**3GPP TSG-RAN WG3 Meeting #117-bis-eR3-225961**

**Online, October 10th – 18th 2022**

Agenda Item: 11.3

Source: Ericsson (moderator)

Title: CB # QoE2\_NRDC- Summary of email discussion

Document for: Approval

# Introduction

The deadline for providing replies to Phase 2 is **Monday, October 17th at 08:00 UTC.**

**Relevant papers:**

R3-225412 Support for QoE in NR-DC (Qualcomm Incorporated)

R3-225413 MDT-QoE alignment and QoE measurement continuity in mobility scenarios in NR-DC (Qualcomm Incorporated)

R3-225431 NR QoE Discussion on support for NR-DC (Samsung)

R3-225480 QoE measurement in NR-DC (Lenovo)

R3-225481 (TP to TS 38.420) Support of QoE measurement in NR-DC (Lenovo)

R3-225558 The Support for QoE and RVQoE Measurement and Reporting in NR-DC Scenarios (Ericsson)

R3-225590 Handling of QMC configuration for NR-DC (Nokia, Nokia Shanghai Bell)

R3-225747 Discussion on QoE in NR-DC (Xiaomi)

R3-225765 Discussion on Support for legacy QoE in NR-DC (CATT)

R3-225766 Discussion on Support for RV-QoE in NR-DC (CATT)

R3-225819 Discussion on QoE configuration and reporting in NR-DC (ZTE, China Telecom)

R3-225820 Discussion on RVQoE configuration and reporting in NR-DC (ZTE, China Telecom)

R3-225821 stage-2 TP to BL CR of 37.340 on QoE in NR-DC (ZTE, China Telecom)

R3-225837 Discussion on QoE measurement in NR-DC (China Unicom)

R3-225843 Further discussions on the support for QoE in NR-DC (Huawei)

# For the Chairman notes

# List of proposals for checking

## **Configuration of m-based QoE**

**Proposal 1: The MN (SN) should notify the SN (MN) that it wants to select a UE for m-based QMC.**

* **Moderator:** Without a notification, we cannot assume that the MN/SN knows if the other node received the configuration and would like to configure the UE with it. If nodes do not notify each other about their intention to configure a UE with m-QoE, it can happen that the UE is configured with two m-QoE measurement configurations for the same service type.
* The agreement from RAN3#117-e states:
  + *If the M-based QoE configuration is* ***received only by the SN****, whether the MN or the SN performs UE selection and sends the QoE configuration to the UE needs to be further discussed.*
    - **For the case when only the SN received the configuration**:
      * If RAN3 decides that the MN always has the final say about who sends the configuration to a UE (still under discussion), if the SN wants to select a UE, it needs to notify the MN, and MN makes the final decision. **So, SN should notify the MN.**
      * If RAN3 decides that the SN has the freedom to decide by itself that it wants to configure the UE (still under discussion), the SN needs to know whether it is the only one that has the configuration (because then it has the freedom to decide). In this case, if we preclude that the MN notifies the SN, then the SN always needs to inquire the MN to do this check. It is therefore simpler to agree that **MN should always notify the SN if it wants to select the UE or not.**
    - **For the case when MN or both MN and SN received the configuration**, if MN decides to select a UE for m-QoE measurements, it should notify the SN, so that the SN does not need to inquire the MN about it.

**Proposal 2: If both MN and SN receive an m-based QoE configuration, the MN should decide on the UE selection and on which node sends the QoE configuration to the UE.**

* **Moderator:** 
  + The following was agreed at RAN3#117-e:
    - *If the M-based QoE configuration is received by the MN, the MN should make the decision on the UE selection and on which node sends the QoE configuration to the UE.*
  + The present proposal intends to extend this to the case where both MN and SN receive the configuration.

**Discuss whether, if an m-based QoE configuration is received only by the SN (e.g., if the MN does not support QoE measurements, MN not in area scope etc.), the SN performs UE selection and sends the QoE configuration to the UE.**

## **Reporting of m-based QoE**

**Proposal 3: If the MN configured the UE with QoE measurements, and the SN is receiving the QoE reports from the UE and forwarding them directly to the MCE, the MN:**

* **Should indicate the QoE reference to the SN.**
* **May indicate the MCE IP address to the SN.**
* **Moderator:** If both MN and SN are in area scope, the SN may already know the MCE IP address, so only the QoE reference should be sent. As Nokia pointed out, only one MCE IP address per configuration may exist.

**Proposal 4: If one of the nodes configured the UE with QoE measurements, and the other node is receiving the QoE reports from the UE, the latter should indicate to the former the session start and/or session stop.**

* **Moderator:** For example, if the MN configures the UE with measurements, but the SN is receiving the QoE reports (from the beginning of the session or after leg switching). Given that the configured the UE, the MN should be notified about session start and stop.

## **Configuration of RVQoE**

**Proposal 5a: The MN can generate an RVQoE configuration for a UE.**

**Proposal 5b: The SN can generate an RVQoE configuration for a UE.**

* **Moderator:** 
  + Please note that **generating the RVQoE configuration is different from sending** the configuration to the UE.
  + This proposal is related to the following existing WA from RAN3#117-e: *MN and SN can generate RVQoE configurations.*
  + Here are some relevant scenarios for P5b (we assume that no one questions P6a):
    - Scenario 1: If only the SN is “interested” in RVQoE measurements from the UE (and the MN is not), **the SN should be able to generate** the RVQoE configuration.
    - Scenario 2: If MN not in scope or if MN does not support QoE, then SN should be able to generate an RVQoE configuration.

**Proposal 6a: The MN can send an RVQoE configuration to the UE.**

**Proposal 6b: The SN can send an RVQoE configuration to the UE.**

* **Moderator:** 
  + Note the existing RAN3#117-e agreement: *MN and SN should coordinate about configuring a dual-connected UE with RVQoE measurements. The details of the coordination are FFS.*
  + So, P6b acknowledges that one possible outcome of the coordination is that the SN sends the configuration to the UE.
  + In addition, Scenarios 1 and 2 are also valid here:
    - Scenario 1: If only the SN is “interested” in RVQoE measurements from the UE (and the MN is not), the SN should be able to generate the RVQoE configuration and send it to the UE.
    - Scenario 2: If MN not in scope or if MN does not support QoE, then SN should be able to generate an RVQoE configuration and send it to the UE.

**Proposal 7: Discuss how to ensure that the RVQoE configuration used for an RVQoE measurement is generated by the node that carries the data for the corresponding application session.**

* **Moderator:** The node carrying the session should decide what should be measured and it should receive the reports.

**Proposal 8: The node that received the QoE configuration from the AMF/OAM sends to the other node the list of available RVQoE metrics.**

**Whether RVQoE configuration content can be negotiated between the MN and the SN.**

## **Reporting of RVQoE**

**Proposal 9a: The MN can receive RVQoE reports directly from the UE.**

**Proposal 9b: The SN can receive RVQoE reports directly from the UE.**

* **Moderator:** 
  + The former corresponding proposal is split into two (MN and SN part) because some companies wondered if the unified proposal means that both nodes receive the reports directly at the same time. This can be discussed later.
  + P9b means that a scenario where the SN receives RVQoE reports directly from a UE is allowed. It follows from the following existing RAN3#117-e agreement:
    - *QoE reports can be transmitted to either MN or SN and the reporting leg (MCG or SCG) can be changed during the application session*.

**Proposal 10: Turn the following WA into an agreement: “UE can send RVQoE report to the MN, the MN then forward the RVQoE report to the SN if needed, and vice versa”.**

* **Moderator:** All companies supported this proposal in Round 1.

**Proposal 11: Discuss how the MN and SN can learn which of them carries the data for an application session subject to RVQoE measurements.**

* **Moderator:** The network needs to know which node carries the application session so that the RVQoE reports are delivered to this node.

## **MN-SN coordination procedure**

Please note that:

* Even though this is a **coordination procedure**, it does not necessarily mean that two nodes negotiate. In some cases, one node can instruct the other node. So, please take the term “coordination” loosely.
* We can discuss later whether one procedure is sufficient, or we may need to define more than one procedure.

**Proposal 12: The coordination between the MN and the SN should support at least the following:**

* **Initiation by either the MN or the SN for m-QoE, by the MN for s-QoE.**
  + **Moderator:** 
    - This is about which node can initiate coordination, in general. It does not mean that either node can initiate for any given reason.
    - For example, for m-QoE, since SN does not know whether the MN received the configuration and intends to configure the UE, it needs to check with the MN.
* **Coordination for deciding which node should configure the UE.**
  + **Moderator:**
    - Even if RAN3 agrees that the MN always configures the UE (still under discussion), if the configuration is received only by the SN, this type of coordination is needed, since the SN would in that case need to inquire the MN.
* **Coordination for establishing the SRB for receiving QoE/RVQoE reports.**
  + **Moderator:**
    - RAN2 will decide the details, but it is certain that coordination over XnAP will be needed.
* **Switching the QoE/RVQoE reporting leg.**
  + **Moderator:**
    - Even if only MN decides about leg switching (still under discussion), the SN needs to be notified that the leg is switched.

# Status after Round 1

**With respect to configuring the UE with RVQoE measurements, discuss how to address the fact that it is unknown in advance which of the two nodes carries the application session.**

**Discuss how the MN/SN can learn which of them carries the data for an application session subject to RVQoE measurements.**

**If SN selects the UE for m-based QMC, it shall notify MN. If MN selects the UE for m-based QMC, it shall notify SN. The content to be transferred is FFS.**

**In DC, the UE switches the reporting leg based on indication from network, FFS on implicit or explicit way.**

**RAN3 should discuss which node can command the UE to switch the reporting leg.**

**Turn into an agreement the WA stating that, if QoE reports are received by the SN, the SN can forward the QoE reports to MCE directly.**

**It is deployment configuration that when QoE is enabled, the MN and SN shall send the QoE report to the same MCE for a specific QoE session.**

# Round 1

At this meeting we will discuss the baseline solution for QoE and RVQoE measurement and reporting in NR-DC. The proposals related to mobility support and alignment with radio related measurements should not be treated before the basic solution is agreed.

## QoE configuration and reporting in NR-DC

### MN-SN coordination procedure

**Q1-1: Which of the following should be supported by the MN-SN coordination procedure:**

1. **Initiation by either the MN or the SN.**
2. **Coordination for deciding which node should configure the UE.**
3. **Coordination of *measConfigApplayerId.***
4. **Indication of the UEs that were configured with QoE/RVQoE measurements.**
5. **Indication of QoE reference and MCE IP address for forwarding the QoE reports directly to MCE.**
6. **Coordination for establishing the SRB for receiving QoE/RVQoE reports.**
7. **Switching the QoE/RVQoE reporting leg.**
8. **Indication of session start/stop.**

Please write your company name in the appropriate column. A separate table for leaving detailed comments is provided below as well.

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| --- | --- | --- |
| **Functionality** | **Companies in favour** | **Companies against** |
| **a)** | Ericsson  CATT  QC (on SN initiated)  Lenovo  Huawei  China Unicom | Xiaomi, question is not clear  QC (on MN initiated)  Nokia (question not clear)  Samsung (question unclear) |
| **b)** | Ericsson  CATT  Huawei (see comments)  Samsung: MN makes the final decision | Xiaomi, MN is responsible for configuring UE.  QC  Lenovo: MN can make the final decision  ZTE: this bullet is not clear. Does it mean to let MN notify to SN about the decision? Or it is for the case that SN receives m-based configuration? Maybe we should discuss case by case.  Nokia: agree with Xiaomi, MN is responsible for configuring UE.  China Unicom, agree the MN should configure the UE, even if the QoE configuration is only received by SN, it need to be coordinated with MN, and it is better for MN to send the QoE configuration. |
| **c)** | Ericsson  CATT  Lenovo | Xiaomi, MN is responsible for assigning the measConfigApplayerId  QC  Huawei (see comments)  Nokia: MN is responsible for assigning the measConfigApplayerId  China Unicom, agree the MN should assign the measConfigApplayerId.  Samsung: after deciding the node for config, that node can generate measConfigApplayerId itself |
| **d)** | Ericsson  Xiaomi, partially yes, only MN indicate what’s configured in UE  CATT  China Unicom | QC  Lenovo: SN can send QoE measurement request info to MN. MN responds SN whether QoE measurement is allowed.  Huawei (see comments)  Samsung: agree with HW’s comments |
| **e)** | Ericsson, but excluding the MCE IP if both nodes are in area scope.  Xiaomi  CATT  QC  ZTE  Huawei (see comments)  Nokia  China Unicom  Samsung | Lenovo: There may be potential issue that the MN and the SN are in different IP domain towards OAM e.g., MN and SN are not connecting same OAM system. We think that the benefit and feasibility that SN forwards the QoE reports to MCE directly needs to be further clarified. |
| **f)** | Ericsson  Xiaomi  QC  Lenovo  Nokia  China Unicom | Huawei. This should be decided by RAN2 when which entity to configure is decided, no?  Samsung: to be discussed in RAN2 first |
| **g)** | Ericsson  Xiaomi, MN is responsible for configuring and switching the QoE/RVQoE reporting leg.  CATT  Lenovo  ZTE  Nokia  China Unicom | QC  Huawei. See comments  Samsung: Open to further discuss. No need for decision for now. |
| **h)** | Ericsson  Xiaomi: suggest reword to “coordination for the indication of session start/stop”  CATT  QC  ZTE  Nokia  China Unicom | Lenovo: it depends on the solutions for MDT alignment.  Huawei, UE should just send the indication to the entity from which the configuration was received, not sure why coordination is needed.  Samsung: Open to further discuss. No need for decision for now. |

If you have any detailed comments, please provide them below.

|  |  |
| --- | --- |
| **Company** | **Comment regarding any of a)- h)** |
| **Ericsson** | Regarding e), if both MN and SN are in the scope, they both have the MCE IP for m-QoE, so there is no need to indicate it via XnAP. If one of them is in the area scope, then indicating the MCE IP should be considered, e.g., for the sake of reporting in overload. |
| Xiaomi | a) is not clear for us, which kind of initiation does this mean?  b) we support MN is responsible for configuring UE, which has less complexity, no need to coordinate.  c) we support MN is responsible for assigning the measConfigApplayerId if MN decides to configure UE, no need to coordinate  d) if MN is responsible for the configuration, MN can indicate the configuration result to SN.  h) we support “coordination for the indication of session start/stop”, as in our understanding the session start/stop can also be sent directly to MN or SN |
| CATT | For some information, the coordination not always needed. The detail should be analysed case by case. |
| Qualcomm | Similar view as Xiaomi on b) and c)  Unclear what d) means.  Need clarification on g) – detailed comments in relevant question below.  Also **not clear on E///’s comment on e)** – why does SN know the MCE IP address if MN and SN are both in area scope? (Do you mean to say if the same m-based QoE is received on both MN and SN?) |
| Lenovo | The details procedure needs to be discussed case by case e.g. for S-based, M-based MN initiated, M based SN initiated, the procedures may be different. |
| ZTE | Actually, as we mentioned in our discussion paper, there might be **more than one** procedures needed between MN and SN for the purpose of coordination. Not sure whether this question is trying to list the capabilities of all potential procedures or just for a single one? This is a question which should be clarified before we further talk about the details of the procedure(s).  Agree with QC that the specific information exchanged during coordination should be discussed case by case. |
| Huawei | In general, we think the simplest way should be MN to make the final decision which entity to configure, the configuration message itself should be complied locally by that entity.  For *measConfigApplayerId*, if finally we agree that there is only on node could generate the configuration, not sure why there is a need to negotiate this ID, we are open to discuss.  For MCE IP address, the safe way is anyway to exchange the received the MCE IP address, in case the node receiving the report is not the node configured the measurement.  For RAN visible QoE measurement, the simpler way is to always let the node which configured the QoE measurement configure visible measurement.  For leg switching of QoE report, maybe just the node configured the measurement to decide whether to switch or, always let MN to decide and indicate to UE? We are open to discuss.  For leg switching of RAN visible QoE report, we think it is not necessary to switch the leg. In R17, the RAN visible QoE is not paused even if the UE receives the pause command. Therefore we think R18 can use the same principle. |
| Nokia | The agreement from last meeting was: *For M-based QoE configuration in NR-DC, coordination between MN and SN is needed.*  It is sufficient that OAM takes into account potential DC when configuring QMC. The area scope handling for DC needs to be solved anyway by the specification (how to handle PCell not in area scope, while PSCell in area scope…). (And a clear rule for CA is needed, too).  Concerning the possibility of different OAM between MN and SN, there is a single MCE IP address defined per QMC session so same MCE is expected. |
| Samsung | We share view with Lenovo. And we are also open to discuss reporting leg switch related issues. |

**To be discussed in Round 2.**

### UE selection and configuration for m-QoE

**Q2-1: If an m-based QoE configuration is received only by the SN, does the SN perform UE selection and sends the QoE configuration to the UE?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | The MN cannot select the UEs and configure them, since it is out of area scope. SN should be able to do that – there is no reason to preclude QoE measurements in this case. |
| Xiaomi | No | We don’t think this is related to area scope. If the SN finds that the UE is in the area scope, SN can send the QoE configuration to MN, MN can decide whether to select UE based on the UE capability and the already configured QoEs, e.g. s-based QoE or m-based QoE in MN. In this way, there will be no duplicated configuration issue. |
| CATT | Yes | The case should be supported. The MN may be not in area scope and not receive the QMC; also the MN may be under another OAM. |
| Qualcomm | Yes on the UE selection  Clarification needed for the configuration part | Yes, SN can perform UE selection if m-based QoE is received on SN (SN is also aware of UE's QMC capability)  Regarding the 2nd part, can it be clarified how SN sends the m-based QoE configuration to the UE?   * Option 1: SN sends m-based QoE configuration to MN over XnAP and MN sends QoE configuration over SRB1 * Option 2: SN sends SN generated RVQoE configuration as a container to MN and MN sends the container over SRB1 * Option 3: SN sends m-based QoE configuration to UE directly over SRB3   We think Option 1 is sufficient and SRB3 need not be considered for configuring m-based QoE. Even if MN is not in area scope, Option 1 can still be used in our view as  “UE is still in area scope under SN” and MN simply configures the UE with the m-based QoE configuration (area scope check already happened at SN during UE selection). |
| Lenovo |  | We are questionable about the scenario. Do you mean MN and SN are connecting different OAM system? If so, how e) Indication of QoE reference and MCE IP address for forwarding the QoE reports directly to MCE in Q1-1 works. |
| ZTE | No | In our mind, it is better to let MN perform UE selection and configure QMC to UE, because MN would anyway be able to do it in other cases. If we simply let SN to perform UE selection and sends the configuration to UE, further enhancement is needed on SCG SRB, which we think is not necessary.  With the coordination procedure (discussed in section 3.1.1), we believe it would be feasible that SN can send the QMC configuration to MN and let MN do the further work. |
| Huawei | See comments | Firstly, after MN and SN exchanged information, both MN and SN learn that m-based QoE configuration is received only by the SN, then it is SN to select UEs and configure. |
| Nokia | No | No need for the network to handle such configuration scenario, OAM solution is sufficient. |
| China Unicom | No | Even if the QoE configuration is only received by SN, it need to coordinate with MN first, otherwise it is not sure whether MN also received the same QoE configuration. Since MN will get the QoE configuration received by SN, it is better for MN to send the QoE configuration to UE, the configuration procedure will be simple and unified for all the cases (received by MN, by SN, by MN and SN). |
| Samsung |  | It could be regarded as SN-initiated qoe configuration case, and we need to firstly make sure that MN makes the final decision on which node to configure. If MN decides such m-based QoE configuration is done by SN, then SN can send QoE config to UE. |
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**Discuss whether, if an m-based QoE configuration is received only by the SN (e.g., if the MN does not support QoE measurements), the SN performs UE selection and sends the QoE configuration to the UE.**

**Q2-2: If only MN or only SN receives an m-based QoE configuration, should this node notify the other node about it?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | Even if the other node is not in area scope, it may be needed to use this other node for QoE reporting, for example during overload. |
| Xiaomi | Partially yes | In our understanding, MN should be in charge of all the QoE configurations for the UE, SN should notify the QoE configuration to MN if the UE is in the scope.  Thus, we think only SN needs to notify MN the m-based QoE configuration in SN. And the RVQoE measurement interests can be discussed separately. |
| CATT | Yes | The node should notify another node. Firstly it is used to confirm whether it is only received by one node. And exchange the configuration to avoid confliction later. |
| Qualcomm | Partially yes (FFS whether implicit or explicit notification) | Similar view as Xiaomi.  If only SN receives an m-based QoE configuration, SN can notify MN about the m-based QoE configuration (FFS whether it can be an implicit notification by sending the entire m-based QoE configuration over Xn or an explicit notification is needed)  If only MN receives an m-based QoE configuration, we are not sure why MN needs to notify SN about the m-based QoE configuration? |
| Lenovo | No | We need to discuss the feasibility of UE based solution as well:  Solution 1: UE based solution  When receiving M-based QoE measurement, the MN or SN may select a UE for the QoE measurement and send QoE measurement configuration to the UE. The UE application layer identifies the QoE measurement as duplicated configuration. The UE application layer ignores or rejects the duplicated QoE measurement configuration and feedbacks to UE RRC layer that the QoE measurement is duplicated and ignored. Then the UE RRC layer responds to the MN or SN that the QoE measurement is ignored or rejected due to duplicated configuration.  Solution 2: Network based solution  One of network-based solution is when receiving M-based QoE activation from OAM and selecting a UE served by SN, SN sends QoE measurement request info to MN. The QoE measurement request info includes the QoE reference, area scope and service type. MN responds SN whether QoE measurement is allowed. MN may further indicate whether the same QoE measurement is already configured to the UE by MN or not.  Even for network based solution, there are many variants. |
| ZTE | Yes | The point is that MN and SN may not be aware that it is the ‘only’ node which receives the m-based QoE configuration, so at least a notification should be sent to the other message to check whether the other node receives the same configuration. Specifically, as discussed in our paper:  Opt 1: **MN-initiated coordination** - if MN receives the QMC configuration, it can trigger a MN-initiated class-1 procedure to check with SN whether it receives the same config;  Opt 2: **SN-initiated coordination** - if SN receives the QMC configuration, SN can trigger an SN-initiated class-1 procedure to check whether MN receives the same configuration.  But bi-directional checking is not needed actually (especially if both MN and SN received the same configuration), which would bring unnecessary signaling overhead, i.e., a one-way checking is sufficient(MN-> SN, or SN-> MN).  If MN initiated coordination is confirmed, in the case that SN is the only node which receives the m-based config, after some period of time, it does not receive any notification from MN, then it can be assumed that only SN receives the m-based configuration.  Either MN initiated or SN initiated procedure is fine to us. Of course the details can be further discussed. |
| Huawei | Yes | Similar view as E///. |
| Nokia | partly yes | the MN needs to inform the SN about m-based configuration in order to enable reporting over the SCG leg, as mentioned by E/// |
| China Unicom | Partially Yes | If SN receives the m-based QoE configuration, it should send the configuration to MN;  If MN receives the m-based QoE configuration, we think only part of the QoE configuration need to send to SN, maybe QoE configuration container is not needed; |
| Samsung | Yes | Share view with E. |
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**Proposal 1: If only MN or only SN receives an m-based QoE configuration, this node should notify the other node about it.**

**Q2-3: If both MN and SN receive an m-based QoE configuration, can the SN select the UEs, and configure them with measurements?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes** | This should be coordinated between the MN and SN, and the decision is up to the MN. |
| Xiaomi | No | As we commented above, only one entity should be responsible for UE selection, to avoid configuration duplication, and we think MN should take this responsibility. |
| CATT | Yes | Based on which node initialled the coordination. If the SN firstly sends the QoE configuration for selected UE to MN, then the MN should follow the UE selection by SN. Also the MN may reject the selection. |
| Qualcomm | Need clarification | Can the scenario “both MN and SN receive an m-based QoE config” be clarified? Which of the following cases are we discussing?  **Case 1:** MN first receives m-based QoE with QoE Reference 1 and then SN receives m-based QoE with the same QoE Reference 1  **Case 2:** SN first receives m-based QoE with QoE Reference 1 and then MN receives m-based QoE with the same QoE Reference 1  **Case 3:** Both MN and SN receives m-based with QoE Reference 1 simultaneously  Irrespective of any of the above cases,   * **MN-SN coordination is needed to ensure a m-based QoE is configured only once at the UE and final decision can be up to MN** * **The node receiving the m-based QoE performs the UE selection**   Similar clarification needed on “configure them with measurements” as in Q2-1 (as in which option is this being referred to) |
| Lenovo | See comments | The final decision should be decided by MN. For example, SN can send QoE measurement request info to MN. MN responds SN whether QoE measurement is allowed. |
| ZTE | No | Anyway coordination is needed between MN and SN to check whether both MN and SN has received the same QoE configuration. If it is the case, MN is already aware of the configuration and can select UEs and send the configuration to UE. |
| Huawei | See comments | This question misleads a bit, we think anyway MN and SN should coordinate, then MN to decide which node to configure. |
| Nokia | No | also agree with QC that the scenario is not clear |
| China Unicom | No | SN select the UEs first, and send the coordination information to MN, MN make the final decision for the UE selection and MN send the configuration to UE. |
| Samsung | No | Fine with proposals by QC. The node receiving the m-based QoE performs the UE selection. |
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**Whether, if both MN and SN receive an m-based QoE configuration, based on the outcome of MN-SN coordination, the SN can select the UEs, and configure them with measurements.**

### QoE measurement reporting

**Q3-1: With respect to switching of the reporting leg, do you agree that:**

1. **For RLF, the UE switches the reporting leg based on configuration received from the network?**
2. **For other leg-switching scenarios, the network sends the command to the UE via RRC to switch the reporting leg?**
3. **RAN3 should discuss which node can command the UE to switch the reporting leg?**

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| --- | --- | --- |
| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Agree to all** |  |
| Xiaomi | Yes to all with rewording comment | For b), we think it is also possible to use lower layer signalling to switch the leg, which should be discussed in RAN2. And we suggest to reword it like this “**For other leg-switching scenarios, the network sends the command to the UE ~~via RRC~~ to switch the reporting leg, FFS on via RRC or lower layer signalling**”  For c), we think MN should be responsible for sending the command to UE |
| CATT | Agree to all | For c), when the SN is overload, it also can send command to UE for the leg switching. |
| Qualcomm | a, b -No (Implicit indication via the SRB setup for QoE reporting is sufficient) | Suppose RAN2 defines SRB5 (SN terminated SCG bearer) for QoE reporting over SN.  Is there a need to setup SRB4 and SRB5 at the same time?   * If yes, an explicit indication from network is needed to indicate the reporting leg * If no, the bearer which is setup can be an implicit indicator on the reporting leg (UE sends over SRB4 if SRB4 is setup and over SRB5 is SRB5 is setup)   **We don’t see the need to setup SRB4 and SRB5 at the same time.**   * If there is no MN overload, SRB4 can be setup * If there is MN overload and no SN overload, SRB5 can be setup   Also, the difference between a) and b) is not clear |
| Lenovo | b) and c) | 1. RLF needs to be clarified. SCG failure or MCG failure. If MCG failure, RRC reestablishment will be performed. If SCG failure, UE will report SCG failure to MN. MN can decide to switch the reporting leg based on its implementation. |
| ZTE | 1. - needs clarification 2. -Yes 3. - Yes | 1. Not sure what the “configuration” stands for. Maybe more clarification is needed. |
| Huawei | Yes with comments | For a), for the RLF of SCG or MCG, we think the UE will wait the configuration from the network. |
| Nokia | see comments | For a), we believe that loss of the MCG leg requires reestablishment? Loss of SCG leg would automatically lead to report over the MCG leg if SRB4 is configured?  Not clear whether further RAN3 discussion is beneficial while RAN2 is working on RAN3's agreement sent by LS (R3-225256): QoE reports can be transmitted to either MN or SN and the reporting leg (MCG or SCG) can be changed during the application session. |
| China Unicom | Yes to all |  |
| Samsung | A,c -ok | B might be discussed and decided by RAN2. |
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**Proposal 2: For RLF, the UE switches the reporting leg based on configuration received from the network.**

**Proposal 3: WA: For leg-switching scenarios other than the RLF, the network sends the command to the UE via RRC to switch the reporting leg.**

**Proposal 4: RAN3 should discuss which node can command the UE to switch the reporting leg.**

**Q3-2: With SN forwarding the QoE reports directly to the MCE, do you agree that:**

1. **The following WA is turned into an agreement: “*WA: If QoE reports are received by the SN, SN can forward the QoE reports to MCE directly.*”?**
2. **The MN should indicate to the SN the QoE reference and the MCE IP address?**
3. **The SN should at least indicate to the MN the session start and stop?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **a), c): yes**  **b): see comment** | b) If both MN and SN are in area scope for m-based QoE, the SN already knows the MCE IP, so no need to indicate the MCE IP in that case.  c) The MN must be aware of when the session that it configured for the UE starts/stops, even if the reporting occurs via the SN. |
| Xiaomi | a) yes  b) and c): rewording | b) agree with E///’s observation, suggest rewording “**The MN may ~~should~~ indicate to the SN the QoE reference and the MCE IP address**”, which means this IE is optional.  c) if both MN and SN can receive the session start and stop indication, there’s no need for additional indication transfer, suggest rewording “**The SN may ~~should at least~~ indicate to the MN the session start and stop**” |
| CATT | Yes to all | For b), in my understanding, the case should be that the MN configures the QMC to UE and then the report received from SN, then SN can send the report to MCE. If the UE QMC is configured by SN, the MCE IP and QoE reference is not transferred.  For c) agree with SS changing. If not MCT aligned configured, the indication is not needed |
| Qualcomm | a), b): Yes  c): Yes (but this is a different topic) | b) – **Not clear on E///’s comment** – why does SN know the MCE IP address if MN and SN are both in area scope? (do you mean to say if the same m-based QoE is received on both MN and SN?)  c) – This is needed in order to align MDT measurements in MN with QoE start/stop or in case there is a HO (so that the QoE Measurement Status can be sent eventually to target MN). We think this is related to MDT-QoE alignment and mobility scenarios in NR-DC and nothing to do with SN forwarding the QoE reports directly to MCE, but we support this. |
| Lenovo | No for all | a)&b) The solution is not workable if MN and SN are connecting different with OAM.  c) depends on solutions for MDT alignment. |
| ZTE | 1. Yes 2. c) see comments | If SN is the node which receives m-based QoE configuration from OAM, then b) is not needed. If not, MN should at least indicate the QoE Reference and MCE IP address during coordination, which was also part of section 3.1.1.   1. seems necessary, but as mentioned, it depends on the discussion on MDT alignment. Anyway, no harm to have this at current stage. |
| Huawei | Yes to a),  See comments to b) and c) | For b), if it is SN which configured the measurement, then not sure if there is a need for MN to indicate to SN the QoE reference and MCE IP address?  For c), similarly, if MN configured the measurement and report goes to SN, not sure how SN would indicate to MN the session start/stop? Also we think firstly RAN3 need to discuss whether the leg of session start and stop need to be switched in NR-DC. In R17, the session start/stop is not paused. We think we can reuse the same principle. It is not necessary to change the path of session start/stop report. |
| China Unicom | 1. Yes 2. Rewording 3. Agree with Xiaomi’s rewording. | b)If MN finally send QoE configuration to UE, the MN should indicate to the SN the QoE reference and the MCE IP address. |
| Samsung |  | We share view with ZTE. |
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**Proposal 5: Turn into an agreement the WA stating that, if QoE reports are received by the SN, the SN can forward the QoE reports to MCE directly.**

**Proposal 6: For the SN to forward the QoE reports directly to the MCE, the MN can indicate to the SN the QoE reference and/or the MCE IP address (the latter in case the SN is not in area scope).**

**Proposal 7: For the case when the MN configured the UE with QoE measurements, and the SN forwards the QoE reports directly to the MCE, the SN should indicate to the MN the session start and stop.**

## RVQoE configuration and reporting in NR-DC

### Generating the RVQoE configuration

**Q4-1: With respect to generating the RVQoE configuration, do you agree that:**

1. **The following WA is turned into an agreement: “*WA: MN and SN can generate RVQoE configurations”?***
2. **The node that received the QoE configuration from the AMF/OAM sends to the other node the list of available RVQoE metrics?**
3. **If both the MN and SN are “interested” in RVQoE measurements from the UE, the MN and SN can indicate the interest to each other, negotiate the RVQoE configuration parameters, after which a common RVQoE configuration is sent to the UE?**
4. **If only the SN is “interested” in RVQoE measurements from the UE (and the MN is not), the SN generates the RVQoE configuration and configures the UE with it?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Agree to all** |  |
| Xiaomi | a) is in contradictory with c)  b) Yes  c) Yes | For a), if c) is agreed, it means a common configuration is sent to UE, and in our understanding, only one node can generate the common configuration, and it should be MN. |
| CATT | Agree to a,b,d.  For C, need more study | For C), we should have more studying. if the common configuration is used, how the report is handling. If both two nodes interest the RVQOE, it is better to have separated configuration. Otherwise the report should be transferred between two nodes. |
| Qualcomm | a) – Pending clarification for d)  b) - OK  c) – Need clarification  d) – Need clarification | c) - Who sends the common RVQoE configuration to the UE? In our view, it should be MN. Also, what kind of negotiation is done regarding the RVQoE configuration parameters (who has the final say e.g., if both MN and SN are interested in a certain RVQoE metric but with different periodicities?). Also, we think SN indicating interest to MN is sufficient and the other direction is not needed.  d) – When we say “*SN generates the RVQoE configuration and configures the UE with it*”, which of the options is referred?   * Option 1: SN sends SN generated RVQoE configuration to MN over XnAP and MN sends QoE configuration over SRB1 * Option 2: SN sends SN generated RVQoE configuration as a container to MN and MN sends the container over SRB1 * Option 3: SN sends SN generated RVQoE configuration over SRB3   We think Option 1 is sufficient and achieves coordination as well. |
| Lenovo | Yes -> a) b) d) | c) common RVQoE configuration needs to be clarified. |
| ZTE | 1. and c) can be merged 2. Yes   d)- See comments | 1. c): our view is both MN and SN can generate RVQoE configuration parameters based on its own “interest”, but it should be MN to send a common RRC message to UE for RVQoE configuration. So, a) and c) can be merged into the following one:   **Both MN and SN can generate RVQoE configuration parameters, but it is MN to make the final decision and send a common RRC message to UE for RVQoE configuration. XnAP coordination is needed for SN to transfer its RVQoE configuration parameters to MN.**  d)- as we commented, SN should send its parameters to MN and let MN make the final decision. Regarding the three options provided by Qualcomm, option 1 is also our preference. |
| Huawei | See comments | Our views:   * Only the node which sends the QoE measurement configuration to the UE can configure the RAN visible QoE measurement corresponding to this QoE measurement, UE only needs to send the RAN visible QoE results to this node. * If one node receives the RAN visible QoE report from the UE and the services corresponding to this QoE measurement is also served by the peer node, it can send the received RAN visible QoE report to the peer node.   For a), we think it is not clear. We think Only the node which sends the QoE measurement configuration to the UE can send the RAN visible QoE measurement corresponding to this QoE measurement to UE. But the negotiation is supported.  For b), we think we need add one condition. “The node that received the QoE configuration from the AMF/OAM sends to the other node the list of available RVQoE metrics Only if the services corresponding to this QoE measurement is served by the other node”. In our understanding, before receiving the start indication including the QoS flow information, the node that received the QoE configuration from AMF/OAM does not know whether the services is served by the other node and also the other node does not know whether it is interested in the RAN visible QoE of these services. Therefore we think the node that received the QoE configuration sends to the other node the list of available RVQoE metrics only after receiving the QoE start indication including the QoS flow information.  For c), similarly, we think the negotiation happens after the QoE start and then the network can reconfigure the RAN visible QoE configuration if needed; but, not sure if we should discuss this scenario.  For d), does this mean that visible measurement configuration and QoE measurement could be configured by different node? As the above comments, we think Only the node which sends the QoE measurement configuration to the UE can configure the RAN visible QoE measurement corresponding to this QoE measurement. |
| Nokia | see comments | a) only the MN sends QMC configuration to the UE, so also only MN generates the final RVQoE. But we're fine that the SN sends its RVQoE requests to the MN, which generates a superset of MN + SN requests.  b) ok, but only the MN receives QMC configuration  c) ok if the negotiation means creation of a superset of the requested metrics  d) better (simpler) to require that both MN and SN support QMC, and MN can then send the configuration to the UE |
| China Unicom | 1. b) d)Yes   c)No | c) We are not clear how to negotiate about the RVQoE configuration considering:  - MN and SN may have different interests of QoE metrics;  - MN and SN may have different preference about the RVQoE reporting periodicity;  - MN and SN may need to configure the RVQoE in different time.  It is difficult for MN and SN to negotiate about the RVQoE configuration, and we think two separate RVQoE configurations for MN and SN are better. |
| Samsung | A,b,d | C could be regarded as optimization but we are open to discuss. |
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**Proposal 8: (reformulated WA for agreement) Depending on the scenario, the MN and the SN can generate RVQoE configurations.**

**Proposal 9: The node that received the QoE configuration from the AMF/OAM sends to the other node the list of available RVQoE metrics.**

**Proposal 10: With respect to configuring the UE with RVQoE measurements, discuss how to address the fact that it is unknown in advance which of the two nodes carries the application session.**

**Proposal 11: RVQoE configuration content can be negotiated between the MN and the SN.**

**Proposal 12: If only the SN is “interested” in RVQoE measurements from the UE (and the MN is not), the SN generates the RVQoE configuration**

### RVQoE reporting

**Q4-2: With respect to RVQoE measurement reporting, do you agree that:**

1. **The following WA is turned into an agreement: “*WA: UE can send RVQoE report to MN, MN then forward the RVQoE report to SN if needed, and vice versa.”?***
2. **Both MN and SN can receive RVQoE reports directly from the UE (not necessarily at the same time)?**
3. **If the node carrying data for a service is different from the node receiving the corresponding RVQoE reports from the UE, the reporting leg for RVQoE can be changed so that the node carrying the session receives the RVQoE reports directly from the UE?**

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| **Company** | **Answer** | **Comment** |
| **Ericsson** | **Yes to all** |  |
| Xiaomi | a), b): Yes  c)No | For c), gNB is not aware of the service session. |
| CATT | Yes to a, c.  Comments to b) | For b), the “(not necessarily at the same time)” should be removed. We should not preclude the two nodes can receive the RVQOE report at same time |
| Qualcomm | a – OK  b – Need clarification  c - No | Need clarification on b):  Both MN and SN can receive RVQoE reports **directly** from the UE at the **same time** 🡪 This needs SRB4 and SRB5 to be setup at the same time; whether this is to be supported is not yet clear as mentioned in Q3-1.  Both MN and SN can receive RVQoE reports **directly** from the UE at **different times** 🡪 Does this also need SRB4 and SRB5 to be setup at the same time and we can dynamically switch between SRB4 and SRB5 without needing to setup/release?  c – If a) is agreed, why do we need c) (to save backhaul load?). Also switching reporting leg is mainly for overload scenario and not for this case |
| Lenovo | Yes for all |  |
| ZTE | 1. b) - Yes   c)- see comments | a) and b) can cover all the cases we cared about, e.g. SN received the RVQoE report direct from UE but it is the interest of MN, etc. With a) and b) supported, MN and SN can both be able to receive RVQoE reports (no matter whether the report is needed by MN/SN), and XnAP can allow them to share with each other the reports received. Seems fair enough.  C) this is related to another question:  **How to decide the reporting leg for RVQoE? Or should the reporting leg indication for legacy QoE also applies to RVQoE?**  Note that the overload indication defined in R17 would not affect RVQoE reporting. But we are not sure in NR-DC, whether the reporting RVQoE would be affected by any specific situation, including the case mentioned in c). |
| Huawei | Yes to a) | For b), does that mean QoE report and visible report could be separated? Maybe this makes things complicated;  For c), the simpler way is just to forward to the other node, then it is up to this node whether to use it or not. |
| Nokia | a), b): Yes  c): No | ok for b) under the assumption that QoE report and visible report are not separated |
| China Unicom | 1. b): Yes   c)No | c) Agree with Xiaomi, gNB is not aware of the service session. |
| Samsung | A,b | C can be up to implementation if we support leg switching, and no need to mandate such behaviour. |

**Proposal 13: Turn the following WA into an agreement: “UE can send RVQoE report to the MN, the MN then forward the RVQoE report to the SN if needed, and vice versa”.**

**Proposal 14: Both the MN and the SN can receive RVQoE reports directly from the UE.**

**If the node carrying data for a service is different from the node receiving the corresponding RVQoE reports from the UE, whether the reporting leg for RVQoE can be changed so that the node carrying the session receives the RVQoE reports directly from the UE.**

### Determining which node delivers the application session to the UE

**Q4-3: Should RAN3 discuss how the MN/SN can learn which of them carries the data for an application session subject to RVQoE measurements? If not, why?**

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| **Company** | **Answer** | **Motivation** |
| **Ericsson** | **Yes** | This is needed because **the node that carries the application session must be able to receive the corresponding RVQoE reports.** |
| Xiaomi | No | gNB is not aware of the application session. |
| CATT |  | Agree with Xiaomi, we cannot get this information. The application session is bound to QoS flow and the information cannot be aware by network |
| Qualcomm | Need clarification | Two potential solutions are proposed in R3-225558   * Option 1: Network can learn with the help of the UE. Since the UE knows whether the MN or the SN delivers the application session, the **UE may indicate this to the network via SRB4**. * Option 2: The node receiving the RVQoE reports can learn from the **identifiers therein** whether it also carries the data for the session   What is the difference in Option 1 and 2? If UE includes the PDU session ID and QoS flow ID in RVQoE report, isn’t that sufficient for MN/SN to learn which of them carries the data for the application session? |
| Lenovo | Yes | It can be learned from bearer type by NW nodes or by UE. Both NW based and UE based solution can be further discussed. |
| ZTE |  | Agree with Xiaomi that gNB is not aware of the application session.  It can be further discussed whether any indication or identifier from UE is needed. |
| Huawei | Yes | In our understanding, the nodes which carry the data for an application session may need the RAN visible QoE results to optimize the resource. RAN3 need to discuss how MN/SN know which nodes carry the data. We think the UE can report the PDU session and QoS flows information with the QoE start indication.. |
| Nokia | Yes | Agree that PDU session id + QoS flow id (or simply DRB id) can be used. Basically, if RVQoE is received by the node hosting PDCP for the concerned DRB, it can forward to the other node if data goes via that other node. But if RVQoE is received by the node not hosting PDCP, it will always have to forward the info because it will not know whether the DRB is a split DRB? |
| China Unicom | No | Agree with Xiaomi and ZTE, gNB is not aware of the application session. |
| Samsung | Yes | Agree with Nok. |
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**Proposal 15: Discuss how the MN/SN can learn which of them carries the data for an application session subject to RVQoE measurements.**