**3GPP TSG RAN WG1 #110 R1-220xxxx**

**Toulouse, France, August 22nd – 26th, 2022**

**Source: Moderator (CATT)**

**Title:** **FL summary of Rel-17 URLLC/IIoT intra-UE MUX A**

**Agenda Item:** **8.3**

**Document for:** **Discussion and Decision**

# Introduction

This document summarizes the inputs and discussions on Rel-17 URLLC/IIoT intra-UE MUX A in RAN1#110.

# Issue 1: Joint operation of R17 URLLC/IIoT and sidelink

In RAN1#109-e, ETRI had the following proposals on joint operation with sidelink.

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| **Proposal 1: Simultaneous transmission of both PUSCH and PUCCH can be supported in the joint operation of sidelink and IIoT.**  **Proposal 2**:**The previous conclusion is still valid in Rel-17 in the same priority: No support of multiplexing of SL HARQ and Uu UCI on PUCCH or PUSCH in Rel-16.**  **Proposal 3: It is allowed that the joint configuration between two features and the serving gNB guarantee to no multiplex sidelink HARQ and Uu UCI.** |

During preparation phase discussion, almost all companies did not agree to discuss the issue (Issue 9 in [4]). Companies commented that it is not an essential issue. Some companies commented that there is no need for joint operation and can be discussed in R17 sidelink if needed.

ETRI discussed the issue in this meeting based on the previous comments in R1-2206948 [1] section 2.1 with the following observations/proposals. Draft CR is provided in [2].

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| **Observation 1: A UE can operate both sidelink and IIoT having any priority index.**  **Observation 2: The previous conclusion is still valid in Rel-17 in the same priority: *No support of multiplexing of SL HARQ and Uu UCI on PUCCH or PUSCH in Rel-16.***  **Proposal 1**: **Simultaneous transmission of both PUSCH with UCI and PUCCH with SL HARQ-ACK can be supported if PUCCH and PUSCH have different priority indices.**  **Proposal 2**: **It is clarified that the joint configuration between two features and the serving gNB guarantee to no multiplex sidelink HARQ and Uu UCI** |

Companies are encouraged to share your views below.

Do you agree to discuss the issue in R1-2206948 section 2.1 in RAN1#110?

|  |  |
| --- | --- |
|  | **Company** |
| **Yes** | ETRI |
| **No** | Samsung, New H3C, Sony, DOCOMO, ZTE, LG, Huawei/Hisi, Intel, CATT, Nokia/NSB, Ericsson, Spreadtrum |

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| **Company** | **Comments** |
| Samsung | We don’t think the issue is essential.  Proposal 1 is already supported.  Proposal 2 is N/A as the specs do not mandate the Gnb behavior |
| New H3C | We don’t think the issue is essential |
| ETRI | We think that two observations above can be confirmed as conclusions because the work item has not discussed yet as far as we concerned.  Regarding the proposals, the behaviour seems not clear in the specification. The Rel-16 behaviour does not have simultaneous transmission of PUCCH and PUSCH and this is clear for us, but the Rel-17 allows that possibly PUSCH and PUCCH transmissions in some limited case.  According to our reading, the current specification tells the case where PUSCH without Uu UCI (DL HARQ-ACK, CSI, SR) and SL HARQ-ACK; and its processing time requirement.  If two proposals are supported, we think the texts should be improved to include the case transmitting both PUSCH and PUCCH, with SL HARQ-ACK and CSI/SR in different physical channels. |
| DOCOMO | We don’t think the issue is essential |
| LG | We also think this issue is not essential. |
| Huawei/Hisi | Not essential. If really needed to be discussed, then would be better discussed at sidelink topic. |
| Intel | We share same view with Huawei that sidelink AI would a better place to discuss this issue, if needed. |
| CATT | We have similar view as Huawei and Intel that the issue should be discussed in sidelink AI if needed. |
| Nokia/NSB | Same view as Huawei, Intel & CATT – better to be handled in SL AI (if needed) |
| QC | Agree with above companies that this seems more related to sidelink and should be handled in that AI. |
| Ericsson | Agree with companies above that the issue is not essential. If necessary, the discussion can be handled by sidelink AI. |
| OPPO | If necessary, the discussion can be handled by sidelink AI. |

# Issue 2: Number of PUCCH resources after UCI multiplexing

In RAN1#109-e, Apple raised an issue that it is not clear when PUCCHs should be trimmed to ensure up to 2 PUCCHs per PHY priority in a slot/sub-slot. Apple discusses the same issue in [3].

During the preparation phase discussion in last meeting, no company supported to discuss the issue (Issue 7 in [4]). Companies commented that the same issue exists in Rel-15 and it is expected to be guaranteed by gNB implementation.

Moderator’s understanding is that there is no trimming procedure at UE side and gNB would ensure that the number of PUCCHs after prioritization/multiplexing would not exceed the number of PUCCHs supported by UE.

Companies are welcome to share your views below.

Do you agree to discuss the issue in R1-2207310 section 2 in RAN1#110?

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|  | **Company** |
| **Yes** |  |
| **No** | Samsung, New h3C, Sony, ETRI, DOCOMO, ZTE, LG Huawei/Hisi, Intel, CATT, Nokia/NSB, Ericsson ,OPPO |

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| **Company** | **Comments** |
| Samsung | We don’t think the issue is essential.  We agree with FL that issue should be avoided by Gnb implementation. |
| New H3C | We don’t think the issue is essential and this issue can be avoided by Gnb implementation |
| ETRI | We also think the UE just performs the procedure, and the potential clarification may be required for Gnb behaviour. It would be helpful to provide the initial text proposal. |
| Apple | If most companies feel that is indeed covered, we are fine to draw a conclusion along the line of the FL comment, e.g., “there is no trimming procedure at UE side to ensure up to 2 PUCCHs per PHY priority in a slot/sub-slot and Gnb would ensure that the number of PUCCHs after prioritization/multiplexing would not exceed the number of PUCCHs supported by UE.” |
| LG | We also think this issue is not essential. |
| Huawei/Hisi | There seems to be no new R17 specific issues, so we can reuse the principle in in R15. |
| Intel | It can be avoided by gNB implementation. |
| CATT | We think the limitation of number of PUCCHs should be guaranteed by gNB and it is the understanding according to current specifications and agreements/conclusions. |
| Nokia/NSB | Agree with moderator assessment. |
| QC | We agree with other companies that it should be handled by gNB. Apple’s suggestion to draw a conclusion is also good. |
| Ericsson | We also don’t see the need to introduce a new procedure in Rel-17 to satisfy the PUCCH limit. The same understanding as in Rel-15 applies, i.e., gNB scheduler should take this into account.  We don’t see the need to draw an explicit conclusion, since it should be common understanding that gNB does not exceed UE capability. There is no need to repeat this understanding for every UE feature. |
| OPPO | The limitation of number of PUCCHs should be guaranteed by gNB and follow R16 capability. It is not necessary to reopen this discussion. |

# Reference

1. R1-2206948 Remaining issues on Enhanced IIoT and URLLC ETRI
2. R1-2206949 Draft CR on Enhanced IIoT and URLLC ETRI
3. R1-2207310 Maintenance on Enhanced Industrial Internet of Things (IoT) and URLLC Apple
4. R1-2205146 Preparation phase FL summary for Rel-17 URLLC/IIoT intra-UE MUX A Moderator (CATT)