**3GPP TSG RAN WG1 Meeting #104-e R1-21xxxxx**

**E-Meeting, January 25th – February 5th, 2021**

**Agenda Item: 6.1**

**Source: Moderator (Huawei)**

**Title: Feature lead summary #1 on [104-e-LTE-6.1CRs-03]**

**Document for: Discussion and Decision**

# Introduction

This documents summarizes the discussions on 1024QAM proposed by companies [1, 2]

[103-e-LTE-Rel17\_NB\_IoT\_eMTC-01] Email discussion on support of 16-QAM for unicast in UL and DL for NB-IoT – Yubo (Huawei)

* 1st check point: 11/5
* 2nd check point: 11/10
* 3rd check point: 11/12

# Discussion

## Issue 1: Correction on spectral efficiency of 1024QAM

|  |  |
| --- | --- |
|  |  |
| ***Reason for change:*** | For 1024QAM, the coding rate and efficiency in CQI table are not aligned. |
|  |  |
| ***Summary of change:*** | The efficiency in CQI table for 1024QAM is corrected to be aligned with the coding rate. |
|  |  |
| ***Consequences if not approved:*** | There may be ambiguity for UEs to calculate the CQI value to be reported. |

<Changes to TS 36.213>

<Unchanged parts are omitted>

7.2.3 Channel Quality Indicator (CQI) definition

<Unchanged parts are omitted>

Table 7.2.3-4: 4-bit CQI Table 4

|  |  |  |  |
| --- | --- | --- | --- |
| **CQI index** | **modulation** | **code rate x 1024** | **Efficiency** |
| 0 | out of range |
| 1 | QPSK  | 78  | 0.1523  |
| 2 | QPSK  | 193  | 0.3770  |
| 3 | QPSK  | 449  | 0.8770  |
| 4 | 16QAM  | 378  | 1.4766  |
| 5 | 16QAM  | 616 | 2.4063 |
| 6 | 64QAM  | 567 | 3.3223 |
| 7 | 64QAM  | 666 | 3.9023 |
| 8 | 64QAM  | 772 | 4.5234 |
| 9 | 64QAM  | 873 | 5.1152 |
| 10 | 256QAM  | 711 | 5.5547 |
| 11 | 256QAM | 797 | 6.2266 |
| 12 | 256QAM  | 885 | 6.9141 |
| 13 | 256QAM  | 948 | 7.4063 |
| 14 | 1024QAM  | 853 | 8.3301 |
| 15 | 1024QAM  | 948  | 9.2578 |

<Unchanged parts are omitted>

Please provide your comments for the proposed CR:

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

## Issue 2: Correction for support of 1024QAM for PDSCH

|  |  |
| --- | --- |
| ***Reason for change:*** | Table 6.3.2-1 (Modulation schemes) does not include support of 1024QAM for PDSCH. |
|  |  |
| ***Summary of change:*** | Clarify in Table 6.3.2-1 that PDSCH supports 1024QAM. |
|  |  |
| ***Consequences if not approved:*** | Specification is inconsistent. |

<Changes to TS 36.211>

### 6.3.2 Modulation

For each codeword , the block of scrambled bits shall be modulated as described in clause 7.1 using one of the modulation schemes in Table 6.3.2-1, resulting in a block of complex-valued modulation symbols .

Table 6.3.2-1: Modulation schemes

|  |  |
| --- | --- |
| Physical channel | Modulation schemes |
| PDSCH | QPSK, 16QAM, 64QAM, 256QAM, 1024QAM |
| PMCH | QPSK, 16QAM, 64QAM, 256QAM |

Please provide your comments for the proposed CR:

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

# Summary

# References

1. R1-2101281 Correction on spectral efficiency of 1024QAM Huawei, HiSilicon
2. R1-2101508 Correction for support of 1024QAM for PDSCH Qualcomm Incorporated