**3GPP TSG RAN WG1 Meeting #109-e R1-22xxxxx**

**e-Meeting, May 9 - 20, 2022**

**Agenda Item: 8.9**

**Source: Moderator (Huawei)**

**Title: Preparation phase discussion on 109-e-Prep-AI8.9 NB-IoT-eMTC**

**Document for: Discussion and Decision**

# Introduction

This documents summarizes the preparation phase discussion of contributions submitted to AI 8.9 for Rel-17 WI NB-IoT and eMTC enhancements [2-5].

# Issues

The issues are summarized in the following table.

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| --- | --- | --- | --- |
| Issues | Summary of issues | Related contributions | Proposals |
| #1 | On whether and how to use the DwPTS in special subframes for NPDSCH with 16QAM. | [2] | Text proposal to TS 36.211:  - On an NB-IoT carrier for which higher-layer parameter *operationModeInfo* indicates *inband-SamePCI* or *inband-DifferentPCI*, or higher-layer parameter *inbandCarrierInfo* is present, or on an NB-IoT carrier for *SystemInformationBlockType1-NB* for which *sib1-carrierInfo* indicates *non-anchor* and the value of the higher layer parameter *sib-GuardbandInfo* is set to *sib-GuardbandInbandSamePCI* or *sib-GuardbandinbandDiffPCI*, DwPTS in special subframe configuration 0 and 5 for normal cyclic prefix is not used for NPDCCH and NPDSCH transmission. DwPTS in special subframe configuration 9 for normal cyclic prefix is not used for NPDSCH transmission with 16QAM, when *NPDSCH-16QAM-Config-NB* is configured. |
| [4] | Text proposal to TS 36.211:  On an NB-IoT carrier for which higher-layer parameter *operationModeInfo* indicates *inband-SamePCI* or *inband-DifferentPCI*, or higher-layer parameter *inbandCarrierInfo* is present, or on an NB-IoT carrier for *SystemInformationBlockType1-NB* for which *sib1-carrierInfo* indicates *non-anchor* and the value of the higher layer parameter *sib-GuardbandInfo* is set to *sib-GuardbandInbandSamePCI* or *sib-GuardbandinbandDiffPCI*, DwPTS in special subframe configuration 0 and 5 for normal cyclic prefix is not used for NPDCCH and NPDSCH transmission, and when *npdsch-16QAM-Config-r17* is configured then DwPTS in special subframe configuration 9 for normal cyclic prefix is also not used for NPDSCH transmission. |
| [5] | **Proposal 1: It is up to the eNB to ensure that NPDSCH transmission on DwPTS using 16-QAM is self-decodable (e.g. coding rate lower than 0.932) by the UE after rate matching. There is no need for specification change.** |
| #2 | The power allocation for NPDSCH with 16QAM is missed for PDSCH in PUR procedure. | [3] | Text proposal to TS 36.213:  If a UE is configured with higher layer parameters *npdsch-16QAM-Config* or *pur-DL-16QAM-Config* and *nrs-PowerRatio*,  - the ratio of NPDSCH EPRE to NRS EPRE among NPDSCH REs in symbols with NRS is given by for a cell with one NRS antenna port and for a cell with two NRS antenna ports, where is given by the parameter *nrs-PowerRatio*. |

# Discussion

It is proposed to have an email thread to address the two issues:

* One email thread to address the following issues for NB-IoT 16QAM
  + Issue #1: On whether and how to use the DwPTS in special subframes for NPDSCH with 16QAM.
    - Discussed in R1-2203223, R1-2204082 and R1-2204878
  + Issue #2: On the power allocation for NPDSCH with 16QAM in PUR procedure
    - Discussed in R1-2203631

Please input your comments for the proposed email discussion:

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| --- | --- |
| Companies | Comments |
| Lenovo | For issue 1), we are fine to have a discussion/clarification in spec on NBIoT DL 16QAM in DwPTS in specifical subframe configuration 9.  For issue 2), the current spec of TS36.213 includes   * case of *npdsch-16QAM-Config* configured in *PhysicalConfigDedicated-NB* (e.g., connected mode) * case of *npdsch-16QAM-Config* configured in *pur-PhysicalConfig* (e.g., idle mode).   So, we prefer not to have the CR.  TS36.213  If a UE is configured with higher layer parameters *npdsch-16QAM-Config* and *nrs-PowerRatio,*  TS36.331  PhysicalConfigDedicated-NB-r13 ::= SEQUENCE {  ……  [[ npusch-ConfigDedicated-v1700 NPUSCH-ConfigDedicated-NB-v1700 OPTIONAL, -- Need ON  npdsch-ConfigDedicated-v1700 SetupRelease {NPDSCH-16QAM-Config-NB-r17} OPTIONAL, -- Need ON  uplinkPowerControlDedicated-v1700 UplinkPowerControlDedicated-NB-v1700 OPTIONAL -- Cond npusch-16QAM  ]]  }  pur-PhysicalConfig-v1700 SEQUENCE {  pur-UL-16QAM-Config-r17 SetupRelease {PUR-UL-16QAM-Config-NB-r17} OPTIONAL, -- Need ON  pur-DL-16QAM-Config-r17 SetupRelease {NPDSCH-16QAM-Config-NB-r17} OPTIONAL -- Need ON  NPDSCH-16QAM-Config-NB-r17 ::=SEQUENCE{  nrs-PowerRatio-r17 ENUMERATED {dB-6, dB-4dot77, dB-3, dB-1dot77, dB0, dB1, dB2, dB3} OPTIONAL,  nrs-PowerRatioWithCRS-r17 ENUMERATED {dB-6, dB-4dot77, dB-3, dB-1dot77, dB0, dB1, dB2, dB3} OPTIONAL -- Cond InBand  } |
| Ericsson | We are ok with the FL’s proposal of having a single e-mail thread including both “Issue #1” and “Issue #2”. |
| Nokia, NSB | We are OK to discuss Issue#1. On Issue#2, we agree with Lenovo’s comment and think that there is no need for a CR. |
| ZTE, Sanechips | For issue1, we are OK to have the discussion.  For issue2, we understand the comments from Lenovo. However, there would be some clairfications.   1. *npdsch-16QAM-Config* is not equal to NPDSCH-16QAM-Config. As seen, capitalized parameter is the correct name. 2. In RAN2, we usually use the lowercase for the starting of parameter name and uppercase for the starting of a IE structure parameter, e.g., NPDSCH-16QAM-Config. So, in RAN1, the correct parameter name should be referred to lowercase for the starting of parameter name. 3. In TS36.213, *npdsch-16QAM-Config* also shows in another place. We also need to check this parameter just contains one case or two cases mentioned by Lenovo.   So, at least, in current spec, parameter name *npdsch-16QAM-Config* is not correct. How to address this issue can be further discussed. Ericsson’s suggestion, including both “Issue #1” and “Issue #2” in one eamil thread, is also OK for us |
| Moderator (Huawei) | For issue#1, all commenting companies agree to discuss it.  For issue#2, companies have different understanding on the RRC parameters names in 36.331, I kind of agree that *npdsch-16QAM-Config* is different with *NPDSCH-16QAM-Config-NB-r17* as the latter one has a suffix -NB, so it seems worthwhile to have some discussion whether some clarification in spec is needed.  Therefore, the following is proposed for email discussion:   * One email thread to address the following issues for NB-IoT 16QAM   + Issue #1: On whether and how to use the DwPTS in special subframes for NPDSCH with 16QAM.     - Discussed in R1-2203223, R1-2204082 and R1-2204878   + Issue #2: On clarification of the power allocation for NPDSCH with 16QAM in PUR procedure     - Discussed in R1-2203631 |

# Summary

# References

1. RP-211340, “WID revision: Additional enhancements for NB-IoT and LTE-MTC”, Huawei, HiSilicon, RAN#92e, E-meeting, June 2021.
2. R1-2203223 On use of DwPTS for 16QAM NPDSCH in NB-IoT Huawei, HiSilicon
3. R1-2203631 Clarifications for DL power allocation for 16-QAM ZTE, Sanechips
4. R1-2204082 Support of 16-QAM for unicast in UL and DL in NB-IoT Ericsson
5. R1-2204878 Support of 16-QAM in NB-IoT TDD Nokia, Nokia Shanghai Bell