3GPP TSG-RAN WG3 #114bis-e [R3-22xxxx](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)

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

# Discussion

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.** |

## 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). |

## 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. |

## 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). |

## 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. |

## 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? |

## 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.** |
| 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. |

## 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. |

# 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)