**3GPP TSG-RAN WG3 Meeting #113-eR3-214199**

**Online, Aug 16th – Aug 26th 2021**

Agenda Item: 15.4

Source: Qualcomm Incorporated (moderator)

Title: Summary of Offline Discussion on the alignment of Radio related measurement and QoE measurement

Document for: Approval

# Introduction

This is the SoD for the following comeback: **CB: # QoE6\_MDTAlignment.**

The deadline for providing replies to Phase 1 is **Friday Aug 20th, 23:59 UTC**

# For the Chairman’s Notes

**TBD**

# Phase 1

## Case where MDT is configured before QoE

The following was agreed and identified as open issues in R3#112e:

* Radio-related measurement and QoE measurement can be configured simultaneously by OAM for the alignment.
* **Further discuss** **the case that MDT is configured before QoE configuration for the alignment.**

The following summarizes the list of proposals related to this topic in this meeting:

**[3], Proposal 1:** Further details for correlation (and further discussion on the case that MDT is configured before QoE configuration for the alignment) are now out of RAN3's scope.

**[2], Proposal 2:** Irrespective of whether multiple trace sessions are supported by the trace framework (awaiting SA5 decision), it is OAM’s responsibility to deactivate current MDT and activate a new trace session with both MDT and QoE if it wants to achieve alignment (in case MDT is configured before QoE).

**[4], Proposal 3:** The existing running MDT cannot be deactivated before QoE measurements stop if one QoE associated with it

**[5], Proposal 1:** RAN3 only focus on the case “Radio-related measurement (i.e. MDT) and QoE measurement can be configured simultaneously by OAM for the alignment” as we agreed, no matter MDT had configured before the QoE configuration or not.

**[9], Proposal 2:** The solutions of alignment/correlation of radio-related measurement report (MDT measurement report) for QoE purpose are the same, regardless whether the radio-related measurement and QoE measurement are configured simultaneously.

**[4], Proposal 1:** Both the existing configured MDT and new added MDT with QoE configuring can be used for the QoE measurements correlation analysis

**[1], Proposal 6:** To enable time alignment between an already ongoing immediate MDT and a QoE measurement started later, the start time and end time of the QoE measurement, in addition to the Trace Reference and Trace Recording Session ID, needs to be added to the QoE measurement report at the NG-RAN node.

It is the moderator’s understanding that the discussion on the case where MDT is configured before QoE for alignment relies significantly on the framework used for QoE activation/deactivation and awaits SA5 reply to LS R3-212975.

Potential way ahead based on SA5 reply:

* **Option 1 (Reuse trace function for QoE and single active trace session support):** Deactivate the on-going MDT and then configure MDT measurement and QoE measurement together to achieve alignment
* **Option 2 (Decoupled function for QoE and/or multiple active trace session support):** FFS whether and how to achieve alignment e.g., via start time and end time of QoE measurement, QoE assistant information in E1/F1

The following is therefore proposed by the moderator:

**Moderator Proposal 1**: Defer the discussion on alignment for the case that MDT is configured before QoE configuration till clarification is received from SA5 on QoE activation/deactivation procedure (i.e., whether to reuse trace function for QoE and if multiple trace sessions can be supported).

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| **Company** | **Whether Moderator Proposal 1 is acceptable (Y/N). Please provide your views.** |
| Huawei | Not sure. Even if the RAN will reuse the trace function, the OAM can trigger another QoE measurement with a different Trace Reference. It will not lead to the deactivation of MDT configuration. |
| Samsung | No matter MDT is configured before the QoE configuration or not, if OAM decides to use the MDT to assist QoE analysis, OAM can configure MDT and QoE together as what we agreed (*Radio-related measurement and QoE measurement can be configured simultaneously by OAM for the alignment*) in RAN3 112e meeting.  |

## Use case for radio-related measurements

**The following was identified in R3#112e as an open item:**

**Further discuss the alignment approaches based on the below cases:**

**- Radio-related measurements is used for QoE analysis.**

**- Radio-related measurements is used for MDT purpose, but can also be used for QoE analysis.**

**Proposals related to the above open item in this meeting:**

**[2], Observation 1:** The scenario that the radio related measurements is used only for QoE analysis is not a practical scenario as MDT and QoE have different purposes

**[2], Proposal 1:** The scenario that the radio related measurements is used only for QoE analysis should not be considered in the study of aligning QoE and MDT measurements.

**[6], Proposal 1:** The case that radio-related measurement is used for QoE analysis is not needed.

**[9], Proposal 1:** For case 1, case 1-b (Radio-related measurements is used for MDT purpose, but can also be used for QoE analysis) should be considered as the typical case, network is responsible for correlating MDT measurement results for QoE purpose.

Based on the proposals above, it seems many companies are of the opinion that the case where the radio related measurements is used only for QoE analysis seems unnecessary and should rather focus on the non-restrictive case that radio related measurements is used for MDT purpose but can also be used for QoE analysis. Time alignment and correlating MDT and QoE can be discussed further in the subsequent sections.

**Moderator Proposal 2:** The scenario that the radio related measurements are used **only** for QoE analysis should not be considered in the study of aligning QoE and MDT measurements.

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| **Company** | **Whether Moderator Proposal 2 is acceptable (Y/N). Please provide your views.** |
| Huawei | Yes. |
| Samsung | No. The scenario that the operator only wants to know the QoE and the MDT is to assist QoE analysis exists. No need to restrict operators on their optimization purposes. |

## Flag in QoE configuration to enable alignment with MDT

**[1], Proposal 1:** For both signalling- and management-based solutions, the OAM explicitly requests the RAN node to perform MDT and QoE measurements at the same time via the “alignment with MDT required” flag per QoE configuration.

**[1], Proposal 2:** For the signalling-based solution, the “alignment with MDT required” flag is included in the QoE Measurement Configuration IE on NG and Xn interfaces.

**[10], Proposal 1**: RAN3 is asked to choose one of the following methods regarding the alignment approaches,

• **Option 1**: If both QoE and MDT configurations are contained within the Trace Activation message, NG interface is enhanced to add information on whether the configured radio related measurements are used for QoE, MDT or both purposes. FFS on details of such information.

• **Option 2:** Introduce a new QoE Activation message independent of Trace Activation message.

**[9], Proposal 3bis**: An indication plus a TCE/MCE address are needed to indicate to RAN as a request for reporting radio-related measurements and radio-related information, respectively.

Some companies proposed to introduce a flag in QoE configuration to inform the RAN node whether the alignment with MDT is required or to notify whether the configured radio related measurements are used for QoE, MDT or both purposes.

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| **Company** | **Whether an “alignment with MDT required” flag is needed per QoE configuration. If yes, discuss Uu signaling and UE behavior impacts if any.** |
| Huawei | Yes. We think the MDT mechanism should not be changed. Therefore it does not have any impacts on the Uu signalling and UE behaviour. The flag is only used by the RAN to know whether it needs send the MDT results to the MCE.  |
| Samsung | Agree with “indication is needed” to let the RAN know the MDT is used for QoE analysis, whether it’s a flag or sth. else need to further discuss.In our view, if we include QoE reference in the MDT configuration, it not only indicates that the MDT will be used for QoE analysis, but also let the NG-RAN node know which QoE collection job will use the MDT report, and NG-RAN node can include the QoE reference in the MDT report for correlation. So this indication could be QoE reference. |

## The alignment of MDT measurement and QoE measurement

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| **Network based solution** | **UE based solution** |
| **[2], Proposal 4:** Radio-related measurements are independent of QoE measurements i.e., radio related measurements can start/stop irrespective of whether QoE measurements started/stopped and should be activated immediately upon receiving configuration **(Approach 2)****[3], Proposal 2:** Use network based solution (e.g. the gNB awaits reception of the first QoE measurement report before starting the configured MDT measurement) for Synchronized start and stop of MDT and QoE logs.**(Approach 3)** | **[1], Proposal 4:** To enable time alignment between Immediate MDT and QoE, the Immediate MDT configuration, kept pending at UE RRC layer, until the UE RRC layer receives a Session Start Indication from the Application layer. **(Approach 1)****[1], Proposal 5:** To enable time alignment between immediate MDT and QoE, a UE can be configured with an Immediate MDT configuration once the Session Start Indication is received by the RAN node from the UE. **(Approach 1)****[4], Proposal 2**: The indication of QoE start/stop from App to AS can be used for the associated immediate MDT start/stop **(Approach 1)****[5], Proposal 5:** Introduce QoE Assistant Information IE in F1AP and E1AP for alignment of QoE report and MDT report **(Approach 4)** |

The potential alignment approaches are summarized here:

**Approach 1:**

* Radio-related measurement will not start once configured, it starts only when QoE measurement starts (e.g., upon receiving Session Start indication or QoE report from UE). Till then, MDT configuration is kept pending at RRC layer in UE.
* Radio-related measurement stops when the corresponding QoE measurement stops or when the corresponding QoE configuration is deactivated.

**Approach 2:**

* Radio-related measurement starts once configured and is not dependent of QoE measurement configuration.
* When the QoE is deactivated or QMC is complete, NG-RAN need not do anything to stop ongoing MDT measurements (MDT can continue independent of QMC stop)

**Approach 3:**

* Radio-related measurement is configured only when the QoE measurement starts (e.g., upon receiving QoE report from UE), and the radio-related measurement starts once configured.

**Approach 4:**

* When QoE is activated/deactivated, the QoE assistant information (via E1/F1 signaling) should be notified to the corresponding nodes that perform the on-going MDT measurement to start/stop sending the MDT report to the QoE analysis server, e.g., MCE.

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| **Company** | **Which approach do you prefer to support the alignment?**  |
| Huawei | Approach 2. RAN3 has agreed that OAM (e.g. TCE or MCE) is responsible for correlation. Therefore we think the OAM can perform the alignment of QoE results and MDT results based the time stamp and one ID that can be used to identify the same UE.  |
| Samsung | Approach 1.Approach 1 is beneficial for the accurate alignment and also will not have additional costs on UE power.If using approach 2 and 4, it is possible that MDT measurement will be performed during the whole configuration lifecycle, but there is no any QoE measurement at all, in this case, the MDT measurements are useless, and it also bring additional power consumptions and signalling overheads.If using approach 3, if the QoE report is sent at the start/end of the session, it has the same spirit of approach 1, but if the first QoE report is sent after a period of time when the session starts or at the end of the session, MDT measurement will not be time aligned with QoE measurement. |

##  Correlation information

### Trace Reference and QoE Reference

**[1], Proposal 3:** To enable coarse correlation between concurrent QoE and MDT measurements, the RAN node adds the NG-RAN Trace ID (i.e., a combination of Trace Reference (TR) and Trace Recording Session Reference (TRSR)) to the QoE report.

**[4], Proposal 5:** Include QoE reference in the configuration and report of MDT and include trace reference in the QoE configuration and report.

**[6], Proposal 2**: MDT Trace ID should be included inside UE Application layer measurement and provided to UE.

**[9], Proposal 5:** For signalling based QoE measurement, when the NG-RAN sends the radio-related information or radio-related measurement or QoE measurement information including the QoE results or start/end indication to the MCE, the NG-RAN also sends the QoE reference/trace reference info.

**[2], Proposal 4:** QoE reference should not be included in immediate MDT report for correlation purposes

**[2], Proposal 5**: Trace reference need not be included in QoE report if only single trace session is supported in the trace framework (as correlation entity is already aware of the active trace session).

Moderator requests the companies to provide comments on the following questions:

* Q1: Should NG-RAN include NG-RAN Trace ID in QoE report sent to MCE? If so, does it include by itself?
* Q2: Should NG-RAN include QoE reference in MDT report sent to TCE? If so, does it include by itself?
* Q3: Should NG-RAN include NG-RAN Trace ID in QoE configuration sent to UE?
* Q4: Should NG-RAN include QoE reference in MDT configuration sent to UE?

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| **Company** | **Please provide your views on Q1-Q4** |
| Huawei | Q1: Yes. The trace ID is used by the OAM to find the MDT results. The NG-RAN can know the NG-RAN trace ID of the MDT that is needed by the OAM to align the QoE results.Q2: Yes. The QoE reference is used by the OAM to know which QoE measurement the MDT report is associated to.Q3: No. The NG-RAN can know the NG-RAN trace ID of the MDT that is needed by the OAM to align the QoE results. The NG-RAN does not need to send the NG-RAN trace ID to the UE.Q4: No. We think the MDT mechanism should not be changed. |
| Samsung | Q1, YesQ2, YesQ3, NoQ4, Yes, if approach 1 in 3.1 is used, UE needs to know which QoE measurement is related to the MDT measurement, so that it can start MDT measurement if received the start indication for this QoE reference from upper layer. |

###  Timestamp information

**[1], Proposal 6:** To enable time alignment between an already ongoing immediate MDT and a QoE measurement started later, the start time and end time of the QoE measurement, in addition to the Trace Reference and Trace Recording Session ID, needs to be added to the QoE measurement report at the NG-RAN node.

**[4], Proposal 6:** The time stamp for the report of MDT and QoE should be included for the post processing.

**[9], Proposal 4:** The NG-RAN sends the time stamp corresponding to the start time and end time of the QoE measurement to the TCE/MCE.

**[2], Proposal 6:** NG-RAN can include the timestamp information i.e. time when it received MDT reports and QoE reports for assisting the correlation entity

**[9], Proposal 3:** The NG-RAN sends the time stamps corresponding to the timing info of both radio-related measurements and radio-related information to the TCE/MCE.

**[5], Proposal 2:** The gNB/UE who performs radio-related measurements should know the start and end indication of QoE measurements for correlation.

Moderator requests the companies to provide comments on the following question:

* Should NG-RAN include any time stamp information related to MDT and QoE reports to assist correlation entity, for example:
	+ Option 1: Start time and end time of the QoE measurements (does it need UE indication, or can NG-RAN add autonomously)?
	+ Option 2: Time it received immediate MDT reports and QoE reports (autonomously)
	+ Option 3: Not needed

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| **Company** | **Please provide your preferred option on the above question (Option 1/2/3)** |
| Huawei | Option 1 and Option 2. The start time and end time of the QoE measurement is used by the OAM to know the start time and end time. Therefore the OAM can know the time range of the MDT that need to be aligned for the whole QoE measurement. The UE can send the start and end indication to the NG-RAN, then NG-RAN send these two indication and the time stamp added by the NG-RAN to the MCE.The time of each immediate MDT reports and QoE reports is used by the MCE to know the time range of the MDT that need to be aligned for each reports. |
| Samsung | Option 1 or option 3Depends on the approach selected in section 3.4 |

### Other information

**[5], Proposal 3**: DRB information (e.g. DRB list or QoS flow ID) related to the QoE measurement should be indicated to the gNB or QoE server for correlation.

**[9], Proposal 6:** For management based QoE measurement, when the QoE measurements is ended, the NG-RAN sends the UE mobility history including the C-RNTI, in addition to QoE reference/trace reference to the MCE.

**[9], Proposal 7**: It is proposed RAN3 discuss to introduce the C-RNTI in *UE History Information* IE in 38.413.

Moderator requests the companies to provide comments on the following question:

Is there any additional information that should be considered for correlation purposes?

* DRB information
* UE mobility history information including C-RNTI
* Serving cell ID

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| **Company** | **Please provide your views on the above question** |
| Huawei | We need to consider the handover case. The OAM needs to know all the results of each UE in each cell.  |
| Samsung | We support to consider DRB information and serving cell ID.DRB information for the corresponding services with QoE measurement is needed, otherwise the OAM cannot perform the correlation as MDT will measure all the DRBs of the UE, but only the subset of the DRBs is used for corresponding services.Serving cell ID would be helpful for identifying cell problems. |

## Misc. proposals

It was also proposed in:

**[9], Proposal 8**: Radio-related information can include feature info and dual connectivity status.

**[4], Proposal 3:** QoE and related MDT report should be sent to the same collection equipment.

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| **Company** | **Any comments on the above proposals** |
| Huawei | Agree both. Radio-related information has been agreed in the SI. It is more effective if both of results are send to the same collection equipment. |
| Samsung | No strong view on the first proposal, it seems have benefits on QoE analysis.For the 2nd one, shall we change “should” to “can”? we think other options may be possible, no need to restrict it, it depends on operators’ implementation. |

## The alignment with RAN visible QoE (will be discussed in CB#5)

**[1], Proposal 8:** The alignment of RVQoE and MDT measurements reuses the solution for the alignment of legacy QoE and MDT measurements.

**[4], Proposal 7:** whether the RAN-visible QoE alignment with radio-related measurements is supported pending to RAN-visible QoE conclusion.

**[9], Proposal 9**: RAN is responsible for the alignment of radio-related measurement/information and RAN visible QoE, and there should be no RAN3 impacts.

**[10], Proposal 2:** For RAN visible QoE measurement, NG-RAN decides when to configure the radio related measurement for QoE purposes to UE.

**[10], Proposal 3**: RAN visible QoE measurement report and radio related measurement report for QoE purposes should be aligned and correlated at NG-RAN.

**[6], Proposal 4**: In the alignment of MDT and RAN visible QoE, the mobility problem should be paid attention to. We suggest the alignment with RAN visible QoE can be further considered.

**- Alignment of RVQOE with radio-related measurements should be discussed in CB#5.**

**As per the chair’s guidance, this shall be discussed in CB#5.**

# References

|  |  |  |
| --- | --- | --- |
| [1] | [R3-213322](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213322.zip) | The Alignment of Radio-Related Measurements and QoE Measurements (Ericsson) |
| [2] | [R3-213657](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213657.zip) | Alignment of Radio-Related Measurement and QoE Measurements (Qualcomm Incorporated) |
| [3] | [R3-213686](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213686.zip) | Remaining open issues for alignment of radio-related measurements and QoE measurements (Nokia, Nokia Shanghai Bell) |
| [4] | [R3-213950](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213950.zip) | Discussion on Alignment of MDT and QoE Measurements (CATT) |
| [5] | [R3-213969](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-213969.zip) | Discussion on the alignment of Radio-Related Measurement and QoE Measurement (Samsung) |
| [6] | [R3-214048](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-214048.zip) | Discussion on alignment of MDT and QoE Measurements (ZTE, China Telecom, China Unicom) |
| [7] | [R3-214049](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-214049.zip) | (TP for 38.401) Alignment of MDT and QoE Measurements (ZTE, China Telecom, China Unicom) |
| [8] | [R3-214050](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-214050.zip) | (TP for E1/F1) Alignment of MDT and QoE Measurements (ZTE, China Telecom) |
| [9] | [R3-214077](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-214077.zip) | Further discussions on Radio-Related Measurement and QoE Measurements (Huawei) |
| [10] | [R3-214108](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_113-e%5CDocs%5CR3-214108.zip) | Further discussions on alignment of radio related measurement and QoE measurement (CMCC) |