3GPP TSG-RAN WG2 #131bis R2-2507430

**Prague, Czech, 13-17 October 2025**

**Agenda Item: 8.7.1**

**Source: Qualcomm Incorporated**

**Title: Summary of [POST131][508][XR] Discussion on XR MAC open issues**

**Document for: Discussion**

# 1. Introduction

Per instruction from the chairlady, this document is to collect open issues identified for Rel-19 XR 38.321 CR. More specifically, please provide here open issues that were identified but not addressed during the running CR review phase or we expect to come from other WGs.

Please provide your input no later than **Friday September 26 18:00 UTC**. After the deadline, I will provide a draft CR for companies to review before submission. In addition, I will also identify issues that are difficult to resolve and should be discussed by contributions, if any, as suggested by the chairlady.

# 2. Contact information

Please provide your contact information in the table below.

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# 3. Open issues

## 3.1 LCP

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| **Company** | **Issue ID** | **Description of open issues** |
| NEC | A.1 | The applied priority (either *additionalpriority* or *priority*) of a LCH is currently determined at the time when UE process a grant for a new transmission. With the limit time budget to prepare a new transmission, this would potentially stress the online processing time at UE.    As same as for Bj handling, we think it is possible and beneficial to maintain the applied priority (*additionalpriority* or *priority*) of a logical channel along the time with the buffer situation changes.  Basically, we propose to move out the description on determining the applied priority from section 5.4.3.1.3 “The MAC entity shall, when a new transmission is performed” branch, place this description to the section above, and section 5.4.3.1.3 could remain unchanged, with the understanding “priority” means the determined “applied priority”  [Rapp] To determine whether an LCH has priority adjustable PDCP SDUs, there are two possible options (for the sake of discussion I am not going to cover all configuration scenarios below):   * Option A. UE checks if an LCH is eligible for priority adjustment when it receives a UL grant for new transmission, as specified in the current spec. This option is performed only when there is a scheduled PUSCH transmission, because the transmission time of this PUSCH is used as the reference by UE to calculate the remaining time of SDUs. * Option B. At any point in time (even when there is no PUSCH scheduled), UE can check if there is a PDCP SDU whose remaining time is less than the priority adjustment threshold. If it is true, then the LCH can be considered for priority adjustment from this point on. No additional checks (including these steps) are necessary. Otherwise, UE still has to perform Option A if an LCH is not eligible for priority adjustment right before it receives a UL grant.   As you may see from the above, Option A alone is sufficient, whereas Option B requires UE to implement Option A too. The rapporteur therefore thinks that a good approach is to specify Option A in normative text and leave Option B to UE implementation. And we can follow the convention that if something is not specified in the spec, it is up to UE implementation.  [NEC] option A (to determine the applied priority only when it is needed) is sufficient functionally, but option A will make the new transmission preparation phase more complicated and run longer in time. Considering the limit time gap from receiving a UL grant for a new transmission to PUSCH transmission, this is not nice to UE implementation.  In our understanding, it is the other way around, option B allow UE to implement option A. if you take Bj as an example, Bj is needed for LCP, but the specification on Bj is now in a different section of LCP, and at any time Bj could be calculated, but it is also possible for UE to only determine Bj at the time when it is needed for LCP  [Rapp] Bj is different, because it does not depend on UL grants like priority adjustment does, i.e. it can be either updated in background (if a UE implement chooses to do so) or only when a PUSCH becomes available.  From conformance point of view, a UE implementation only needs to ensure the appropriate priority is applied when LCP is performed. The exact time when the criterion is evaluated can be up to UE implementation. The current text is adopted is because it is the easiest to understand (at least for the rapporteur) and a direct capture of the agreement.  [Nokia] Current specification does not seem to limit any UE implementation on when/how the UE does the determination as long as it is determined based on the buffer status of when the TB is transmitted. All the other legacy actions need to be performed during the processing time before the actual transmission anyway. |
| Huawei, HiSilicon | A.2 | The MAC entity shall, when a new transmission is performed:  1> if a logical channel is configured with *priorityAdjustmentThreshold* and has a PDCP SDU available for this transmission:  2> if the PDCP entity associated with this logical channel is configured with *pdu-SetDiscard*, and the PDU Set remaining time of the PDCP SDU (as defined in TS 38.323 [4]), evaluated at the time of the first symbol of this transmission, is less than the *priorityAdjustmentThreshold*; or  2> if the PDCP entity associated with this logical channel is not configured with *pdu-SetDiscard,* and the remaining time of *discardTimer* of the PDCP SDU (as defined in TS 38.323 [4]), evaluated at the time of the first symbol of this transmission, is less than the *priorityAdjustmentThreshold*:  3> consider this PDCP SDU being priority adjustable.1> allocate resources to the logical channels as follows:  2> if a logical channel has a priority adjustable PDCP SDU:  3> apply *additionalPriority* of this logical channel;  The highlighted part could be changed to “**if a priority adjustable PDCP SDU is buffered for a logical channel”**  [Rapp] Agree. |
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## 3.2 DSR

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| **Company** | **Issue ID** | **Description of open issues** |
| CATT | B.1 | In RAN2#130 meeting, the below agrrement was reached:  [UE Cap-1] From UE capability signalling perspective, no need to have the pre-requisite for the capability of Rel-19 DSR.  That is to say, a R19 UE who is support of R19 DSR may not need to support R18 DSR. But in the current 38.321 spec, there is one case who is controversy with the above agreement.  In R2-2506349,  5.4.9 Delay status reporting  If there is at least one DSR pending, the MAC entity shall:  1> if UL-SCH resources are available for a new transmission:  2> if at least one LCG is configured with *dsr-ReportingThresList* and the UL-SCH resources can accommodate the Multiple Entry DSR MAC CE as specified in clause 6.1.3.72 plus its subheader as a result of logical channel prioritization:  3> instruct the Multiplexing and Assembly procedure to generate the Multiple Entry DSR MAC CE as specified in clause 6.1.3.72;  2> else if none of the LCG(s) is configured with *dsr-ReportingThresList* and the UL-SCH resources can accommodate the Single Entry DSR MAC CE as specified in clause 6.1.3.72 plus its subheader as a result of logical channel prioritization:  3> instruct the Multiplexing and Assembly procedure to generate the Single Entry DSR MAC CE as specified in clause 6.1.3.72;  2> else if there is no pending SR already triggered by the DSR procedure for the same logical channel as of this DSR:  3> trigger a Scheduling Request;  1> else if there is no pending SR already triggered by the DSR procedure for the same logical channel as of this DSR:  2> trigger a Scheduling Request.  NOTE 1: The availability of UL-SCH resources for the transmission of a DSR MAC CE follows the same critieria specified in clause 5.4.5.  We assume that the UE and gNB are all R19 DSR function supported. The concerned case is the gNB didn’t configure the *dsr-ReportingThresList* for any LCG(s)*,* under this case and with the current specification, the green marked part will be carried out which implies that for the current R19 DSR supported UE should also need to support R18 DSR function(then it can follow the procedure to generate the Single Entry DSR MAC CE which is bound to R18 DSR capability).    [Rapp] In RAN2#129, the following agreement was made:  *If UE is configured to use R19 DSR, then any LCG with a triggering threshold shall be configured with at least one reporting threshold.*  Therefore, if a UE indicates support of R19 DSR, the network **shall** configure at least one reporting threshold for any LCG configured with DSR. The case of concern to you, i.e. an LCG has a triggering threshold but no reporting thresholds, can happen only with a UE that supports only R18 DSR. For this reason, the rapporteur thinks the current spec (38.321) is correct. If you think the above agreement should be formally captured in some way, I’d suggest you ask the RRC rapporteur if he is willing to capture it in some field description.  [NEC] we think current specification is ok. at the beginning of this DSR section, it says “***If there is at least one DSR pending, the MAC entity shall:…”*** which means Rel18 DSR is configured if Rel19 DSR (dsr-ReportingThresList) is not configured. In short, green marked text is to cover the case when Rel-18 DSR is configured. |
| Samsung | B.2 | |  | | --- | | If there is at least one DSR pending, the MAC entity shall:  1> if UL-SCH resources are available for a new transmission:  2> if at least one LCG is configured with *dsr-ReportingThresList* and the UL-SCH resources can accommodate the Multiple Entry DSR MAC CE as specified in clause 6.1.3.72 plus its subheader as a result of logical channel prioritization:  3> instruct the Multiplexing and Assembly procedure to generate the Multiple Entry DSR MAC CE as specified in clause 6.1.3.72;  2> else if none of the LCG(s) is configured with *dsr-ReportingThresList* and the UL-SCH resources can accommodate the Single Entry DSR MAC CE as specified in clause 6.1.3.72 plus its subheader as a result of logical channel prioritization:  3> instruct the Multiplexing and Assembly procedure to generate the Single Entry DSR MAC CE as specified in clause 6.1.3.72;  2> else if there is no pending SR already triggered by the DSR procedure for the same logical channel as of this DSR:  3> trigger a Scheduling Request; |  |  | | --- | | - EXT i,j: This field is present only in the Multiple Entry DSR MAC CE. When set to 1, it indicates that an additional pair of Remaining Time field and Buffer Size field corresponding to the reporting threshold k (k>j) of the i:th reported LCG is included immediately after the field Buffer Size i,j, as illustrated in Figure 6.1.3.72-2. When set to 0, it indicates that no additional field is present after the field Buffer Size i,j for the i:th reported LCG. |   For the agreed and approved CR in R2-2506619:   1. There is incorrect behavior, as the CR missed the track changes while attempting to remove the below part from the legacy spec (38.321 v18.6.0):   - R: Reserved bit, set to 0   1. Further, as highlighted above, there is a discrepancy that when a Single Entry DSR MAC CE is to be generated, there is no clarity on presence of R bit in the description in clause 6.1.3.72 (unlike Rel-18 MAC spec). Single Entry DSR MAC CE is still relevant for Rel-19 MAC spec and therefore, it is proposed to amend spec CR with below TP:   TP: 6.1.3.72 Delay Status Report MAC CE ….  - EXT i,j: This field is present only in the Multiple Entry DSR MAC CE. When set to 1, it indicates that an additional pair of Remaining Time field and Buffer Size field corresponding to the reporting threshold k (k>j) of the i:th reported LCG is included immediately after the field Buffer Size i,j, as illustrated in Figure 6.1.3.72-2. When set to 0, it indicates that no additional field is present after the field Buffer Size i,j for the i:th reported LCG.  - R: Reserved bit, set to 0. This field is only present in the Single Entry DSR MAC CE.  [Rapp] Agree |
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## 3.3 UL Rate control

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| **Company** | **Issue ID** | **Description of open issues** |
| vivo | C.1 | In section 5.18.x, it states that “A bit rate query remains pending after being triggered, until it is cancelled.”.  We think in some cases, UE may cancel the pending bit rate query by its implementation. For example, the pending query waits for a very long time and becomes outdated, leading that UE intends not to send it anymore. The current description may limit the UE implementation, so we suggest to remove this sentence or the later half sentence “until it is cancelled”.  [Rapp] I think the current text still applies in your scenario, i.e. if the UE does not want to send a query anymore, it cancels it.  [Nokia] We see no big issue to solve. MAC does not restrict that cancellation is only done by MAC itself, i.e., we understand that it is still possible query is cancelled by upper layer based on implementation. |
| vivo | C.2 | As UL rate control is used to handle the congestion case, after congestion relief, it is better to increase the UL bit rate to guarantee the UE experience.  Comparing the NW side, the UE application layer has more information to determine the appropriate adjustment of the UL rate control, it would be preferable to allow the UE to send the corresponding rate control query information after congestion relief. Thus, in the case of congestion relief, the gNB should inform the UE as early as possible, so that the service bit rate for the application could be increased to meet the required QoS.  In our understanding, one specific codepoint of bit rate (i.e., Index 0) could be defined for the case of congestion relief; upon receiving DL Rate Control MAC CE indicating this codepoint for a QoS flow from the network, the UE can consider that the network allows rate query about such QoS flow, and therefore can send the UL Rate Control MAC CE regarding this QoS flow and (re-)start the prohibit timer, if any.  [Rapp] I think what you are proposing is a new gating mechanism for rate query, in addition to the existing prohibit timer. Since it is a new feature instead of a correction, I’d suggest you submit a contribution for it.  [Nokia] If congestion is relieved, the network will indicate a new bit rate. The UE can then handle triggering and send another value, if needed, since triggering of query is left to UE implementation. We see no real benefit of using a codepoint for this. |
| vivo | C.3 | In section 6.1.3.x, for the description of Fi, the index may vary for UL rate control and UL rate query due to the independent configuration for supported QoS flows as specified in RRC. In order to make the description clearer and more direct, we suggest describing rate control and rate control query separately to avoid misunderstanding.  [Rapp] Overall, I still prefer to keep a common text for both UL and DL, because the MAC CE sent on DL and UL have the exact same set of fields. The text would be very redundant if we have separate description for rate indication and rate query. But I think your concern on the different set of QoS flows configured for DL and UL is valid. I can add a clarification on that as follows: “…where PDU Session ID (specified in clause 5.6.9 in TS 23.501 [x]) and QoS Flow Identifier (specified in clause 5.7.3 in TS 23.501 [x]) are those of the QoS flows configured to support UL rate control (as specified in clause 5.18.x) in the direction where the UL Rate Control MAC CE is sent.”  Similar issue also in 6.2.1, two MAC CEs for DL-SCH and UL-SCH are named the same. Follow the legacy description, we also see clearer if we name the UL-SCH MAC CE with “UL Rate Control Query”.  [Rapp] In legacy, there is a clear misalignment between 6.2.1 and 5.18.10 (and 6.1.3.20). I tend to think the term in 6.2.1 should follow the convention in 5.18.10 and 6.1.3.20.  [Nokia] Good to confirm the companies understanding first. Our understanding is that, even when some of the QoS flows are not allowed for query – depending on timer configuration – the Fi should be commonly used in the MAC CE from the UE for query and from the gNB for rate control. |
| Huawei, HiSilicon | C.4 | **Remove the condition “ if *bitRateQueryProhibitTimer* for the QoS flow is configured” from the procedure text of bit rate query:**  1> for each QoS flow with a pending bit rate query:  2> if *bitRateQueryProhibitTimer* for the QoS flow is ~~configured but~~ not running:  3> include the QoS flow and its preferred bit rate in the MAC entity’s list of pending bit rate queries;  The reason is that if the QoS flow is pending with a bit rate query, it must be configured with prohibit timer. The current RRC looks like this  ul-RateQuery SEQUENCE {  ul-RateQueryConfigList-r19 SEQUENCE (SIZE (1..maxNrofRateQueryQFIs-r19)) OF QoS-FlowIdentity-r19,  ul-RateQueryProhibitTimer-r19 ENUMERATED {s0, s0dot1, s0dot2, s0dot5, s1, s2, s5, s10, s20, s30, s60, s90, s120, s300, s600, spare1},  ...  } OPTIONAL, -- Need R  [Rapp] Agree |
| Samsung | C.5 | "*bitRateQueryProhibitTimer*" is a legacy term used for RBR procedure, MAC spec CR need to use the term specified by RRC spec (i.e. “*ul-RateQueryProhibitTimer*”).  When UL-SCH resources are available for a new transmission, the MAC entity shall:  1> for each QoS flow with a pending bit rate query:  2> if *ul-RateQueryProhibitTimer* for the QoS flow is configured but not running:  3> include the QoS flow and its preferred bit rate in the MAC entity’s list of pending bit rate queries;  1> if there is at least one entry in the MAC entity’s list of pending bit rate queries; and  1> if the UL-SCH resources can accommodate the UL Rate Control MAC CE, including its subheader and preferred bit rate of at least one of the pending queries, as a result of logical channel prioritization:  2> instruct the Multiplexing and Assembly procedure to generate the UL Rate Control MAC CE;  1> for each QoS flow whose bit rate query is included in the UL Rate Control MAC CE:  2> start its *ul-RateQueryProhibitTimer*;  2> cancel its bit rate query.  [Rapp] Agree |

## 3.4 Other

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| **Company** | **Issue ID** | **Description of open issues** |
| Huawei, HiSilicon | D.1 | The following could be corrected for MG handling. It should be made clear that the gap cancellation indication is made for a certain MG occasion rather than a certain activated MG  5.14 Handling of measurement gaps  During an activated measurement gap, the MAC entity shall, on the Serving Cell(s) in the corresponding frequency range of the measurement gap configured by *measGapConfig* as specified in TS 38.331 [5], for each measurement gap occasion which is not indicated to be cancelled by the indication from the lower layer as specified in TS 38.213 [6]:  [Rapp] I think the reason you have this comment perhaps is because there are different usage of “measurement gap” in 38.321. In clauses other than positioning, a measure gap refers to a measurement gap occasion. But in most text in the clause on positioning, it seems to mean a measurement gap configuration. Since the legacy text in this specific clause means “a measurement gap occasion”, I think I’ll stick to that convention.  [Nokia] current text looks ok, could add “by lower layer indication” to “has not been cancelled” if seen needed.  [Rapp] I am fine with adding “by lower layer indication”. |
| Huawei, HiSilicon | D.2 | The following paragraph might be a bit misleading  For configured uplink grants configured with *cg-RetransmissionTimer*, the UE implementation selects an HARQ Process ID among the HARQ process IDs available for the configured grant configuration. If the MAC entity is configured with *intraCG-Prioritization*, for HARQ Process ID selection, the UE shall prioritize the HARQ Process ID with the highest priority, where the priority of HARQ process is determined by the highest priority among priorities of the logical channels that are multiplexed (i.e. the MAC PDU to transmit is already stored in the HARQ buffer) or have data available that can be multiplexed (i.e. the MAC PDU to transmit is not stored in the HARQ buffer) in the MAC PDU, according to the mapping restrictions as described in clause 5.4.3.1.2. In this selection, the priority of a logical channel configured with *priorityAdjustmentThreshold* shall be the highest priority that can be applied or has been applied for it in the LCP procedure for the MAC PDU (see clause 5.4.3.1.3). ……Omitted……  it seems to imply that additionalPriority is always considered as long as a logical channel is configured with priorityAdjustmentThreshold, which is not correct as the additionalPriority is only applied if the logical channel has priority adjustable PDCP SDU that can be multiplexed or has been multiplexed in the LCP procedure for the MAC PDU. We think the following change could be made  ……Omitted……  In this determination, the priority of a logical channel configured with *priorityAdjustmentThreshold* shall be the *additionalpriority* if there is a priority adjustable PDCP SDU that can be multiplexed or has been multiplexed from it in the LCP procedure for the MAC PDU (see clause 5.4.3.1.3).  ……Omitted……  [Rapp] It is not clear how you conclude from the current text that “additionalPriority is always considered”. The “highest priority” in the current text simply means that “it is the default priority if additional priority is not used; otherwise, it is the additional priority.”  [Nokia] Current text looks ok which says the highest applied or to be applied priority which could be the legacy one or additional one depending on whether the additional one is used in any of the LCP steps.  [HW]Just by the wording itself “the highest priority that can be applied or has been applied for it in the LCP procedure for the MAC PDU”, if additionalPriority is configured, then the highest priority that can be applied is always the additionalPriority. That is the not the intended behavior, right?  [Rapp] Even if additionalPriority is configured, it can’t be applied if the priority adjustment criteria are not met. I tend to think this is how most people would interpret it. But if some companies still have concerns or think it can lead to a different interpretation, I am open to rewording it. Additional comments are welcome.  [Lenovo] We have the same understanding as the rapporteur. The term “can be applied” or “has been applied” is to be understood in the context of whether the criteria for applying the additional priority is satisfied during first/second step of LCP. “Can be applied” is for the case that the MAC PDU is not yet stored in the HARQ buffer (same as for the other intra-UE prioritization description). We think the current text is clear. But if there is majority of companies who sees a need to further clarify the wording, we could have the following text:  “In this selection, the priority of a logical channel configured with *priorityAdjustmentThreshold* shall be the highest priority that can be applied or has been applied, e.g. depending on the presence of a priority adjustable PDCP SDU, for it in the LCP procedure for the MAC PDU (see clause 5.4.3.1.3). |
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# 4. Summary

Based on the discussion above, the following is the rapporteur’s recommendation on how to handle the issues.

**Proposal 1. Adopt TPs proposed in Issue A.2, B.2, C.4 and C.5.**

**Proposal 2. Improve the wordings for the issues raised in Issue C.3 and D.1.**

**Proposal 3. Discuss more on Issue D.2.**