c3GPP TSG-RAN WG2 Meeting #117-e R2-22XXXX

Electronic Meeting, 21 Feb – 3 January 2022

**Agenda item: 8.14.4**

**Source: CMCC**

**Title: Report for** **[AT117-e][047][QoE] UE capability (CMCC)**

**WID/SID: NR\_QoE**

**Document for: Discussion and Decision**

# Introduction

This document aims at initiating the discussion on UE capabilities for NR QoE.

* [AT117-e][047][QoE] UE capability (CMCC)

Scope: Treat R2-2202827, R2-2202988, R2-2203347, R2-2203404, R2-2203429, determine agreeable parts and discussion points. Determine need for LS outs if any.

Intended outcome: Report

Deadline: W1 Friday (for online CB W2 Monday).

**Contact List**

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# Discussion

## Open issue 1: AS and APP layer interactions

In [1], it is suggested to discuss the open issue that whether and how AS layer obtains application capability. With the efforts from the companies participating, there are two options that rapporteur can humbly summarized:

**Option 1: How AS layer obtains application capability is based on UE implementation, which means there will be no spec impact.**

**Option 2: Introduce QoE capability interaction between AS layer and APP layer by e.g., AT-command.**

In the latest running CR of TS 38.306, *qoe-MeasReport-r15* and *qoe-MTSI-MeasReport-r15* relating both APP layer and AS layer capability are defined, which is similar to the existing UE capability IE in LTE QoE. And in LTE, there does not exist any interaction between AS layer and APP layer on QoE capability. Therefore, proposals in [2][3] suggest that NR QoE should be applied the same principle as well.

On the other hand, to ask SA4/CT1 on the AT-command that indicates APP layer capability on QoE to AS layer seems to be an alternative approach, as [4] propose.

And in [5], it is assumed that SA4 can address some mechanism on QoE capability interaction. It is the rapporteur’s understanding that no matter which option RAN2 agrees to accept, SA4/CT1 should be informed for such decision.

**Q1: Which option do you prefer on** **QoE capability interaction between AS layer and APP Layer？**

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| **Company** | **Option** | **Comments** |
| Huawei, HiSilicon | 1 | We think that the question should be: whether and how AS layer obtains application capability. For the question, we prefer option 1 because QoE feature is an E2E feature, and before UE setting the QoE UE capabilities in AS layer, it will anyway check with APP layer.  In other words, there will be co-ordinations between AS and APP layers, but we do not see a strong need to standardize them in 3GPP. If option 2 is selected, it means the co-ordinations is a must in the standard (e.g. RAN2, CT1, and maybe other WGs), and then every time RAN2 discusses QoE UE capabilities, there may be impacts to other WGs. In general, we think UE implementation can have the same effects as option 2 and option 2 may introduce extra work (for now and for the future). |
| CMCC | Option 1 | We think both options are capable to have AS layer obtain APP layer capabilities on QoE.  Option 2 has spec impact on both RAN2 and other WGs, therefore we prefer option 1. CT1 and SA4 should be informed. |
| Nokia, Nokia Shanghai Bell | Option 1 | QoE support in Application layer should be built-in functionality implemented as complementary part of QoE. If the UE indicates radio capability it implies the feature is complete, while we see no need to coordinate the different capabilities in standardized manner. |
| Apple | Option 1 | We also think that Option 2 brings unnecessary specification impact and inter-WG dependency. |
| CATT | Option 1 | Share with above |
| Qualcomm |  | Since we see there is a lot of capability interaction defined in AT command, it is better to inform CT1 about this issue, let CT1 determine how to do it. RAN2 has no much idea about the usual handling. |
| Ericsson |  | It is a bit outside RAN2’s scope to determine this. It would be better to ask CT1 and SA4. |
| ZTE | Option1 | Share same view with HW. |
| Intel | Option 1 | We think there’s no need to introduce capability interaction. It can be left to UE implementation. |
| Samsung | Option 1 |  |
| LGE | Option 1 |  |

Summary:

9 of 11 companies agree that how AS layer obtains application capability on QoE measurement is based on UE implementation, which means no spec impact. One company suggests that since there are a lot of capability interactions defined in AT command, it is better to inform CT1 about this issue and let CT1 determine how to do it. Also, the other company thinks it would be better to ask CT1 and SA4.

Since a majority view on how AS layer obtains application capability can be drawn from RAN2, also with emerge of the consideration to inform CT1 and SA4, it seems to be reasonable to inform CT1 and SA4 the majority view of RAN2 and ask for their view on this open issue. if CT1 and SA4 determines to design a mechanism e.g., defining AT commands for transferring application QoE capability to AS layer, RAN2 can also be informed in the reply.

Proposal:

**(9/11) Proposal 1: RAN2 assumes that how AS layer obtain application capability is based on UE implementation and there is no spec impact.**

## Open issue 2: App Layer requirement on QoE support

* In both [4] and [6], there emerge the concerns about APP layer requirement on NR QoE.
* And in [4], a case on multiple application for a same service type is presented as follows,

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| There can be several different applications for the same service type. UE capabilities for QoE are defined per service type. If the UE e.g., has three applications for streaming, but only one of the applications supports QoE, can the UE indicate support for QoE streaming or do all three applications need to support QoE? Or alternatively, the UE may not take the support in the application into account when reporting the AS UE capability for QoE. |

* Therefore, the rapporteur would like to collect opinions on whether there exists a case that UE supports QMC for a certain service type, but not all related applications support QMC for further decision making.
* **Q2.1: Do you think there exists the case illustrated above?**

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| **Company** | **Yes or no** | **Comments** |
| Huawei, HiSilicon | Yes | In RAN2, we mainly discuss the service type for the QoE support. From SA4 point of view, they just specify the service type for QoE definitions, e.g. TS 26.247 is for Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH). We think per service type definition for QoE is flexible, and any application supporting the TS 26.247 will have the same behaviours on QoE measurement collection behaviours.  In addition, the development of applications in the real world is changing quickly, so it is hard to define QoE per applications. So per service type QoE definitions are a good way forward.  For the case showed above, we do not think there is a problem.  For example, operator A, network vendor B, UE vendor C and APP provider D can support QoE measurement collection for streaming, and then APP provider D is just one application for streaming (which means UE AS and UE APP only support QoE for application D for streaming). When the UE performs streaming services and QoE collection, it will only collect QoE from APP provider D, and operator A can collect the QoE and do the optimizations. In the future, if APP provider E can also support QoE measurement collection for streaming, operator A may differentiate the two applications by QoE reference ids.  In general, we think it is reasonable for the UE to only support one or more applications for the same service, and the current QoE design can work. |
| CMCC | Yes | The presented case is possible and we think this question is related to Q1.  We think UE can only collect the APP that supports QMC and indicate QoE capability for the relating service type. There is a case that we think should be prohibited, which is UE indicates the QoE capability for a certain service type, but no relating APP supports QMC. And we think it can be achieved by UE implementation. |
| Nokia, Nokia Shanghai Bell | No | For now, 3 specific services can be supported in the scope of QMC: MTSI, Streaming and VR. We understand the support of QMC per service type will depend on UE vendors plans for implementation.  But, if the UE supports QMC in Rel-17 per service type, the QOE capability could be per service, i.e. no need to distinguish even further, i.e. per service type, “per application”. |
| Apple | Yes | Agree with Huawei |
| CATT | No | I don’t think we need to differentiate the QoE capability per application. The QoE capability should be no different in same service type. |
| Qualcomm | Yes | For a service type, different APPs could come from different customers as indicated from SA5, and then APPs could have different QoE capabilities. Capability per service type is enough. Since UE AS layer forwards QoE configuration to APPs according to service type, we can ask SA4 whether there is issue when application layer does not support QoE receives QoE configuration from AS layer. |
| Ericsson | Yes | We think the case can happen. |
| ZTE | .. | Though we think this case may happen, we believe this can be based on UE implementation. No impact on spec. |
| Intel | No | The QoE measurement is requested per service type, rather than per application. All applications for the corresponding service type need to support for QoE measurement. |
| Samsung |  | We think this is out of RAN2 scope. Maybe SA4 or SA5? However, anyhow QoE capability was defined per service type in LTE. So unless SA groups raise any issue on it, RAN2 needs to go for the legacy manner (i.e., QoE capability per service type) |
| LGE |  | Agree with samsung. |

* **Q2.2: If the answer to the above question is Yes, what and how the information should be** **interacted between AS layer and APP layer?**

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| **Company** | **Comments** |
| Huawei, HiSilicon | As we commented above, we do not see a need to define extra information. The current QoE design can work. |
| CMCC | We think it can be left for UE implementation, but it’s better to check with SA4. |
| Apple | There is no need to exchange such information |
| Qualcomm | We can ask SA4 whether there is issue when application layer does not support QoE receives QoE configuration from AS layer. |
| Ericsson | We could ask SA4 whether this is an issue. |
| ZTE | By UE implementation. No impact on spec. |
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Summary:

8 of 11 companies think the case can happen. And 8 of 11 companies think that QoE capability per service type is enough and there is no need to differentiate QoE capability per application. There also exist suggestions on check with SA4 about the illustrated case.

It is the moderator’s understanding the initial intention of this issue is not to make QoE capability per application, but to discuss if different applications for a same service type have different support for the QoE measurement collection.

As some companies suggests, this issue is a bit out of RAN2’s scope. Since the majority of companies agree this case can happen, RAN2 can at least ask SA4 whether there exists any issue how AS layer indicates QoE capability when not all relating applications support QMC.

* **(3/11) Proposal 2: Discuss whether to check with SA4 on how to handle the case when application layer that does not support QoE receives QoE configuration from AS layer, and check whether there’s any issue identified from SA4 perspective.**

## Open issue 3: LS to CT1/SA4

Since the open issues on AS and APP layer interactions involve other WGs, also as proposed in [3], an LS on QoE UE capability should be sent to SA4 and CT1 after the meeting.

**Q3.1 Do you agree to send an LS on the** **QoE UE capability interaction between AS layer and APP layer** **to related WGs (e.g., SA4, CT1)?**

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| **Company** | **Yes or no** | **Comments** |
| Huawei, HiSilicon | FFS | It should be discussed case by case. For example, for UL segmentation capability, RAN2 has sent a LS to SA4 for double check; for “whether and how AS layer obtains application capability” in Q1, it is under discussions.  So we think Q3.1 can be more concrete so that companies can technically check it. |
| CMCC | Yes | If RAN2 can achieve agreements on QoE capability interaction between AS layer and APP Layer, the related WG should be informed.  If not, opinions from other WGs on whether and how AS layer obtain APP layer capability should be taken into consideration. |
| Nokia, Nokia Shanghai Bell | No | For now we see no need, as in our view the interaction would remain implementation specific. |
| Apple | Maybe | Agree with Nokia that, as of now, no need has been identified. As Huawei suggested, there may be some need later depending on SA4 reply on application capability. |
| CATT |  | Share with Apple. We may have it based on the RAN2 conclusion. |
| Qualcomm |  | We think it is helpful to let CT1 and SA4 know the issues RAN2 is discussing as our views in open issue 1 and open issue 2. |
| Ericsson | Yes | We think it is good to ask SA4 and CT1 about it. |
| ZTE | No | Share the same view with Apple. No for current stage. We may recheck this problem when SA2 replies. |
| Intel | No | Agree with Nokia. |
| Samsung |  | Agree with QC |
| LGE |  | Agree with QC. |

* **Q3.2 If the answer to the above question is Yes, what should be captured in the LS?**

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| **Company** | **Comments** |
| CMCC | See our comment in Q3.1 |
| Qualcomm | See our comment in open issue 1 and open issue 2. |
| Ericsson | The open issues in question 1 and 2. |
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* Summary:
* 5 of 11 companies agree to send an LS to CT1 and SA4 about the view in open issue 1 and open issue 2. And 4 of 11 companies thinks it is an FFS based on RAN2’s conclusions and/or SA4’s reply. 2 of 11 companies thinks it remains implementation specific, no need to send an LS.
* In open issue 1, 9 of 11 companies agree that how AS layer obtain application capability is based on UE implantation and there is no spec impact. And the remaining 2 companies suggest to inform CT1 and SA4. It is the moderator’s understanding that it is helpful to check with CT1 and SA4 on RAN2’s assumption and ask their opinions.
* **(5/11) Proposal 3: Discuss whether to check with SA4 and CT1 on Proposal 1 mentioned above.**

# Summary

The summary provides following proposal:

**Easily agreeable:**

**(9/11) Proposal 1: RAN2 assumes that how AS layer obtain application capability is based on UE implementation and there is no spec impact.**

**To be decided online:**

* **(3/11) Proposal 2: Discuss whether to check with SA4 on how to handle the case when application layer that does not support QoE receives QoE configuration from AS layer, and check whether there’s any issue identified from SA4 perspective.**
* **(5/11) Proposal 3: Discuss whether to check with SA4 and CT1 on Proposal 1 mentioned above.**

# References

1. R2-2202043 QoE related open issue list, China Unicom
2. R2-2203347 AS and application layer interactions for NR QoE UE capabilities, Huawei
3. R2-2202827 Discussion on UE Capability for QoE, ZTE
4. R2-2203429 UE capabilities for QoE measurements, Ericsson
5. R2-2202988 Capabilities of AS layer and application layer, Samsung
6. R2-2203404 UE Capabilities for QMC, Nokia