**3GPP TSG-RAN WG3 Meeting #114-eR3-215868**

**Online, November 1st - 11th 2021**

Agenda Item: 15.2.2

Source: Ericsson (moderator)

Title: CB # QoE4\_Mobility - Summary of email discussion

Document for: Approval

# Introduction

This is the SoD for the following comeback: **CB: # QoE4\_Mobility**

The deadline for providing replies to Phase 1 is **Friday, November 5th at 23.59 UTC.**

Relevant papers:

1. R3-214728 Mobility Support for NR QoE Management (Ericsson)
2. R3-214729 CR TS 38.423 Mobility Support for NR QoE Measurement Collection (Ericsson)
3. R3-214910 QoE measurement collection and reporting continuity in mobility scenarios (Qualcomm Incorporated)
4. R3-215118 Discussion on Measurement Collection and Continuity in Intra-System Intra-RAT Mobility (CATT)
5. R3-215311 Inter-node propagation of management-based QMC configuration (Nokia, Nokia Shanghai Bell)
6. R3-215545 Mobility issues of NR QoE (Samsung)
7. R3-215639 Further discussion on Measurement Collection and Continuity in Intra-System Intra-RAT Mobility (ZTE, China Telecom)
8. R3-215662 Further discussions on measurement collection and mobility continuity (Huawei)
9. R3-214726 Procedures for Configuration, Activation and Deactivation of QMC (Ericsson)

# For the Chairman’s Notes

**TBW**

# Discussion

## The coexistence of m- and s-based configurations

This issue was discussed in papers [1, 3, 4, 6, 7, 8].

Paper [1] proposes to confirm that there may exist an s- and m-based configuration pertaining to the same application session.

Papers [3, 4] propose a set of overwriting rules assuming that two QoE configurations have the same QoE reference. Paper [8] proposes that overriding should be allowed among m-based, but not among s-based configurations.

Paper [6] argues that the overriding within the same measurement type cannot happen since this is under control of OAM which can avoid it. It is further argued that, in case one configuration is to be replaced by another, the network should first deactivate the old measurement, and then configure the new one.

Based on the papers, the following proposals try to capture the common view:

**Potential proposal 1-1: A UE can simultaneously be configured with multiple s- and/or m-based configuration(s) pertaining to the same application session, as long as the maximum number of simultaneous configurations at a UE is not exceeded.**

**Q1-1: Please state your preference:**

* **Option A: The network can achieve overriding within the same configuration type (m- or s-based) by deactivating an existing measurement and configuring another measurement of the same configuration type.**
* **Option B: The network can achieve overriding by sending to the UE a new configuration wit the same QoE reference.**

**Please motivate.**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Agree to P1-1**  **Q1-1: A** | Wrt Q1-1 please note that:   * Nothing prevents the network to release the measurement of any kind at any time and configure one of the same type immediately afterwards, or even in the same message, with a different QoE reference (Option A). * Given that an ongoing measurement configuration cannot be modified (i.e., only release is possible while session is ongoing), **there is no overriding per se** – instead, the new configuration can be activated only when a new session starts. For that, Option A can be applied. * Overwriting based on the same QoE reference has at least the following **consequences**: * For m-based, if RAN receives, on behalf of the UE, a new config with the same QoE reference and the UE undergoes a HO inside the Area, an inconsistency will occur: the target will have the old configuration and the UE will have the new configuration, both of them having the same QoE reference. * For s-based, given that the UE context shall be passed to target at HO, the target would not be aware that the new configuration has not yet been activated and that the ongoing session would be using the old configuration instead. |
| Qualcomm | Agree to P1-1  Q1-1: Option A, Option B is upto RAN2 | **Can we assume that OAM will never provide the same QoE Reference to different QoE configurations irrespective of QoE type**? If this assumption is true (can check with SA5), override scenarios will never happen.  However, we can still define error handling, i.e., what should NG-RAN do in case OAM provides a QoE Reference same as one previously configured? Options are i) NG-RAN should ignore such a QoE configuration, ii) Send this new configuration to the UE with the same QoE Reference, either immediately or after session ends.  For Q1-1, Option A should be supported as it is. Option B depends on the above error handling at NG-RAN and up to RAN2 whether they can support QoE modification or delta config. But agree with E/// that Option B might cause complexities. |
| Huawei | P1-1 is technically possible; Option A is possible; Option B needs both RAN3 and RAN2 to confirm | For P1-1, technically it is allowed, but then what the UE behaviour would be, it is a question mark actually. Then we are not sure why OAM would provide the same QoE Reference to difference QoE configurations, what’s the purpose of doing so? But in order to be safe, maybe as QC commented that we could try to define some error handling behaviour, but this would make things complicated, we don’t think spec should cover all possible wrong behaviour. Maybe we could put some stage 2 descriptions as guidance. |
| Samsung | Disagree to P1-1  Q1-1 option A | For P1-1 multiple QMC support is for different application session, it cannot be for the same application session. If we look at the initial requirement from SA5, in TS 28.404, the related requirement is:  “*REQ-EUSPC-CON-8: In 5G the operator shall have a capability to order several QoE measurement collections from each UE simultaneously, e.g. for different end user services*.”  We think it’s quite clear that multiple QMC can be supported simultaneously for different services.  Besides, we don’t see any scenario need this requirement (i.e. multiple QMC for the same application session), it seems no need and redundant. If multiple QMC is for the same session, from RAN3 perspective, we don’t know how it will work, at least we should check the possibility with SA4 and SA5.  Even companies think it is possible, could we leave it to R18? As it seems make things complicated and we don’t have enough time to coordinate with other groups for this complicated but not that necessary requirement. |
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## Area Scope handling

Papers [1, 3, 6, 7] discuss the Area Scope handling at mobility. Papers [1, 6] argue that, based on SA4 requirements, the measurements for an ongoing session should continue even when the UE leaves the Area Scope. Meanwhile, papers [3,7] argue that, when UE moves out of Area Scope, the measurements should be released.

**Q2-1: Should the UE continue an ongoing measurement once it leaves the Area? Please motivate your answer.**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | * The TS 26.247 clearly states that the criteria for a configuration are to be **checked only at the beginning of a session**. * By mandating that the network releases the measurements upon leaving area scope, **we are mandating node behaviour**, which should be **strictly avoided** in RAN3 normative work. * If the release would be mandated when the UE leaves the Area, then large percentage of the sessions started by **UEs located at the border** of the Area are **likely to be lost**. |
| Qualcomm | See comments | We understand that we don’t want to mandate node behavior when UE moves out of area scope i.e., network can send a release, pause or do nothing. The following UE behaviours are possible:   * If network sends **release**, UE will stop performing QoE measurements * If network sends **pause**, UE will continue to perform QoE measurements, store it in either UE APP/AS buffer but stop QoE reporting. * If network **does nothing**, UE can continue to perform QoE measurements and report QoE as usual, but this needs some clarifications:   + Is the QoE configuration propagated to a target node, even if outside the area scope?     - If yes, can the target node, even if outside the area scope configure SRB4 and collect this QoE report from UE? If so, isn’t it against the notion a node “outside” the area scope is collecting QoE reports?     - If no, the target node can’t collect the QoE reports from UE.   + Alternatively, if QoE configuration is to be continually propagated till UE comes back inside area scope, won’t this be a waste if UE never comes back within area scope? Also, how long should a UE keep performing QoE measurements (till session ends?). Also, where will UE buffer the QoE measurements (in UE APP/AS?) till it moves within the area scope? |
| Huawei | yes | In our understanding, SA4 think it is not useful if the network only collects only part of the QoE results in the whole session. Therefore it is better that the UE continues an ongoing measurement once it leaves the Area scope.  As to the UE behaviours for the ongoing session, the UE will continue the measurement and reporting. |
| Samsung | Yes | Same view as E///and HW, SA4 said “*For QoE configuration change, the network still wants the QoE reports from the UE side*,” in the reply LS, we understand UE leaves out the area is one kind of QoE configuration from SA4 point of view, and this understanding is aligned with SA4’s specification as E/// point out.  Of course, network can release the QoE configuration anytime if it wants, but that’s another topic. |
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## Mobility support for m-based QoE

**NOTE:** The present discussion is not about transferring the m-based QoE measurement configuration container to the target, given that the target cannot read the XML file. The discussion is about **passing the information about the m-based QoE measurement configuration.**

Regarding mobility support for m-based QoE, papers [1, 3, 5, 6] argue that at least some information related to an m-based QoE configuration should be propagated to the target, whereas paper [5] argues that this is needed to enable the target to be able release the m-based QoE configuration.

Paper [1] proposes that at least the following information about m-based configuration needs to be passed to the target:

* QoE Reference.
* MCE IP address (needed in case the target is outside Area Scope).
* Measurement type.
* Measurement status.
* The mapping between the Measurement Configuration Application Layer ID and QoE Reference.
* MDT Alignment info (needed in case the target is outside Area Scope).

Paper [8] argues that there is no need to explicitly include the m-based configuration in the handover request message, but that the m-based QoE measurement configuration sent to the UE can be transferred via the RRC information container in the handover request message. Finally, paper [4] argues that there is no need to propagate m-based QoE measurement configuration during mobility, but then also proposes to ask RAN2 to include UE configured m-based and s-based QoE measurement configuration which has been stored in UE in RRC container.

We start the discussion from the most detailed proposal submitted:

**Q3-1: Which of the following information about an m-based measurement configuration should be explicitly passed to the target during handover:**

1. **MCE IP address**
2. **Measurement type**
3. **Measurement status**
4. **The Measurement Configuration Application Layer ID corresponding to the QoE Reference.**
5. **MDT Alignment info ([1] argues that it is needed in case the target is outside Area Scope).**

**Please motivate your answer for each of the information types a) – e) and add any additional information, if applicable.**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **All are neeeded** | a) A target outside of Area needs to know where to forward the reports.  b) The target should be aware of measurement type so that it could know how to handle configuration “overwriting”.  c) The target needs to know if the measurement is ongoing, in order to be able to satisfy SA4 requirements related to measurement continuity.  d) The *MeasConfigAppLayerId* is generated at the source RAN and target needs to know *MeasConfigAppLayerId* corresponds to the QoE Reference.  e) RAN is involved in QoE-MDT alignment. A target outside the Area needs to know whether the alignment is needed so that it could timestamp the reports, if needed (as per previous RAN3 agreement). |
| **Qualcomm** | **a) - Maybe**  **b) – Depends on whether override is possible**  **c) – Wait for RAN2**  **d)- OK**  **e) - Maybe** | a)- Agree with E///. But this has nothing specific with m-based configuration, but regarding handling upon moving outside area scope. This is acceptable once clarifications to our comments in section 3.2 is provided.  b) – If OAM provides a unique QoE Reference for each QoE configuration irrespective of QoE type (also discussed in section 3.1), then this override scenario might not happen and this IE won’t be needed.  c) – If target node knows a measurement is ongoing, then it can choose to not release that QoE configuration in order to collect it later. Whether UE provides this indication is being discussed in RAN2 and we can discuss the RAN3 IE later  d) – Agree, mapping needs to be known at the target  e) – Seems OK. But clarifications to moving outside area scope as mentioned in a) and agreements on CB # QoE6\_MDTAlignment needed before agreeing this. |
| Huawei | Not sure | Firstly, did we already agree to support mobility for M-based?  We think the QoE configuration parameters(i.e. a) MCE IP address and e)MDT Alignment info) received by the source RAN from the OAM will not be propagated to the target RAN.  As to other parameters.   * We think the b) Measurement type is not needed because the target node can know the service type based on the explicit IEs and the RRC context in the source-to-target container. * For c), we think it is needed. But it depends on RAN2 * For c) , we think RAN2 has agreed it. |
| Samsung | a) needed  b) not needed  c) not needed  d)needed  e) needed, details depend on CB#6 | In general, we agree this m-based related information is based on the fact that m-based related information is only for QoE report delivery if there’s on-going recording session. We don’t agree propagate the whole m-based configuration.   1. MCE IP address -needed, as it’s for QoE report delivery 2. Measurement type – not needed, we see no overriding issue. 3. Measurement status – not needed, if we assume there’s a measurement status, if the measurement status is no recording session, the source will not send this m-based related information to the target. 4. the Measurement Configuration Application Layer ID corresponding to the QoE Reference. –needed 5. MDT Alignment info. –needed, details depend on CB#6 |
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## The content of handover messages

The issue is addressed in all paper submitted to the present AI.

**NOTE:** The proposals 2 and 3 from [7] describe the procedures for mobility handling of s- and m-based QoE. They can be considered depending on the outcome of this phase of the discussion.

Paper [6] proposes that only a subset of m-based configuration info should be sent, while paper [1] argues that the configuration container need not be send since the target cannot read it. Therefore, it is proposed that the container is:

* Optionally present in the NGAP QoE IE (it is needed for initial configuration, but not for NGAP handover).
* Absent from the XnAP QoE IE.

Paper [4] proposes to propagate s-based QoE measurements activation configuration in the form of encoded container.

**Q4-1: Do you agree that the QoE configuration container is:**

* **Optionally present in the NGAP QoE IE (it is needed for initial configuration, but not for NGAP handover).**
* **Absent from the XnAP QoE IE.**

Paper [3] proposes to send to target:

* MCE IP address and QoE Reference for m-based case.
* The mapping between *MeasConfigAppLayerId* and QoE Reference (for both m- and s-based?).
* Measurement type (in an explicit or implicit form).

Paper [8] argues that there is no need to introduce the QoE measurement type indication in Handover preparation and Retrieve UE Context procedures. It is also proposed that, for the ongoing QoE measurement marking indication, RAN3 should wait the progress of RAN2.

**Q4-2: Which of the following information should be sent to the target node:**

1. **QoE reference.**
2. **MCE IP address.**
3. **The *MeasConfigAppLayerId*.**
4. **Measurement type.**

**NOTE:**

* For Q4-2, please only answer with “needed” or “not needed” for points a) – d) – so, if you can find at least one scenario where the info should be present, please answer with “needed”.
* At this stage we will not specify whether the information is needed for NGAP and/or XnAP, for HO and/or UE Context Retrieval, or for m- and/or s-based, but you can comment along these dimensions to justify your answer.

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Q4-1: Yes**  **Q4-2: All are needed** | b) MCE IP Address is needed when the target is outside the Area so target knows where to send the reports.  c) The *MeasConfigAppLayerId* is generated at the source RAN and target needs to know *MeasConfigAppLayerId* corresponds to the QoE Reference.  d) The target should be aware of measurement type so that it could know how to handle configuration “overwriting”. |
| **Qualcomm** | **Q4-1: Not clear**  **Q4-2: All OK except d)** | Q4-1 is **not clear.** Are we discussing s-based QoE? If so, why should the **QoE configuration container** be absent from XnAP QoE IE (I assume this is within HANDOVER REQUEST). Also, for NGAP, I assume we are discussing INITIAL CONTEXT SETUP REQUEST and HANDOVER REQUEST?  Q4-2: Again, I assume this is for s-based QoE? (otherwise, duplicate discussion as section 3.3). Everything except d) is OK. Same reasoning for d) as in m-based QoE (we first need to confirm if override scenarios are possible). |
| Huawei | Q4-1: Not clear  Q4-2: Not sure | For Q4-1, similar comment as QC, not sure the intention of this question; we think the container should contain all the configurations in the source side.  For Q4-2, as commented in Q3-1, it depends on whether this question is about the S-based or the M-based. |
| Samsung | We should firstly discuss the two options in our comments. | I guess the intension of the proposal is trying to combine both m-based and s-based configuration to a general signalling format, right? given that we are discussing m-based related information can be transferred during mobility and s-based configuration will be propagated during mobility. There’re some common IEs.  But we should firstly discuss whether combine m-based relate information and s-based configuration together.   * Option 1, using a general format, as proposed by moderator, Q 4-1 and Q4-2 are YES. * Option 2, using separate format, m-based related information can be introduced as a new and separate IE. There’re some redundant IEs, but there’s no need to introduce “measurement type”   Either option is Ok for us. |
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Paper [1] provides a list of information that are to be included in XnAP HANDOVER REQUEST, XnAP RETRIEVE UE CONTEXT RESPONSE, NGAP HANDOVER REQUIRED and NGAP HANDOVER REQUEST messages, for each QoE reference. The list pertains to both m-based and s-based. Paper [7] provides a similar list pertaining only to s-based case.

**Q4-3: Which of the following information should be included in NGAP and/or XnAP handover and/or XnAP UE Context Retrieve signalling, per QoE reference:**

1. **Service type.**
2. **QoE Measurement Status.**
3. **MDT Alignment Information.**
4. **Area Scope.**
5. **Slice List.**
6. **The List of Available RVQoE Metrics.**

**NOTE:**

* Please only answer with “needed” or “not needed” – so, if you can find at least one scenario where the info should be present, please answer with “needed”.
* At this stage we will not specify whether the information is needed for NGAP and/or XnAP, for HO and/or UE Context Retrieval, or for m- and/or s-based, but you can comment along these dimensions to justify your answer.

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **All are needed** | f) is needed because the target needs to know if the measurement is ongoing, in order to be able to satisfy SA4 requirements related to measurement continuity.  g) RAN is involved in QoE-MDT alignment. A target outside the Area needs to know whether the alignment is needed so that it could timestamp the reports, if needed (as per previous RAN3 agreement).  h), i) are needed for s-based on Xn since AMF is not involved in Xn HO and UE Context Retrieve.  j) is needed at the target because the source receives this list from OAM during initial configuration. |
| **Qualcomm** | **e), h), i)** | Same reasoning for f) and g) as mentioned for m-based QoE in section 3.3.  i.) is the slice scope right?  j.) should be first agreed in CB # QoE5\_RANVisible |
| Huawei | all are needed but | As commented, it depends on the measurement type of QoE.  For the s-based, all the information are needed in XnAP HANDOVER REQUEST, XnAP RETRIEVE UE CONTEXT RESPONSE, NGAP HANDOVER REQUEST messages, but not NGAP HANDOVER REQUIRED message.  For the m-based, only f) is needed. |
| Samsung | At least e), g), h), i) are needed, others are FFS | e) Service type.-needed  f) QoE Measurement Status. – depends on RAN2  g) MDT Alignment Information. - needed  h) Area Scope. - needed  i) Slice List. -needed  j) The List of Available RVQoE Metrics.- not sure, should be discussed in CB#5 |
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Papers [1] and [7] propose that the IE carrying the QoE information should be separate from the Trace Activation IE in NGAP and XnAP HO messages.

**Q4-4: Should the IE carrying the QoE information should be separate from the *Trace Activation* IE in NGAP and XnAP HO messages?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | In NGAP HANDOVER REQUEST and XnAP HANDOVER REQUEST messages, there is a single instance of *Trace Activation* IE and this one should be used to carry the MDT-related information. In *Trace Activation* IE there is only one NG-RAN Trace ID. This means that if the IE is also used to carry the QoE information, the QoE and MDT would need to have the same NG-RAN Trace ID.  The NGAP HANDOVER REQUIRED does not contain the ***Trace Activation*** IE. |
| **Qualcomm** | **See comments** | Shouldn’t this be discussed along with the discussion on QoE framework i.e., whether to couple or decouple with trace framework?  But agree with E/// that in case trace framework is to be reused, same NG-RAN Trace ID has to be used for both MDT and QoE with the current signaling or we have to extend the signaling to include multiple NG-RAN Trace IDs to be propagated during handover. (This is a drawback with using trace framework and should be considered while deciding QoE framework) |
| Huawei | Not sure | Similar comments as QC, this should be part of that discussion. But, anyway we think if trace and QMC are configured using the same trace message, we should use QoE reference to identify this QoE measurement, with this understanding, we don’t think there is a need to separate the two, as long as we could distinguish between the two. |
| Samsung | Depends on CB#2 |  |
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## The XnAP/NGAP handover messages to be enhanced

The message impact is discussed in papers [1, 4, 7, 9].

Papers [1, 7] proposes to include the **information** about QoE measurement configuration (not the configuration container!) in the following messages (in addition to XnAP HANDOVER REQUEST and NGAP HANDOVER REQUEST):

* XnAP RETRIEVE UE CONTEXT RESPONSE.
* NGAP HANDOVER REQUIRED.

**Q5-1: Should the information about QoE measurement configuration be included in the XnAP RETRIEVE UE CONTEXT RESPONSE?**

Paper [4] argues that NGAP HANDOVER REQUIRED need not be enhanced to carry the s-based configuration info, since AMF is already aware of the configuration.

Paper [9], submitted to AI 15.2.1.1 argues that the AMF does not have all the information it needs and that not including the in NGAP HANDOVER REQUIRED the information about QoE measurements configured at the UE has at least the following consequences:

* The target node does not know whether it may release the QoE configuration immediately or upon session end.
* The target node outside area scope does not know the IP address of the MCE that should receive the QoE reports.
* The target node (inside or outside area scope) does not know the mapping between Measurement Configuration Application Layer ID and QoE Reference.

**Q5-2: Should the information about QoE measurement configuration be included in the NGAP HANDOVER REQUIRED? If your answer is “no”, please comment on the consequences of not doing it, claimed by the proponents.**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Q5-1: Yes**  **Q5-2: Yes** | Q5-1: The same reasons apply as for including this info in the XnAP HANDOVER REQUEST.  Q5-2: Yes, due to the consequences listed above and in [9]. |
| Qualcomm | **Q5-1: Yes**  **Q5-2: Yes** |  |
| Huawei | Yes to both, but | Q5-1: The information for the s-based and m-based are different as comments in the above Questions.  Q5-2: Only some information are needed and we think it should be included in the Source NG-RAN Node to Target NG-RAN Node Transparent Container. |
| Samsung | Yes to both, but | Agree with HW |
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## Mobility to a target node that does not support QoE

This issue was discussed in papers [1, 3, 6, 7, 8]. Based on the papers, the following proposal is derived:

**Potential proposal 6: In case of mobility to a target node not supporting QoE, the target node can release the QoE configuration.**

**NOTE:** Although it is a common understanding that the configuration cannot be stored or propagated any further, we should not mandate node behavior, so this may be captured only as s common understanding.

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| **Company** | **Agree/disagree?** | **Comment** |
| **Ericsson** | **Agree** | The target cannot read XML, and even if it could, it would not understand the QoE configuration. |
| **Qualcomm** | **Agree** |  |
| Huawei | Agree |  |
| Samsung | Agree |  |
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