**3GPP TSG RAN WG1 Meeting #106bis-e R1-21xxxxx**

**e-Meeting, October 11th – October 19th, 2021**

**Agenda Item: 8.9**

**Source: Moderator (Huawei)**

**Title: Feature lead summary #1 on 106bis-e-R17-RRC-NB-IoT-eMTC**

**Document for: Discussion and Decision**

# Introduction

In email discussion post RAN1#106-e, there were initial draft of RRC parameters for the WI [1].

This documents provides the proposals and summary of discussions of the corresponding email discussion on RRC parameters.

[106bis-e-R17-RRC-NB-IoT-eMTC] Email discussion on Rel-17 RRC parameters for Rel-17 NB-IoT and eMTC – Yubo (Huawei)

The RRC parameter list is located at:

# Discussion

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

**Issue 1-1: Configuration of PUR**

For the configuration of NPUSCH for PUR, there are two entries in brackets as following in the RRC parameter list.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NB\_IOTenh4\_LTE\_eMTC6 | 16QAM for NB-IoT | 36.211, 36.213 | 　 | 　 | 　 | enable16QAM-ul in PUR-config-NB | New | enable 16QAM for NPUSCH in PUR procedure | Enable/disable the use of 16QAM for NPUSCH in PUR procedure | Enable | disable | Per UE | UE specific | 36.331] | 　 |
| [NB\_IOTenh4\_LTE\_eMTC6 | 16QAM for NB-IoT | 36.211, 36.213 | 　 | 　 | 　 | npusch-MCS | FFS New or existing | the TBS index for NPUSCH for PUR | the TBS index for NPUSCH for PUR when 16QAM is configured | 14,15,…,21 | 　 | Per UE | UE specific | 36.331] | 　 |

The following are proposed regarding this issue:

|  |  |
| --- | --- |
| Sourcing | proposals |
| [4] | **Proposal 9: For supporting 16-QAM in PUR procedure,** * **One IE is introduced in pur-PhysicalConfig to enable the use of 16-QAM in NPUSCH**
	+ **The field multiTone in npusch-MCS in PUR NPUSCH configuration is modified to include MCS 0-21.**
* **One IE is introduced in pur-PhysicalConfig to enable the use of 16-QAM in NPDSCH**
	+ **Power ratios of NRS and NPDSCH are given in pur-PhysicalConfig**
 |
| [8] | Proposal 7 To support 16-QAM for NPDSCH and NPUSCH in PUR procedure,* 16-QAM can be enabled/disabled by UE specific RRC signaling in *PUR-Config-NB* for NPDSCH and NPUSCH separately.
	+ When 16-QAM is enabled for NPUSCH, the MCS indices, RU indices and UL power control parameter are indicated in *PUR-Config-NB*.
		- Note1: It’s up to RAN2 whether a new parameter or the legacy parameter is used to indicate the RU indices.
		- Note 2: There may be additional parameters if agreed.
	+ When 16-QAM is enabled for NPDSCH, the DL power allocation is indicated in *PUR-Config-NB*.
 |

For the enabler of 16-QAM for NPUSCH in PUR procedure, based on the inputs, the following is proposed:

Proposal 1: 16-QAM is enabled/disabled for NPUSCH in PUR procedure by a UE specific RRC signaling

* Option 1: in *PUR-config-NB*
* Option 2: in *pur-PhysicalConfig*
* Option 3: up to RAN2

For the indication of MCS indices, the following is proposed:

Proposal 2: If 16-QAM is enabled, the MCS indices of PUR NPUSCH is signaled by:

* Option 1: modification of field *multitone* to include MCS 0~21
* Option 2: a new field to signal the MCS 14~21
* Option 3: up to RAN2

The details of RRC parameters for NPDSCH in PUR procedure can be discussed if it’s agreed.

Please input your comments for the above proposal:

|  |  |
| --- | --- |
| Companies | Comments |
| Ericsson | For both Proposal 1 and Proposal 2, we think that Option-3 (i.e., “up to RAN2”) should be selected, especially because in our undestanding there is already a running CRs on TS 36.331 touching upon the PUR configuration  |
|  |  |
|  |  |

**Issue 1-2: Configuration for downlink power allocation**

This will be discussed once it’s agreed.

**Issue 1-3: Configuration for uplink power control**

This will be discussed once it’s agreed.

**Issue 1-4: Others**

Please input your comments on issues other than the above ones:

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| --- | --- |
| Companies | Comments |
|  |  |
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## Support additional PDSCH scheduling delay for introduction of 14-HARQ processes in DL for eMTC

Please input your comments in below table:

|  |  |
| --- | --- |
| Companies | Comments |
|  |  |
|  |  |
|  |  |

## Support a maximum DL TBS of 1736 bits as a Rel-17 optional UE capability

The following are proposed:

|  |  |
| --- | --- |
| Sourcing | proposals |
| [15] | **Proposal 1: Parameters on configuration of the maximum DL TBS for multicast and PUR in eMTC are not needed.** |

Please input your comments in below table:

|  |  |
| --- | --- |
| Companies | Comments |
| Ericsson | If multicast were supported, there will be an impact in the configuration of SC-MTCH provided via SC-MCCH. Thus, supporting multicast won’t be transparent, and as we expressed in the previous e-meeting, multicast used along with the new DL TBS of 1736 bits does not seem to be a relevant scenario that can provide significant gains as to justify the specification impacts (e.g., there might be very few UEs that implement multicast + larger TBS). Thus, we are only OK with supporting the larger TBS for connected mode features + PUR. |
|  |  |
|  |  |

# Summary

# References

1. R1-2108684, [Post-106-e-Rel17-RRC-09] Summary of email discussion on RRC parameters for Enhancements for NB-IoT and LTE-MTC, Moderator (Huawei), RAN1#106-e, Aug., 16th-27th, 2021.
2. R1-2108777 Support of 16QAM for unicast in UL and DL in NB-IoT Huawei, HiSilicon
3. R1-2109174 Support of 16-QAM for NB-IoT Qualcomm Incorporated
4. R1-2109314 Support of 16-QAM for NB-IoT Nokia, Nokia Shanghai Bell
5. R1-2109320 Support 16QAM for NBIoT Lenovo, Motorola Mobility
6. R1-2109337 Discussion on UL and DL 16QAM for NB-IoT ZTE, Sanechips
7. R1-2109559 Remaining Issues on supporting 16QAM in NB-IOT R17 MediaTek Inc.
8. R1-2110316 Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson
9. R1-2108778 Support of 14-HARQ processes in DL for HD-FDD MTC UEs Huawei, HiSilicon
10. R1-2109175 Support of 14 HARQ processes and scheduling delay Qualcomm Incorporated
11. R1-2109315 Support of 14-HARQ processes in DL for eMTC Nokia, Nokia Shanghai Bell
12. R1-2109338 Remaining issues on 14-HARQ processes in DL for eMTC ZTE, Sanechips
13. R1-2110317 Support of 14 HARQ processes in DL in LTE-MTC Ericsson
14. R1-2110318 On the support of 16-QAM for unicast in UL and DL for TDD NB-IoT Ericsson
15. R1-2110372 Discussion on RRC parameters for max DL TBS of 1736 bits Huawei, HiSilicon