**3GPP TSG-RAN WG3 Meeting #112-eR3-212642**

**Online, May 17th – May 27th 2021**

Agenda Item: 15.4

Source: Samsung (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: # NRQoE5bis-RRM\_alignment**

The deadline for providing replies to Phase 1 is **Friday May21st, 23:59 UTC**

Relevant papers:

1. R3-211737 Alignment of Radio-Related Measurement and QoE Measurements (Qualcomm Incorporated)
2. R3-211841 Discussion on Alignment of MDT and QoE Measurements (CATT)
3. R3-211982 Discussion on the alignment of Radio-Related Measurement and QoE Measurement (Samsung)
4. R3-211991 The Alignment of Radio-Related Measurements and QoE Measurements (Ericsson)
5. R3-212326 On the alignment of QoE measurements and MDT measurements (Nokia, Nokia Shanghai Bell)
6. R3-212449 Alignment of MDT and QoE Measurements (ZTE Corporation, China Telecom, China Unicom)
7. R3-212452 (TP for 38.401) Alignment of MDT and QoE Measurements (ZTE Corporation, China Telecom, China Unicom)
8. R3-212453 (TP for 38.473) Alignment of MDT and QoE Measurements (ZTE Corporation, China Telecom, China Unicom)
9. R3-212455 (TP for 38.463) Alignment of MDT and QoE Measurements (ZTE Corporation, China Telecom, China Unicom)
10. R3-212496Alignment of radio related measurement and QoE measurement (CMCC)
11. R3-212517 Further analysis on spec impacts of the potential solutions to RAN assitsted measurement (Huawei)

# For the Chairman’s Notes

**Proposal 1: Immediate MDT is taken as baseline for the collection of Radio-related Measurements to assist QoE analysis.**

**Proposal 2: Existing measurements specified for immediate MDT can be used for Radio-related measurements for QoE analysis.**

**Proposal 2bis: New radio-related measurements, if any, should be defined in the SON/MDT WI.**

**Proposal 3: RAN3 to consider the case that Radio-related measurement and QoE measurement are configured simultaneously by OAM for the alignment.**

**Proposal 4: OAM, TCE or MCE is responsible for correlation.**

**Proposal 5: QoE reference and Trace reference should be considered as baseline for correlation, how to correlate and whether other information is needed are FFS.**

**To be continued:**

**Further discuss the case that MDT is configured before QoE configuration for the alignment.**

**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, but can also be used for QoE analysis**

**The alignment with RAN visible QoE can be discussed later when the RAN visible topics achieves a comparatively stable status.**

**Further discuss what kind of the radio-related information independent of radio-related measurements can be used for QoE analysis.**

# Phase 2:

## Agreements

The following proposals can be agreeable after Phase 1 discussion:

**Proposal 1: Immediate MDT is taken as baseline for the collection of Radio-related Measurements to assist QoE analysis.**

**Proposal 2: existing measurements specified for immediate MDT can be used for Radio-related measurements for QoE analysis.**

**Proposal 2bis: new radio-related measurements, if any, should be defined in the SON/MDT WI.**

**Proposal 3: RAN3 to consider the case that Radio-related measurement and QoE measurement are configured simultaneously by OAM for the alignment.**

**Proposal 4: OAM, TCE or MCE is responsible for correlation**

## FFS

**Further discuss the case that MDT is configured before QoE configuration for the alignment.**

**Further discuss the alignment approaches based on the cases.**

**QoE reference and Trace reference should be considered as baseline for correlation, other information is FFS.**

**The alignment with RAN visible QoE can be discussed later when the RAN visible topics achieves a comparatively stable status.**

**Further discuss the radio-related information independent of radio-related measurements in the next meeting**

If you have other opinion or update for the proposal, please provide your comments:

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| **Company** | **Please provide you views.** |
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## Open issues

### Open issue 1: Clarification for case 1

As mentioned in moderator’s summary in section 3.2.1, companies have different understandings on case 1, to help our further discussion on the alignment approaches, moderator thinks further clarify case 1 is necessary, based on our discussion, below sub-cases for case 1 can be further discussed:

- Case 1-a: **the radio related measurements is only for QoE analysis.**

- Case 1-b: **the radio related measurements is mainly for MDT, but can also be used for QoE analysis.**

**Question 1: Do you agree RAN3 to consider case 1 or/and case 2 for the alignment?**

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| **Company** | **Please provide you views.** |
| Samsung | Case 1-a should be considered as the typical case. Case 1-b may need further discussion, as the MDT and QoE have different purposes so that the measurement configuration and reporting configuration are different, it’s better to left to implementation. |
| ZTE | Both case need to be considered for NR QoE. |
| Qualcomm | Case 1-b is the typical scenario. Case 1-a only makes sense if we introduce new radio-related measurements, otherwise should not be considered.OAM configures immediate MDT measurements for network optimization purposes and for L2 measurements. While OAM can also configure QoE for application layer measurements. Or both could be configured at the same time as well (which can be correlated for better analysis). But saying that radio related measurements are only for QoE (i.e. case 1-a) is very restrictive and not a typical scenario. |
| CATT | Both cases are needed. The two scenarios should be supported  |
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**Moderator’s Summary:** from the comments above, both cases should be considered. To make things not that restrictive, moderator would like to revise the descriptions of the cases as below:

**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, but can also be used for QoE analysis**

### Open issue 2: Correlation information in QoE/MDT report

Based on the discussion in section 3.2.4, most companies agree that QoE reference and MDT reference can be taken as baseline for correlation, and one company points out we need to discuss which information needs to be sent with QoE report container, based on the discussion, moderator would like to make further progress on the correlation information discussion and below questions are provided.

**Question 2: Do you agree that MDT reports and QoE reports are transmitted in separate messages by reusing existing mechanisms?**

**Question 3: if yes to question 2, which option below can be taken as baseline:**

* **Option 1: including QoE reference in MDT report for correlation**
* **Option 2: including Trace reference in QoE report for correlation**

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| **Company** | **Please provide you views. (if you have any other option for Q3, feel free to add it)** |
| Samsung | Q2: YesQ3: option 1 |
| ZTE | Q2: Agree MDT reports and QoE reports can be report separately from NG-RAN node to server (s).Q3: Both solutions are feasible. Option 1 may impact MDT behavior and need to be approved by SON/MDT WID.Option 2 only limited to NR QoE WID. Therefore, prefer option 2. |
| Qualcomm | Q2: AgreeQ3: Agree with ZTE. Option 2 could be considered but this should probably wait till we have understanding whether Trace function and QMC function are decoupled or not. If not decoupled i.e. trace function is reused, can’t we then assume all QoE reference IDs will belong to the same trace ID (if multiple traces are not supported at the same time)? Then there is no need to include Trace ID in QoE report. |
| CATT | Q2: yesQ3: prefer option2. We should assume the QoE is required the correlation in tis WI |
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**Moderator’s Summary:** from the comments above and comments in section 3.2.4, below proposal can be provided:

**Proposal 5: QoE reference and Trace reference should be considered as baseline for correlation, how to correlate and whether other information is needed are FFS**

**.**

# Phase 1: Reaching the essential agreements

In NR QoE study phase, below descriptions for the radio-related measurements had been captured in TR 38.890:

## 6.8 Radio- related measurements and information for QoE

In order for the network to further evaluate and improve the QoE, the RAN could also trigger radio-related measurements towards a certain UE, based on the QoE measurement configuration received from the OAM. For triggering the measurements, an existing mechanism, e.g. MDT procedure, can be used. Collection of radio related measurements, if needed, should be done by existing methods such as MDT, if the UE supports MDT in R17.

The radio-related QoE measurements are reported for all types of supported services, and they include MDT-like measurements and, potentially, additional measurements related to the radio interface. If new radio-related measurements, with respect to what is currently specified in MDT, are required for NR QoE management, these additional radio-related QoE measurements will be specified as a part of MDT measurements. Application-related QoE measurements are only collected when the application session is ongoing. If these radio-related measurements are used for assisting application-related QoE measurements, it is beneficial and efficient if measurement collection and reporting can start at the same time. If configured together e.g. using same trace reference and time aligned, e.g. based on time stamps, correlation of the results may be done by post processing. Besides radio-related measurement results, radio-related information may also be reported. Radio-related information may be reported even when radio-related measurements are not triggered over the radio.

Both of the radio-related measurement results and radio-related information, if reported, should be aligned and correlated with the QoE report, using e.g. trace ID.

Our discussions are expected to be based on the key points high-lighted above.

## General aspects

### Mechanism for Radio-related measurements

**NOTE: The objective of phase 1 is to reach the essential agreements, based on which a TP for BLCR is to be produced in Phase 2.**

In papers [1] - [11], the discussions on Radio-related measurements are all based on the MDT mechanism. Paper [1], [2], [4], [10] and [11] discussed Radio-related measurement based on Immediate MDT. And paper [2] proposes Immediate MDT can be configured by RAN for radio-related measurements based on the QoE configuration,

Based on the above, a simple proposal can be used as a start:

**Proposal 1: Immediate MDT is used as baseline for the collection of Radio-related Measurements for assisting QoE analysis.**

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| **Company** | **Do you agree with Proposals 1?** |
| Samsung | Yes. Enhancements are needed to support the alignment |
| CMCC | Yes. Immediate MDT measurement should be the baseline for radio-related measurement. |
| Qualcomm | Yes |
| Huawei | Yes. |
| CATT | Yes |
| ZTE | Yes |
| China Unicom | Yes. |
| **Ericsson** | Yes |
| **Nokia** | Yes |
| **Lenovo, Motorola Mobility** | Yes |

**Moderator’s Summary:** all companies agreed proposal 1 below

**Proposal 1: Immediate MDT is taken as baseline for the collection of Radio-related Measurements to assist QoE analysis.**

### Contents of Radio-related measurements

As there are many kinds of MDT measurements specified in specifications, the measurements may be performed in UE or/and gNB, Paper [3] thinks we should discuss what kind of radio-related measurements are needed for QoE, and Paper [1] proposes existing MDT measurements are sufficient to assist NR QoE management and no new radio-related measurements are to be introduced, but Paper [2] thinks new radio-related measurement may be needed based on QoE measurement special features.

Based on the above, the following proposals are derived:

**Proposal 2-1: Current measurements specified for immediate MDT can be used for radio related measurements.**

**Proposal 2-2: New radio related measurements not specified in MDT may be needed and may need further discussion.**

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|  **Company** | **Do you agree with Proposals 2-1 and 2-2?** |
| Samsung | Agree with both |
| CMCC | **Agree both. And we’ve agreed during SI that if new radio related measurements are deemed useful, they will be set as a part of radio related measurements.** |
| Qualcomm | OK with proposal 2-1. Proposal 2-2 is probably not needed.We feel existing radio related measurements from immediate MDT should suffice to be correlated with QoE measurements.Regarding enhancements, we are okay if NG-RAN can provide additional information (e.g. radio related information), but don’t see the need to add new measurements at UE, unless not available at NG-RAN. |
| Huawei | We prefer to reuse current MDT measurement, for new radio related measurements, this could be discussed in SON/MDT WI, even there will be QoE specific measurements which will be discussed here, the final conclusion should be better to leave SON/MDT WI to handle. |
| CATT | Both, some existing measurement can be used and we may design new measurement for the QoE correlation analysis purpose |
| ZTE | OK with proposal 2-1.If new measurement identified, then can be add into MDT. |
| China Unicom | Agree with both. |
| **Ericsson** | **P2-1: OK****P2-2:** needs to capture that **new MDT measurements,** if any, are to be **defined in the SON/MDT WI.** |
| **Nokia** | **P2-1: OK** **P2-2:** We prefer to reuse current MDT measurement, and agree that new MDT measurements, if any, are to be defined in the SON/MDT WI. |
| **Lenovo, Motorola Mobility** | P2-1: OKP2-2: we are open to discuss new MDR measurements. |

**Moderator’s Summary:** all companies agree current measurements specified for immediate MDT can be used for radio related measurements, 8 companies are fine/open to discuss new radio-related measurements if needed and beneficial, 3 companies suggest new MDT measurements if any should be defined in SON/MDT WI.

Based on the above, below proposals are provided:

**Proposal 2: existing measurements specified for immediate MDT can be used for Radio-related measurements for QoE analysis.**

**Proposal 2bis: new radio-related measurements, if any, should be defined in the SON/MDT WI.**

## The alignment of Radio-related measurement and QoE measurement

The moderator notes that the solutions for the alignment from different companies are discussed from different point view. And moderator suggests we can discuss it from the procedure point view, the discussion can be divided into two phases below:

* Configuration from OAM/CN to NG-RAN
* Configuration inside NG-RAN

### Configuration from OAM/CN to NG-RAN

For the configuration from OAM/CN to NG-RAN, paper [6] discussed two cases and proposes the QoE measurement can use on going MDT measurement as radio related measurement, on the other hand, paper [4] and [10] proposes OAM can provide both QoE configuration and MDT configuration for QoE purposes to RAN simultaneously. Paper [6] proposes the OAM is responsible for providing the MDT configuration.

Based on the above, below options can be considered:

**Proposal 3: RAN3 to consider below cases for the alignment:**

* **Case 1, the configurations of radio-related measurement and QoE measurement are transmitted simultaneously from OAM/CN to the NG-RAN node.**
* **Case 2: MDT is configured before QoE configuration, and the on-going MDT measurement can be used for radio-related measurement when QoE configuration is transmitted from OAM/CN to the NG-RAN node.**

Moderator understanding is the QoE measurement and on-going MDT measurement used for radio-related measurement in case 2 belongs to different trace sessions. So in case 2, a question is whether to support more than one trace session, or keep the principle (i.e. only one TR/TRSR on-going) unchanged by doing something, e.g. deactivate the on-going MDT and then configure radio-related measurement and QoE measurement. Basically go back to case 1.

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| **Company** | **Do you agree with the case 1 or case 2 or both? in addition, if case 2, do you agree to support one than one trace session?**  |
| Samsung | Case 1 should be considered.For case 2, even MDT is configured before QoE, if new MDT configuration with QoE configuration comes, the on-going MDT is deactivated, which brings us back to case 1. |
| CMCC | **Both can be considered. OAM should ensure that the MDT measurement will last during the time for QoE measurement, no matter the MDT measurement is activated by MDT purpose or QoE purpose.** |
| Qualcomm | Same view as Samsung i.e. OAM can try to configure both together. If not, old trace session would have to be deactivated first before configuring both QoE and MDT together.  |
| Huawei | Case 1 should be the typical case;While for case 2, we think anyway both the MDT and QoE are configured by OAM/CN, if MDT is configured before, and radio related measurements is requested when QoE is configured, network could just update/reconfigure/release and reconfigure the MDT measurement configuration if needed. |
| CATT | Both cases are reasonable. Case 1 is typically for the QoE triggered MDT. Case 2 is the MDT is running and QoE triggered.  |
| ZTE | Both cases. |
| China Unicom | Both can be considered. |
| **Ericsson** | We think that **only Case 1 should be discussed**. In fact, **Case 2 seems** needs enhancement to be made useful for time alignment and smart data collection, which can be achieved by implementation. |
| **Nokia** | We believe that both cases are relevant, and that ongoing MDT should not be cancelled upon configuration of QMC (unless the QMC configuration comes with a new MDT configuration). |
| **Lenovo, Motorola Mobility** | Both cases. For case2, the parallel traces should be supported for multiple QMC anyway, in which case parallel MDT configurations should also be supported. |

**Moderator’s Summary:** 10 companies comment, 10 companies agree case 1 should be considered, 5 companies agree case 2 should be considered, 4 companies think case 2 can be achieved by implementation and 1 companies thinks both cases are relevant. Below agreement is provided:

**Proposal 3: RAN3 to consider the case that Radio-related measurement and QoE measurement are configured simultaneously by OAM**

Further discuss case 2 may be needed.

However, from the discussions, moderator noticed that companies may have different understandings on the case 1, so moderator would like to further clarify case 1, hope this can help us for further discussion on the alignment solutions

### Start of the radio-related measurement

After the related configurations transmitted from OAM/CN to NG-RAN, it is NG-RAN to decide how to handle the start/end of the radio-related measurement or the report of the on-going MDT measurement.

**For case 1 (i.e. MDT and QoE configured together from OAM/CN)**, paper [1] prefers MDT and QoE measurements are configured together without any indications and restrictions needed, the alignment can be achieved by e.g. using same trace reference and time aligned, however, paper [4] finds this correlation-based alignment have many drawbacks, also, paper [3], [4] have the same views that correlation-based alignment is not efficient. So paper [2], [3], [4] proposes specify or support the start/stop the radio-related measurement and QoE measurements at the same time.

Furthermore, paper [2] proposes the duration of QoE associated radio-related measurement should cover all the QoE sessions if multiple QoE session configured. Paper [3] and [4] give two approaches to enable the alignment between radio-related measurement reports and QoE reports. Paper [5] also discusses Network-based and UE-based solutions to enable the alignment and shows their preference on network based solution. Paper [10] discussed 2 options and proposes RAN provides QoE configuration and MDT configuration for QoE purposes to UE simultaneously. And paper [11] proposes the time stamps for the corresponding to the start time and end time of the QoE measurement and radio-related measurement to the TCE for alignment, in which the start/end time of QoE measurement should be provided by UE.

Based on the above, for case 1, below approaches can be derived:

**In case of MDT and QoE configured together by OAM,**

* **Approach 1: Radio-related measurement is configured once QoE measurement is configured.**
	+ **Approach 1-a, Radio-related measurement will not start once configured, it starts only when QoE measurement starts (e.g by receiving the indication or QoE report from UE).**
	+ **Approach 1-b, Radio-related measurement starts once configured, and the measurement will last throughout the entire time for the QoE configuration. The time alignment may be achieved based on the time stamps provided by NG-RAN**
* **Approach 2: Radio-related measurement is configured only when the QoE measurement starts (e.g. by receiving the indication or QoE report from UE), and the radio-related measurement starts once configured.**

**For case 2 (i.e. MDT is configured before QoE),** paper [6] provides approaches to support the case that QoE measurement activated after MDT measurement has triggered, and proposes introduce QoE Assistant Information IE in F1AP and E1AP for alignment of QoE report and MDT report.

Based on the above, for case 2, below approach can be derived:

**In case of MDT is configured before QoE and the on-going MDT is used for radio related measurement,**

* **Approach 3: when QoE is activated, the QoE assistant information should be notified to the corresponding nodes that perform the on-going MDT measurement to start sending the MDT report to the QoE analysis server, e.g. MCE**

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| **Company** | **Which approach should be selected for the alignment?** |
| Samsung | We support Approach 1-a and Approach 2  |
| CMCC | Approach 1-b. We need to avoid the situation that MDT measurement for MDT purpose cannot be performed without QoE configuration, and it is not our intention to impact the current immediate MDT behaviour for MDT purpose.Although radio related measurement may adopt immediate MDT measurement as a baseline, such radio related measurement is mainly used for QoE purpose. There is a chance that immediate MDT measurement for MDT purpose and for QoE purpose overlap in time, then it is enough to just collect one copy of such immediate MDT measurement during the overlapped period, but for non-overlapped period, the immediate MDT measurement should last either for MDT purpose or QoE purpose. |
| Qualcomm | **Approach 1-b** is preferred.**Approach 1-a, Approach 2** and **Approach 3** imposes limitation that radio-related measurements can’t start till the application starts, which is not good. Radio-related measurements can still be used for MDT purposes and should not be restricted in this way.**Approach 1-b** makes sure that radio-related measurements start before or together with the application start time and we can correlate them both at the network. |
| Huawei | Approach 1-b and Approach 2. We also think the Approach 1-b also can be used in case of MDT is configured before QoE. |
| CATT | Before we selection the approach, we should clear understanding the pre-condition. i.e what is the purpose of the MDT configured. If the QoE is configured with the MDT at same time and aim to correlation post processing, Approach 1-a, Approach 2 are good choiceIf the aim is not only for the correlation, Approach 1-a Approach 3 are good choice. So we need identify the aim of the MDT firstly |
| ZTE | **In case of MDT and QoE configured together by OAM**Case 1-b is the best. Because we need to support multiple QoE functionality.And we believe only 1 MDT session is enough for multiple simultaneously QoE session of a UE. Then if we select 1a or 2 , the signalling will be very complex.**In case of MDT is configured before QoE and the on-going MDT is used for radio related measurement:**Approach 3 is necessary to be consider.  |
| China Unicom | We support approach 1-b.The MDT can be applied for multiple QoE measurement. If the QoE measurement is configured, there should be simultaneous MDT measurement. |
| Ericsson | We **prefer to discuss 1-a and 2,** where the indication that marks the start of QoE measurements **is not a QoE report,** but rather a start indication *per se* (in the former case, the first QoE report could not be correlated to the MDT).Regarding other cases, we think that **the focus of the discussion is the use of MDT for QoE**. QoE can run with or without MDT, and MDT can run with and without QoE. If the intention is to use MDT for QoE, then it should be made simple, by aligning their initiation. Anyway, **1-a and 2 should at least be optional**. It should be possible to **reduce the amount of data to be processed when aligning.** |
| Nokia | Agree to discuss 1-a and 2. |
| Lenovo, Motorola Mobility | We prefer option 1-b. in option 1-b, the time stamp is not necessary. It is up to network implementation to align the timing. We don’t understand why the strict alignment between MDT and QoE measurement is needed. **Moderator’s** reply: As paper [2], [3], [4] pointed out, if configured radio-related measurements only for QoE purpose, no strict alignment may lead a lot of useless MDT measurements, extra signalling overhead and extra (UE/gNB) power consumption as QoE measurement starts only when session starts (depends on the UE behaviour) but MDT starts once configured, that’s the main reason. |

**Moderator’s Summary:**10 companies comment, there is no consensus, 4 companies support 1-a, 6 companies support 1-b, and 5 companies support 2, and 2 companies support 3, and 1 operator points out current immediate MDT behavior for MDT purpose should not be impact. As pointed out by 2 companies, it’s hard to down-select if we have no common understanding on cases, so moderator suggests we discuss the cases first, and then further discuss the solutions based on the agreed cases.

### End of the radio-related measurement

The same as start mechanism, there are also two cases for the end of radio-related measurement below:

* Case 1 the radio-related measurement is dependent on QoE configuration/measurement
* Case 2 the radio-related measurement is independent on QoE configuration/measurement

**For case 1,** paper [2] observes that the radio-related measurements start/stop at the same time with QoE measurement and proposes that specify the start/stop mechanism for radio-related measurement different from the existing MDT mechanism, and paper [4] also proposes RAN3 provide optional support for ending the MDT measurements and QoE measurements at the same time.

Based on the above, for case 1, below approaches can be derived:

**For the time alignment measurements of the radio-related measurement configured at the time with QoE configuration,**

* **Approach 1: Radio-related measurement stops when the corresponding QoE measurement stops.**
* **Approach 2: Radio-related measurement stops when the corresponding QoE configuration is deactivated.**

**For case 2,** paper [6] proposes introduce QoE Assistant Information IE in F1AP and E1AP for alignment of QoE report and MDT report.

**For the alignment of the radio-related measurement and QoE measurement if the radio-related measurement stops independent from QoE:**

* **Approach 3: when QoE is deactivated, the QoE assistant information should be notified to the corresponding nodes that perform the on-going MDT measurement to stop sending the MDT report to the QoE analysis server, e.g. MCE**

In addition, paper [11] proposes the NG-RAN sends the UE mobility history including the C-RNTI and the NG-RAN trace ID to the MCE when the QoE measurements is ended, it doesn’t mention it’s case 1 or case 2, so moderator assumes it can be applied for both cases. The approach is:

* **Approach 4: when the QoE measurements is ended, the NG-RAN sends the UE mobility history including the C-RNTI and the NG-RAN trace ID to the MCE**
* **Approach 5: When the QoE is deactivated or QMC is complete, NG-RAN does nothing to stop ongoing MDT measurements (MDT can continue independent of QMC stop)**

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| **Company** | **Which approach should be selected to support the alignment?**  |
| Samsung  | We support approach 1 |
| CMCC | Please see the answer above in 3.2.2. moderator’s notes: approach 2 |
| Qualcomm | We are in favor of case 2 i.e. the radio-related measurement is independent on QoE configuration/measurement. We are not sure if we need either Approach 3 or Approach 4 if they are independent. So, we have added **Approach 5** i.e. MDT can continue independent of QMC stop. OAM can choose to deactivate MDT as well when it wants to deactivate QoE.For case 1, similar answer as in 3.2.2. Approach 1 and 2 restrict radio-related measurements to stop when QoE is deactivated/stopped. If we have a mechanism to only deactivate QoE in Trace Deactivation message as discussed in CB NRQoE2, MDT measurements can still continue post QoE deactivation for MDT optimization purposes. |
| Huawei | Approach 4. We think the MDT configuration and QoE measurement can be configured and performed independently. Therefore we prefer the Radio-related measurement will continue until the RAN receives the legacy MDT deactivation command from the CN/OAM.In our understanding, when the RAN sends the radio-related measurement results or QoE measurement results to the MCE, the RAN also send the UE ID and time stamps of the measurement results. The MCE can perform the alignment. But the UE will move to new cells/nodes during the QoE measurement. The MCE will receive the results from different cell/nodes. Therefore the MCE need to know the UE ID in different cells. We think the MCE can first find UE id and the measurement results received from each cell based on the mobility history, then perform the alignment.  |
| CATT | As we answer in last question , we should consider the configuration purposeIf we just consider the alignments the QoE and radio related information. The approach 1 is the best solution. If consider the existing MDT, we need mix the solutions |
|  | First of all, RAN3 need to achieve convergent on cases* Case 1 the radio-related measurement is dependent on QoE configuration/measurement
* Case 2 the radio-related measurement is independent on QoE configuration/measurement

Different case has different solution and apparently case 1 and 2 are mutually exclusive.We prefer case 2. **Moderator’s** reply: we can first discuss the two cases as suggested in summary 3.2.1  |
| China Unicom | Support Approach 2 and Approach3.If all the QoE measurement corresponding with the MDT are all deactivated, the MDT measurement should stop sending the report to analysis server. |
| **Ericsson** | In our view, A**pproach 1** should **at least be optional.** The reason is that, for a smarter/valuable data collection, it **should be possible to stop the MDT measurements when QoE measurements stopped/deactivated.** This will bring better value to the data, which would be better time-aligned, requiring less processing.  |
| Nokia | approach 1 seems beneficial. |
| Lenovo, Motorola Mobility | We would prefer case 2/Approach 5. We don’t understand why put a strict restriction between two measurements. |

**Moderator’s Summary:**10 companies commented, there is no consensus,4 companies support approach 1, 2 companies support approach 2, 2 companies support approach 5, 1 company support approach 4, and 1 company suggests to achieve convergent on cases.

Same as summary in section 3.2.2, moderator suggests we discuss the cases first, and then further discuss the solutions based on the agreed cases.

### Correlation information

Paper [2], [3], [5] think QoE reference and Trace reference should be used for correlation, Paper [2], [5], [11] think time stamp can be used for correlation. Furthermore, paper [3] proposes 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. And paper [11] proposes the NG-RAN also sends the NG-RAN trace ID, C-RNTI, serving cell ID to the MCE for correlation. Moderator’s understanding is that some correlation information depends on the solution selected, maybe we can discuss this in phase2, but some should be used no matter which solution is selected.

From the above, the following proposal can be derived:

**Question 1: is there any information below should be considered no matter which solution is selected?**

* **Trace Reference**
* **QoE Reference**
* **Timestamps**
* **DRB information**
* **Serving cell ID**
* **C-RNTI**

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| **Company** | **Please provide your views.** |
| Samsung | No matter which solution is selected, trace reference and QoE reference should be considered for alignment.Besides, DRB information corresponding to the QoE measurement should also be considered for alignment. |
| CMCC | If the information indicated here is the one transmitted from NG-RAN to Collection Entity, we need to discuss which information needs to be sent with QoE report container, and which information needs to be sent with immediate MDT measurement results.Our understanding is that for immediate MDT measurement results, timestamps are needed to be added by NG-RAN, and at least QoE reference is also needed to help MCE/QoE server identify that such immediate MDT measurement results are performed for QoE purpose and for which QoE reference.While for QoE report or immediate MDT measurement results, DRB information might be added for OAM observatory purpose.**Moderator’s** reply: we can further discuss include which info. In which reports in 2nd round. |
| Qualcomm | If we agree to reuse trace procedures for QoE, then there shall be only 1 trace ID active at a given UE. NG-RAN can then assume that the immediate MDT measurements and QoE reports from a given UE are for the same trace ID and can be correlated based on received time stamps. Interpolation/extrapolation might be needed for correlation in certain cases (e.g event triggered) as alignment of MDT and QoE reports are very hard to achieve i.e. MDT is sent when a certain radio condition is met and QoE report is sent when a session ends or based on application rules. Alignment can be easier if OAM configures QoE and MDT with a same reporting periodicity. |
| Huawei | So here the proposal is to also include some radio-related information when radio-related measurement result is reported to TCE? Since C-RNTI, DRB information could be collected without MDT measurement.Of course, trace reference is anyway needed, QoE reference is pending on discussion on CB#3.**Moderator’s** reply: moderator’s understanding the information discussed here is used for measurements correlation. And the radio-related information discussed in 3.3.2 is the information that may be reported even when radio-related measurements are not triggered over the radio(as captured in the TR) |
| CATT | Trace Reference, QoE Reference and Timestamps should be considered for the correlation  |
| ZTE | At least the following:* **Trace Reference of MDT**
* **QoE Reference**
* **Timestamps**
 |
| China Unicom | Trace Reference and QoE reference should be included in the report for the alignment, and DRB information for QoE is useful to align with the MDT measurement. |
| **Ericsson** | We think that high level concepts should be determined first, but, anyway, we think that **timestamps, QoE reference and Trace reference** should be considered **as baseline.**Regarding C-RNTI, **C-RNTI is cell-related configuration information** and we have reservations towards sending it to OAM. |
| Nokia | Agree to consider timestamps, QoE reference and Trace reference as baseline |
| Lenovo, Motorola Mobility | QoE reference and Trace reference as baseline. We are wondering why timestamps are needed. |

**Moderator’s Summary:** based on the discussion, most companies agree that QoE reference and Trace reference should be considered as baseline. Moderator’s understanding is QoE report and MDT report are sent to the correlation entity in separate messages by reusing the current mechanisms. To make further progress, there are two kinds of correlation ways can be considered (we can discuss in 2nd round):

* Option 1: including QoE reference in MDT report for correlation
* Option 2: including Trace reference in QoE report for correlation

Regarding other correlation information (e.g. timestamps, DRB information, and C-RNTI), there is no consensus, may be discuss later when solution is clear.

### Correlation entity

Paper [5] proposes RAN3 to discuss where to locate mapping between QoE Reference (if needed) and Trace Reference. Options are in the UE, in the gNB or in the post-processing system. And Paper [6] proposes QoE and related MDT report should be sent to the same collection equipment. And paper [10] proposes Legacy QoE measurement report and MDT measurement report for QoE purposes should be aligned and correlated at OAM. Paper [11] thinks it is the MCE to make correlation between radio-related measurements, radio-related info and QoE measurement results

Based on the above, the following question is derived:

**Question 2: which entity (UE, gNB, post-processing server (e.g. OAM, TCE, or MCE)) is responsible for the correlation of the Radio-related measurement and QoE measurement?**

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| **Company** | **Please provide your views.** |
| CMCC | Post-processing server needs to take responsibility. And MCE could be a proper place, for it logically collects measurement results for QoE purpose. |
| Qualcomm | OAM (i.e. TCE/MCE) can do the post processing. |
| Huawei | We would think it is OAM/TCE/MCE, since they are the final user of Radio-related measurement |
| CATT | OAM (i.e. TCE/MCE) |
| ZTE | **post-processing server: MCE** |
| China Unicom | TCE/MCE is responsible for correlation. |
| Ericsson | The **OAM, TCE or MCE is responsible for correlation**, where the UE should enable the correlation of MDT and QoE reports at OAM by inserting common IDs, timestamp, etc. into the reports. Moreover, the RAN, being interested in the “conclusions”, and being the consumer of RAN visible QoE, can be an entity enabled to identify that a correlation exists, and signal it to the OAM.  |
| Nokia | OAM (i.e. TCE/MCE) |
| Lenovo, Motorola Mobility | post-processing server/OAM |

**Moderator’s Summary:** All companies have the same understanding.

**Proposal 4: OAM, TCE or MCE is responsible for correlation.**

## Others

### The alignment with RAN visible QoE

Paper [10] proposes for RAN visible QoE measurement, RAN provides RAN visible QoE configuration and MDT configuration for QoE purposes to UE simultaneously, and RAN visible QoE measurement report and MDT measurement report for QoE purposes should be aligned and correlated at NG-RAN. As RAN visible QoE is under discussion in other CB, moderator is not sure whether we should consider RAN visible QoE at this stage, so below question are derived:

**Question 3, should RAN3 consider RAN visible QoE in the alignment of radio-related measurement and QoE measurement.**

**Question 3bis, if yes to question 3, for RAN visible QoE measurement, RAN is responsible for the radio-related measurement configuration and the alignment of radio-related measurement and RAN visible QoE measurement.**

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| **Company** | **Please provide your views.** |
| CMCC | Yes. RAN is responsible for such correlation. But we can wait for RAN visible QoE topic alone achieves a comparatively stable status, then to open the discussion on such crossover topics. |
| Qualcomm | This could be discussed later once we have agreements on alignment for application layer QoE and MDT. |
| Huawei | RAN visible QoE is for RAN to use, while radio-related measurement is for high layer to use, seems they are independent? Of course, they could be requested at the same time. Also we think this question depends on whether the RAN visible QoE measurement can be configured only if QoE measurements are configured for the same service type (i.e. the Q9 in CB: # NRQoE5-RAN\_visible).  |
| CATT | Yes, agree with CMCC |
| ZTE | Can be discuss later |
| China Unicom | Discuss later on. |
| Ericsson | Yes, this is the responsibility of the **RAN.** |
| Nokia | Not sure there will be normative impact from this aspect, because the measurements will anyway be visible to the NG-RAN node. |
| Lenovo, Motorola Mobility | Can be discuss later |

**Moderator’s Summary:** some companies think we should consider RAN visible QoE for the alignment, and some companies point out too early to discuss.

FFS: The alignment with RAN visible QoE can be discussed later when the RAN visible topics achieves a comparatively stable status.

### Radio-related information

Paper [11] proposes radio-related information is collected by the NG-RAN and there is no need for the UE to collect this information. Moderator is not sure whether radio-related information is in the scope of this CB, so below question are derived:

**Question 4: should RAN3 need to discuss the radio-related information in this CB?**

**Question 4bis: If yes to question 4, should radio-related information provided by gNB or UE?**

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| **Company** | **Please provide you views.** |
| CMCC | Yes, and the radio-related information, such as DRB/QoS Flow information, could be considered for correlation with RAN visible QoE report which is provided by UE. But we can wait for RAN visible QoE topic alone achieves a comparatively stable status, then to open the discussion on such crossover topics. |
| Qualcomm | Radio related information should not be provided by UE (immediate MDT should suffice). We are okay to discuss gNB provided additional information if deemed useful, may be later. |
| Huawei | Radio-related information is part of the conclusion the SI, so anyway we need to discuss if there are any spec impacts to support it.We think radio-related information should be provided by gNB, this is also the conclusion of the SI.  |
| CATT | Yes, if the MDT is configured for the QoE, the UE provided radio related information is enough. Otherwise RAN need to collect the required information. |
| ZTE | The information ,if needed , can be provide by RAN node. |
| China Unicom  | Yes, we prefer RAN node provides radio-related information. |
| **Ericsson** | Why don’t we **first discuss what this information is?** |
| Nokia | The consumer of the radio related information would in our understanding be the application server or the MCE. Which means we might need to consult SA4 about which information that could be needed. |
| Lenovo, Motorola Mobility | Same view with Huawei. |

**Moderator’s Summary:** moderator noticed that companies have different understandings on Radio-related information here. As captured in the TR “Radio-related information may be reported even when radio-related measurements are not triggered over the radio” and we already discussed the information for correlation in section 3.2.4, moderator assumes that the radio-related information here is independent of MDT measurements. And moderator thinks it’s a good suggestion that we discuss what the radio related information is, then discuss where is the information from. But we may have no time to discuss in this meeting, so moderator suggests further discuss the radio-related information for the next meeting:

Further discuss the radio-related information independent of radio-related measurements in the next meeting.

### Other topics

Any other proposals.