**3GPP TSG-RAN WG2 Meeting #123 bis R2-231XXXX**

**Xiamen, China, Oct.9th- 18th, 2023**

**Agenda item: 7.14.5**

**Title: Report of [Post123bis][619][QoE] UE capabilities CRs update and open issues (CMCC)**

**Source: CMCC**

**Document for:** **Discussion and decision**

# 1. Introduction

This document captures the following UE capabilities discussion,

* [Post123bis][619][QoE] UE capabilities CRs update and open issues (CMCC)

 Scope: Running CRs update and open issues

 Intended outcome:

* Endorsed running CRs
* List of open issues for UE capabilities (separate document)

 Deadline: Friday Oct.27th，2023

The email discussion participants are kindly asked to fill in the following table.

**Contact List**

|  |  |  |
| --- | --- | --- |
| Company name | Delegate name | Email address |
| ZTE | Zhihong Qiu | qiu.zhihong@zte.com.cn |
| Huawei, HiSilicon | Jun Chen | jun.chen@huawei.com |
| CMCC | Kangyi Liu | liukangyi@chinamobile.com |
| China Unicom | Shuai Gao | gaos30@chinaunicom.cn |
| Samsung | Seung-Beom | s90.jeong@samsung.com |
| Ericsson | Cecilia Eklöf | cecilia.eklof@ericsson.com |
|  |  |  |
|  |  |  |

# 2. Discussion

## 2.1 AS buffer size for RedCap/eRedCap UE

There are still some controversies within RAN2 regarding UE's AS layer buffer size for paused and/or non-connected state QoE [1], especially for RedCap/eRedCap UE:

|  |
| --- |
| * For non-RedCap UE, minimum memory requirement for IDLE/INACTIVE reports is 64KB. This memory is in addition to 64KB used for QoE report storage during pause.
* FFS For RedCap/eRedCap UE, the minimum requirement is 64 KB total for both IDLE/INACTIVE and paused reports
* Introduce an optional UE capability indicates whether UE supports 128, 256, 512 and 1024KB buffer size.
 |

Also, for eRedCap UE, whether the AS layer buffer size requirement would be the same as that of RedCap UE still needs consideration.

Hence, comments from companies are invited for this discussion.

#### Q1. Does company agree that the minimum memory requirement is 64KB total for both IDLE/INACTIVE and paused QoE reports for RedCap/eRedCap UE?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comments** |
| ZTE | No strong view | Can follow majorities’ view |
| Huawei, HiSilicon | Yes | The RedCap UEs may be used in wearables, industrial wireless sensors, and video surveillance cases, and QoE measurement collection may be applied.On one hand, if we do not define special memory values for RedCap/eRedCap UEs, it can still work. For example, if RedCap UEs would like to implement the QoE feature, it can be implemented to support the defined buffer. In addition, the smaller value will compromise the value of QoE feature.On the other hand, RedCap UEs should be of low cost, and thus smaller memory size can fit the goal. Otherwise, there may be less interests for chipset vendors to implement this feature. In this case, we see some benefits of the smaller value.In general, we can be ok to have a separate definition.For stage-3 details, we think the existing UE capability bit supportOfRedCap-r17 can be used for RedCap UEs. For eRedCap UEs, it is about Rel-18 discussions, and we can further check details. For example, if eRedCap UEs are linked to RedCap UEs, it may be sufficient to define the memory requirement only for RedCap UEs. |
| CMCC | No but | Compared to paused QoE, UE has to store QoE configurations in RRC\_IDLE and RRC\_INACTIVE. Therefore, more memory is necessary.But if UE vendor were to express profound objection on additional memory, we could accept 64KB for RedCap UE. |
| China Unicom |  | Generally RAN2 has not discussed whether to support QoE while a UE type is redCap, it’s not a issue in our perspective. If the majority cannot make consensus on the QoE buffer size capability of RedCap UE, it’s suggested to just discard this question in case there are more redcap issues input to QoE WI during Rel-18 phase. |
| Samsung | No | We do not understand why 64KB requirement is acceptable to RedCap UEs while 128KB is not. Is there any special issue between 64KB and 128KB? We think there is no big difference between 64KB and 128KB memory requirement, in terms of cost and implementation complexity. So, we prefer not to define RedCap specific capabiltiy |
| CATT |  | Agree with CU. |
| Ericsson | No | Agree with Samsung. |
|  |  |  |

**Summary:** Only 1 company support minimum 64Kb AS layer for RedCap/RedCap UE, 1 company can accept the majority view, 2 companies suggest we don’t introduce Redcap-specific capability for R-18 QoE. 2 companies think RedCap and non-RedCap UE should have 128Kb AS layer memory, i.e., .not to introduce RedCap UE capability

Since the lack of one major UE vendor’s comment, and at least 4 companies agree not to introduce RedCap-specific UE capability for R-18 QoE, this issue may need to be determined in F2F discussion.

**(4/7) Proposal 1: RAN2 does not define RedCap-specific UE capability for Rel-18 QoE.**

#### Q2. If company puts No to Q1, does company agree the minimum memory requirement is the same for both RedCap and eRedCap UE?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comments** |
| CMCC | No | eRedCap UE can be regarded as non-RedCap UE and has 128KB memory size total for paused QoE and QoE in RRC\_IDLE and RRC\_INACTIVE. |
| Samsung | Yes | We prefer to have the same memory requirement for all UEs (i.e. non-RedCap, RedCap, eRedCap) |
| Ericsson | Yes | Agree with Samsung. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Summary:** Majority companies agree RedCap and eRedCap UE should have the same minimum memory requirement.

**(2/3) Proposal 2: RedCap and eRedCap UE should have the same minimum memory requirement for QoE in RRC\_IDLE and RRC\_INACTIVE.**

## 2.2 MBS QoE capability

For MBS QoE capability, it’s agreed to introduce a UE capability for QoE in RRC\_IDLE and RRC\_INACTIVE. But in RRC\_CONNECTED, it’s suggested to wait for RAN3’s conclusion since RAN3 may introduce delivery mode in MBS QoE configuration.

Regarding RAN3 agreement for QoE in RAN3#121bis [2], RAN3 agrees to introduce MBS broadcast and MBS multicast, but doesn’t decide whether introduce MBS unicast.

|  |
| --- |
| **QMC is supported for MBS broadcast and multicast. Accordingly, define new extensible IEs with “multicast” and “broadcast” in XnAP and NGAP for QMC configuration.****MBS Service Area and MBS Session ID will not be added as explicit IE for MBS related QoE configuration in Rel-18.****FFS whether the new communication service mode IE also contains a third codepoint - for unicast.** |

For broadcast, NW cannot predetermine which UE receives MBS broadcasts, therefore, there is no need to introduce relevant capability signaling.

But for multicast, it seems that there is no dedicated UE capability indicating whether UE supports MBS multicast delivery mode, hence a new UE capability may be introduced indicating whether UE supports MBS multicast QoE in RRC\_CONNECTED to assist NW in determining QoE configuration. The following description can be regarded as an early attempt.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***qoe-MBSMulticast-MeasReport-r18***Indicates whether the UE supports MBS multicast delivery mode QoE Measurement Collection in RRC\_CONNECT, see TS 38.331[9] | UE | No | No | No |

For RRC\_IDLE and RRC\_INACTIVE, Rel-18 only intends to support MBS Broadcast QoE. So, no impact for former UE capability indicating whether UE can perform MBS QoE in RRC\_IDLE and RRC\_INACTIVE.

#### Q3. Does company agree to introduce a new UE capability indicating whether UE supports MBS multicast QoE in RRC\_CONNECT?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comments** |
| ZTE | Maybe No | It needs more discussion how this information will be used by UE. In our understanding RAN3 only agreed to exchange the configuration (multicast/broadcast) in XnAP and NGAP interface, while whether such configuration is transparent to UE or not still needs RAN2 discussion. For connected case, since MBS is assumed to be a communication type in this release, which means QoE collection behavior in connected mode is the same as legacy. For broadcast, it has been agreed that one indication to indicate whether the configuration shall be kept in idle/inactive, no more configuration is needed.For multicast in connected mode, NW is aware of whether UE is receiving multicast or not, also NW in in charge of area scope checking, it is possible for NW to control QoE for multicast in connected mode as well. No need to provide multicast configuration for UE. Based on above analysis, no additional MBS configuration is needed for connected UE, therefore no new capability is needed. |
| Huawei, HiSilicon | No | We are not sure what this capability means and how it would be used by the gNB. The application does not distinguish whether the service is running over MBS or unicast and it simply provides reports based on QoE configuration. The existing “per-service” capabilities are sufficient then. |
| CMCC | No | We think unicast or multicast has no impact on QoE UE capability |
| China Unicom | No |  |
| Samsung | No |  |
| CATT | No |  |
| Ericsson | No |  |
|  |  |  |

**Summary:** No company agree to introduce MBS multicast UE capability. Also, since MBS multicast is not supported in RRC\_IDLE/RRC\_INACTIVE, MBS multicast UE capability is not supported for all RRC states.

**(7/7) Proposal 3: Do not introduce MBS multicast UE capability for all RRC states in Rel-18 QoE.**

## 2.3 NR-DC QoE capability description

It is agreed to introduce an overall UE capability for NR-DC and a separate UE capability for supporting SRB5. But there can be some ambiguity for the overall NR-DC capability description. Hence, comments from companies are invited.

The following description serves an early attempt and any comments are welcome.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***qoe-NRDC-MeasReport-r18***Indicates whether the UE supports to receive QoE configuration via SRB1 and SRB3, and send QoE report via SRB4 | UE | No | No | No |

And for SRB5 capability, companies can consider the following description and provide comments.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***srb5***Indicates whether the UE supports direct SRB5 between the SN and the UE as specified in TS 37.340 [7]. A UE supporting this feature shall also indicate support of *qoe-NRDC-MeasReport-r18* and any of *qoe-Streaming-MeasReport-r17*, *qoe-MTSI-MeasReport-r17* or *qoe-VR-MeasReport-r17*. | UE | No | No | No |

#### Q4. Does company agree to the above NR-DC QoE UE capability IE? If not or if there are any suggestions on the wording, please provide your comment.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or no** | **Comments** |
| ZTE | See comments | ***For DC capability:*** It is suggested to have some description on DC, otherwise it looks exactly like legacy QoE capability. Also since SRB3 is optional supported, this shall be reflected in the description as well. Optional support of SRB5 shall also be reflected. Suggested wording is as below:***qoe-NRDC-MeasReport-r18***Indicates whether the UE supports ~~to receive~~ QoE measurements when operating in dual connectivity mode, which includes receiving QoE configuration via SRB1 and optionally via SRB3, and sending QoE report via SRB4, and optionally by SRB5 as configured by NW.***For DC capability:***Since SRB5 is only for QoE report from UE to SN (not bi-directional), it can be reflected in the description. Also suggest to add reference to 38.331. Moreover, similar to SRB3 capability, there is no need to make the SRB5 capability conditional to QoE DC since anyway NW can based on the overall UE capability to decide how to provide configuration properly. To simply the description, we propose to have below rewording:***srb5***Indicates whether the UE supports direct ~~SRB5 between~~ ~~the SN and the UE~~ QoE report from UE to SN via SRB5 as specified in TS 37.340 [7] and TS 38.331[9]. ~~A UE supporting this feature shall also indicate support of~~ *~~qoe-NRDC-MeasReport-r18~~* ~~and any of~~ *~~qoe-Streaming-MeasReport-r17~~*~~,~~ *~~qoe-MTSI-MeasReport-r17~~* ~~or~~ *~~qoe-VR-MeasReport-r17~~*~~.~~ |
| Huawei, HiSilicon | See comments | Receiving via SRB1 and sending over SRB4 is already supported without this capability. It should be clarified here that this relates to QOE configurations from SN, e.g.:“Indicates whether the UE supports to receive QoE configuration via SRB1 and SRB3 from SN, and send the corresponding QoE reports via SRB4.”For SRB3/SRB5 capabilities:Now that SRB3 is not the only direct SRB supported in NR, it could be good to reword as follows: “Indicates whether the UE supports SRB3 which is a direct SRB between the SN and the UE….”Similar rewording is suggested for SRB5.For SRB5, the these conditions could be actually moved under *qoe-NRDC-MeasReport-r18* description: “and any of *qoe-Streaming-MeasReport-r17*, *qoe-MTSI-MeasReport-r17* or *qoe-VR-MeasReport-r17*.” |
| CMCC |  | Agree with Huawei |
| China Unicom |  | We are fine with the current description in“38306 draft CR for Rel-18 QoE\_v6\_China Unicom” tdoc. |
| Samsung |  | Same view with China Unicom |
| CATT |  | Same view with CU. |
| Ericsson |  | Agree with Huawei, but maybe check if “SN” or “SCG” is used in 38.306. |
|  |  |  |

**Summary:** Most companies accept current CR description. Should there be more comments, it can be reflected in CR discussion. No proposal here.

## 2.4 Open issue for QoE UE capability

Apart from the open issue in R2-2310204, there are still some potential open issues pending on other WG’s progress. For the convenience of further discussion, comments from company is always appreciated.

The following is the open issue identified based on the contributions from companies and agreements from other WGs:

Open issue 1: MBS unicast capability (pending on RAN3)

 RAN3 is discuss whether codepoint for MBS unicast should be included in QMC configurations in XnAP and NGAP. If agreed, UE capability for MBS unicast QoE may need to be introduced. Suggest to wait for SA3 progress.

Open issue 2: AR/MR QoE capability (pending on SA4)

 RAN3 has agreed to introduce AR/MR as a service type for QoE, but SA4 hasn’t formulated the metric for AR/MR. Suggest to wait for SA4 progress.

Open issue 3: Clarification of Rel-17 legacy QoE capability is only for RRC\_CONNECTED

 Companies wonders whether to clarify Rel-17 QoE capability (e.g.,*qoe-Streaming-MeasReport-r17*, *qoe-MTSI-MeasReport-r17* or *qoe-VR-MeasReport-r17*) that they only apply in RRC\_CONNECTED.

Open issue 4: Impact of priority and assistance information in QoE configuration

 RAN3 has agreed to introduce priority information as assistance information over NG for QoE report upon RAN overload (see R3-235346), it seems that a new UE capability can be helpful for RAN.

For buffer level threshold-based RVQoE reporting, RAN3 has confirm it will not be pursued in Rel-18[2]. Therefore, it seems no need to add an open issue for that.

#### Q5. Does company have any comments on the above open issues?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | For open issue 1, as commented above we don’t think new capability is needed for multicast, the same comments for unicast if agreed. Even if new capability for multicast is eventually agreed, it shall be the same connected QoE capability for unicast case. For open issue 4, buffer handling is part of package for QoE in idle/inactive, there is no need for additional capability.  |
| Huawei, HiSilicon | Open issue 1: It is unclear what this codepoint in the QMC would be used for. In any case, it is only for NGAP and XnAP and has no impact on AS layer and on capabilities. We do not think there is an open issue here.Open issue 3: We agree this should be clarified.Open issue 4: This does not seem to require any new capability. It should be supported by all the UEs which support IDLE/INACTIVE QoE.  |
| CMCC | For open issue 1: Similar to multicast, we haven’t observed any impact on UE capability for now.For open issue 4: we think UE may not support discarding based on priority (e.g., RedCap UE). And therefore, UE capability may be useful. |
| China Unicom | OI1: Not a issue.OI2: SA4 have defined some potential QoE metrics in the approved draft TS 26.119 (MeCar WI) and TR 26.812 (ARMRQoE SI), may be RAN2 can directly define a new capability for AR/MR QoE capability in Rel-18.OI3: AgreeOI4: It’s not needed to introduce a separate capability for this. RedCap UE that support QoE measurement is out of the scope of RAN2. |
| Ericsson | QI3: Agree |
|  |  |
|  |  |
|  |  |

**Summary:** No company agrees that MBS unicast UE capability is not an OI, i.e., it will not be introduced. AR/MR related QoE capability is supported by 2 companies. Clarification on Rel-17 UE capability is for RRC\_CONNECTED is supported by at least 3 of 5 companies. And 4 of 5 companies support priority based QoE report discarding is within QoE IDLE/INACTIVE capability.

**Proposal 5: RAN2 to focus on the following open issues related to UE capability in RAN2#124:**

* + - **OI1:** **AR/MR QoE capability**
		- **OI2: Clarification of Rel-17 legacy QoE capability is only for RRC\_CONNECTED**
		- **OI3: Clarification of RRC\_IDLE/INACTIVE QoE capability includes priority-based QoE report discarding.**

#### Q6. Does company have any further open issue? If so, please provide feedback.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Below agreement have been agreed for segmentation over SRB5 last RAN2 meeting:

|  |
| --- |
| Introduce a new indicator (ex, rrc-SegAllowed-SN-r17) for NW to inform UE of whether SN allows RRC segmentation via SRB5.For Rel-18, clarify that the “segmentation flag” from Rel-17 refers to SRB4 only |

Based on above agreements, new UE capability is required, clarification for legacy segmentation capability description is also needed. Example wording could be as below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***ul-MeasurementReportAppLayer-Seg-r17***Indicates whether the UE supports RRC segmentation of the MeasurementReportAppLayer message in UL over SRB4, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***ul-MeasurementReportAppLayer-Seg-srb5-r18***Indicates whether the UE supports RRC segmentation of the MeasurementReportAppLayer message in UL over SRB5, as specified in TS 38.331 [9]. | UE | No | No | No |

 |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Summary:** 1 company think SRB5 segmentation should be a separate UE capability regarding to the Rel-17 segmentation capability. There may be some argument on whether it can be possible for UE that supports SRB4 segmentation but not support SRB5 segmentation. So, from rapporteur’s point of view, it may need to be discussed in RAN2#124.

**Proposal 6: Include OI4, i.e., introduction of separate SRB5 segmentation UE capability and clarification the legacy UE capability is for SRB4 to the Open issue list.**

# 3. Conclusion

There aren’t many companies participate this post-email discussion. The premature conclusions are as follows,

*Need further discussion:*

**(4/7) Proposal 1: RAN2 does not define RedCap-specific UE capability for Rel-18 QoE.**

*Easy agreeable:*

**(2/3) Proposal 2: RedCap and eRedCap UE should have the same minimum memory requirement for QoE in RRC\_IDLE and RRC\_INACTIVE.**

**(7/7) Proposal 3: Do not introduce MBS multicast UE capability for all RRC states in Rel-18 QoE.**

*Open issues for RAN2#124:*

**Proposal 5: Introduce the following open issue related to UE capability in RAN2#124:**

* + - **OI1:** **AR/MR QoE capability**
		- **OI2: Clarification of Rel-17 legacy QoE capability is only for RRC\_CONNECTED**
		- **OI3: Clarification of RRC\_IDLE/INACTIVE QoE capability includes priority-based QoE report discarding.**

**Proposal 6: Include OI4, i.e., introduction of separate SRB5 segmentation UE capability and clarification the legacy UE capability is for SRB4 to the Open issue list.**

# 4. References

[1] R2-2311277, Report from session on MBS, QoE and LTE legacy

[2] RAN3\_121bis\_agenda\_20231013\_EOM