3GPP TSG-RAN WG3 #112-e R3-212640

Online, 17 – 27 May, 2021

Agenda Item: 15.2.2

Source: Qualcomm Incorporated (moderator)

Title: Summary of Offline Discussion on CB #: NRQoE4-Mobility

Document for: Approval

# Introduction

**CB: # NRQoE4-Mobility**

**- If target node doesn’t support source node’s QoE configuration, target node can either explicitly release SRB4, implicitly release SRB4 by not configuring SRB4 or send a pause QoE indication to pause QoE reporting to non-supporting node? Send LS to RAN2 to check if RAN2 can support SRB4 setup/release? Network is responsible for QoE area scope check i.e. keeps track of whether UE is inside or outside the area allowed for QMC? Network can reuse the same indicator as QoE paused indicator for area scope check as well?**

**- The management-based QoE measurements configuration is not propagated during mobility or needed? Propagate signaling based QoE measurements activation configuration in the form of encoded container?**

**- Include in XnAP and NGAP Handover Preparation procedures) an IE, per service type, indicating whether signalling-based QoE or management-based QoE is configured and/or ongoing for the service type?**

**- Whether a management-based QoE configuration can override an existing management-based QoE configuration? Whether a signalling-based QoE configuration can override an existing management-based QoE configuration?**

**- Capture mobility principles for stage2, if agreeable**

**- List open issues for next meeting in the summary**

(QC - moderator)

Summary of offline disc R3-212640

# For the Chairman’s Notes

Propose the following:

R3-20xxxa, R3-20xxxc merged

R3-20xxxc rev [in xxxg] – agreed

R3-20xxxd rev [in xxxh] – agreed

R3-20xxxe rev [in xxxi] – agreed

R3-20xxxf rev [in xxxj] – endorsed

Propose to capture the following:

**Agreement text…**

**Agreement text…**

**WA: carefully crafted text…**

Issue 1: no consensus

**Issue 2: issue is acknowledged; need to further check the impact on xxx. May be possible to address with a pure st2 change. To be continued…**

# Discussion

## Signaling based QoE

### QoE configuration transfer during handover preparation and Retrieve UE context procedure

[2], Proposal 1: Include signaling based QoE measurements activation configuration in handover preparation procedure.

[2], Proposal 5: Include Signalling based QoE measurement configuration in Retrieve UE Context procedure.

[2], Proposal 4: Signalling based QoE measurement configuration is stored in NG-RAN when UE enters RRC\_INACTIVE and propagate it to new serving NG-RAN when UE resume RRC connection in another NG-RAN.

[3], Proposal 1: For signalling-based QoE, include the QoE measurement configuration into the following legacy messages:

 - XnAP HANDOVER REQUEST message.

 - NGAP HANDOVER REQUEST and HANDOVER REQUIRED messages.

- XnAP RETRIEVE UE CONTEXT RESPONSE message.

[4], Proposal 2: HANDOVER REQUIRED and HANDOVER REQUEST message in NGAP and HANDOVER REQUEST and RETRIEVE UE CONTEXT RESPONSE in XnAP can be used to carry QoE information for QoE measurement collection and reporting continuity in intra-system intra-RAT mobility scenario.

Since all companies seem to have consensus on the configuration transfer of signaling based QoE, the following is proposed:

**Moderator Proposal 1: Include signaling based QoE measurement configuration in handover preparation procedure i.e. in XnAP: HANDOVER REQUEST, NGAP: HANDOVER REQUEST and NGAP: HANDOVER REQUIRED messages**

**Moderator Proposal 2: Signalling based QoE measurement configuration is stored in NG-RAN when UE enters RRC\_INACTIVE and is propagated to new serving NG-RAN using Retrieve UE context procedure when UE resumes RRC connection in another NG-RAN i.e. include signalling based QoE configuration in RETRIEVE UE CONTEXT RESPONSE in XnAP**

Companies are requested to provide their views on the following:

**Q1: Can we agree on Moderator Proposal 1 and 2?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | No for P1Yes for P2 | For P1, we agree to include the signaling based QoE measurement configuration in XnAP HANDOVER REQUEST and NGAP HANDOVER REQUEST. Like the LTE/NR trace and MDT configuration and LTE QoE configuration in handover, the CN can send the QoE configuration in NGAP HANDOVER REQUEST to the target node. The source node does not need to transfer the signaling based QoE configuration to the target node. Therefore it is not needed to include the QoE measurement configuration in NGAP HANDOVER REQUIRE. For P2, we can reuse the principle of signaling based MDT. |
| Samsung | Same view as HW |  |
| CMCC | Same view as HW |  |
| CATT | Yes | Similar as signaling base trace/MDT, signaling base QoE measurement shall be included in handover preparation procedure and Retrieve UE context procedure.We are open to the activation in NGAP HANDOVER REQUIRE. Pause status may be need transferred from source to target  |
| ZTE | P1/P2 | Maybe we are not just copy&past LTE QoE to NR. For P1, as we discussed in other CB, in order to support multiple QOE functionality, QOE configuration may not necessary to combine with Trace, therefore , it is also necessary for source gNB to provide QOE information (maybe part of QoE configuration ) to the AMF.In addition, it is also allow the possible for RAN visible topic.Then NGAP HANDOVER REQUIRE is also need to be consider in NR. |
| **Ericsson** | **Agree to both P1 and P2** | Regarding P1, the TS 32.422, clause 4.1.2.16 says:*If the subscriber or equipment which is traced makes a handover to a target NG-RAN node using the NG interface, it is the AMF's responsibility to propagate the trace control and configuration parameters to the target NG-RAN node.**If the tracing shall continue also after the relocation has been performed, the 5GC Trace Start procedure shall be re-initiated from the 5GC towards the future NG-RAN node after the Relocation Resource Allocation procedure has been executed successfully.*The above means that the continuity of Trace is ensured by AMF **re-initiating** the Trace session. **We do not think this is suitable for QoE**, having in mind requirements wrt measurement continuity.We also propose to **add “FFS for management-based configuration”** to both proposals.  |

### Multiple QoE configurations

Further, the following were proposed for forwarding multiple sets of signalling-based QoE measurement configuration:

[2], Proposal 2: Include multiple sets of signalling-based QoE measurements configuration in handover preparation procedure

[2], Proposal 6: Include multiple sets of signalling-based QoE measurements configuration in Retrieve UE Context procedure

**Moderator Proposal 3: Include multiple sets of signalling-based QoE measurements configuration in handover preparation procedure and Retrieve UE Context procedure.**

Companies are requested to provide their views on the following:

**Q2: Can we agree on Moderator Proposal 3?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | Yes |  |
| Samsung | Yes  |  |
| CMCC | Yes |  |
| CATT | Yes |  |
| ZTE | Yes,but | Would like to point that QoE information maybe different in retrieve UE context message from HO preparation procedure.In retrieve procedure, whole configuration is needed.While for HO case, the main reason to provide QoE information is to keep SRB4 and waiting for UE report. Then in this case, source RAN node may not provide whole configuration for the target.Would it be ok to rephrase as :**Moderator Proposal 3: Include multiple sets of signalling-based QoE measurements ~~configuration~~ information in handover preparation procedure and Retrieve UE Context procedure** |
| **Ericsson** | **Yes, and in NG Ho procedures** |  |

### Remaining time period for ongoing QoE configuration

Also, it was proposed in [3] to include an indication per service type, of remaining time period for the ongoing QoE configuration if a time-based criterion is defined in the QoE measurement configuration to trigger/stop QoE measurements.

These triggering conditions is proposed to be forwarded at handover from the source NG-RAN node to the target NG-RAN node or at resume during the UE Context retrieval.

[3], Proposal 2: Include in XnAP HANDOVER REQUEST, NGAP HANDOVER REQUEST, NGAP HANDOVER REQUIRED and XnAP RETRIEVE UE CONTEXT RESPONSE, an indication, per service type, of remaining time period for the ongoing QoE configuration.

Companies are requested to provide their views on the following:

**Q3: If a time based criterion is agreed to be supported in CB: # NRQoE3-RANConfig, should an indication per service type, of remaining time period for ongoing QoE configuration be forwarded at handover or at resume during the UE context retrieval?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | No | Even time based criteria is agreed, for a QoE measurement task druing HO, either it is ongoing, or it is to be ongoing (pending on starting time), so there is no need to indicate the remaining time period, since UE knows the situation.  |
| Samsung | No | Too early to discuss this. Even time based criterion is agreed, at least we should firstly discuss who (gNB or UE) is responsible for checking the criteria. And we prefer UE to do this as it knowns the whole situation. |
| CMCC |  | Maybe my understanding is incorrect, but if the time period is expired, then whether the QMC need to be deactivated? |
| CATT |  | Need further check. I am not sure if these information is needed |
| ZTE |  | Can be discuss later. |
| **Ericsson** | **Yes** | The proposal is mentioned in [3] but is essentially a proposal for our paper in CB#3 on QoE config. So, the root proposal is to include the measurement time duration in the general QoE configuration, and in the context of this CB, the QoE configuration is passed from source to target. |

## Management-based QoE

[2],

The management based MDT configuration is not propagated during handover in the current specification. The management based QoE configuration may follow the same principle. The target node checks the OAM configuration when the UE move in. The target node sends the configuration to UE if the UE is qualified.

**Proposal 3:** The management-based QoE measurements configuration is not propagated during mobility

[3],

Regarding the possibility to account for failures in sending (or receiving) a management-based QoE configuration to one (or more) RAN nodes, one method to ensure that QoE measurements can continue in the wanted area, is that, upon mobility, a source RAN node sends the QoE configuration to a target RAN node.

**Proposal 3:** Include management-based QoE configuration information for a UE:

 - XnAP HANDOVER REQUEST message.

 - NGAP HANDOVER REQUEST and HANDOVER REQUIRED messages.

- XnAP RETRIEVE UE CONTEXT RESPONSE message.

Companies are requested to provide their views on the following:

**Q4: Whether management-based QoE measurement configuration is to be propagated during mobility? Please take into account the fulfilment of SA4 requirements, failure in sending (or receiving) a management-based QoE configuration to one(or more) RAN nodes etc..**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | No | We think there is no need to explicitly transfer M-based configuration, the target should know whether the M-based is configured or not from the container, then target could decide whether to continue or not. |
| Samsung |  | We prefer to use the same mechanism as MDT, the configuration of management based QoE should not be propagated during mobility.However, some information related to management based QoE may need to be transmitted to the target node, we may need further confirmation with SA5. As in SA5 spec, some information of management based QoE is transmitted on X2[28.405]. |
| CMCC |  | Agree with SS. |
| CATT | No | For management-based QoE configuration, it may follow the same principle as trace/MDT, i.e. it is not required to be propagated during mobility.If this question is related to Area handing, we may discuss it 3.5. |
| ZTE |  | It is clear captured in the objective part of WID that “Mobility support for management based QoE measurements is pending input from SA5”We can open the discussion when receive confirm from SA5. |
| **Ericsson** | **Yes** | We have explained the motivation for the proposal in [3], namely:* SA4 requirements fulfillment in case the UE moves in and out of area scope during the application session.
* Failure in delivering the m-based configuration from OAM to target.

So, let us discuss on the basis of the above two scenarios. |

## Indication of ongoing QoE measurement type

[3], Proposal 4: Include in XnAP and NGAP Handover Preparation procedures) an IE, per service type, indicating whether signalling-based QoE or management-based QoE is configured and/or ongoing for the service type.

[3], Proposal 5: Include in the XnAP Retrieve UE Context procedure an IE, per service type, indicating whether signalling-based QoE or management-based QoE is configured and/or ongoing for the service type.

Companies are requested to provide their views on the following:

**Q5: Whether a QoE Measurement Type indicator should be included in QoE configuration and signaled to target node during Handover preparation and Retrieve UE Context Procedures?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | No | In our understanding, the target node can know which QoE measurement configuration has been configured for the UE according to the RRCReconfiguration container in the HandoverPreparationInformation. Also as commended in the Q3.1 and Q3.2, the source node only propagate the signaling based QoE to the target node in XnAP. Therefore the target node can know the type of the QoE measurements that have been configured for the UE. |
| Samsung | No | Only signaling based QMC will be propagated, no need type indication. |
| CMCC |  | Depending on the outcome of Q4. |
| CATT | No | Same view as SS |
| ZTE |  | Can be discuss later. |
| **Ericsson** | **Yes** | First, **this is not about propagating m-based configuration**, but rather about indicating to the target that s- or m-based configuration is present.We also feel that our motivation in [3] has not been studied. The scenarios we discussed are:* Scenario 1: **Management-based** QoE in target node **does not override** ongoing **signalling-based** QoE, QoE configuration for **one service type**.
* Scenario 2: **Signalling-based** QoE in target node **overrides** ongoing management-based QoE, QoE configuration for **one service type.**
* Scenario 3: Signalling-based QoE in target node overrides ongoing management-based QoE, **multiple QoE configurations.**

So, let us discuss on the basis of those scenarios. |

## Overriding QoE configurations

[3], Proposal 6: RAN3 to discuss:

 1. Whether a management-based QoE configuration can override an existing management-based QoE configuration

 2. Whether a signalling-based QoE configuration can override an existing signalling-based QoE configuration.

One way to handle the above issues is to e.g. assign a priority to a QoE configuration, which could be used to resolve possible “conflict” between QoE configurations of the same type.

Companies are requested to provide their views on the following:

**Q6: Whether any special handling to prevent overriding in above scenarios need to be considered?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei | Yes | At least S-based measurement should not be overridden by M-based management. |
| Samsung | Yes  | Same view as HW |
| CMCC | Yes | Same view as HW, SS. |
| CATT | Yes | The RAN may handle the override issue because it has the whole picture of the QoE. The specification of Trace procedure can be used  |
| ZTE |  | Actually, the override requirement need to be confirmed by SA5. |
| **Ericsson** | **Yes** | ...as explained in [3]. Please note a typo in the second bullet of the proposal. |

## Area handling for QoE

For the Area Handling at mobility there are three main options as captured in the TR, as follows:

- Option 1, where the network is responsible for keeping track of whether the UE is inside or outside the area and configures / releases configuration accordingly.

- Option 2, where the network is responsible for keeping track of whether the UE is inside or outside the area, and the UE responsible to manage start/stop of QoE accordingly.

- Option 3, where the UE is responsible for area checking (UE has the area configuration) and to manage start/stop of QoE accordingly.

Following are the proposals by different companies on this topic:

**[1], Proposal 3:** Network is responsible for QoE area scope check i.e. keeps track of whether UE is inside or outside the area allowed for QMC (option 1 or option 2)

**[1], Proposal 4:** QoE area configuration is not signalled in RRC for area scope check at UE in Rel-17. Whether area scope check needs to be done by UE for QMC in RRC\_INACTIVE and RRC\_IDLE can be discussed in future releases.

**[1], Proposal 5:** Network can configure/release QoE configuration accordingly in case UE goes outside the allowed QMC area. Network can reuse the same indicator as *QoE paused indicator* for area scope check as well.

**[2], Proposal 8:** Area Handling for QoE configuration is pending RAN2 conclusion for the three options, and then RAN3 discuss this issue accordingly.

**[4]:** When the UE moves in the network, it may move out of the range of area scope, but it does not mean that the UE will never return to the range of area scope. Therefore, in option1, it is not appropriate to terminate the QoE measurement on the UE once the UE moves to a cell outside area scope. In option2, each time a UE moves to a new cell, the network starts a check and notifies the UE of the result. Compared with option 3, the signaling load between the network and the UE is increased. Therefore, we prefer the option 3.

Companies are requested to provide their views on the following:

**Q1: Which option do you prefer (option 1, 2 or 3) or should this be left to RAN2 decision?**

|  |  |  |
| --- | --- | --- |
| Company | Which option do you prefer? (option 1, 2 or 3) or RAN2 decision | Comment |
| Huawei |  | We think RAN3 could agree some principles here, i.e. network to monitor (e.g. to release when HO target is out of the scope), and UE to monitor as well (e.g. to stop the measurement when out of the scope)  |
| Samsung | Option 1, 3 | We think option 1 and 3 are the ways that LTE QMC uses today. |
| CMCC | Option 1, 3 | Reuse LTE as the baseline could be enough. |
| CATT | RAN2 decision | These options are output of RAN2 SI |
| ZTE |  | Option 1-3 are network based solution , UE based solution or hybrid.RAN3 can provide preference and then align with RAN2. |
| **Ericsson** | **Option 1** | We prefer to go for one option. Option 1 also reduces the burden on the UE. |

## 3.6 Non-supporting target node

[2],

But if the target node does not support the QoE measurement, the target node may not decode the configuration correctly and may discard this information. If the UE move to another target node which support the QoE measurement later, the configuration should be valuable in this target node. However, the configuration is discarded by the first target node. So, if we want to continue the transferring of the configuration with the area scope in which may include non-supporting QoE measurement node, the QoE measurements activation configuration may be transferred in a container to keep it not lost.

**[2], Proposal 7:** Propagate signaling based QoE measurements activation configuration in the form of encoded container.

**[1], Proposal 1**: If target node doesn’t support source node’s QoE configuration, target node should ignore the received QoE configuration and should not set up any trace session with TCE and should not initiate any QoE measurement collection.

Above proposals intend to define target node’s behavior upon reception of a QoE configuration in a non-supporting node (e.g. a Rel-16 node which doesn’t support QoE or an inter-RAT node) and might need to be captured in procedural text or define appropriate signaling.

Companies are requested to provide their views on the following:

**Moderator Proposal 4: Upon the reception of QoE configuration on a non-supporting node, define the target node behavior as:**

* **P1: Target node should ignore the received QoE configuration and should not set up any trace session with TCE and should not initiate any QoE measurement collection.**
* **P2a: Target node should discard the received non-supporting QoE configuration**
* **P2b: Target node should store the non-supporting QoE configuration (received as an encoded container) and forward it to a subsequent node during future handovers/resume**

|  |  |  |
| --- | --- | --- |
| Company | Support for P1, P2a/P2b | Comment |
| Huawei | P1 and P2a | What the difference is between ignore and discard? Here we think anyway the target node could do nothing, including not store the received configuration which is not understood to it. |
| Samsung | P1, P2a | If the target node is a non-supporting node, the target node can not understand the IE, and same view as HW, we don’t know what’s the difference between ignore and discard. |
| CMCC | P1 | Either P2a or P2b is workable. For P2a, CN needs to guarantee to trigger new QoE configuration once the UE moves back to a supporting area, which may need further check with SA2. |
| CATT | P2b | For signaling based QoE measurements, if it is discarded during mobility, we cannot handle it in subsequent handover. So we may use container to keep it. |
| ZTE |  | The same issue may happen for other function e.g. MDT in mobility scenario. But it seems no control on the issue yet.Can be discuss later when Mobility mechanism for NR QoE become mature. |
| **Ericsson** | Look to the right | **Wrt P2b**, we propose a rewording:***P2b: The target node non-supporting QoE configuration should forward the QoE configuration to a subsequent node during future handovers/resume. Details FFS.*****Wrt P1**, we propose a rewording:***P1: Target node should not set up any trace session with TCE and should not initiate any QoE measurement collection.***We **do not support P2a.** |

**[1], Proposal 2**: If target node doesn’t support source node’s QoE configuration, target node can either explicitly release SRB4, implicitly release SRB4 by not configuring SRB4 or send a pause QoE indication to pause QoE reporting to non-supporting node**.**

The above proposal seems to define target node’s response upon reception of a QoE configuration in a non-supporting node.

Companies are requested to provide their views on the following:

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comment |
| Huawei |  | If the target doesn’t support, what the target could do? Could we assume that the target could release or pause an ongoing QoE measurement task even it doesn’t support QoE measurement? |
| Samsung |  | Our understanding of this proposal is the target node don’t support the delivery of QoE report, one possible solution could be pausing QoE reporting and resuming it if UE moves to a node support the delivery of QoE, just the same mechanism as overload handling. Thus the integrity of the QoE report is guaranteed. |
| CMCC |  | Agree with SS. |
| CATT |  | “Does not support” means out the Area or any other? We may follow the principle of the UE move to not support Area. Either release the configuration, or stop the measurementRan2 should discuss this issue  |
| ZTE |  | If target node support SRB4, would it mean target node support the QOE function?Detail can be discuss later. |
| **Ericsson** | **Let us discuss this** | Similar view as Samsung – pausing and resuming the measurements later on. |

## 3.7 Duplicate proposals from other CBs

Proposal 3: In order to support multiple QoE function, a QoE configuration list should be supported in QoE information which provide from source RAN node to target RAN node.

The QoE configuration includes :

 1: List of UE Application layer measurement configuration

 2: MCE Address

 3: MDT Trace ID

Where each UE Application layer measurement configuration IE in the list further contains:

 1: QoE Reference ID

 2: Area scope

 3: Service type

 4: Container for application layer measurement configuration

Proposal 4: QoE information IE needs to be separated from Trace Activation IE in the message in NGAP and XnAP.

Since the above proposals are listed to be discussed in CB: # NRQoE3-RANConfig and CB: # NRQoE2-Activation\_Deactivation as per VC’s guidance, it is proposed to not discuss these proposals in this CB

# Conclusion, Recommendations [if needed]

If needed

# References

|  |  |  |  |
| --- | --- | --- | --- |
| [1] | R3-211735 | QoE measurement collection and reporting continuity in mobility scenarios (Qualcomm Incorporated) | discussion |
| [2] | R3-211838 | Discussion on Measurement Collection and Continuity in Mobility (CATT) | discussion |
| [3] | R3-211988 | QoE Mobility Support (Ericsson) | discussion |
| [4] | R3-212445 | Measurement Collection and Continuity in Intra-System Intra-RAT Mobility (ZTE Corporation, China Telecom, China Unicom) | discussion |