some spec impact.
* RAN2 confirm the following scenario is valid, for standalone deployment: EPRE of non-anchor carrier smaller than EPRE of anchor cell. Non-anchor carrier is deployed on the same frequency with anchor carrier of neighbouring cell.
* RAN2 confirm the following issue exists:
	+ - DL issue: Due to lower EPRE of non-anchor than EPRE of anchor cell, shrunken coverage of non-anchor carrier may results to MSG2 failure.
		- UL issue: Non-anchor carrier suffered more UL interference than anchor carrier for the same cell, due to intra-frequency interference from anchor carrier of neighbouring cell. This may degrade uplink performance, e.g., MSG 1 failure on non-anchor carrier.
* postponed

[R2-2110240](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110240.zip) Discussion on the issue for Random Access on multicarrier for NB-IoT CMCC discussion

[R2-2110241](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110241.zip) Solving the issue for random access on multiCarrier in NB-IoT CMCC draftCR Rel-16 36.331 16.6.0 B NB\_IOTenh3-Core

[R2-2110762](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110762.zip) Solving the issue for random access on multiCarrier in NB-IoT CMCC draftCR Rel-16 36.321 16.6.0 F NB\_IOTenh3-Core Late

[R2-2110472](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110472.zip) Correction to DL Multi-TB scheduling in NB-IoT Huawei, HiSilicon CR Rel-16 36.331 16.6.0 4734 - F NB\_IOTenh3-Core

* Revised in [R2-2111395](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111395.zip)

[R2-2111395](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111395.zip) Correction to DL Multi-TB scheduling in NB-IoT Huawei, HiSilicon CR Rel-16 36.331 16.6.0 4734 1 F NB\_IOTenh3-Core

* Agreed

## 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

Including outcome of [Post115-e][304][NBIOT/eMTC R17] 36.300 running CR (Huawei)

Including outcome of [Post115-e][305][NBIOT/eMTC R17] 36.331 running CR (Qualcomm)

[R2-2110477](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110477.zip) Running CR: Introduction of Rel-17 enhancements for NB-IoT and eMTC Huawei draftCR Rel-17 36.300 16.6.0 B NB\_IOTenh4\_LTE\_eMTC6-Core

* Endorsed as baseline

[R2-2110692](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110692.zip) [Running CR] Introduction of NB-IoT/eMTC Enhancements Qualcomm Incorporated draftCR Rel-17 36.331 16.6.0 NB\_IOTenh4\_LTE\_eMTC6-Core

* Endorsed as baseline

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

Including outcome of [Post115-e][301][NBIOT/eMTC R17] RLF measurements (Huawei)

Contributions invited on open issues not covered by email discussion

[R2-2110476](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110476.zip) Summary of [301] RLF measurements (Huawei) Huawei report Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

**Proposal 1:** NW signals two separate thresholds for intra- and inter-frequency measurements.

* Ericsson wonder how useful this really is. Huawei think this doesn’t really help. QC thinks it is logical to define the criteria in a similar way as idle mode.

**Proposal 2**: RAN2 to further discuss enabling/disabling of the variance criteria in broadcast signalling.

* QC thinks that if the UE supports this in idle mode it can be used in connected too.
* Ericsson think we are re-using the idle mode mechanism, not introducing a new one.
* ZTE thinks dedicated signalling is needed. ZTE thinks this criteria may not always be used.
* QC wonders if the intention is to enable/disable or to provide separate values compared to idle mode.

**Proposal 3:** The values of s-SearchDeltaP and TSearchDeltaP can be different in RRC\_CONNECTED and RRC\_IDLE, they are signalled in a separate set of parameters.

* Ericsson and QC thinks we have to define what happens upon state transition.

**Proposal 4:** RAN2 to discuss support of an indication that the UE starts measurement based on contributions describing solutions.

* QC have provided some solution details in 0693 and think that it is necessary to have sufficient gaps to perform the measurements. QC thinks we may alternatively have to specify that no measurements are required in certain cases.
* Ericsson think the WID explicitly mentions no new gaps, if the NW knows UE capability then this should be enough. Thales agrees. QC thinks this is not the same as the gaps mentioned in the WID.
* Nokia thinks there is some benefit. Huawei thinks the feature is mainly for UEs in normal coverage so large gap shouldn’t be needed.
* Sequans wonders how reliable the indication would be considering this is during RLF.
* QC wonders what happens in the cases that RAN4 requirements can’t be met.

**Proposal 5:** No enhancement is introduced to have a shorter T310 timer for mobile UEs supporting connected mode measurement.

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| Agreements* NW signals two separate thresholds for intra- and inter-frequency measurements.
* The values of *s-SearchDeltaP* and *TSearchDeltaP* maybe different in RRC\_CONNECTED and RRC\_IDLE, they are signalled in a separate set of parameters.
	+ s-SearchDeltaP has the same value range as the existing RRC\_IDLE parameter
	+ FFS how to define TSearchDeltaP
	+ FFS how to specify the state change
	+ FFS whether NW can disable / what happens when the IEs are absent
* [FFS] An indication that the UE starts measurement is not introduced.
* No enhancement is introduced to have a shorter T310 timer for mobile UEs supporting connected mode measurement.
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* [AT116e][303][NBIOT/eMTC] RLF measurements (Qualcomm)

 Scope: Conclude the FFS on RLF measurements

 Intended outcome: Report in R2-2111393

 Deadline: Monday 8 Nov 1200 UTC

[R2-2109913](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2109913.zip) Discussion on connected mode measurement in NB-IoT Ericsson discussion Rel-17

[R2-2110109](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110109.zip) Remaining FFSs on RLF measurements ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2110147](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110147.zip) Network assistance for Re-establishment enhancement Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2110474](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110474.zip) Relaxed monitoring in RRC connected mode Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2110693](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110693.zip) Consideration on open issues for neighbour cell measurement in RRC connected state Qualcomm Incorporated 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

Including outcome of [Post115-e][302] [NBIOT/eMTC R17] carrier selection (Ericsson)

Contributions invited on open issues not covered by email discussion

[R2-2109911](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2109911.zip) Report of email discussion [302] [NBIOT/eMTC R17] Carrier Selection Ericsson discussion Rel-17 Late

* ZTE thinks some of the proposals don’t reflect the discussion.

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| Agreements* DRX is not used a criterion that needs to be explicitly considered for paging carrier selection.
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* [AT116e][304][NBIOT/eMTC] NB-IoT carrier selection (ZTE)

 Scope: Clarify option 1c details including cell change. Decide between option 1c and 2a.

 Intended outcome: Report in R2-2111394 and decision between 1c and 2a.

 Deadline: Monday 8 Nov 1200 UTC

[R2-2109912](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2109912.zip) Analysis of Rmax based solution and carrier-based solution Ericsson discussion Rel-17

[R2-2110110](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110110.zip) Option1c for CEL-based paging carrier selection ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2110148](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110148.zip) Paging strategy impacts for coverage based paging carrier selection Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2110149](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110149.zip) Network configuration for paging carrier selection based on coverage level Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2110191](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110191.zip) Further discussion on enhanced paging carrier selection NEC Corporation discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core R2-2107391

[R2-2110475](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110475.zip) Discussion on coverage based paging carrier Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2110694](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110694.zip) Further consideration on open issues for coverage-based paging carrier selection Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2110695](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110695.zip) Signalling for coverage-based paging carrier selection Qualcomm Incorporated discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2111113](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2111113.zip) Discussion on details of paging carrier selection options MediaTek Inc. discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

### 9.1.4 Other

Includes WI objectives led by other WGs.

[R2-2109914](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2109914.zip) Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson discussion Rel-17

[R2-2110111](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110111.zip) Remaining FFSs on 16QAM for NB-IoT ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core R2-2107764

[R2-2110112](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110112.zip) Remaining FFSs on 1736bits TBS for eMTC ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core R2-2107763

[R2-2110473](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110473.zip) L2 buffer size calculations for eMTC and NB-IoT enhancements Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core R2-2107431

[R2-2110800](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Docs/R2-2110800.zip) On remaining issues of 16QAM Nokia Solutions & Networks (I) discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6

* Above documents are noted
* For CQI reporting, wait for RAN1/RAN4 progress

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| Agreements* No change to existing L2 buffer requirements for supporting 1736bits TBS for eMTC
* Confirm the working assumption of 12000 bytes for DL 16QAM for NB-IoT
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