**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  |
| Nokia, NSB | We don’t have a strong view here and we are OK to leave to RAN2. |
| ZTE, Sanechips | For both proposals, we are OK to leave it to RAN2. |

**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:

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

## 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. |
| Nokia, NSB | We share similar view as Ericsson.  |
| ZTE, Sanechips | We are OK to support PUR with 1736 bits. As for the multicast, we think the larger TBS still has some benefits for multicast transmission. However, we do not have the strong view here and can follow the majority views. |

# 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