3GPP TSG-RAN WG3 #114bis-e [R3-22](https://ericsson-my.sharepoint.com/personal/filip_barac_ericsson_com/Documents/WORK/3GPP.exe/Meetings/RAN3%23113-e.exe/Meetings/RAN3%23113/chairnotes/Inbox/R3-214141.zip)xxxx

Online, 17 – 26 Jan, 2022

Agenda Item: 15.3

Source: China Unicom (moderator)

Title: Summary of Offline Discussion on CB: # QoE5\_RANVisible

Document for: Approval

# Introduction

**CB: # QoE5\_RANVisible**

**- Check LS from RAN2 and reply if needed.**

**- Whether and how to support RVQoE values? Which node to calculate the values and how to calculate the values? Coordination with SA4?**

**- RVQoE capability indication from UE?**

**- The reporting periodicity of RVQoE, same or different with legacy QoE? Using same or different RRC messages? RVQoE should always be reported together with legacy QoE?**

**- PDU/DRB/QoS information inside RVQoE report? Check whether Application layer is aware of the DRB/PDU/QoS information and the service type. LS to SA4?**

**- Pause/resume of RVQoE**

**- Co-ordinate with other groups if needed**

**- Focus on key issues, capture agreements and provide TPs if agreeable.**

(CU - moderator)

Summary of offline disc [R3-221039](file:///E:\4_标准\3GPP\2022年\2_RAN3工作\RAN3%23114e-bis\QoE\CB%231\Inbox\R3-221039.zip)

# For the Chairman’s Notes (Phase-II)

# Discussion (Phase-II)

According to online discussion, the focuses of Phase 2 discussion are listed as below:

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| --- |
| Chair: Merge P5 and P6 to make it more clear  For 2nd Round:  -Check details of the LS  -Check details of p10~p13  -TPs if agreeable |

## Merge P5 and P6

In the Phase-I discussion, the Proposal 5 and Proposal 6 are listed as below:

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| --- |
| **Proposal 5: For s-based QoE, RAN visible QoE metrics send from OAM need to be propagate from source node to the target node at mobility.**  **Proposal 6: WA for RAN visible QoE configuration can be propagated from the source to the target node upon mobility and during context retrieval.** |

More clarification about the two proposal:

- P5: Since it is already agreed in last meeting:

The OAM sends a list of the available RAN visible QoE metrics to the RAN node, outside the legacy QoE configuration container.

This configuration should be propagate from source node to target node for s-based QoE, outside the legacy QoE configuration container. Then target node can decide the RAN visible QoE configuration according to the available RAN visible QoE metrics provided by OAM. This configuration should be include outside the legacy QoE container, outside the RRC Container.

- P6: RAN visible configuration which is configured to UE should be propagate from source node to target node, it is different with the P5, and it should be a subset of the RAN visible QoE metrics send from OAM. This configuration should be included in the RRC Container.

**According to the guidance of chairlady, to make the proposal more clearly, we propose to merge the two proposal as below:**

**Proposal 5: RAN visible QoE metrics send from OAM need to be transparent from source NG-RAN node to the target NG-RAN node during mobility procedure for s-based QoE. RAN visible QoE configuration which is configured to UE can be transparent from the source NG-RAN node to the target NG-RAN node during mobility procedure for both m-based and s-based QoE.**

**Q1: Please let me know if any comments on the above proposal.**

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| **Company** | **Comment** |
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## Discussion for P10 to P13

**Proposal 10: RAN visible QoE reports and legacy QoE reports should use different periodicity, the reporting periodicity can be ms120, ms240, ms480, ms640, ms1024, ms2048, FFS for ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60.**

**Q2: Please let me know if any comments on proposal 10.**

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| **Company** | **Comment** |
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**Proposal 11: RAN visible QoE report need to pause/resume when RAN overload.**

**Q3: Please let me know if any comments on proposal 11.**

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| **Company** | **Comment** |
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**Proposal 12: FFS on whether to send LS to SA4 to check feasibility to include QoS flow information in RAN visible QoE report.**

**Q4: Please let me know if any comments on proposal 12.**

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| **Company** | **Comment** |
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**Proposal 13: FFS whether to introduce user consent mechanism for RAN visible QoE metrics, similar as in MDT.**

**Q5: Please let me know if any comments on proposal 13.**

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| **Company** | **Comment** |
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## Draft TP for RAN Visible QoE

If the draft TPs for RAN visible QoE are available, please share your comments in the table or directly feedback in the draft folder.

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| **Company** | **Comment** |
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# For the Chairman’s Notes

**Proposal 1: Send LS reply to RAN2 to clarify that the usage of RAN visible QoE may require the delivery of RAN visible QoE reports at a higher priority than legacy QoE reports, the final decision for which SRB should be used can be made by RAN2.**

**Proposal 2: The RAN visible QoE value is generated by UE APP, it can be further discussed in R18.**

**Proposal 3: RAN visible QoE capability should be discussed in RAN2, this should be up to RAN2 decision.**

**Proposal 4: Include PDU information and slice information in RVQoE report.**

**Proposal 5: For s-based QoE, RAN visible QoE metrics send from OAM need to be propagate from source node to the target node at mobility.**

**Proposal 6: WA for RAN visible QoE configuration can be propagated from the source to the target node upon mobility and during context retrieval.**

**Proposal 7: Target node may generate new RAN visible QoE configuration and send to UE during handover or RRC resume procedure.**

**Proposal 8: Send an LS to SA4/CT1/RAN2 informing about our agreements on RAN visible QoE and requesting them to provide the necessary specification support.**

**Proposal 9: Introduce a new class-2 message for QoE information transfer over F1. Stage-3 IE details can be FFS.**

**Proposal 10: RAN visible QoE reports and legacy QoE reports should use different periodicity, the reporting periodicity can be ms120, ms240, ms480, ms640, ms1024, ms2048, FFS for ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60.**

**Proposal 11: RAN visible QoE report need to pause/resume when RAN overload.**

**Proposal 12: FFS on whether to send LS to SA4 to check feasibility to include QoS flow information in RAN visible QoE report.**

**Proposal 13: FFS whether to introduce user consent mechanism for RAN visible QoE metrics, similar as in MDT.**

# Round-2 Discussion (Phase-I)

## Any Comments on proposed agreements?

**Q1: Please let me know if any concerns on the proposed agreements or any rewording suggestion for the specified proposals.**

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| **Company** | **Comment** |
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## Reporting Periodicity for RAN visible QoE

**Q2: Whether the RAN visible QoE is used for real time optimization? Whether RAN can know the legacy QoE reporting periodicity beforehand? Shouldn’t RAN be able to decide how often it should receive the RAN visible QoE reports?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| China Unicom | RAN visible QoE is used for real time optimization. RAN should be able to configure the periodicity of RAN visible QoE, and know the reporting periodicity. |
| **Ericsson** | Same view as CU. Otherwise we are constraining the RVQoE framework, and we reduce its usefulness. The following questions of ours were not answered:   * How can RAN know the legacy QoE reporting periodicity beforehand? Shouldn’t RAN be able to decide how often it should receive the RVQoE reports? * What should RAN do with a buffer level that is reported once per 1-hour video? |
| Qualcomm | If the intention is indeed for a real-time optimization, we are OK to compromise to allow a separate reporting periodicity for RVQoE but only if the lower reporting periodicities are allowed (see our answer to Q3).  Agree RAN can configure its desired periodicity, but there is no point in configuring RVQoE with periodicity > legacy QoE periodicity (which can be upto a minimum of 1 second). |
| **CATT** | RAN can decide the periodicity of the RVQOE. But the RAN cannot know the periodicity of the legacy QoE because the configuration container is transparent. So we should study how to handle these two periodicity. Whether it is absolutely independent or any relation |
| **CMCC** | We share view with CU and E///. |
| **ZTE** | Not sure. Actually as I know, we usually don’t define specific use cases in RAN3, except in some new features like AI/ML. We are not sure whether **real time** optimization should be defined for the use of RVQoE. It seems kind of network behavior, which is not supposed to be specified in our work.  Answer to Ericcson’s questions:   * The RAN does not need to know or configure the periodicity of reporting RVQoE, if RVQoE is reported together with legacy QoE. By the way, have we confirmed whether RVQoE should be reported together with legacy QoE or separately? * Not sure, maybe no use. We can not make sure that each and every RVQoE report is of great use to RAN optimization. It is just kind of assistance, after all, RAN still has its own mechanism for optimization. |

**Proposal: RAN visible QoE reports and legacy QoE reports should use different periodicity, the reporting periodicity can be ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60.**

**Q3: Do companies agreed with the above proposal?**

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| --- | --- |
| **Company** | **Comment** |
| China Unicom | Agree |
| **Ericsson** | **Agree** |
| Qualcomm | If the intention is indeed for a real-time use case, there is no point having higher reporting periodicities. Let’s just limit it till 1sec or 2sec at worst.  **ms120, ms240, ms480, ms640, ms1024** |
| **CATT** | Share with QC, we may study how to set the maximum value is? The “min” unit may be too larger |
| **CMCC** | Agree |
| **ZTE** | We would prefer using the same periodicity with legacy QoE, i.e., reporting RVQoE together with legacy QoE.  Different periodicity would definitely have much impact on RAN2 and SA4. If RAN3 really wants different periodicities for the reporting of RVQoE, the feasibility should at least confirmed by SA4/RAN2, before we make any agreement.  By the way, if different periodicities are really needed, the large values like ‘min60’ is meaningless in our mind. Is it defined for cases like a QoE session reported once during 1-hour video? |

## QoS flow in RAN visible QoE report

**Q4: Whether need to send LS to SA4 to check:**

**1. Whether one PDU session will corresponding with multiple applications but different QoS flows?**

**2. Whether APP is aware of the QoS flow?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| **Ericsson** | We think that this question is not relevant, given that only PDU session ID is on the table. |
| **Qualcomm** | Agree with E///. Lets’ just limit it to PDU session ID for this release. No need to send LS to SA4. |
| CATT | Agree with above |
| CMCC | We think the more important question is whether UE AS is able to know which QoS flow is associated with a specific APP ongoing session by AT command. But we are also fine to limit to PDU session ID for this release if time is limited. |
| **ZTE** | **Agree with above.** |

## Whether RAN visible QoE need pause/resume

**Q5: Please share your comments on whether RAN visible QoE need pause/resume like legacy QoE.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| China Unicom | Since RAN visible QoE is used for RAN optimization, late report may meaningless for RAN, it is no need to introduce pause/resume indication for RAN visible QoE, when RAN overload, the RAN visible QoE report can continue to report or the gNB can directly release the RAN visible QoE configuration. |
| **Ericsson** | **RAN should decide whether it also wants to pause RVQoE reporting**. We think that the need for pausing RVQoE reporting occurs much more seldom than the need to pause legacy RVQoE reporting. RAN may be quite interested in user experience during overload. |
| Qualcomm | Why do we want to make the pause/resume mechanism more and more complex? Let’s just have one flag which can be used to pause/resume both legacy QoE and RVQoE.  If RAN anticipates an overload, RAN can also modify the RVQoE periodicity to a larger value and collect it post the overload. Also please note that the overload is also not supposed to happen for a long duration as per SA4 reply LS. |
| **CATT** | **Yes** |
| **CMCC** | **Maybe not needed considering the limited overhead.** |
| **ZTE** | The clarification from Ericsson makes some sense.  The situation would be either one of the following:  - RAN decides that RVQoE should not be paused, then RVQoE is not paused together with legacy QoE.  - RVQoE decides that RVQoE is paused together with legacy QoE, then RVQoE should be paused together with legacy QoE, using the same indication.  So the pause indication needed to be designed to provide a switch for RAN to select whether RVQoE should be paused, maybe a flag like (true, false) ?  And maybe this should be confirmed by RAN2. |

**Proposal: RAN visible QoE report don’t need to pause/resume when RAN overload.**

**Q6: If it is agreed that RAN visible QoE is used for RAN optimization, do companies agreed with the above proposal?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| China Unicom | Agree |
| **Ericsson** | **Agree** |
| Qualcomm | Disagree (see our comments to Q5). |
| **CATT** | Disagree |
| **CMCC** | Agree |
| **ZTE** | RAN can decide whether there is a need to pause/resume. Maybe confirmed by RAN2. |

## LS Preparation in 2nd round

Moderator proposes the following work plan to have LSs ready so that companies can take a look before the online time.

1. **(LS to RAN2)** Draft LS based on Proposal 1
2. **(LS to RAN2/CT1/SA4)** Revision LS based on R3-220171 according to current agreements
3. **(LS to SA4)** Draft LS if it is agreed to check with SA4 in 3.3.

**Q7: Please let me know is you have any concerns**

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| **Company** | **Comment** |
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## Whether to introduce user consent mechanism, similar as in MDT, for RAN visible QoE metrics.

In [7], the following is propose to introduce user consent mechanism, similar as in MDT, for RAN visible QoE metrics.

**Q8: Whether to introduce user consent mechanism for RAN visible QoE metrics, similar as in MDT?**

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| --- | --- | --- |
| **Company** | **Agree?** | **Comment** |
| **Huawei** | Yes | We think this should be introduced, since QoE metric collections is pending on user’s acknowledgement. |
| **Ericsson** | See comment | The measurements such as packet delay and buffer level are already collected at L2. RVQoE reports contain a subset of info contained in the legacy QoE reports. We do not understand what else is needed? |
| **Qualcomm** | No | Similar view as E///. We are going to introduce UE capabilities anyway. |
| **CATT** | NO |  |
| **CMCC** | No | Our understanding is that UE capability may be enough. |
| **ZTE** | No |  |

## Any other comments

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| --- | --- |
| **Company** | **Comment** |
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# Round-1 Discussion (Phase-I)

The discussion will try to discuss the further details on the following topics: RAN visible QoE values, RAN visible QoE UE capability, RAN visible QoE report, RAN visible QoE when RAN overload and other miscellaneous points, the discussion will take the papers from [1] to [9] into account.

Please note that, for other topics which might impact NG, e.g. MDT alignment, we also have dedicated CB, for which moderator would leave the discussion there.

## Check LS from RAN2 on High Priority SRB

In RAN3#113e meeting, a LS for whether to use high-priority SRB for RAN visible QoE is send to RAN2, in RAN2#116e meeting, RAN2 send the LS [1] and would like RAN3 to provide more justifications on RAN visible QoE measurements usage to assist RAN2 in determination. Here is the issue in the LS.

|  |
| --- |
| ***Issue 1:*** *RAN2 discussed which SRB should be used to transmit RAN visible QoE measurements. RAN2 discussed whether SRB1 can be used to transmit RAN visible QoE report, and understands SRB1 is to react to radio conditions in time, so it is not preferred to transmit RAN visible QoE report. RAN2 discussed two additional options-SRB2 or SRB4 (which is agreed for reporting application layer QoE container), and many companies were not clear about why to put higher priority on RAN visible QoE measurements. RAN2 would like RAN3 to provide more explanations about RAN visible QoE measurements usage to assist RAN2 in determination.* |

**Q1: Comments on answer the issue1 in the LS. Whether RAN visible QoE should use SRB2 or use SRB4 like legacy QoE report? Please provide you reason as well.**

|  |  |
| --- | --- |
| Company | Comment |
| China Unicom | SRB2  RAN visible QoE is used for RAN optimization, it should have higher priority than legacy QoE report. For some high priority users, RAN visible QoE report will help operator to improve the user experience immediately even when the network resource usage is very high, and it is the original design for RAN visible QoE. Legacy QoE report is used in the OAM for post process, it has relatively low priority, and it can still use SRB4. If RAN visible QoE is also use SRB4, the RAN optimization based on RAN visible QoE report can't be guaranteed. |
| Qualcomm | SRB4  From the LS, it looks like RAN2 either prefers SRB2 or SRB4 (not SRB1) for RVQoE report. **For the sake of simplicity, we can ask RAN2 to use SRB4**.  Also, RAN3 agreed the following last meeting:   * RAN3’s decision on whether to have a different reporting periodicity for RAN visible QoE is independent of RAN2’s decision on which SRB to use for RAN visible QoE   This means we can still use a different periodicity for RVQoE if we are interested in more “real time optimizations” and not depend on the SRB used.  Further, RAN3 can provide more details on the RVQoE metrics for “*provide more explanations about RAN visible QoE measurements usage to assist RAN2 in determination*” but should reply that the decision is up to RAN2 and the use cases don’t necessarily require a different SRB than the existing SRB4 used for legacy QoE (especially if we agree on a separate reporting periodicity). |
| Huawei | We think whether to use SRB2 or SRB4 should be left for RAN2 to decide, while in RAN3, we could try to make further clarifications about the usage of RAN visible QoE, e.g., it serves for RAN to learn some metrics of an ongoing service which could further help RAN make better resource scheduling decision. |
| CATT | We prefer to use the same SRB with legacy one. i.e SRB4. We don’t see the RAN visible QoE report transmission is big difference from the legacy one. |
| Nokia | We believe SRB4 is preferable. |
| ZTE | SRB4  Similar view with QC. Considering that we have only two meetings left (this meeting included) for Rel-17WI, we would prefer to use SRB4 for the sake of simplicity. We also don’t think the need for different periodicity is depended on which SRB is used. If there are really strong need for real time optimization in the future, new periodicity can be introduced for reporting, using SRB4.  To save time and reduce interactions between WGs, we would propose RAN3 makes a decision on which SRB is used (**SRB4** from our side) and **reply to RAN2 with our decision/preference.** |
| **Ericsson** | **SRB2**. It makes no sense to report something that is to be used for post processing (legacy QoE) and something used for fast optimization (RVQoE) on the same SRB. |
| **Samsung** | **Similar view as HW,** the question is about how important of the RVQoE report is and how the RVQoE report will be used, to help RAN2 to make decision.  In our understanding, the RVQoE report can be used for scheduling optimization, moreover, in some cases, for the high priority users (Gold user) as mentioned by CU, the gNB can prevent the QoE degradation based on the real time RVQoE. In those scenarios, we think RVQoE report is more important than legacy QoE report. |
| **CMCC** | **SRB2.** And we share view with CU, Ericsson and Samsung. Note that SRB4 may be assigned with a lower priority compared to other SRBs or even DRBs. So if NG-RAN requires performing real-time operations such as scheduling optimization based on RVQoE report, then RVQoE report should better be sent over SRB with higher priority. |

**Since the final decision for which SRB should be used for RAN visible QoE will be made by RAN2. In RAN3, we should make further clarifications about the usage of RAN visible QoE.**

**Proposal 1: Send LS reply to RAN2 to clarify the usage of RAN visible QoE, the final decision for which SRB should be used can be made by RAN2.**

## RAN visible QoE value

The question is derived based on proposals in papers [4, 7, 8].

**Q2: Which node should responsible for generate the QoE values, UE APP, or gNB?**

**a. if UE APP is agreed to generate RVQoE value, how to calculate the QoE value, and how about the value range? [7][8]**

**b. if gNB is agreed to generate RVQoE value, what additional RVQoE metrics(i.e. PlayList) are needed to be introduced? How to calculate the QoE value, and how about the value range? [4][8]**

|  |  |  |
| --- | --- | --- |
| Company | UE APP/gNB | Comment |
| China Unicom | UE APP | UE APP need to generate RAN visible QoE value, but if how to calculate the QoE value will not have consensus, it can be discussed in R18. |
| Qualcomm | See comments | Considering the limited time left in Rel-17 and no clarity on how to represent RVQoE values as an objective or qualitative representation (i.e., on a score of 0-5 or poor/medium/good), we propose to not include any such RVQoE value.  The only thing we are open to consider is whether to represent any **derived information from existing legacy QoE metrics**, e.g., number of stalling occurrences from the PlayList and report it as a RVQoE value.  If the above is considered, then UE APP can compute the “number of stalling occurrences” in a measurement period (by counting the number of times stopReason = “rebuffering” in PlayList). But it is also not clear how useful is this statistical information. |
| Huawei | UE APP is preferred | As discussed before, RAN visible QoE value is calculated from QoE metrics which are E2E, some but not all of them are visible to RAN, while UE APP knows all the metrics.  As to how to calculate the value, we think it should be up to SA4 to discuss.  From RAN side, we could try to make signaling ready, e.g. to introduce something like: “excellent, good, normal, below average” or “from 1 to 10”, as suggestion/reference for SA4’s consideration. |
| CATT |  | We don’t the RVQOE value added to the metrics can introduce more meanings. We just use the metrics which SA4 defined. If we plan to have the value, the UE APP may perform this function |
| Nokia |  | Same view as CATT. This would have to be a UE APP functionality requiring SA4 involvement and evaluation from their side. It doesn't seem feasible to introduce RVQoE value in Rel-17. |
| ZTE | UE APP | Share the view with Huawei.  RAN visible QoE values should be calculated by UE APP layer, because it is APP layer that performs the QoE measurement, which means only APP layer has best vision of **all** **the QoE metrics**. SA4 can define the function or build the model for calculating QoE values, to generate RVQoE value(s) which could reflect a general level of service quality. Furthermore, we think RVQoE value should be a general value calculated based on multiple metrics, while gNB only know part of metrics from RVQoE report. so, the gNB is not good choice for QoE values calculation.  We acknowledge the time left for R17 WI is limited, but how to calculate RAN visible QoE values is honestly not RAN3 work and would not cost our time. What RAN3 needs to do is letting SA5 know our requirement so that they can provide corresponding support (LS to SA4 needed). |
| **Ericsson** | No time for this in Rel-17 | But, in general, App layer should do this. |
| Samsung | gNB in R17  UE APP can be discussed in R18 | As we analyzed in our contribution, QoE value generated by UE APP is complicated and need coordination with other groups, but we don’t have enough time in R17. For saving time, if we really want to support RVQoE values in R17, it is also possible that RAN node can calculate it according to RVQoE metrics, the only enhancement we need is to introduce PlayList as one of the RVQoE metrics.  Please note the below observation from SA4’s study,  **the metrics InitialPlayoutDelay and PlayList defined in in TS 26.247 are support the calculation of stalling related values in P.NATS mode 0.** |
| CMCC | UE APP | We share view with HW and ZTE. |

**Moderator’s Summary:**

**Majority view is that the UE APP should generate the QoE value. If the QoE value is generate by the gNB, it will rely on the gNB implementation, new RAN visible QoE metrics need to be supported, moderator propose to discussed new QoE metrics in R18.**

**Since there is no consensus for how to calculate the QoE value. Maybe more cross WGs work are needed, considering the time left for R17, The following has been proposed by the moderator:**

**Proposal 2: The RAN visible QoE value is generate by UE APP, it can be further discussed in R18.**

## RAN visible QoE capability

It was agreed in previous RAN3 meeting:

*“The UE is assumed to indicate to the RAN its capability with respect to providing RVQOE metrics (LS to RAN2 seems needed).”*

An LS had already send to RAN2(R3-214477):

*“RAN3 respectfully asks RAN2 to define UE capability to support RAN visible QoE measurement.”*

**How to define RAN visible QoE capability needs to be further discussed in RAN3 and RAN2 meeting, there are two options:**

**Option1: Define a RAN visible QoE capability parameter for all service type, there’s no need to define separate parameters as per service type for RAN visible QoE;**

**Option2: Define RAN visible QoE capability for some specific service type, e.g. DASH streaming and VR services;**

**Q3: Which option do you support, and why?**

|  |  |  |
| --- | --- | --- |
| Company | Which Option? | Comment |
| China Unicom | Option1 | Legacy QoE can be configured for different service type, it is no need to define RAN visible QoE for each service type. |
| Qualcomm | Option 2 | Per service type is better (e.g., R17 only supports legacy QoE for MTSI but not RVQoE).  But this should be discussed in RAN2. |
| Huawei | See comments | We still think this should be up to RAN2 to decide, since RAN2 understands the way how UE would support different services. |
| CATT | Option 2 | Follow the legacy QoE |
| Nokia | up to RAN2 | We expect option 1 would primarily reflect an access stratum capability. For option 2, the UE AS would have to check capabilities of the UE APP layer? Or would the intention be that UE AS layer has some hard-coded capability information about APP layer (which might be the case for LTE QMC). Hence RAN2 would have to decide. |
| ZTE | Prefer Option 1, but decided by RAN2 | This question is in RAN2 scope and as we know, RAN2 has started their discussion on this.  If RAN3 should provide some preference, we would prefer option 1. |
| **Ericsson** | Option 2 |  |
| **Samsung** | Option 1 | Option 1. We already have QoE capabilities per service type for legacy QoE, and configuration of RVQoE is based on the legacy QoE, so we think one parameter for RVQoE capability along with current legacy QoE capability is enough to decide whether gNB can configure the UE the RVQoE for a specific service type. |
| **CMCC** | Prefer Option 1, but up to RAN2 | RAN2 is also discussing the same issue, and it is safer to decide it in RAN2 in case of conflict. |

**Moderator’s Summary:**

**Since RAN visible QoE capability discussion is started in RAN2. To avoid the overlapping with RAN2 discussion, it is proposed:**

**Proposal 3: RAN visible QoE capability should be discussed in RAN2, this should be up to RAN2 decision.**

## RAN Visible QoE Report Periodicity

The question is derived based on proposals in papers [2, 3, 4, 6, 7, 8, 9].

**Q4: Whether RAN visible QoE reports and legacy QoE reports should use different periodicity?**

**- If different periodicity is supported, what periodicity is suitable to be defined in the RAN visible QoE configuration, e.g. ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| China Unicom | Yes | Since RAN visible QoE report will be used for RAN optimization, separate periodicity can be configured. The following periodicity can be supported:  ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60 |
| Qualcomm | Prefer No (SA4 should confirm feasibility) | We prefer having the same reporting periodicity for RVQoE and legacy QoE to avoid increasing processing complexities at the UE APP if different reporting periodicities for RVQoE and legacy QoE are to be handled. This needs to be checked with SA4 whether this is feasible, especially if RVQoE reporting needs to be very frequent e.g., 120 ms, 240 ms.  **If SA4 confirms that that this is feasible, we are open to consider a separate reporting periodicity for RVQoE.**  Regarding the periodicities,  NG-RAN doesn’t know the reporting periodicity of legacy QoE and it is possible that NG-RAN might configure the RVQoE periodicity greater than legacy QoE, which would not be useful. **Should we ensure RVQoE reporting periodicity < legacy QoE periodicity and if so how?** |
| Huawei | No | We think, to be simple, there is no need to have different periodicity, this would introduce additional work load in RAN2 and CT4, since this info needs to convey to application layer which would also require additional work at app layer. |
| CATT |  | We should support the RVQOE use the same or different periodicity.  More discussion is needed for the value of the periodicity |
| Nokia | No | From the use case discussion we have had so far, same periodicity as legacy reporting seems sufficient. |
| ZTE | Prefer No | Similar view with QC.  At current stage, the same periodicity for reporting seems enough and would simplify our work and save our time for good. If there is really strong need for real time optimization, i.e., more frequently reporting, it should be confirmed by SA4 (also LS needed). |
| **Ericsson** | **Yes** | Same view as China Unicom, we propose the following periodicities:  ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30, min60  Questions to the opponents: how can RAN know the legacy QoE reporting periodicity beforehand? Shouldn’t RAN be able to decide how often it should receive the RVQoE reports? And what should RAN do with a RVQoE report that is sent one time per session? |
| Samsung | Yes | But confirm with SA4 is also needed. |
| CMCC | Yes | If we can agree that RVQoE report can be used for RAN optimization in a real-time manner, then shorter reporting interval should be considered. But of course confirmation from SA4 is needed. |

**Moderator’s Summary:**

**No (4/9), Yes (4/9), No strong view (1/9).**

**But in the discussion of 4.1, two companies (Qualcomm, ZTE) comments like below:**

“*This means we can still use a different periodicity for RVQoE if we are interested in more “real time optimizations” and not depend on the SRB used.*”

“*If there are really strong need for real time optimization in the future, new periodicity can be introduced for reporting, using SRB4.*”

**Thus, whether the RAN visible QoE is used for real time optimization should be discussed first. If yes, different periodicity for RAN visible QoE reports and legacy QoE reports should be considered.**

**It should also be discussed that whether RAN can know the legacy QoE reporting periodicity beforehand? Shouldn’t RAN be able to decide how often it should receive the RVQoE reports?**

## PDU/DRB/QoS information inside RVQoE report

It is agreed to make a WA in the last RAN3 meeting:

“WA: Include PDU or QoS related information in RVQoE report”.

It is also discussed in papers [4, 8].

|  |
| --- |
| [2] Proposal 6: Postpone the discussion on inclusion of PDU or QoS related information in RVQoE report in Rel-18.  [4] Proposal 10: Include PDU session ID in RVQoE report  [5] Proposal 1: Request RAN2 to include either the DRB id, or alternatively PDU session ID and QoS flow ID, in the RVQOE report.  [6] Proposal 1: Include PDU session ID(s) information in RAN visible QoE, it is no need to also include QoS flow information in RAN visible QoE report.  [7] Proposal 2: For the RAN visible QoE, the slice id outside the reporting container is not needed.  [7] Proposal 3: The PDU session information and QoS flow information are reported together with the RAN visible QoE.  [8] Proposal 12, the DRB list should be included in the QoE report for QoS aware scheduling. |

**Q5: Whether to include PDU session information in RAN visible QoE report? Whether need to also include other information in RAN visible QoE report (e.g. QoS flow information, DRB list)?**

**Q6: Whether application layer is aware of the DRB/PDU/QoS information and the service type? Whether need to send LS to SA4?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| China Unicom | Yes | PDU session should be included in RAN visible QoE report. Other information is not needed, since gNB can get the QoS flow and DRB information according to PDU session.  Since the LS reply from SA2 and SA4 is indicate that application layer is aware of the slice and PDU session, it is no need to send LS to SA4. |
| Qualcomm | Q5 – Only PDU session ID  Q6 – APP is aware of PDU session ID; No need of LS | This is a snippet of the LS reply sent by SA4 in S4-211225:  ..  *The QoE reporting procedure in 5GMS is performed by the Media Session Handler, which subscribes for OAM metrics configurations, collects reports from the media player, compiles and sends the reports to the OAM. For MTSI, the MTSI client is responsible for collecting and reporting the OAM metric measurements.*  *The MSH and the MTSI client are able to identify the PDU session and the corresponding S-NSSAI and DNN, over which the media streaming session or the MTSI call is running. One way to discover the used S-NSSAI is through the +CGDCONT? AT command.*  This clearly states that the application is clearly aware of the PDU session and S-NSSAI over which the QoE client is running via AT commands.  **Q5** – We therefore think PDU session ID can be forwarded along with the RAN visible QoE report via AT command and further included in the RAN visible QoE report over Uu.  No need to include QoS flow information or DRB list in the RVQoE report as this would mean UE AS has to do find out the mapping between the PDU session ID and the DRB/QoS flow before including it in the RVQoE report  **Q6** – Application is aware of PDU session but not the DRB and QoS flow information. We propose to just consider the inclusion of PDU session ID in the RVQoE report for the sake of simplicity and not consider DRB or QoS flow info. Also, no need to send LS to SA4 to check. |
| Huawei | Yes to Q5  No strong opinion to Q6 | For Q5, we think at least PDU session info should be included, better to include QoS flow info as well;  For Q6, we think if we could reach agreements at RAN side, then there is no need to check with SA4. |
| CATT |  | We are open for the carrying the PDU session ID in the report. |
| Nokia | yes to Q5 + in principle need for QoS flow | We saw the following statement in [6]: "Since one PDU session will corresponding with only one application session […)" However we think that multiple applications, allocated to the same slice, could use the same PDU session but different QoS flows and hence different DRBs. Still, if absence of support for Q6 comes from technical complexity relative to providing QoS flow info (we acknowledge being close to end of the WI), maybe the Rel-17 solution will have to address a simple scenario with single QoS flow per PDU session. |
| ZTE | PDU session ID, QoS flow id  No need to send LS to check | In our paper[10], we proposed to include PDU session ID and QoS flow id in the RVQoE report. UE AS layer is aware of the PDU session and QoS flow information of the corresponding application layer session. With these information inside the RVQoE report, RAN could well know which PDU session and QoS flow this report is corresponded with, and then it can play more accurate optimization or resource reallocation.  Regarding UE APP layer awareness, we think APP is only aware of PDU session ID, LS not needed to check with SA4. |
| **Ericsson** | We should discuss PDU Session ID only. | The Application layer has no knowledge of QoS flow info and DRB IDs. |
| **Samsung** | Include PDU session ID in RVQoE report over Uu is fine, but | No matter how, the final purpose of the RVQoE is to optimize the DRB scheduling, and the NG-RAN node can also map the PDU session to DRB, so we think include DRB list in QoE Information Transfer message over F1AP is more straightforward.  China Unicom: since the application will not aware of the DRB information, the gNB can get the DRB list according to the PDU session information in QoE report. |
| **CMCC** |  | We acknowledge that UE APP layer is aware of PDU session information and service type, but not aware of DRB or QoS info.  But we are not sure if UE or gNB is able to identify the associated QoS info or DRB info merely based on PDU Session ID. But since the time is limited, we can live with just adopting PDU Session ID in R17. |

**Moderator’s Summary:**

**It is consensus that PDU session should be included in the RAN visible QoE report. But it need to check with SA4 whether it is aware of the QoS flow.**

**Send LS to SA4 to check whether one PDU session will corresponding with multiple applications but different QoS flows, check whether APP is aware of the QoS flow.**

**Proposal 4: Include PDU information in RVQoE report.**

## RAN visible QoE Report in case of RAN overload situation

The question is derived based on proposals in papers [2, 4].

**Q7: If the legacy QoE reporting is paused/resumed, whether the corresponding RVQOE reporting should be paused/resumed as well?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| China Unicom | No | RAN visible QoE is used for RAN optimization, if the RAN visible QoE report is paused, it will has no use for RAN optimization, and the payload of RAN visible QoE report is much smaller than legacy QoE report, so if the legacy QoE reporting is paused/resumed, the corresponding RVQOE reporting should continue to report. |
| Qualcomm | Yes | When there is RAN overload, RVQoE reporting should also be paused. If the network wants to know the QoE during the overload, we always have the legacy QoE reports which will be sent post the overload and can used to identify problems or potential optimizations.  We don’t see the need to continue just RVQoE reporting but pause legacy QoE reporting. This would mean we need two different pause/resume indicators – one for legacy QoE and one for RVQoE – over Uu and in the AT commands. |
| Huawei | Yes, but | To b be simple, we think RAN visible QoE report should be paused/resumed together, otherwise, we need different pause/resume indication for legacy QoE report and RAN visible QoE report respectively, but it is finally up RAN2 to decide if RAN2 don’t see any complexities. |
| CATT | Yes | Under the overload of the RAN node, RVQOE should be treated same as legacy QoE. As SA4 point, the legacy QOE report also does not introduce high load. We still apply the pause when RAN overload. |
| Nokia | Yes |  |
| ZTE | Not sure | This can be pending the progress of RAN2 on the design of pause/resume mechanism. Or maybe this should also decided by RAN2? |
| **Ericsson** | **No** | Same view as China Unicom – the payload of RVQoE reports is tiny, even compared to legacy RVQoE reports (just a few bytes). |
| Samsung | Yes | we don’t see the need to introduce two pause/resume indicators |
| CMCC | No | The outdated RVQoE reports will be of less use for a NG-RAN node than reporting without pause, considering the payload is limited. |

**Moderator’s Summary:**

**No (3/9), Yes (5/9), No strong view (1/9).**

**It is no consensus for whether to paused/resumed RAN visible QoE when the corresponding legacy QoE reporting is paused/resumed. But the main concern is whether to introduce two pause/resume indicators in RAN2.**

**Moderator’s view is that it is no need to introduce pause/resume indication for RAN visible QoE, when RAN overload, the RAN visible QoE report can continue to report or the gNB can directly release the RAN visible QoE configuration.**

**RAN3 should discuss whether pause/resume should only influence legacy QoE report. Whether RAN visible QoE report need pause/resume.**

## Mobility Support for RAN Visible QoE

The question is derived based on proposals in papers [2, 4, 6, 8, 9].

Moderator’s summary for the proposals:

**Proposal:**

**For s-based QoE, RAN visible QoE metrics send from OAM need to be propagate from source node to target node at mobility.**

**RAN visible QoE configuration can be propagated from the source to target node upon mobility and during context retrieval.**

**Target node shall generates new RAN visible QoE configuration and send to UE during handover or RRC resume procedure.**

**Q8: For the RAN visible QoE configuration delivery during mobility, do companies agree with the above proposal?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| China Unicom | Yes | Since RAN visible QoE configuration is generate by each gNB, both source gNB and target gNB should know the RAN visible QoE metrics send from OAM, for m-based QoE, the target node can also get the configuration from OAM, but for s-based QoE, it should propagate from source gNB to target gNB during mobility.  Source node can propagate the RAN visible QoE configuration to target node, and target node can generate new RAN visible QoE configuration or still use the source node RAN visible QoE configuration, which is based on the target node decision, new RAN visible QoE configuration can be configured during handover or RRC resume procedure for connected and inactive UE. |
| Qualcomm | Yes | We agree with the moderator proposals. Further, we list below the different cases possible for the sake of completeness:  When Source gNB propagates the RVQoE configuration to target gNB, following 4 cases are possible:  **Case 1: Target gNB releases the source RVQoE configuration explicitly** 🡪 Post handover, no RVQoE configuration is present at the UE and UE should discard the stored RVQoE reports  **Case 2: Target gNB configures a new RVQoE configuration with the same QoE Reference** 🡪 Source gNB’s RVQoE configuration is overwritten with the target gNB’s new RVQoE configuration. The stored RVQoE reports should be discarded and UE should start measuring RVQoE for the new configuration  **Case 3: Target gNB configures a new RVQoE configuration with a different QoE Reference** 🡪 As no explicit release of the source gNB configuration is sent, there are currently two RVQoE configurations at the UE. UE will measure both RVQoE configurations  **Case 4:** **Target gNB does nothing 🡪** Source gNB’s RVQoE configuration continues in the target node; UE continues to measure the RVQoE and sends it to the target gNB |
| Huawei | Yes | Huawei |
| CATT | Partial yes | We don’t think the below is needed. The target node can configure the RVQOE configuration  **RAN visible QoE configuration can be propagated from the source to target node upon mobility and during context retrieval.** |
| Nokia | Yes (but see comment) | with the understanding that there is a typo here:  **For s-based QoE, RAN visible QoE ~~metrics~~ configuration send from OAM need to be propagate from source node to target node at mobility.**  Also, the next proposal seems to say the same but additionally includes resume from inactive (which is OK): **RAN visible QoE configuration can be propagated from the source to target node upon mobility and during context retrieval.**  **China Unicom: The agreement of last RAN3 meeting:**  **“**The OAM sends a list of the available RAN visible QoE metrics to the RAN node, outside the legacy QoE configuration container.**”**  **It is better to keep the same with the agreement.** |
| ZTE | Yes for the 1st proposal | We don’t see the necessity for the last two proposals.  In our view, there is no need for the source node to propagate RVQoE configuration to the target node. The target node can configure RVQoE based on its own requirement after the handover. The configuration from the source node only reflects the requirement of the source node itself, we don’t think it has any use to the target node.  For the last proposal, we think it can be revised into ‘**Target node can generate new RAN visible QoE configuration and send to UE if needed’.** ‘during handover or RRC resume procedure’ seems no needed.  Comments on the four cases listed by Qualcomm:  Case 1: **Target gNB releases the source RVQoE configuration explicitly** 🡪 ZTE: seems the source RVQoE configuration is not needed.  **Case 2: Target gNB configures a new RVQoE configuration with the same QoE Reference** 🡪 ZTE: also seems the source RVQoE configuration is not needed.  **Case 3: Target gNB configures a new RVQoE configuration with a different QoE Reference** 🡪 ZTE: the old configuration is based on the requirement from source node, even of it is kept by the target node, we don’t think it would be of any use.  **Case 4:** **Target gNB does nothing 🡪** ZTE: similar comment as in case 3. why would the report based on old configuration be of any use to target node? Besides, if the target node does nothing, it can be assumed that the target node has no requirement for RAN visible QoE measurement.  So based on the four cases above, it still seems **unnecessary** to send the RVQoE configuration from the source node to target. |
| **Ericsson** | **Yes, with edits** | We think that the RVQoE config should be propagated between source and target, as target may reuse the same settings.  Regarding case 4, we disagree with ZTE’s comment - we think that target should still confirm the RVQoE config at the UE, even if it changes nothing. This is to avoid the UE reporting RVQoE in vain.  Some edits suggested:    Reason: OAM does not provide RVQoE configuration to the RAN, it provides the list of available metrics. We think that it is simpler that in both cases (m- and s-) the source propagates the RVQoE config info to target, rather than OAM sending to RAN same info (i.e. available RVQoE metrics) over and over again. **RAN visible QoE configuration can be propagated from the source to the target node upon mobility and during context retrieval.**  **Target node may generate new RAN visible QoE configuration and send to UE during handover or RRC resume procedure.**  **China Unicom: OAM should send the list of available metrics to target node for s-based QoE, then the target node can generate new RAN visible QoE configuration.** |
| **Samsung** | **Yes** | The rewording from E/// is ok.  But another open issue is missed here, which is **whether to deliver the RVQoE report after handover**. The RVQoE report which reflects the UE experience in source gNB and during handover should be transmitted from the target gNB to the source gNB after handover, so that the source gNB can evaluate the handover decisions and optimize the handover parameters to increase or ensure the UE experience of following handover UEs.  Maybe we can discuss this in the second round.  China Unicom: Since it is not clear how to identify whether the RAN visible report is generate in the source node or the target node, it can be discussed in the following meeting or in R18. Maybe we can only focus on the key issue following the chairlady’s guidance this meeting. |
| **CMCC** | **Yes** | The rewording from E/// is good. |

**Moderator’s Summary:**

**Proposal 5: For s-based QoE, RAN visible QoE metrics send from OAM need to be propagate from source node to the target node at mobility.**

**Proposal 6: FFS for whether RAN visible QoE configuration can be propagated from the source to the target node upon mobility and during context retrieval.**

**Proposal 7: Target node may generate new RAN visible QoE configuration and send to UE during handover or RRC resume procedure.**

## LS to other groups

The following LS to other groups have been proposed. The final LS send to other groups need to base on the agreements achieved this meeting.

**Q9: Take [2] as baseline to capture the above agreements to inform RAN2/SA4/CT1.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| China Unicom | Yes | The LS to CT1, SA4 and RAN2 need to be send in this meeting. The detail should based on the agreements achieved in this meeting. |
| Qualcomm | Yes | Same view as China Unicom. |
| Huawei |  | Better to take all the agreements related with each group, then we could decide how to organize the outgoing LS, otherwise there are so many LSes. |
| CATT | Yes |  |
| Nokia |  | We prefer to group the LSs (several WGs impacted by same decisions).  Annex A (LS to RAN2): comments provided on capability indication and reporting interval above.  Annex B (LS to SA4): comment on reporting interval above.  Annex C (LS to CT1): Clarify that the RAN needs to receive RVQOE metric in RRC encoded IEs. How to do this will require RAN2 involvement. Maybe a possible solution is that the AT commands conveying the RVQOE metric will use RRC encoded containers, but at least CT1 has to be made aware that this is needed in the LS. We believe there is also be similar constraint in the other direction (for the RVQOE configuration), i.e. it has to be transparently forwarded by UE AS to UE APP without e.g. XML encoding. |
| ZTE | Yes | Same view as China Unicom. |
| **Ericsson** | Yes | Agree with CU. |
| **Samsung** | Yes |  |
| **CMCC** | Yes |  |

**Moderator’s Summary:**

**Proposal 8: Send LS reply to RAN2 to clarify the usage of RAN visible QoE.**

**Proposal 9: Send an LS to SA4/CT1/RAN2 informing about our agreements on RAN visible QoE and requesting them to provide the necessary specification support.**

## Fixing a RAN3#114-e agreement

In [2], the following is proposed:

**Proposal 7: Replace “class-1” with “class-2” in the following RAN3#114-e agreement:“*Introduce a new class-1 message for QoE information transfer over F1. Stage-3 IE details can be FFS.*”**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree?** | **Comment** |
| **Ericsson** | Yes |  |
| **Samsung** | Yes | Anyway, it’s a class 2 message in current BL CR, so this is just a typo. |

**Moderator’s Summary:**

**Proposal 10: Introduce a new class-2 message for QoE information transfer over F1. Stage-3 IE details can be FFS.**

# Conclusion, Recommendations

If needed

# References

1. R3-220111 LS on RAN visible QoE (RAN2)
2. R3-220171 The Remaining Issues for RAN Visible QoE (Ericsson)
3. R3-220172 Reporting Periodicity of RAN Visible QoE (Ericsson, CMCC, China Unicom)
4. R3-220274 RAN visible QoE (Qualcomm Incorporated)
5. R3-220331 Use of RAN visible QoE in the NG-RAN node (Nokia, Nokia Shanghai Bell)
6. R3-220734 Configuration and Reporting of RAN Visible QoE (China Unicom)
7. R3-220912 Further discussions on RAN visible QoE metrics (Huawei)
8. R3-220923 Further discussion on RAN visible QoE (Samsung)
9. R3-220937 Discussion on RAN visible QoE configuration and reporting (CATT)
10. R3-220964 Further consideration on RVQoE configuration and reporting (ZTE, China Telecom)
11. R3-220965 [draft] LS on the support for RAN visible QoE (ZTE)