3GPP TSG-RAN WG3 #117-e R3-225012

15-24 Aug 2022

Agenda Item: 11.4

Source: Huawei (moderator)

Title: Summary of Offline Discussion on CB: # QoE3\_Others

Document for: Approval

# Introduction

**CB: # QoE3\_Others**

**- Evaluate and decide the left issues to be solved in R18**

**- Capture agreements and open issues**

(HW - moderator)

[NWM] Summary of offline disc R3-225012

Summary of offline disc

# For the Chairman’s Notes

**For chairlady to copy:**

**Agreement:**

* **Introduce the slice scope information in the container, and send LS out to SA4.**
* **Definition of QoE value is out of RAN3 scope, LS out to SA4 is needed.**
* **WA: UE application layer is responsible for generating RAN-visible QoE value.**
* **UE should report QoS flow information to RAN.**
* **QoS flow information should be introduced as an explicit IE in the RAN visible QoE report over F1.**
* **WA: OAM can send the priorities for the management based QoE measurements to NG-RAN.**
* **WA: In the AI of Left-over from R17, it is suggested to focus on the following issues:**

**- Specify per-slice QoE measurement configuration enhancement.**

**- Specify RAN visible QoE enhancements for QoE value, RAN visible QoE trigger event, RAN visible QoE Report over F1.**

**- Specify QoE reporting handling enhancement for overload scenario.**

**Other enhancements of existing features should be treated as low priority.**

**Open issues:**

* **FFS whether there is a need to introduce enhancement to per-slice RAN visible QoE.**
* **In the second round, we continue discuss the details of draft LS OUT to SA4, which should provide guidance on the definition of QoE value.**
* **What is the real benefit of introducing Threshold-based triggers and Event based triggers?**
* **Should the measurement behaviour of UE application layer impacted by event-based triggers?**
* **Is a LS out to RAN2 needed to let RAN2 know UE should provide QoS flow information to RAN?**
* **How to handle the scenario that different PDU sessions use the same qos flow ID, if only qos flow information is included in F1?**
* **Discuss whether a LS to RAN2 is needed, to ask RAN2 whether UE want to know priority information as well.**

Detailed discussions

**For Per-slice QoE measurement configuration enhancement.**

All the companies agree to introduce the slice scope information in the container, LS out to SA4 is needed. In the second round, details of draft LS OUT to SA4 will be discussed.

No consensus was reached regarding the need of enhancement to per-slice RAN visible QoE.

**For RAN visible QoE enhancements for QoE value**

9 of 10 companies believe definition of QoE value is out of RAN3 scope, 3 of 10 companies also think RAN3 need to provide some guidance on the definition. 1 company think RVQoE values related to the events at the AS layer need to be considered as well, and RAN3 need to guide SA4.

8 of 10 companies believe QoE value should be generated by application layer, while the other two companies think the value can be generated by AS layer as well.

Most companies fail to understand the usage of RVQoE value target, or think it is not needed.

**For RAN visible QoE trigger event**

4 of 10 companies prefer to have threshold-based triggers for RAN visible QoE report. Two companies think more discussion on the triggers is needed, and another three companies have no strong view. One (or two) company think legacy mechanism is sufficient for QoE report.

4 of 9 companies think event-based trigger is designed for RAN visible QoE reporting, another 4 of 9 companies think the trigger can be designed for RAN visible QoE measurement as well. Also, 5 of 9 companies support event-based triggers, while the other companies think the benefit needs more discussion. The events that are mentioned by the companies are diverse.

**For RAN visible QoE Report over F1**

7 of 10 companies think there is no need to introduce the PDU session ID as an explicit IE in the RAN visible QoE report over F1. All companies agree to let UE report QoS flow information to RAN, and introduce QoS flow information (or DRB) as an explicit IE in the RAN visible QoE report over F1. In addition, the moderator thinks a LS out to RAN2 is also needed if we all agree UE should report QoS flow information to RAN.

7 of 9 companies think the enhancements of F1 proposed in [12] is not needed or need further discussion.

**For QoE reporting handling enhancement for overload scenario**

6 of 9 companies think it is beneficial to let OAM sends the priorities for the management based QoE measurements to NG-RAN. Two companies have no strong view. 4 of 9 companies think the priority can also be applied to s-based QoE. One company not agree to introduce the priority. In addition, there is no consensus on whether there is a need to send priority information to UE.

**For Others**

6 of 8 companies believe we should keep the R17 leftover issue as small as possible and focus on the issues listed in the scope.

# Discussion

In this CB, we will try to discuss left-over features from Rel-17, as well as the enhancements of existing features which are not included in Rel-17. The discussion will take the papers from [1] to [14] into account.

In general, the AI this CB is associated with, is a small basket which contains quite a lot of diverse issues. For achieving the goal of an efficient discussion, the moderator suggests to first focus on the issues specified in the WID, which are:

- Specify per-slice QoE measurement configuration enhancement.

- Specify RAN visible QoE enhancements for QoE value, RAN visible QoE trigger event, RAN visible QoE Report over F1.

- Specify QoE reporting handling enhancement for overload scenario.

Other issues will be treated in a relatively low priority.

## Per-slice QoE measurement configuration enhancement.

Moderator’s note: Papers in [1], [2] and [3] all mentioned that per-slice QoE measurement information should be included in QoE configuration container, and LS to SA4 is needed. Besides, [4] and [5] both indicate that an alternative is introducing the slice scope in the Uu as an explicit IE, which will impact RAN2. It seems there is a consensus that the target of applying QoE measurement to slices indicated by CN/OAM is not fully satisfied yet, and enhancement is needed. The only issue here is which option we should take.

Then, enhancement to per-slice RAN visible QoE is proposed in [5] and [6], where the goal is to let gNB perform the optimization of resource allocation in terms of slice scope. Specifically, [5] proposes to add the slice ID information as an explicit IE over Uu in RVQoE configuration and report, with an alternative to add PDU session ID information in RVQoE configuration. Contribution in [6] has a similar proposal, which asks RAN2 to include S-NSSAI in RAN visible QoE configuration and report.

The moderator also notes that, PML also brings a contribution [7] related to slice along with two CRs [8] and [9], but in moderator’s view, the issues these papers are discussing is not really related to per-slice QoE measurement configuration enhancement, thus they will not be discussed in this section.

**Q1. Which option do you prefer, introduce the slice scope in the QoE configuration container or in the Uu as an explicit IE? Correspondingly, do you agree send a LS to SA4 or RAN2 depends on the solution we take.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Yes for container | OAM can include a slice scope within the QoE configuration container which will be evaluated at UE APP to decide whether QoE measurements for a particular slice has to be collected. Otherwise a UE might collect QoE for even those slices for which OAM was not interested (e.g. when same service type is mapped to multiple slices).  LS to SA4 can be sent seeking support. |
| CATT | If feasible, prefer in container. | Both solutions can solve the issue RAN3 concerned. For explicit IE solution, it is clear that it is feasible. For the container solution, we should check with SA4 /SA5 (I don’t know who is responsible for the container encoding) whether the slice scope is aware at the container encoding point and whether it is feasible include the slice scope in configuration container. |
| Xiaomi | Yes for container | Similar view as QC. |
| ZTE | Yes for container | Adding the slice information into QMC configuration container is better than transmitting it explicitly over Uu, the later would need RAN2 to enhance RRC signaling and SA4 to enhance AT command. So the most straight way is to directly add the slice info in configuration container so that UE application layer would be aware of the slice information configured by OAM.  LS to SA4 is needed, but the content can be pending on other topics of this CB, e.g. RAN visible QoE values, if possible. |
| Huawei | In the container | Both options can work, but since the slice scope information is used by the application layer of UE, there is no need to let AS layer of UE to know such information. Correspondingly, LS to SA4 is needed. |
| Samsung | In the container | For the legacy QoE, there is no need to include slice ID as an explicit IE over Uu outside the QoE configuration and reporting container. It’s our agreement achieved in the 114e meeting.  And since SA4 has included the slice ID inside the transparent QoE reporting container, it’s straight forward to add it in the configure container also. |
| **Ericsson** | Inside the container | OK to liaise SA4 |
| China Unicom | In the container | Prefer to include the slice scope information in the container.  LS to SA4 is needed. |
| **China Telecom** | Yes ,for container | we are fine to include the slice information in container. This is a very simple way. And we are also support to send LS to SA4 |
| Nokia | Inside the container | OK to liaise SA4 |

**Moderator’s summary: All the companies agree to introduce the slice scope information in the container, LS out to SA4 is needed. In the second round, details of draft LS OUT to SA4 will be discussed.**

**Agreement: Introduce the slice scope information in the container, and send LS out to SA4.**

**To be continue: Details of draft LS OUT to SA4 to be discussed in the second round.**

**Q2. Do you think enhancement to per-slice RAN visible QoE is needed? If yes, what kind of enhancement should be done?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | No | This is needed only if MCE and RAN have different objectives for optimizing per-slice QoE. If slice scope is included in QoE configuration container as in Q1, then the purpose of UE performing unnecessary QoE measurements is anyway resolved. |
| CATT | No/Yes | Should the RV-QoE slice scope be aligned with legacy QoE? If yes, no special specified is needed. If RAN node wants to collect RVQOE measurements different slice from legacy QoE, the enhancement is needed |
| Xiaomi | Yes | In our understanding, gNB may be only interested in part of the slice in the slice scope in QMC configuration, it is possible for the gNB only configure a subset of the slice scope for RVQoE collection. |
| ZTE | No | We’ve already have PDU session ID information in RVQoE report. There is no need to add slice information in RVQoE report. |
| Huawei | No | Agree with Qualcomm, we don’t see the need for gNB to optimize the resource on slice scope. |
| Samsung | Yes | We think if the gNB wants to optimize the resource on one of the slices configured the legacy QoE, it’s better to include the slice ID as an explicit IE over Uu for RV QoE metric configuration and reporting. And include the PDU session ID in the RV QoE metric configuration is another option. |
| **Ericsson** | **Yes** | We really fail to understand the arguments of the opponents.  Why do OAM and RAN have to have the same optimization objectives? That does not make sense at all. OAM does long-term optimization, while RAN does it more dynamically.  Why should we prevent the RAN from doing slice-based QoE optimization? Do we or don’t we have already today load reporting per slice on F1? |
| China Unicom |  | The benefit of per-slice configuration for RVQoE need to be clarified. |
| **China Telecom** | **No** | We don’t see the need to support per slice RAN visible QOE |
| Nokia | No | We believe that optimization per slice should be configurable by the operator (OAM), so indeed OAM and RAN have the same optimization objectives. Also, we're not sure it would make sense at the application level to handle different slice scopes for encapsulated and non-encapsulated reporting within the same QoE session. |

**Moderator’s summary: No consensus was reached regarding the need of enhancement to per-slice RAN visible QoE.**

**To be continue: FFS whether there is a need to introduce enhancement to per-slice RAN visible QoE.**

## RAN Visible QoE enhancements

### RAN visible QoE enhancements for QoE value

Moderator’s note: A couple of contributions in [1], [2], [3], [5] and [10] all think it is beneficial to introduce the QoE value to indicate subjective experience of an ongoing service. In [11], it is suggested to discuss whether an objective/qualitative representation of QoE metrics is beneficial. In the meanwhile, one paper [4] thinks it is not necessary to introduce such subjective value, and the reason is they believe such values will be used by OAM instead of RAN.

In addition, Qualcomm in [11] also proposed to discuss whether this objective/qualitative representation of QoE metrics is to be calculated based on measurements from a single QoE metric (per metric) or multiple QoE metrics. While some other companies think the definition of QoE value is out of RAN3’s scope, and LS to SA4 is needed as SA4 should define the QoE value.

Based on above, the moderator would like to first ask the following questions.

**Q1. Do you agree that the definition of QoE value is out of RAN3 scope? If yes, shall we send an LS to SA4？**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | See comments | Agree this might out of RAN3 scope, but RAN3 as leading WG should at least identify proper requirements and provide some guidance on the definition of RVQoE value before sending any LS. We therefore propose to have at least some preliminary discussion for the below as mentioned in our paper [11].  **Proposal 2:** RAN3 should discuss whether this objective/qualitative representation of QoE metrics is to be calculated based on measurements from a single QoE metric or multiple QoE metrics  **Proposal 3:** RAN3 should discuss and down select among the 2 options if RVQoE value is calculated based on measurements from a single QoE metric:   * **Option 1:** NG-RAN can configure different levels for a QoE metric to the UE and UE reports them as a certain RVQoE value if a certain level is met * **Option 2:** UE reports RVQoE values autonomously based on a pre-defined formula in the specifications   **Proposal 4:** If RVQoE value is to be calculated based on measurements from multiple QoE metrics, RAN3 should discuss how to identify the set of QoE metrics and define a formula for this RVQoE value. |
| CATT |  | For the value concept, this should be out of RAN3 scope. Also as we state in [4], we don’t think the value introduce any benefit to RAN node for the radio resource optimization.  The value concept may introduce in the legacy QoE report to the MCE |
| Xiaomi | See comments | We think we may not to stuck on the value should be defined by SA4, the RVQoE value is for RAN optimization, it can be defined by RAN3 for RAN specific purposes. Comparing to RVQoE metrics, we think RVQoE value can be signalling saving and latency reduction, please note that the initial intension to introduce RVQoE is for scheduling, but we think current RVQoE metric reporting mechanism is not enough to support QoE-aware scheduling.  In general, we agree to discuss QC’s proposal 2 and proposal3 firstly. |
| ZTE | Yes and LS to SA4 | In our understanding, RAN visible QoE value should be a generalized value which could provide a whole pic of the UE experience quality. Only the UE application layer is aware of all the QoE metrics, so it should be the UE app layer to define the RVQoE value and calculate it.  Answer to Qualcomm’s proposals:  To Proposal 2: RVQoE value should be calculated based on multiple QoE metrics.  To Proposal 3: Option 2. The calculation formula/model should be decided by SA4.  To Proposal 4: how to calculate the RAN visible QoE vlaues should be decided by SA4, but RAN3 can provide the QoE metrics of preference. |
| Huawei | Yes | We think the purpose of RAN visible QoE value is to indicate subjective experience of an ongoing service, which could be useful for RAN to take further actions. It is not used by human/OAM. In the meanwhile, we think the definition of QoE value is out of RAN3 scope and should be examined by SA4, where a LS is needed. As for Qualcomm’s suggestion, we may discuss it in the second round. |
| Samsung | Yes | How to get the RV QoE value should be considered by SA4. |
| **Ericsson** | **No** | We think that RAN3 should also **consider RVQoE values related to the events at the AS layer as well**, so we cannot agree to the proposal. Also, it doesn’t make sense that RAN3 asks SA4 to tell to RAN3 what RAN3 needs. We need to guide SA4. |
| China Unicom | Yes | The definition of the QoE value can be discussed by SA4, LS to SA4 is needed. |
| **China telecom** | **yes** | Out of RAN3 scope. The values shall be considered by SA4 |
| Nokia | Yes | The purpose is to serve the application, and also the application will have the burden to calculate the QoE value. So it is better that SA4 defines the QoE value as they already do for QoE metrics. This work has to be done per service type, and specific requirements per service type are better known by SA4 than by RAN3. |

**Moderator’s summary: 9 of 10 companies believe definition of QoE value is out of RAN3 scope, 3 of 10 companies also think RAN3 need to provide some guidance on the definition. 1 company think RVQoE values related to the events at the AS layer need to be considered as well, and RAN3 need to guide SA4. Therefore, the moderator would like to propose the following:**

**Agreement: Definition of QoE value is out of RAN3 scope, LS out to SA4 is needed.**

**To be continue: In the second round, RAN3 discuss the details of draft LS OUT, which should provide guidance on the definition of QoE value.**

Moderator’s note: RAN-visible QoE value is defined as “a set of values derived from QoE metrics data through a model/function defined in collaboration with SA4”. Papers in [2], [3] and [5] clearly propose that QoE value should be generated by application layer.

**Q2: Do you agree that QoE value should be generated by application layer?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | See comments | UE APP generating a RVQoE value should be possible. But as mentioned before, let’s at least get clarity on the definition |
| CATT |  | Agree with QC, UE app layer can generate the value if we try to support the value concept |
| Xiaomi | See comments | Both application layer or the AS layer can generate the QoE value, let’s clarify what’s the RVQoE value first. |
| ZTE | Yes | From the point of RAN side, RVQoE value is a quantified representation of the UE experience, which is calculated by UE app layer as we commented above. |
| Huawei | Yes | RAN visible QoE value is used to indicate subjective experience of an ongoing service, it is thus reasonable to be calculated in UE APP layer |
| Samsung | Yes | The UE app layer should generate the RV QoE value since it knows all the QoE related metrics. |
| **Ericsson** | **Not only by the App layer** | Same view as Xiaomi |
| China Unicom | Yes | Same view with Samsung. An LS to SA4 is needed. |
| **China telecom** |  | Agree with QC. We also support to clarify the definition of QOE Value first |
| Nokia | Yes | We believe any cross-layer responsibility (UE app layer + UE AS) should be avoided. The UE AS is responsible for QoS-related reporting (e.g. UL PDCP delay). QoE-related reporting belongs to the application layer. |

**Moderator’s summary: 8 of 10 companies believe QoE value should be generated by application layer, while the other two companies think the value can be generated by AS layer as well. Based on the above, the moderator thinks it is reasonable to have a working assumption here.**

**WA: UE application layer is responsible for generating RAN-visible QoE value.**

Moderator’s note: The paper in [3] also suggests to define the RVQoE value target in RAN side, which indicates the QoE value that needs to be guaranteed by RAN for UE. According to [3], if the received RAN visible QoE value from UE exceeds the RVQoE value target in RAN side, the RAN node would take some corresponding action to adjust the scheduling strategy. Additionally, it is proposed such RVQoE target should be signaled by CN for signaling-based QoE and configured by OAM for management-based QoE.

**Q3: Whether a RAN visible QoE value target is needed? And does it need to be signaled/configured by CN/OAM?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Not clear | How is this RVQoE value target even defined? For that, we should first know what RVQoE value is! If it’s a score of 0-5, RVQoE target can be set for a minimum/maximum score e.g. atleast score 2? Isn’t this just another event trigger for reporting QoE values? |
| CATT | No | I don’t think it is good idea to use this value method to scheduling the resource. |
| Xiaomi | Not clear | In our understanding, how to use the RVQoE value for scheduling is up to gNB implementation. |
| ZTE | Yes | Yes this is our proposal.  Regarding Qualcomm’s question, RVQoE value target is not a event trigger for reporting RVQoE value. It is a target value configured by OAM for RAN’s reference after it receives the RVQoE value. RAN can compare the received RVQoE value and target value to evaluate the UE experience and adjust network scheduling correspondingly.  For example, if the received RVQoE value is 3, but the target value is 4, then RAN would consider the UE experience is lower than expectation and would take some action to improve its performance.  Reply to CATT and Xiaomi:  Yes how RAN schedules the resources is an implementation thing, but a target value for RVQoE would play an role of assistant in the scheduling, which is helpful from our point of view. |
| Huawei | No | We are also not clear how RVQoE value target will be defined, such value target can be dynamic and various among different operators. |
| Samsung | neutral | It makes sense that the service has the target RVQoE value for RAN to modify the resources scheduling. But we think the benefit is not obvious. |
| **Ericsson** | No | The OAM should not instruct the RAN about what is good and what is bad. |
| China Unicom | Not sure | It may need more discussion about how to define the RVQoE value target. |
| **China Telecom** | No |  |
| Nokia | configurable | We don't have a full understanding of the QoE value, but once defined we expect SLAs would contain some targets/requirements (e.g. per slice) for such value. Similar to targets/requirements for legacy QoE metric and QoS parameters. |

**Moderator’s summary: Most companies fail to understand the usage of RVQoE value target, or think it is not needed.**

### RAN visible QoE trigger event

Moderator’s note: It is suggested in [1] that we use the legacy mechanism that the RAN visible QoE results sent together with the QoE reporting container without specifying a trigger event, as the benefits of setting a RAN visible QoE trigger condition is unclear. Then, the paper in [11] and [12] suggest to consider triggers based on measured values of RAN Visible QoE metrics, as the results of RAN Visible QoE measurements when the measured values are “good” may not always be interesting for network optimization.

**Q4. Do you prefer to introduce a RAN Visible QoE metric-based event triggers, i.e., report RAN Visible QoE only upon crossing a threshold configured for that RAN Visible QoE metric?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Yes | Value based triggers can be considered e.g., report only if buffer level > X. Whether this trigger is evaluated at UE AS or UE APP is up to RAN2. |
| CATT |  | We can have more discussion on the trigger. we should identify the possible trigger and use cases |
| Xiaomi | Yes | We think both value based triggers and event based triggers should be considered. |
| ZTE | No strong view |  |
| Huawei | Tend to No | Honestly, we think the legacy mechanism works well, where the RAN visible QoE results will be sent together with the reporting container whenever the results are available. The benefit of a trigger might be to make the report mechanism more flexible, so the overloading in the signalling can be avoided. However, the size of legacy QoE report is small, let along the size of RAN visible QoE report which is just a portion of the whole report. In addition, the measurement results which are good (better than some threshold) may also be beneficial to RAN. Therefore, we are not convinced that event triggers have big benefits. |
| Samsung | Yes | Value-based trigger and event-based triggering can help operators to collect more specific QoE information form UE. It should be considered. |
| **Ericsson** | **Yes** | First, we have decided already in Rel-17 that RVQoE reports may be sent with or without accompanying QoE reports.  **Proposal: RAN3 to discuss two types of triggers:**   * **Threshold-based triggers – for example, an RVQoE metric value is above/below a threshold** * **Event-based triggers – for example, UE sends an RVQoE report upon handover, RRC state transition etc.**   **Proposal: RAN3 to consider triggers for RVQoE reporting that are evaluated at the UE and the triggers that are evaluated at the RAN.**  And we need to set the terminology straight: **value of an RVQoE metrics above a threshold is not an event-based trigger**, it is a threshold-based trigger. |
| China Unicom |  | Same view with CATT |
| **China telecom** | No strong view | We prefer to say No. The legacy mechanism is sufficient for QOE report. |
| Nokia | maybe | to be checked per scenario and metric by metric. One scenario to check is video stalling. (The application sends a DL PDCP buffer report when the buffer in the UE gets below a certain value. However the RAN could do something about that only if it has corresponding DL PDCP packets buffered in the CU-UP.) |

**Moderator’s summary: 4 of 10 companies prefer to have threshold-based triggers for RAN visible QoE report. Two companies think more discussion on the triggers is needed, and another three companies have no strong view. One (or two) company think legacy mechanism is sufficient for QoE report. Since no consensus is reached, the moderator suggest we discuss this issue online or in the second round.**

**To be continue: What is the real benefit of introducing Threshold-based triggers and Event based triggers?**

Moderator’s note: Contributions in [5], [11], [12] and [13] also mention that events such as handover, RAN overload, RRC state transition, video stalling, high speed scenario, bad-coverage scenario and high-interference scenario can also be trigger to **report** RAN Visible QoE. In the meanwhile, in [4], the trigger event is used for RAN Visible QoE **measurement**.

Based on above, the moderator would like to first figure out the real intention of event-based trigger, and then to check companies’ views about the necessity of introducing such trigger.

**Q5.1. Is the event-based trigger designed for RAN visible QoE reporting or measurement?**

**Q5.2. Let’s assume the answer to Q5.1 is for reporting, then do companies believe event-based triggers are needed and should be introduced in R18? If so, which events should be prioritized?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Q5.1: Reporting  Q5.2: Yes | Q5.1: The triggers should be for RVQoE reporting. The QoE meaurements are still performed based on the QoE configuration by OAM. The intention of event-based triggers is to report RVQoE only when a certain interesting event happens  Q5.2: We can consider handover scenario first. Also, whether an event trigger for high mobility scenario is needed can be decided post the discussion on CB#QoE1 on high mobility scenarios. Other triggers can be deprioritized. |
| CATT | Q5.1: Reporting/ measurement  Q5.2: Yes | To get more precise report, we may set the wanted trigger for the Reporting and measurement. |
| Xiaomi | Q5.1: Reporting/ measurement  Q5.2: Yes | We should discuss this based on scenarios.  For handover, high speed scenario, bad-coverage scenario and high-interference scenario, the event trigger can be used for both measurement and reporting.  For video stalling, the event trigger can only be used for reporting. |
| ZTE | No strong view | Fine to follow the majority but we actually don’t think much trigger events should be introduced in this WI. |
| Huawei | Q5.1 Reporting  Q5.2 tend to no | Q5.1: The measurement of RAN visible QoE is performed at a same time with other QoE metrics. The periodicity, and event trigger are only designed for RAN visible QoE reporting  Q5.2: See our previous answer to Q4. We are not convinced that event triggers have big benefits. In addition, we should avoid too many types of event-based triggers. |
| Samsung | Q5.1: Reporting/ measurement  Q5.2: Yes | Depends on different scenarios, the event trigger could be used on RV QoE measurement or/and reporting. |
| **Ericsson** | **Q5.1: Depends on the trigger**  **Q5.2: Yes** | **Q5.1:** similar view as Xiaomi – this depends on the trigger  **Q5.2:** handover, RAN overload, RRC state transition, video stalling should be prioritized |
| China Unicom | Q5.1 Reporting  Q5.2 Need more discussion | Q5.2 RVQoE trigger event may have some benefits, but it need to involve RAN2 for the decision. |
| Nokia | Q5.1 Reporting  Q5.2 Need more discussion | on Q5.2, it remains an open question whether it is beneficial to introduce requirements that the UE application layer is aware of AS events. And if so, which events should be concerned, e.g. handover (and which handover type), DC, CA, FR1 vs FR2, RAN overload, … We already have QMC/MDT alignment which enables efficient post-processing in the MCE. And the RAN is of course already aware of all these events and scenarios and can do its own processing in case of non-encapsulated reporting. An event-based function in the AS could save OTA signalling (and post-processing efforts in the MCE if applied to encapsulated reporting). Drawbacks are increased UE complexity and "hard-coded" replacement of existing flexible and implementation based post-processing functionality. |

**Moderator’s summary: 4 of 9 companies think event-based trigger is designed for RAN visible QoE reporting, another 4 of 9 companies think the trigger can be designed for RAN visible QoE measurement as well. Also, 5 of 9 companies support event-based triggers, while the other companies think the benefit needs more discussion. The events that are mentioned by the companies are diverse. This seems a quite controversial issue here, so the moderator suggest to discuss in the second round the following question.**

**To be continue: Should the measurement behavior of UE application layer impacted by event-based triggers?**

### RAN visible QoE Report over F1

Moderator’s note: It is pointed out by many companies [1], [4], [5], [10] and [11] that, for RAN visible QoE, DU needs the PDU session ID to associate the received RAN visible QoE report with a specific DRB and then to optimize the DRB scheduling to improve the QoE. In addition, it is also suggested to include qos flow information to realize better resource optimization.

**Q6.1 Do you agree to introduce the PDU session ID as an explicit IE in the RAN visible QoE report over F1?**

**Q6.2 Do you agree to let UE report QoS flow information to RAN, and introduce QoS flow information (or DRB) as an explicit IE in the RAN visible QoE report over F1**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Q6.1: Maybe not  Q6.2: Yes | If we support QoS Flow ID, PDU session might not be needed as we already would have more granular information for optimizing DRB scheduling. |
| CATT | Q6.1: No  Q6.2: Yes | We support QoS flow ID. It is more precise. |
| Xiaomi | Q6.1 No  Q6.2 Yes | Agree with CATT |
| ZTE | Q6.1: Maybe not  Q6.2: Yes | Share the view with above companies. |
| Huawei | Q6.1: Yes  Q6.2: Yes | For better optimizing the DRB scheduling to improve the QoE, we think both changes are needed. For Q6.2, qos flow information is preferred rather than DRB information. |
| Samsung | Q6.1: Maybe not  Q6.2: Yes | We support QoS Flow ID, which could be obtained by UE application layer.  If QoS Flow ID is supported, the PDU session ID is not needed. |
| **Ericsson** | **Q6.1: No**  **Q6.2: Yes** | We prefer the DRB ID, then the QoS flow ID, due to better granularity. |
| China Unicom | Q6.1 Yes  Q6.2: Yes | We think both PDU session ID and QoS flow ID can be considered to include in the RVQoE report over F1. |
| **China Telecom** | Q6.1: No  Q6.2: Yes | Agree with CATT and Qualcomm |
| Nokia | Q6.1 Yes  Q6.2: Yes | QoS flow id probably needs to come on top of the PDU session id. DRB id could be sufficient, but not optimal due to dependence created between application layer and AS. |

**Moderator’s summary: 7 of 10 companies think there is no need to introduce the PDU session ID as an explicit IE in the RAN visible QoE report over F1.** **All companies agree to let UE report QoS flow information to RAN, and introduce QoS flow information (or DRB) as an explicit IE in the RAN visible QoE report over F1. In addition, the moderator thinks a LS out to RAN2 is also needed if we all agree UE should report QoS flow information to RAN.**

**Agreement: UE should report QoS flow information to RAN.**

**Agreement: QoS flow information should be introduced as an explicit IE in the RAN visible QoE report over F1.**

**To be continue: Is a LS out to RAN2 needed to let RAN2 know UE should provide QoS flow information to RAN?**

**To be continue: How to handle the scenario that different PDU sessions use the same qos flow ID, if only qos flow information is included in F1?**

Moderator’s note: In [12], some new designs in F1 is proposed. Specifically, it is proposed to introduce a new class-1 procedure, with an initiating message sent from the DU to the CU, for requesting the RVQoE metrics, and the corresponding response from the CU to the DU. In addition, it is also proposed that DU can suggest to a CU the parameters to be used in the RVQoE configuration, and CU can notify a DU when RVQoE metrics are available.

**Q7. In your view, is the above mentioned enhancements to F1 needed?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Clarification needed | OK to consider some enhancements. But some questions:   * Would we then have a class-1 message (DU initiated) in addition to the existing class-2 message (QoE Information Transfer)? * If CU has to notify a DU when RVQoE metrics are available anyway (as DU has no idea on which UEs are configured with RVQoE), what is the point of having a DU initiated procedure? |
| CATT |  | We don’t think we need increase the scope of the item due to so many wok to do. |
| Xiaomi | See comments | Current mechanism can work but OK to consider enhancements, we prefer the way that CU notify the DU what can be configured for RVQoE metrics, then DU response which RVQoE metrics are needed, then the CU can use class-2 message to transfer the RVQoE information. |
| ZTE | Clarification needed | Ok for the part that DU sends suggested parameters to CU as the initiated message.  But for the response message, in which CU notifies DU the availability of RVQoE report, we don’t get the point why this can be a response message of the RVQoE parameters from DU. There seems no logic connection between the two messages, so we wonder how they can create a class-1 procedure. |
| Huawei | No | First, the current mechanism works well, if DU will not use the report, it can simply discard it, no issue here. But with the enhancement, we have to introduce a lot of signalling via F1 along with new request/stop/notify mechanisms, which makes things more complicated. Note that introduction of RAN visible QoE metric is to help more efficient resource scheduling at network side. The enhancement somehow deviates the aim. |
| Samsung | No | Till now the RAN visible QoE metrics are quite simple. The current mechanism can work well.  Even the different service type may introduce the different RAN visible QoE metrics in R18, it’s not expected to define too many metrics for one specific service type. Maybe the simple RVQoE value is a good choice for resource scheduling optimization.  We do not think it’s necessary for DU to select the interested RV QoE parameters since the total available number is very little. |
| **Ericsson** | **Yes** | @Qualcomm and ZTE: we can leave the procedure design aside for now and discuss the problem first. As for the second question, the CU may for example inform the DU about its intention to configure a UE with RVQoE measurements, after which the DU, if interested, can indicate its interest and provide a configuration suggestion.  The opponents should answer the following questions:   * Why should the DU receive the reports at millisecond periodicity for potentially tens or hundreds of UEs, even if it is not interested in receiving them? * Does it make sense that the entity consuming the RVQoE reports has no say in the configuration of the measurements?   @Samsung: the configuration suggestion is not only about the number of RVQoE metrics defined, but also about periodicity. Moreover, we will in this release define even more RVQoE metrics and maybe RVQoE values.  @Huawei: what is meant with “the current mechanism works well”? What is meant by “a lot of signalling”? Is it more than receiving RVQoE reports at millisecond periodicity for potentially tens or hundreds of UEs?  @CATT: the issue is very much in scope of the WI, which has enhancements to RVQoE reporting over F1 as one of its objectives. |
| China Unicom | Need further discussion |  |
| Nokia | not at this stage | as commented by Samsung, the metrics currently standardized for non-encapsulated reporting would not justify the proposed enhancements. |

**Moderator’s summary: 7 of 9 companies think the enhancements of F1 proposed in [12] is not needed or need further discussion.**

## QoE reporting handling enhancement for overload scenario

Moderator’s note: In [14], the proposal of the paper is considering a need for enhanced network management strategy in case of pausing of different QoE measurements configurations. Then in [1], [2] and [4], similar proposals are given, which is OAM sends the priorities for the management based QoE measurements to NG-RAN for overload scenario. In addition, both [1] and [2] mentioned that there is no need to send priority information to UE.

**Q8.1. Do you agree to let OAM sends the priorities for the management based QoE measurements to NG-RAN? Is priorities for the signaling based QoE measurements also desired?**

**Q8.2 Do you agree that there is no need to send priority information to UE?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | Q8.1 – Yes  Q8.2 – RAN2 can decide | Q8.1 – More details needed. Are these priorities for service types or slices? Also, we think these priorities can apply to both s-based and m-based QoE as it can be applicable whenever multiple QoE measurements are configured.  Q8.2 – Agree but RAN2 can decide whether any UE behavior needs to be defined on whether to handle the paused QoE reports in a special way based on priorities |
| CATT | Q8.1 – Yes  Q8.2 – No | UE may use the priority to pause resume reporting. |
| Xiaomi | Q8.1 – Yes  Q8.2 – RAN2 can decide | Share the same view as QC. |
| ZTE | Q8.1 - Not sure  Q8.2 - Yes | Further discussion is needed, e.g. how to settle the priorities, any coordination with SA5 needed? |
| Huawei | Q8.1 Yes  Q8.2 Yes | Yes, we think the priorities can be configured for both different service types and different slices, and this relates to network strategy, since different operators may have different priorities on different service types and slices. Additionally, we think we might only need priority for m-based QoE measurements, because the priority of signalling based QoE is high, and there will not be many signalling based QoE measurements in one RAN.  We think the priority information is used by RAN instead of UE, so no need to send it to UE. |
| Samsung | No strong view | Fine to follow the majority |
| **Ericsson** | **Q8.1: Absolutely not**  **Q8.2: Yes** | **Q8.1:** The OAM should not instruct the RAN about what the RAN should do. We have discussed the issue in Rel-17, and this was one of those proposals that was precluded due to objections on the technical merit, and not due to lack of time or similar.  Our understanding of overload handling, and the reason why it is in the scope, is the reporting leg switching in case of RAN overload. |
| China Unicom | Q8.1 – Yes  Q8.2 – Prefer no | Q8.1 Priority can be applied to both s-based QoE and m-based QoE.  Q8.2 Priority information can be used by RAN, but RAN2 can also discuss whether this information need to be used for any UE behavior. |
| Nokia | Q8.1 – Yes  Q8.2 – Discussion needed in RAN3 first | On Q8.1, it would in our view be beneficial that the operator could configure the priority, e.g. some m-based QoE sessions could actually be high priority and some quite low priority. And exactly the same applies to s-based QoE sessions. A per session priority would also enable differentiation per service type and slice, if needed. Of course, the RAN will still remain in charge of identifying the overload situation.  On Q8.2, because overload handling is under the responsibility of the network, the discussion should first take place in RAN3 to identify whether the overload handling would require priority awareness in the UE. |

**Moderator’s summary: 6 of 9 companies think it is beneficial to let OAM sends the priorities for the management based QoE measurements to NG-RAN. Two companies have no strong view. 4 of 9 companies think the priority can also be applied to s-based QoE. One company not agree to introduce the priority. In addition, there is no consensus on whether there is a need to send priority information to UE. Based on the above, the moderator suggest the following:**

**WA: OAM can send the priorities for the management based QoE measurements to NG-RAN.**

**To be continue: Discuss whether a LS to RAN2 is needed, to check whether RAN2 want to know priority information as well.**

## Others

Moderator’s note: The moderator notices that, there are also some other issues raised in contributions, which are out of scope.

* Papers in [7], [8] and [9] propose to introduce some QoS parameters and QoE measurement IE in Xn and F1.
* In [6], the issue of introducing MCE URI is raised.
* The issue of alignment between s-based QoE and m-based MDT measurements is also raised by [6].

**Companies are invited to share views on whether to treat these issues in this meeting, and feel free to add further issues if any.**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Qualcomm | See comments | Proposal in [6] to enable streaming based QMC (by defining MCE URI) seems simple enough and can be agreed.  s-based QoE/m-based MDT alignment can be low priority and not even in WID scope |
| CATT |  | We should keep the R17 leftover issue as small as possible |
| ZTE |  | Share the view with CATT. |
| Huawei |  | We should focus on the issues in the scope, and put other issues as low priority. |
| Samsung |  | Share the view with Huawei |
| **Ericsson** | See comments | **This AI is not purely about Rel-17 leftovers**, but also about enhancements of features specified in Rel-17, so can the Moderator please explain how are these issues out of scope? From the WID:  Left-over features from Rel-17, as well as the enhancements of existing features which are not included in Rel-17 normative phase, should be supported in Rel-18 if consensus on benefits are reached |
| China Unicom |  | Share the view with Huawei |
| **China telecom** |  | Share the view with CATT. |

**Moderator’s summary: 6 of 8 companies believe we should keep the R17 leftover issue as small as possible and focus on the issues listed in the scope. To Ericsson: Other issues can be discussed if time allowed, but it is suggested to put other issues as low priority, as we have three main topics listed in the objective of WID, still to be solved.**

**WA: In the AI of Left-over from R17, it is suggested to focus on the following issues:**

**- Specify per-slice QoE measurement configuration enhancement.**

**- Specify RAN visible QoE enhancements for QoE value, RAN visible QoE trigger event, RAN visible QoE Report over F1.**

**- Specify QoE reporting handling enhancement for overload scenario.**

**Other enhancements of existing features should be treated as low priority.**

# Conclusion, Recommendations [if needed]

If needed

# References

1. R3-224589, Discussion on the support of R17 left-over features (Huawei)
2. R3-224866, Further discussion on R17 leftover issues (China Unicom)
3. R3-224938, Discussion on R17 QoE left-over issues (ZTE)
4. R3-224792, Discussion on Left-over issues (CATT)
5. R3-224839, NR QoE Discussion on left over from R17 (Samsung)
6. R3-224364, The Enhancements of QMC Rel-17 Features (Ericsson)
7. R3-224227, Consideration on Slice Grouping and Slice (PML)
8. R3-224228, Enable QoE reporting of Network Slice Groups and Slice(F1AP) (PML)
9. R3-224229, Enable QoE reporting of Network Slice Groups and Slice(XnAP) (PML)
10. R3-224760, Discussion on RVQoE value (Xiaomi)
11. R3-224613, Enhancements to RAN visible QoE (Qualcomm Incorporated)
12. R3-224363, The Enhancements of RAN Visible QoE Measurements and Reporting (Ericsson)
13. R3-224761, Discussion on event-triggered RVQoE (Xiaomi)
14. R3-224460, QMC enhancements for RAN overload (Nokia, Nokia Shanghai Bell)