3GPP TSG-RAN WG2 #117-e R2-22xxxx

Electronic meeting, 2022-02-21 - 2022-03-03

Agenda Item: 9.1.4

Source: Ericsson

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

Document for: Discussion, Decision

# 1 Introduction

This document is to lick off below email discussion.

* [Pre117-e][303][NBIOT/eMTC R17] (Ericsson)

Agreements in this area are listed below:

### NB-IoT 16-QAM for unicast in UL and DL

|  |
| --- |
| RAN2#113bis-e agreements:   * Working assumption: For the UE supporting 16-QAM, the L2 buffer size is 12000 bytes. * Working assumption: Support of 16-QAM has separate UE capabilities for DL and UL   RAN2#114-e agreements: None  RAN2#115-e agreements:   * Confirm the working assumption: The support of 16-QAM uses separate UE capabilities for DL and UL. * 16QAM is configured via dedicated signaling separately for UL and DL. * A NPUSCH 16QAM activation indication is needed in PUR configuration.   RAN2#116-e agreements:   * Confirm the working assumption of 12000 bytes for DL 16QAM for NB-IoT |

### 14 HARQ processes in DL for HD-FDD Cat M1 UEs

|  |
| --- |
| RAN2#113bis-e agreements:   * 14 HARQ activation is configured by dedicated RRC signalling. * Working assumption: No change to current L2 buffer size requirement   RAN2#114-e agreements: None  RAN2#115-e agreements:   * Confirm the working assumption: No change to current L2 buffer size requirement for HD-FDD Cat M1 UEs supporting 14 HARQ processes in DL. |

Paper submitted in RAN2#116bis-e

[R2-2200677](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip) On thje open issues for 16QAM for NB-IoT Nokia, Nokia Shanghai Bells discussion Rel-17

[R2-2200683](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200683.zip) Remaining FFSs on 16QAM for NB-IoT and 1736bits TBS for eMTC ZTE Corporation, Sanechips discussion NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2201078](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201078.zip) Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson discussion Rel-17

[R2-2201449](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201449.zip) CQI reporting for 16QAM DL Huawei, HiSilicon discussion Rel-17 NB\_IOTenh4\_LTE\_eMTC6-Core

[R2-2201448](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201448.zip) Introduction of Rel-17 enhancements for NB-IoT and eMTC Huawei, HiSilicon draftCR Rel-17 36.302 16.1.0 B NB\_IOTenh4\_LTE\_eMTC6-Core

# 2 Open Issue List

The resolution proposed is based upon below

1. **Each open issue** should be associated with **suggested treatment/handling**.
   1. **Company input into Pre117-e-offline (i.e. no company tdocs)**
   2. Company tdocs invited.
   3. CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting).
   4. Other, e.g. immature area, reference to dependency, unclear status etc.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Slogan | Open Issue | Criticality | Remark | Resolution |
| CQI Reporting extension for 16 QAM in msg3 | Is CQI Reporting extension for 16 QAM in msg3 should be supported? [[R2-2200677](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip)] | low | RAN1 agreed that The channel quality report is not supported in Msg3 in connected mode in Rel-17.  Further, [R2-2200683](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200683.zip) suggest 16QAM related channel quality report in Msg3 in idle mode is not supported.  We can follow this suggestion and agree that in Rel-17 16QAM related channel quality report in Msg3 in idle mode is not supported. | Company input into Pre117-e-offline (i.e. no company tdocs) |
| supporting 16 QAM for MT EDT | Is 16 QAM for MT EDT supported? [[R2-2200677](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip)] | low | Not necessary to consider this optimization in this release; i.e not needed to complete the 16QAM feature in connected mode. | Company input into Pre117-e-offline (i.e. no company tdocs) |
| Trigger for 16QAM | Is trigger for 16QAM needed, if yes which trigger to use | Medium | legacy Downlink Channel Quality Report Command MAC CE can be reused to trigger the 16QAM related channel quality. | Pre-117e-Offline |
| Code Points for 16QAM | How to report CQI for 16QAM [[R2-2200677](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200677.zip)] | medium | For connected mode CQI Reporting for 16 QAM use of R bits or unused code-points of NPDCCH-CQI can be considered. R2-2200093 Rapporteur of the TS from MAC and RRC should consider updating. | Pre-117e-Offline |
| Implementation of RAN1 parameterlist | Capturing of RAN1 parameter list and RAN1 agreements | high | TS 36.331 Running CR Rapporteur may check the TP [R2-2201078](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201078.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201078.zip) and RAN1 parameter list and take any missing attributes into account | CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting) |
| Field description of ***npusch-MCS*** | *Is field description update as below suggetsed in* [R2-2201078](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201078.zip) *agreeable?*  *npusch-MCS* Index to tables specified in TS 36.213 [23], Table 16.5.1.2-1 and Table 16.5.1.2-2 for single tone and multi tone respectively, that defines modulation and TBS index for NPUSCH for PUR. In case of pur-UL-16QAM-Config is true, multiTone index is used, for the guardband and standalone modes the 16-QAM MCS index is equal to multiTone + 14, for the inband mode the 16-QAM MCS index is equal to multiTone + 11. | Medium | Instead of using new ASN.1 bits; PUR-UL-16QAM-Config-NB-r17 ::= SEQUENCE {  npusch-MCS-r17 INTEGER (14..21)  } the field description can be updated. TS 36.331 rapporteur can take into consideration | CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting) |
| Stage 2 for 16QAM | *How to capture stage2 for 16QAM?* | Medium | Adopt the CR [R2-2201448](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201448.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201448.zip) | Pre-117e-Offline |
| TBS Size | *Support of TBS size 1736 bits with other features* | Low | Check the below proposals in next meeting. **Proposal 2: RAN2 confirm that DL TBS of 1736 bits can be supported in multi-TB scheduling.**  **Proposal 3a: DL TBS of 1736 bits is not supported in SC-PTM.**  **Proposal 3b: DL TBS of 1736 bits is not supported in EDT.** | Company input into Pre117-e-offline (i.e. no company tdocs) |

# 3 Discussion on Open Issue List

## 3.1 CQI Report for16QAM in Msg3

Question 1: Should CQI Reporting extension for 16 QAM in msg3 be supported?

**Please provide the comments on the Question here:**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No |  |
| Huawei, HiSilicon | No | For MSG3, UE is configured with QPSK so what would be the benefit to report a smaller range |
| Qualcomm | No | For MSG3 sent in connected mode RAN1 conclusion is not to support 16QAM CQI reporting.  For MSG3 sent during idle mode (e.g., during connection establishment or EDT), 16QAM CQI does not apply because UE would not have any 16QAM metrics to report. |
| ZTE | No | As rapporteur mentioned, RAN1 has concluded that 16QAM related channel quality reporting is not supported in Msg3 in connected mode in Rel-17.  If we want to support 16QAM related channel quality reporting in Msg3 in idle, changes to the specs may be much, e.g:   1. The eNB needs to broadcast an indication to indicate whether 16QAM related channel quality reporting in Msg3 is allowed. 2. Only three remaining values in CQI-NPDCCH-NB can be used and no value can be used in CQI-NPDCCH-Short-NB. If CQI-NPDCCH-NB is used, only three values of 16QAM related channel quality can be reported in Msg3, which is too limited. Or we can consider to introduce larger Msg3 Size. But this may lead radio resource waste and power consumption for legacy UE.   Therefore, we suggest 16QAM related channel quality reporting in Msg3 in idle mode is not supported. |
| MediaTek | No | Agree with ZTE. |
| Ericsson | No |  |
|  |  |  |
|  |  |  |

Summary of section 3.1: 5 companies replied, and all have the same view that CQI report for 16QAM in Msg3 is not supported

1. UE does not provide CQI report for 16QAM in MSG3.

## 3.2 16QAM feature support for MT-EDT

Question 2: Is 16 QAM for MT EDT to be supported?

**Please provide the comments on the Question here:**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No |  |
| Huawei, HiSilicon | No | We do not see how the UE would know as MSG4 in EDT uses the MAC/PHY default configuration |
| Qualcomm | No | RAN1 has agreed to not support 16QAM with EDT for both UL and DL. |
| ZTE | No | Agree with above comments. |
| MediaTek | No |  |
| Ericsson | No |  |
|  |  |  |
|  |  |  |

Summary of section 3.2: 5 companies replied, and all have the same view that 16 QAM for MT EDT is not supported

1. 16QAM feature is not supported for MT-EDT.

## 3.3 Trigger for 16QAM

Question 3: Is trigger for 16QAM needed, if yes which trigger to use?

1. legacy Downlink Channel Quality Report Command MAC CE can be reused to trigger the 16QAM related channel quality.
2. Any Other
3. No trigger needed

**Please provide the comments on the Question here:**

|  |  |  |
| --- | --- | --- |
| Company | OPTIONS (A/B/C) |  |
| Huawei, HiSilcion | Not C | We think a trigger is needed for reporting in connected mode, same as in legacy.  Whether we can use the legacy trigger depends on RAN1 whether the UE can be asked or not to report one or the other table. |
| Qualcomm | A | No technical reason to have a new trigger. |
| ZTE | A |  |
| MediaTek | A |  |
| Ericsson | A |  |
|  |  |  |
|  |  |  |

Summary of section 3.3: 5 companies replied, 4 companies view that legacy trigger can be reused whereas one of the companies’ view is that whether the legacy trigger can be reused depends on RAN1 decision on which table is used for DL-CQR.

1. WA: Legacy Downlink Channel Quality Report Command MAC CE is reused to trigger the channel quality report for 16QAM.

## 3.4 Code Points for 16QAM

Question 4: How to report CQI for 16QAM?

* For connected mode CQI Reporting for 16 QAM use of R bits or unused code-points of NPDCCH-CQI can be considered.

**Please provide your solution on which code points for 16QAM needs to be used and please provide motivation.**

|  |  |
| --- | --- |
| Company | Solution: Which code points |
| Huawei, HiSilicon | We are not sure about the question. RAN1 has agreed on a new table that RAN4 has incorporated in their specification. There is no need for redefinition of any code points in RAN2  In MAC, we will just need to specify under which conditions one or the other table is used. This is pending on RAN1 discussion. |
| Qualcomm | We don’t think MAC needs to differentiate between reporting legacy reporting values and new reporting values.  The RAN1 has designed the new reporting values to include both QPSK and 16QAM CQIs. This means if UE is configured with 16QAM for NPDSCH then UE shall report the new values only and there would be no confusion at the eNB. |
| ZTE | We may have generally similar view as Huawei.  RAN1 has endorsed a new table which includes both QPSK and 16QAM CQIs. But the maximum repetitions is only 32. Since the legacy CQI-NPDCCH table has more NPDCCH repetition number, if NPDCCH repetition number is larger than 32, it is suitable that UE uses the legacy CQI-NPDCCH table to report the CQI-NPDCCH. In other cases, UE can use the new CQI table to report the (16QAM) CQI-NPDCCH. Therefore, we assume both legacy and new tables may be used by the UE and if this is the case, one reserved bit in the DCQR and AS RAI MAC control element can be used to indicate which table is used.  If only new table is allowed to use when 16QAM is configured, NPDCCH repetition number larger than 32 cannot be reported anymore even if NPDCCH repetition number larger than 32 is detected. |
| MediaTek | We should wait for RAN1 agreement of CQI table selection. If UE can autonomously select CQI table, one R bit in CQI reporting MAC CE should be used to indicate eNB which CQI table the UE is using. |
| Ericsson | We can wait for RAN1 to finalize |
|  |  |
|  |  |

Summary of section 3.4: 5 companies replied, majority of the company echo that RAN1 has defined a new table however which table UE shall use in which conditions are still not finalized.

1. Wait for RAN1 input to decide whether only new table is used for 16QAM reporting or also the legacy table.

## 3.5 Stage 2 for 16QAM

Question 1: Please review [R2-2201448](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201448.zip) and provide your comments.

**Please provide the comments on the Question here:**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No |  |
| Huawei. HiSilicon | Yes |  |
| Qualcomm | N/A | Draft CR in R2-2201448 looks fine. |
| ZTE | N/A |  |
| MediaTek | Yes |  |
| Ericsson | Yes | Draft looks fine |
|  |  |  |
|  |  |  |

Summary of section 3.5: 5 companies replied, all the companies are fine or have no comments for stage 2 16QAM; hence.

1. Draft CR in R2-2201448 for stage 2 16QAM description is endorsed.

## 3.6 TBS Size

Question 1: Do companies agree with the below proposals from paper [R2-2200683](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200683.zip)?

**Proposal 2: RAN2 confirm that DL TBS of 1736 bits can be supported in multi-TB scheduling.**

**Proposal 3a: DL TBS of 1736 bits is not supported in SC-PTM.**

**Proposal 3b: DL TBS of 1736 bits is not supported in EDT.**

**Please provide the comments on the Question here:**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No |  |
| Huawei, HiSilicon | Yes |  |
| Qualcomm | Yes |  |
| ZTE | Yes |  |
| Ericsson | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |

Summary of section 3.6: 5 companies replied, all the companies support the below proposal

1. RAN2 confirm that DL TBS of 1736 bits can be supported in multi-TB scheduling.
2. DL TBS of 1736 bits is not supported in SC-PTM.
3. DL TBS of 1736 bits is not supported in EDT.

## 3.7 Any Other

**Please provide the comments for anything missing:**

|  |  |
| --- | --- |
| Company |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Conclusion

Based on the discussion in the previous sections we propose the following:

[Proposal 1 UE does not provide CQI report for 16QAM in MSG3.](#_Toc95857615)

[Proposal 2 16QAM feature is not supported for MT-EDT.](#_Toc95857616)

[Proposal 3 WA: Legacy Downlink Channel Quality Report Command MAC CE is reused to trigger the channel quality report for 16QAM.](#_Toc95857617)

[Proposal 4 Wait for RAN1 input to decide whether only new table is used for 16QAM reporting or also the legacy table.](#_Toc95857618)

[Proposal 5 Draft CR in R2-2201448 for stage 2 16QAM description is endorsed.](#_Toc95857619)

[Proposal 6 RAN2 confirm that DL TBS of 1736 bits can be supported in multi-TB scheduling.](#_Toc95857620)

[Proposal 7 DL TBS of 1736 bits is not supported in SC-PTM.](#_Toc95857621)

[Proposal 8 DL TBS of 1736 bits is not supported in EDT.](#_Toc95857622)