3GPP TSG-RAN WG1 Meeting #101-e R1- 20xxxxx

e-Meeting, May 25th – June 5th, 2020

Agenda Item: 6.2.1.4

Source: Moderator (Ericsson)

Title: Feature lead summary #2 for NR coexistence performance improvements for LTE-MTC

Document for: Discussion, Decision

# Introduction

This document summarizes the email discussion [101-e-LTE-eMTC5-Coex-NR-01]. This email discussion followed the preparatory email discussion [101-e-Prep-LTE-eMTC5-Coex-NR] which is summarized in [6].

# Issue #1: Resource reservation in special subframes

According to 36.211 clauses 6.4.1 and 6.8B.5, the UE shall not expect PDSCH or MPDCCH in a subframe if it is not a BL/CE DL subframe. Furthermore, according to the 36.213 CR endorsed by RAN1#100bis-e in [4], the set of BL/CE DL subframes only includes downlink subframes, not special subframes for TDD. As a result, PDSCH and MPDCCH can no longer be transmitted in a special subframe even if it is unreserved and thus potentially available for transmission of MPDCCH or PDSCH.

ZTE contribution [1] provides the following 36.213 TP which considers that special subframe may not be available for transmission in all special subframe configurations. For more detailed discussion, see [1].

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| 7.1 UE procedure for receiving the physical downlink shared channel  **<Unchanged parts are omitted>**  For BL/CE UEs, the set of BL/CE DL subframes is indicated as follows  - If higher layer parameter *ce-reserved-resource-DL-freq* or *ce-reserved-resource-DL-time* is configured,  - for PDSCH transmission associated with C-RNTI or SPS C-RNTI using UE-specific MPDCCH search space including PDSCH transmission without a corresponding MPDCCH,  - if the Resource reservation field in the DCI is set to 0, then the set of BL/CE DL subframes corresponds to all downlink subframes or special subframes during the PDSCH transmission;  - if the Resource reservation field in the DCI is set to 1, then the set of BL/CE DL subframes corresponds to all downlink subframes or special subframes that are not fully reserved according to higher layer parameters (a subframe is considered fully reserved if and only if all OFDM symbols of all PRBs of the PDSCH transmission are reserved in the subframe);  - for MPDCCH transmission associated with C-RNTI or SPS C-RNTI using UE-specific MPDCCH search space,  - the set of BL/CE DL subframes corresponds to all downlink subframes or available special subframes that are not fully reserved according to higher layer parameters (a subframe is considered fully reserved if and only if all OFDM symbols of all PRBs of the MPDCCH transmission are reserved in the subframe).  - In all other cases, the set of BL/CE DL subframes is indicated by the higher layers according to *fdd-DownlinkOrTddSubframeBitmapBR* [11].  **<Unchanged parts are omitted>** |

Proposal 1 Consider the above 36.213 TP on resource reservation in special subframes.

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| **Company** | **Comments on Proposal 1** |
| Huawei, HiSilicon | We support the TP, the special subframes are omitted in current spec. |
| Qualcomm | We support the proposed TP |
| Nokia, NSB | We are fine with the TP |
| ZTE | We support the TP. |
| Ericsson | We are fine except that we prefer to write “and” instead of “or”. |

# Issue #3: Resource reservation for DL DMRS

RAN1#100bis-e discussed DL DMRS handling for Rel-16 LTE-MTC resource reservation in the email discussion “[100b-e-LTE-eMTC5-Coex-NR-01]”. For more background information, see “Issue #3” in the email discussion summary in [5]. Ericsson contribution [3] presents the following 36.211 TP.

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| ***Reason for change:*** | RAN1#99 made the following agreement for Rel-16 LTE-MTC which needs to be captured in the specification:   * In DL frequency-domain and DL time-domain resource reservation, DMRS REs can be reserved if and only if all other non-CRS REs in the same slot and PRB are also reserved. |
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| ***Summary of change:*** | The agreement is implemented in the specification. |
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| ***Consequences if not approved:*** | Resource reservation may be incorrectly implemented for DL DMRS. |
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| ***Clauses affected:*** | 6.10.3.2, 6.10.3A.2 |

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| 6.10.3.2 Mapping to resource elements  **<Unchanged parts are omitted>**  For BL/CE UEs, if higher layer parameter *ce-reserved-resource-DL-freq* or *ce-reserved-resource-DL-time* is configured, and the Resource reservation field in the DCI is set to 1, then in case of PDSCH transmission associated with C-RNTI or SPS C-RNTI using UE-specific MPDCCH search space,  - If and only if all OFDM symbols in a PRB are reserved, the demodulation reference signal transmission in that PRB is dropped.  **<Unchanged parts are omitted>**  6.10.3A.2 Mapping to resource elements  **<Unchanged parts are omitted>**  For BL/CE UEs, if higher layer parameter *ce-reserved-resource-DL-freq* or *ce-reserved-resource-DL-time* is configured, then in case of MPDCCH transmission associated with C-RNTI or SPS C-RNTI using UE-specific MPDCCH search space,  - If and only if all OFDM symbols in a PRB are reserved, the demodulation reference signal transmission in that PRB is dropped.  **<Unchanged parts are omitted>** |

Proposal 3 Consider the above 36.211 TP on resource reservation for DL DMRS.

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| **Company** | **Comments on Proposal 3** |
| Huawei, HiSilicon | We are still not clear the motivation to add the “only if” in spec, as transmitting the DMRS is the default behavior as specified in 6.10.3A.2 if not explicitly stated in the spec to drop it, and we don’t see any other place in the spec to drop the DMRS. |
| Qualcomm | We don’t see any problem to make the spec clearer in this case. It is true that there is no other place in the spec to drop the DMRS. But in section 6.4.1, it is specified that PDSCH transmission is dropped on the reserved OFDM symbols. Therefore, it would be good to explicitly state that DMRS is not dropped on the reserved OFDM symbols of a partially reserved subframe where PDSCH is dropped in order to avoid any misunderstanding. |
| Nokia, NSB | While we have no strong view here, we think the specification is clear and there is no need to add “and only if”. |
| ZTE | We don’t think the change is necessary. |
| Ericsson | We support the TP. |

# References

1. [R1-2003793](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2003793.zip), “Remaining issues on LTE-MTC resource reservation”, ZTE

1. [R1-2004165](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2004165.zip), “Corrections on eMTC co-existence with NR”, Huawei, HiSilicon

1. [R1-2004657](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_101-e/Docs/R1-2004657.zip), “TP for 36.211 on DL DMRS handling for LTE-MTC resource reservation”, Ericsson

1. [R1-2003157](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2003157.zip), 36.213 CR1333 (Rel-16, F) “Corrections to Additional MTC Enhancements for LTE”

1. [R1-2002797](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002797.zip), “Feature lead summary #2 for NR coexistence performance improvements for LTE-MTC”

1. [R1-2004697](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Docs/R1-2004697.zip), “Feature lead summary #1 for NR coexistence performance improvements for LTE-MTC”