

[RAN94e-R18Prep-21] QoE Enhancements - Version 0.0.6
RAN

3GPP TSG RAN Meeting #94-e

RP-212681

Electronic Meeting, December 06 - 17, 2021

Agenda Item: 8A.3

Source: China Unicom

Title: Moderator's summary of discussion [RAN94e-R18Prep-21] QoE (Quality of Experience) Enhancements

Document for: Report

1 Introduction

The discussion in this thread covers the topic #21 **QoE enhancements in [1]**. Following the conclusion of email discussion in [2], there is consensus to have a QoE enhancements WI, and the scope in [2] will be treated as baseline in this email discussion. Companies can provide the comments including detailed justification for areas/scopes in this topic and according to the guidance in [1].

The moderator would suggest the following plan, for the initial round, let's focus on the further clarifications on each objective, companies could also discuss if any new objectives are to be added. For the intermediate round, let's try to stabilize the objectives with no contentious, and decide the leading groups and impacted groups. For the final round, we will discuss on the remaining open issues if any, e.g. if there are some objective which are still contentious.

- Any further update/consolidation of the topics/structure is to be handled in RAN#94-e
- Aim to identify whether a topic should be a SI, or WI (including possibly a study phase for some scope(s))
- Aim to identify on the leading WG (including if any change compared with those in RP-212608) and the secondary WG(s)
- Aim to identify on the potential interaction with SA/CT

2 Initial Round

2.1 Supporting service type

In [2], the support service type is AR, MR, MBS, etc.

Company comments are welcome in the following feedback form:

Feedback Form 1: Service type related with QoE

<p>1 – China Unicom</p> <p>In R18, some new service type, such as AR, MR, MBS should be supported.</p>
<p>2 – ZTE Corporation</p> <p>We agree to support service type AR/MR/MBS into Rel-18 WID.</p>
<p>3 – CATT</p> <p>We agree to support new service type including AR,MR,MBS</p>
<p>4 – Huawei Technologies France</p> <p>We think new service type should be supported for QoE measurement, i.e. AR, MR, MBS. Of course, this will need coordination with SA4. The vertical aspects like IIoT, V2X particularly for the Side Linde should also be considered.</p>
<p>5 – Samsung R&D Institute UK</p> <p>We agree to support the above service types in R18</p>
<p>6 – Samsung R&D Institute UK</p> <p>We agree to support the above service types (i.e. AR, MR, MBS) in R18</p>
<p>7 – China Mobile Com. Corporation</p> <p>We agree to at least support the service types (i.e. AR, MR, MBS) mentioned above in R18.</p>
<p>8 – Nokia</p> <p>The above service types (AR, MR, MBS) are fine to support, assuming there is also related work in SA4.</p>
<p>9 – Qualcomm Technologies Int</p> <p>Rel-17 only supports QoE measurement collection for streaming services, MTSI and VR. The following service types can be considered in Rel-18 conditional that SA4 will support the QoE framework and define QoE metrics for: i) XR (TR 26.926, TR 26.928), ii) MBS (TS 26.502) and iii) AR/MR (TR 26.998)</p>
<p>10 – Ericsson LM</p> <p>We are fine with supporting the following service types: AR, MR, MBS, IIoT/TSN. We also think that QoE support for high mobility scenarios e.g., High Speed Trains should be addressed.</p>
<p>11 – Verizon UK Ltd</p> <p>AR, VR, IIoT, mobility scenarios and MBS service types should be supported.</p>

12 – Apple AB

We agree with other companies that these service types can be supported in R18. In our understanding, supporting from a RAN perspective, mainly implies that service type IE can indicate these newer values since the actual measurement configuration and reporting is transparent to RAN.

13 – Motorola Mobility UK Ltd.

We agree with the list of service types. In this context we suggest to remove the „etc.“ WID should be clear about the scope. If we identify any new service type which should be supported it can be added in a WID revision.

14 – VODAFONE Group Plc

Agree with Ericsson with the addition of Cloud Gaming.

15 – Intel Deutschland GmbH

In general, we are ok with above service types for management-based QoE, not for RAN visible QoE

2.2 Potential enhancement on RAN visible QoE related with specific service type

In [2], potential enhancement on RAN visible QoE related with specific service type (including new 5G service).

Company comments are welcome in the following feedback form:

Feedback Form 2: Potential enhancement on RAN visible QoE related with specific service type

1 – China Unicom

R17 will define the framework for RAN visible QoE, and the new RVQoE metrics for the above new 5G service and existing 5G service that can be further studied and extended to support in R18.

2 – ZTE Corporation

Based on the progress of Rel-17 QoE, the RAN visible QoE may need further enhancement in Rel-18. We support this feature in Rel-18 QoE. But We prefer this feature merged in to Rel-17 left over issues part.

3 – CATT

We are OK to consider enhancement on RAN visible QoE. Details on this bullet may needs revisit after the completion of Rel-17 WI.

4 – Huawei Technologies France

We see potential areas which deserves further investigations and possible enhancements, for example, if new services (AR/MR) are to be supported, then RAN visible QoE metrics for these new services should be considered; in addition, for DC operation, QoE metrics’ visibility to SN may help SN optimize the resource scheduling. Whether visible metrics should be transferred from source to target during mobility may also

needs further study (of course this may have some overlaps with SON/MDT, but this could be discussed during WI phase).

5 – Samsung R&D Institute UK

We support this feature, and current text looks fine for us.

6 – China Mobile Com. Corporation

Generally fine with the text.

And we assume the scope for this bullet is mainly focused on new RAN visible QoE metrics/values supported by newly introduced service types; while for some intersecting topics introduced by new features which are more framework-related, including the alignment of radio related measurement and RAN visible QoE measurement, per-slice RAN visible QoE measurement, if such topics cannot be completely discussed in R17, we can treat such topics as leftover issues of R17 in the new WI.

7 – Nokia

For RAN visible QoE, we should wait for progress on this topic in the Rel-17 work item before considering further enhancement.

8 – LG Electronics Polska

Agree with Nokia's comment.

9 – Qualcomm Technologies Int

Rel-17 will only support RAN visible QoE for DASH streaming and VR. Rel-18 can support RAN Visible QoE for MTSI and new service types to be supported in Rel-18, such as XR, MBS, AR/MR.

Other enhancements (e.g., indicating DRB related information in RAN visible QoE, alignment of RAN visible QoE with MDT) can also be considered depending on Rel-17 progress.

10 – Ericsson LM

We are fine with supporting RAN visible QoE for the new service types (AR, MR, MBS, IIoT/TSN) as well as with defining additional metrics and functionalities for the service types supported in Rel-17 NR QoE.

11 – Verizon UK Ltd

We support RAN visible QoE for all new service types in R-18 on top of what is specified in R-17 QoE.

12 – Apple AB

Can wait for R17 progress and be de-prioritized for now.

13 – Motorola Mobility UK Ltd.

RVQoE may be extended in R18 for service types other than DASH streaming and VR. But we agree with others that further discussion on potential enhancements for this topic should be low-prioritized for now and we should wait for further progress in the WGs.

14 – Intel Deutschland GmbH

Ok to be studied based on the outcome and progress of Rel-17.

2.3 Potential enhancement on slice related QoE measurement and report

In [2], the potential enhancement on slice related QoE measurement and report.

Company comments are welcome in the following feedback form:

Feedback Form 3: Potential enhancement on slice related QoE measurement and report

1 – ZTE Corporation

Slice related feature also in the scope in Rel-17 QoE. SA4 provides their understanding in S4-211225 that App layer in the UE is able to identify the PDU session and the corresponding S-NSSAI and DNN. In addition, SA2 also identify USRP usage with Slice and PDU session. It is becoming more clearer to achieve a framework for collect QoE per slice in Rel-17.

Based on the progress, there is no new requirement for slice related QoE measurement in Rel-18, the feature can be deprioritized at this moment.

Therefore, we propose to move this objective into Rel-17 Left over issues .

2 – Huawei Technologies France

For this point, we may need to see the progress of R17 WI. For example, how slice info is linked with QoE report, PDU session info/flow info, DRB info, such relationship, if known to RAN, would be helpful for resource usage optimization.

3 – Samsung R&D Institute UK

We support to further investigate the enhancement on per slice QoE, as slice is an E2E concept, per-slice QoE may need more SA2 involvement in R18, e.g. CN can trigger and use per-slice QoE for slice selection.

4 – China Mobile Com. Corporation

We may need to revisit this bullet after the completion of R17 WI. If no new topics can be foreseen in terms of per-slice QoE, it is enough to be potentially treated in the leftover issue then.

5 – Nokia

Slice-related aspects are in principle sufficiently covered in Rel-17.

6 – CATT

Similar view with others that we could revisit this bullet at the end of Rel-17. If slice related topic is already completed and no new requirement is detected, this bullet is not needed.

<p>7 – Qualcomm Technologies Int</p> <p>OK, but depends on Rel-17 progress.</p>
<p>8 – Ericsson LM</p> <p>If slice-based support is not finalized in Rel-17, it should be addressed in Rel-18.</p>
<p>9 – Verizon UK Ltd</p> <p>Slice based QoE support is important for operators desiring to offer new services. Whatever could not be specified in R-17 as well as any related requirements for new use cases should be specified in R-18.</p>
<p>10 – Apple AB</p> <p>Can wait for R17 progress</p>
<p>11 – Motorola Mobility UK Ltd.</p> <p>It is currently not clear to us whether per-Slice QoE measurements can be sufficiently covered in R17 or not. Therefore, we agree with others that we should wait for further work progress in R17.</p>
<p>12 – VODAFONE Group Plc</p> <p>Providing QoE measurements on a per-slice basis is important.</p>

2.4 QoE measurement in RRC IDLE and RRC INACTIVE

In [2], both RRC IDLE and RRC INACTIVE are supported in QoE measurement in R18.

Company comments are welcome in the following feedback form:

Feedback Form 4: QoE measurement in RRC IDLE and RRC INACTIVE

<p>1 – China Unicom</p> <p>Specify the QoE configuration, measurement collection and reporting in <i>RRCIDLE</i> and <i>RRCINACTIVE</i> state for MBS service.</p>
<p>2 – ZTE Corporation</p> <p>Share the view as China Unicom, we support this feature in Rel-18 QoE WI.</p>
<p>3 – CATT</p> <p>We are OK with this bullet</p>
<p>4 – Huawei Technologies France</p> <p>We think at least for some certain service type, e.g. MBS service, both <i>RRC_IDLE</i> and <i>RRC_INACTIVE</i> state should be considered; more discussions are needed if such state also applies to other service type, e.g. VR.</p>

<p>5 – Samsung R&D Institute UK</p> <p>We agree to support QoE measurement in RRC IDLE and RRC INACTIVE</p>
<p>6 – China Mobile Com. Corporation</p> <p>Agree to all comments by all companies above.</p>
<p>7 – Nokia</p> <p>We agree that QoE in RRC_INACTIVE should be supported for MBS. However, we note that QoE in RRC_IDLE may significantly impact the QoE framework and has not been previously studied.</p>
<p>8 – LG Electronics Polska</p> <p>QoE measurement is done in the application layer and it doesn't know the RRC state. If UE doesn't release the QoE configuration upon leaving CONNECTED, this objective can be achieved without further standardization.</p>
<p>9 – Qualcomm Technologies Int</p> <p>This should be the highest priority objective in Rel-18. Some of the objectives can include i) Whether UE should perform QoE measurement collection in RRC_IDLE and RRC_INACTIVE, ii) Whether and how network should propagate the QoE configuration in RRC_IDLE and RRC_INACTIVE upon mobility and iii) framework for collecting and reporting QoE measurements collected in RRC_IDLE and RRC_INACTIVE.</p>
<p>10 – Ericsson LM</p> <p>We think that both RRC IDLE and RRC INACTIVE should be supported if there is a clear use case for that.</p>
<p>11 – Verizon UK Ltd</p> <p>Both RRC IDLE and RRC INACTIVE mode QoE measurement should be supported - especially QoE measurement framework/config/reporting.</p>
<p>12 – Apple AB</p> <p>Support this at least for MBS.</p>
<p>13 – Motorola Mobility UK Ltd.</p> <p>We agree with others that QoE measurement in RRC IDLE/RRC INACTIVE should be supported for MBS.</p>
<p>14 – VODAFONE Group Plc</p> <p>We view MBS as low priority.</p>

15 – Intel Deutschland GmbH

It would be good to clarify whether the main use case of this objective is to support multicast in IDLE/INACTIVE state? If so, it would be good to discuss QoE aspects after Rel-18 MBS WI concludes on how to support RRC_INACTIVE and RRC_IDLE for multicast service.

2.5 QoE in MR-DC with 5GC

In [2], MR-DC with 5GC is considered to be support in R18.

Company comments are welcome in the following feedback form:

Feedback Form 5: QoE in MR-DC with 5GC

1 – China Unicom

Specify the QoE configuration, measurement reporting via MN/SN considering the RAN-visible and radio related measurements.
Specify the QoE measurement continuity in mobility scenarios in MR-DC.
Specify the alignment of QoE and radio related measurements in MR-DC

2 – ZTE Corporation

We still not fully understand the objective of this feature. In genearl , QoE collect in UE side and does not aware the MR-DC status .
If the intention is to use SN as a potencial way for QoE report, the benefit is not obviously and the complex may increase due to the enhancment.
We propose to deprioritize this feature in Rel-18.

3 – Huawei Technologies France

RAN3 discussed it in the R17 SI, it was deprioritized in R17 due to the time. In our understanding, the operators want to know QoE results of services carried in any nodes, and if SN is also allowed to trigger some QoE measurement directly, e.g. some special service is served by SN, so that it is good for SN to configure and be reported.

4 – Samsung R&D Institute UK

We don't support this item, as QoE measurement collection should be MR-DC agnostic, introducing QoE configuration and reporting via SN will bring complexity, and the benefits are not clear. For the impacts of RAN visible QoE and the alignment of MDT and QoE, they should be discussed in RVQoE topic or alignment topic, otherwise, there will be overlaps.

5 – China Mobile Com. Corporation

We support the bullets proposed by the moderator.

<p>6 – CATT</p> <p>It is OK for us to discuss on this topic in Rel-18, maybe with low priority since it was already de-prioritized in Rel-17</p>
<p>7 – Nokia</p> <p>We are OK to support QoE in MR-DC with 5GC.</p>
<p>8 – LG Electronics Polska</p> <p>Agree with ZTE's comments. We can see no benefit of the configuration by SN/reporting to SN.</p>
<p>9 – Qualcomm Technologies Int</p> <p>OK to have this in scope. Some of the objectives can include i) whether both MN and SN can configure QoE independently or QoE configuration is to be restricted to a single node, ii) whether UE can send QoE report over SN, iii) whether to have special handling of QoE reports during only MN or SN overload, iv) per-DRB or per-interface (MN or SN) QoE configuration and reporting.</p>
<p>10 – Ericsson LM</p> <p>We think that this should be supported. Two aspects should be considered: 1) using the secondary node as an alternative to deliver the QoE report. 2) evaluation of QoE in MR-DC scenarios.</p>
<p>11 – Apple AB</p> <p>We don't really understand the need for this since QoE measurement collection happens at the application layer, and don't support this objective.</p>
<p>12 – Verizon UK Ltd</p> <p>QoE in MR-DC scenarios needs to be supported including configuration / measurement / reporting of QoE by both MN and SN.</p>
<p>13 – Motorola Mobility UK Ltd.</p> <p>The value of QoE support for MR-DC is not clear to us, especially since we agreed to not support inter-system/inter-RAT QoE mobility. So, then the scope of enhancements is then whether to support the QoE configuration by either MN/SN and QoE reporting by UE to either MN/SN? Maybe this is a topic that may need a study phase.</p>
<p>14 – Intel Deutschland GmbH</p> <p>Considering the TU of Rel-18 WI, it is difficult to contain all items. We think it would be good to focus on NR-DC only.</p>

2.6 Rel-17 left-overs issues

The NR QoE in R17 is still ongoing, some Rel-17 left-over issues will be supported in R18, e.g. enhancement on alignment of radio related measurements and QoE measurements.

Company comments are welcome in the following feedback form:

Feedback Form 6: Rel-17 left-overs issues

1 – ZTE Corporation

The Left over issues may including : RAN visible QoE, Slice related QoE if any, M-based QoE for mobility .

2 – CATT

Ok to include Rel-17 leftover.Maybe the details could be decided when Rel-17 WI ends

3 – Huawei Technologies France

If there are any left over issues in R17, we support to continue to finish them in R18.

For example, as commented above, we think the RAN need to know the corresponding DRBs information of the QoE results. Not sure whether it can be finished in R17. In addition, we see inter-system mobility support should be considered, which was downprioritized in R17.

4 – Samsung R&D Institute UK

Current text looks fine, we support enhancement on alignment of radio related measurements and QoE measurements if it cannot be finished in R17.

5 – China Mobile Com. Corporation

As commented above, if some topic is not finished in R17, we can put them in the leftover part.

And we do not think alignment of radio related measurements and QoE measurements is a completely leftover issue.

Since many companies are supportive to introduce MBS service type and discuss QoE measurements in RRC Idle/Inactive in R18, there is potentially a need to discuss how to align the logged MDT with logged QoE measurements under such case.

Of course an alternative way is to set a new bullet under the potential topic QoE measurement in RRC Idle/Inactive stating to discuss the alignment of logged MDT and QoE measurements, and the leftover part only focus on the topic that is not finished in R17.

6 – Nokia

In principle we are OK to cover Rel-17 left-over issues, to be defined by the end of the Rel-17 work item.

7 – Qualcomm Technologies Int

OK to have this placeholder. But we prefer to remove the “e.g., enhancement on alignment of radio related measurements and QoE measurements”. This should depend on Rel-17 progress. Also some items pushed out of Rel-17 scope such as QoE handling during inter-RAT and inter-system mobility can be considered.

8 – Ericsson LM

Rel-17 leftovers should be prioritized, for example the MR-DC support and the support for mobility scenarios not addressed in Rel-17 (e.g., Inter-RAT handover). We do not fully understand why alignment between radio related measurements and QoE measurements is mentioned as a leftover, given that the related AI is in full speed in RAN3.

<p>9 – Apple AB</p> <p>We think this objective needs to be prioritized over others to ensure that the QoE feature is stable and useful.</p>
<p>10 – Verizon UK Ltd</p> <p>R-17 leftover items should be considered and prioritized in R-18.</p>
<p>11 – Motorola Mobility UK Ltd.</p> <p>We think leftover issues from R17 can be considered but we are hesitant to make a blank cheque for them, i.e. we should decide case by case whether a leftover issue should be considered in R18 or not.</p>

2.7 Leading Working group and the secondary WG(s)

In [3], the leading working group of NR QoE Enhancement is RAN3. The secondary working group(s) should be discussed.

Company comments are welcome in the following feedback form:

Feedback Form 7: Leading WG and the secondary WG(s)

<p>1 – China Unicom</p> <p>Since there are a lot of impacts for RAN2, the secondary working group should be RAN2.</p>
<p>2 – ZTE Corporation</p> <p>Agree that Leading group be RAN3 and RAN2 be the secondary working group.</p>
<p>3 – CATT</p> <p>RAN2 should be the secondary WG</p>
<p>4 – Huawei Technologies France</p> <p>We see no problem we just follow what we did for Rel-17 WI.</p>
<p>5 – Samsung R&D Institute UK</p> <p>Same as R17, RAN3 is the leading WG, RAN2 is the secondary WG</p>
<p>6 – China Mobile Com. Corporation</p> <p>Same as in R17.</p>
<p>7 – Nokia</p> <p>Leading WG: RAN3. Secondary WG: RAN2. (as in R17)</p>
<p>8 – Qualcomm Technologies Int</p> <p>Leading WG -RAN3, Secondary WG – RAN2</p>

<p>9 – Ericsson LM</p> <p>RAN3 should lead, and RAN2 should be the secondary group.</p>
<p>10 – Apple AB</p> <p>Same views as others; RAN3 as lead, RAN secondary.</p>
<p>11 – Verizon UK Ltd</p> <p>RAN3 lead and RAN2 as secondary group.</p>
<p>12 – Motorola Mobility UK Ltd.</p> <p>We are also fine with RAN3 as leading WG and RAN2 as secondary WG.</p>
<p>13 – VODAFONE Group Plc</p> <p>same as in R17</p>
<p>14 – Intel Deutschland GmbH</p> <p>Leading WG: RAN2, secondary WG: RAN3.</p>

2.8 Potential interaction with SA/CT

In [2], the scope seems to have dependencies e.g. to current ongoing work on QoE, possibly to XR study, SA4 work etc.

Company comments are welcome in the following feedback form:

Feedback Form 8: Potential interaction with SA/CT

<p>1 – China Unicom</p> <p>The QoE for new service type should depending on SA4.</p> <p>There are also some interactions with SA/CT, the RVQoE reporting value definition, the QoE mechanism enhancement etc. They may need cooperation with SA/CT.</p>
<p>2 – ZTE Corporation</p> <p>Due to service type defined in SA4, SA4 should be involved.</p> <p>Due to AT command defined in CT3, CT3 need to be involved.</p> <p>Due to QoE configuration defiend in SA5, SA5 need to be involved.</p> <p>Due to signalling based QoE need to be provide from Core network, SA2 need to be involved.</p>
<p>3 – Huawei Technologies France</p> <p>For the R18 XR , there are some potential areas on the KPI/application awareness, which at least is related with SA4; and the potential slice enhancements may also need to coordinate with CT group.</p>

<p>4 – Samsung R&D Institute UK</p> <p>Coordination with SA4 on the QoE metrics definition of the new services is needed. Coordination with SA5 and SA2 on the whole procedure of signaling-based QMC is also needed.</p>
<p>5 – Nokia</p> <p>Interaction with SA4 and SA5 is required. Enhancements for RAN Visible QoE in Rel-18 (if any) may require interaction with CT1.</p>
<p>6 – Qualcomm Technologies Int</p> <p>Coordination with SA WGs (SA4/SA5) and CT1 is expected as in Rel-17.</p>
<p>7 – Ericsson LM</p> <p>TSG SA4: at least for the definition of new QoE metrics and RAN visible QoE metrics TSG SA5: at least for the QoE measurement configuration and reporting aspects TSG CT1: at least for the UE internal handling between its Access Stratum and upper layers</p>
<p>8 – Apple AB</p> <p>We think this is business as usual, as was done in R17</p>
<p>9 – Verizon UK Ltd</p> <p>Same view as Ericsson comment above in SA/CT interactions.</p>
<p>10 – Motorola Mobility UK Ltd.</p> <p>We share the same view as Ericsson.</p>

2.9 Others

Other potential areas are related with QoE enhancements are not discussed in above.

Company comments are welcome in the following feedback form:

Feedback Form 9: Others

<p>1 – China Unicom</p> <p>For some specific scenarios, such as high speed mobility scenario, some special QoE configuration may need to be defined.</p>
<p>2 – Huawei Technologies France</p> <p>Some enhancements for Cross-WIDs. The RAN visible QoE can reflect the performance of the network. We think the neighbor nodes can inform the relation between radio results and QoE results in MLB. Then the source node can decide whether to handover some UE to the neighbor node based on the relation.</p>
<p>3 – Qualcomm Technologies Int</p>

Sidelink related enhancements to QoE can be considered, e.g., UE can indicate to MCE/NG-RAN whether an application is using Uu-DRB or SL-DRB.

4 – Ericsson LM

Any new radio related measurements should be defined in the MDT/SON WI.

Inputs coming from other SIs/WIs may need to be considered.

5 – Motorola Mobility UK Ltd.

We could have initial discussion to TU allocation in the intermediate and final rounds. Acc. to current R18 schedule 15 months are available for the R18 stage 2/3 work in RAN2/3, however due to high competition with other R18 topics it is very unlikely that many TUs will be allocated to this WI (similar as in R17).

- Rel-18 starts in 2Q'22 for RAN1 and in 3Q'22 for RAN2/3/4
- Stage 3 freeze in December 2023
- ASN.1 freeze in March 2024

2.10 Moderator summary of initial Round and recommendation

2.10.1 Supporting service type

Proposal 1: The support service types include AR, MR, MBS, IIoT/TSN, V2X, cloud gaming. And the high mobility scenarios e.g., High Speed Trains should also be considered in the R18 WI.

2.10.2 Potential enhancement on RAN visible QoE related with specific service type

Proposal 2: The new introduced service types (i.e. AR, MR, MBS, IIoT/TSN, etc) as well as defining additional metrics and functionalities of RAN visible QoE as defined in R17 shall be supported in R18.

Proposal 3: The potential enhancements, such as DC operation, RAN visible metrics transferring during mobility, need further discussion.

Proposal 4: Some other enhancements (e.g., alignment of radio related measurement and RAN visible QoE measurement, per-slice RAN visible QoE measurement, indicating DRB related information in RAN visible QoE, etc) can be considered depending on R17 progress. Wait for R17 progress and revisit this bullet as R17 leftover issue.

2.10.3 Potential enhancement on slice related QoE measurement and report

For the potential enhancement on slice related QoE, this feature depends on R17 progress. If per-slice QoE is not finalized in R17, the leftover will be included in R18.

Proposal 5: Wait for R17 progress and revisit this bullet as R17 leftover issue.

2.11 QoE measurement in RRC_IDLE and RRC_INACTIVE

Proposal 6: QoE configuration, measurement collection and reporting shall support RRC_IDLE and RRC_INACTIVE state for MBS service.

There is the concern for QoE in RRC_IDLE, which may significantly impact the QoE framework and has not been previously studied. The potential impacts on framework need further discussion in next round.

There is the concern on whether the main use case of this objective is to support multicast in IDLE/INACTIVE state. While Rel-18 MBS WI will conclude on how to support RRC_INACTIVE and RRC_IDLE for multicast service.

Proposal 7: Wait for Rel-18 MBS WI progress and further discuss on how to support multicast.

2.12 QoE in MR-DC with 5GC

Operators express their demands to support QoE in MR-DC scenarios, both RAN visible and radio related measurements are considered for MR-DC.

Proposal 8: According to initial round discussion, the potential enhancements for MR-DC are proposed for next round discussion.

1. Support QoE in MR-DC scenarios, e.g. QoE configuration, measurement and reporting for both MN and SN independently, as well as considering RAN-visible and radio related measurement configuration, measurement reporting for MN/SN.
2. Support SN as an alternative to deliver the QoE report.
3. Support the QoE measurement continuity in mobility scenarios in MR-DC.
4. Support the alignment of QoE and radio related measurements in MR-DC.
5. Support special handling of QoE reports during only MN or SN overload.
6. Whether to support per-DRB or per-interface (MN or SN) QoE configuration and reporting.
7. Whether to focus on NR-DC only and exclude other scenarios?

2.13 Rel-17 left-overs issues

Proposal 9: If there are any left-over issues in R17, these features shall be supported to continue to complete them in R18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI.

The R17 left-over issues may include RAN visible QoE, Slice related QoE if any, management-based QoE for mobility, inter-system mobility, the alignment of the logged MDT with logged QoE measurements for MBS, Inter-RAT handover, etc.

To facility the discussion in next round, moderator splits Rel-17 left-over issues which are not covered by above discussion. These topics, such RAN visible QoE, Slice related QoE if any, management-based QoE for

mobility, are covered by above bullets. The alignment of the logged MDT with logged QoE measurements for MBS is considered as one of sub-bullets for MBS.

Proposal 10: For the inter-system mobility and inter-RAT handover, it is proposed for next round discussion and decide whether to support or not in R18.

2.14 Leading Working group and the secondary WG(s)

Proposal 11: RAN3 is considering as the leading group, and RAN2 is considered as the secondary working group.

2.15 Potential interaction with SA/CT

Proposal 12: The potential interaction with SA4/SA5/SA2/CT1/CT3 WGs are required.

2.16 Others

RAN visible QoE and radio results has potential impacts with cross-WID, i.e. MLB, the new defined radio related measurements in SON/MDT enhancements. This cross-WID topics shall be considered in R18.

Sidelink related QoE enhancement, e.g., UE can indicate to MCE/NG-RAN whether an application is using Uu-DRB or SL-DRB.

Proposal 13: Sidelink related QoE enhancement, e.g., UE can indicate to MCE/NG-RAN whether an application is using Uu-DRB or SL-DRB, is proposed for next round discussion.

3 Intermediate Round

3.1 Justification for NR QoE enhancement

5G-Advanced is designed for providing a large number of various types of new services. The enhancement of QoE management is aiming to specify the generic framework/mechanism to support QoE configuration, QoE related measurement collection and reporting, and optimizations of the radio-related parameters for various types of 5G service, including 5G eMBB service, as well as the new 5G service, i.e. AR/VR/XR, URLLC, TSN, cloud gaming, etc.

In Rel-17, the generic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement, including all relevant entities (e.g. UE, network entities), have been fully discussed in SI and WI phase. Some important features were carefully studied with lots of interests, such as RAN-visible QoE, Per-slice QoE, radio related measurements, etc. If these R17 features cannot be fully completed to standardization, the left-over issues will continue to complete in Rel-18. The NR QoE enhancement is extended to support for RRC_INACTIVE and RRC_IDLE state, e.g. for MBS service. For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed, as well as support RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

RAN3 is considering as the leading group, and RAN2 is considered as the secondary working group.

3.2 Scope for NR QoE enhancement

The objectives of this R18 NR QoE enhancement WI are summarized as below.

1. Support for new service type, such as AR, MR, MBS, IIoT/ TSN, V2X, cloud gaming etc, as well as the high mobility scenarios e.g., High Speed Trains.
 - a) The above new service types as well as defining additional metrics and functionalities of RAN visible QoE defined in R17 shall be supported.
 - b) Support RAN-visible parameters for additional service types, depending on SA4.
2. Specify for QoE configuration, measurement collection and reporting in RRC_INACTIVE and RRC_IDLE state, e.g. for MBS service.
3. Specify to support for QoE in MR-DC.
 - a) Specify the QoE configuration, measurement reporting over MN/SN, e.g. QoE configuration, measurement and reporting for both MN and SN independently.
 - b) Support RAN-visible and radio related measurement configuration, measurement reporting for MN/SN.
 - c) Specify the QoE measurement continuity in mobility scenarios in MR-DC.
 - d) Specify the alignment of QoE and radio related measurements in MR-DC.

4. Left-over features which are not included in Rel-17 normative phase.

Note1 : If there are any left-over issues in R17, these features shall be supported to continue to complete them in R18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI.

Note2 : If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1/CT3.

Moderator's proposal: Discuss the text provided in the above draft WID.

Please provide your views in the feedback form.

Feedback Form 10: Comments on the draft WID

1 – China Unicom

Agree with the moderator for the objective.

1. As 5G new introduced service types are very important for 5G-Advanced, R18 QoE enhancement need to extend R17 framework/mechanism to support more types of 5G service, such as cloud gaming, XR, IIoT, TSN, etc. For RAN Visible QoE enhancement, this is related with 5G service type for RAN optimization to improve user service experience.
2. QoE configuration, measurement collection and reporting in RRCINACTIVE and RRCIDLE state for certain service type should be supported, such as MBS, and the QoE configuration and reporting framework/mechanism should be define.
3. For MR-DC QoE enhancement, this architecture is widely deployed and this should be supported in R18. For more details, it need to support QoE mechanism for both MN and SN, the cooperation of MN and SN to reporting QoE report and RAN side optimization for certain service type.
4. R17 NR QoE WI left-over features should be treated in high priority if there is any left.

2 – MediaTek Inc.

RAN2 Chair:

I am somewhat worried about the mentioned collection of radio measurements.

Q1: Is the intention to collect by QoE signalling mechanism measurements that can also be collected by MDT? We usually try to avoid such overlaps, to avoid double work and avoid a confusing product.

Q2: Regardless if there is a current overlap, maybe we need to think about the future as well. Is there a need for architectural principles QoE vs MDT? i.e. addressing what is collected by which mechanism, and if the plan is indeed to have overlap, for which cases or reasons such overlap is justified?

Q3: What is the Alignment of QoE and Radio related measurements? is it about the ability do correlation? if so, is this then a SA5 matter? e.g. to specify a common correlation ID that can be used together with time stamps?

I also wonder about RAN visible QoE:

Q4: Shall RV QoE collection now be adopted for ALL cases of QoE? If no is there a selection process with selection criteria in this work? Which purposes shall be addressed for the RV QoE (would be good to mention in the WID if possible)? If yes, why don't we then change the architecture in the ongoing R17 to make all QoE reporting visible to gNB?

Any views?

3 – Motorola Mobility UK Ltd.

To 1): We wonder about IIoT/ TSN, V2X, cloud gaming and high-speed train scenarios. Why do they need to be supported by QoE? Can't they better be supported by MDT?

To 2): We can further clarify that we target MBS broadcast service and leave multicast service FFS.

To 3): We prefer to focus on NR-DC instead of MR-DC.

To 4):

- To Note 1: We suggest to replace „shall be supported to continue ...“ by „can be considered to continue ...“ Reason: If a R17 QoE subfeature cannot be completed in a stable manner then it should be better moved to R18. It makes no sense to specify an incomplete and instable subfeature in R17.
- To Note 2: How is CT3 affected by QoE? We don't recall any LS exchange with CT3 for LTE/NR QoE in the past.

4 – MediaTek Inc.

First, we understand that QoE is for application layer measurement so we would like to clarify (with a Note) in a WID that “no new radio related measurements is introduced for QoE”.

For objective 3 (MR-DC QoE), it is unclear why the QoE measurement should be MN/SN differentiated ? We think that QoE is agnostic to MR-DC architecture. As also commented by other companies, the benefit to report QoE to SN is unclear. We think this objective is not needed.

For objective 2 (IDLE/INACTIVE mode QoE), we wondering that whether this is for MBS only ? If that is the case, should we wait the Rel-18 MBS conclusion on whether multicast in IDLE/INACTIVE is supported?

5 – China Unicom

As the rapporteur of R17 NR QoE WI, our clarifications for RAN2 chair comments are as below:

Q1: Is the intention to collect by QoE signalling mechanism measurements that can also be collected by MDT? We usually try to avoid such overlaps, to avoid double work and avoid a confusing product.

A1: NR QoE measurement is used to collect application layer QoE measurement result which is different from MDT measurement. There is no overlap of signaling-based QoE measurement and MDT.

Q2: Regardless if there is a current overlap, maybe we need to think about the future as well. Is there a need for architectural principles QoE vs MDT? i.e. addressing what is collected by which mechanism, and if the plan is indeed to have overlap, for which cases or reasons such overlap is justified?

A2: The answer is the same as Q1.

Q3: What is the Alignment of QoE and Radio related measurements? is it about the ability do correlation? if so, is this then a SA5 matter? e.g. to specify a common correlation ID that can be used together with time stamps?

A3: The purpose of alignment of QoE and radio related measurements is used for post processing in OAM and gNB side which is still discussed in R17. This is related with SA5, but RAN3 is discussing whether to specify the correlation ID or other solutions.

Q4: Shall RV QoE collection now be adopted for ALL cases of QoE? If no is there a selection process with selection criteria in this work? Which purposes shall be addressed for the RV QoE (would be good to mention in the WID if possible)? If yes, why don't we then change the architecture in the ongoing R17 to make all QoE reporting visible to gNB?

A4: If I understand correctly, "for ALL cases of QoE" refer to all service type, I think the new 5G service type in R18 should be discussed case by case for supporting RAN visible QoE report, this is related with SA4.

According to R17 QoE WI, not all QoE reporting metrics are useful for gNB, so there is no need to make all QoE reporting visible to gNB.

6 – ZTE Corporation

We are in general fine with the justificatoin & Objective part. In addition, would share the view to take NR-NR DC instead of MR-DC.

7 – Nokia

We have the following comments/suggestions:

- Bullet 1: We are fine with the list of new service types but this will be decided by SA4, so the "depending on SA4" should be moved up from sub-bullet 1b to the main bullet. Also, sub-bullet 1a seems redundant with other text, so nothing seems lost if it is deleted.
- Bullet 2: The "e.g." should be deleted in order to be precise, i.e. the bullet applies only to MBS (any other service requires further discussion).
- Bullet 3: We are not clear on the need for 3a or 3c.

- Note 2: We don't think CT3 should be explicitly mentioned (the list is anyway "e.g." and does not preclude other WGs than the main ones: SA4/SA5/SA2/CT1).

8 – China Mobile Com. Corporation

We are generally fine with the proposal, with some suggestions on wording:

- Bullet 1 a) seems more like the justification than an objective, and it seems overlapping with 1b), so we suggest the following rewording:
 - 1. Support for new service type, such as AR, MR, MBS, IIoT/ TSN, V2X, cloud gaming etc, as well as the high mobility scenarios e.g., High Speed Trains. Support RAN-visible parameters for additional service types, coordination with SA4 is needed.*
- Our understanding is that NR QMC in RRC Idle/Inactive would be one of the main objectives in R18, so it would be better to provide more details in Objectives so that we can better evaluate our work in R18:
 - 2. Specify for QoE measurement in RRC_INACTIVE and RRC_IDLE state, e.g. for MBS service.*
 - a) Specify the QoE measurement configuration, collection and reporting, including both legacy QoE and RAN Visible QoE.*
 - b) Specify the mechanism to support alignment of radio related measurement and 'logged' QoE reporting.*
- Regarding bullet 3b, we assume that there's no need to mention radio related measurement here, since the configuration and reporting of radio related measurement can be covered by existing mechanism/other bullets such as 3a and 3d. So the proposed rewording would be:
 - 3. Specify to support for QoE in MR-DC.*
 - ...
 - b)Support RAN-visible measurement configuration, collection and reporting for MN/SN.*

Regarding Qs raised by RAN2 Chair, we share similar view with answers by China Unicom.

9 – Samsung R&D Institute UK

We have below comments for draft WID

1. Service types and scenarios

We are fine to support new services including AR, MR, MBS and cloud gaming, as long as SA4 defines. We are also fine to support the high speed scenario. But we don't think IIoT/TSN or V2X stands for one kind of service types which can be defined by SA4, there may be many kinds of service types in TSN and V2X, we prefer to just consider the service types that defined by SA4 in R18.

The service types for RVQoE should be further discussed whether RAN visible is needed or not.

2. Specify for QoE configuration, measurement collection and reporting in RRCINACTIVE and RRCIDLE state, e.g. for MBS service

We strongly support this, we assume this is only for MBS in R18

3. QoE in MR-DC

For the bullet "Specify the QoE configuration, measurement reporting over MN/SN," in the 1st round discussion, we couldn't find clear benefit from this. Therefore, we still have doubt for configuration/report via SN.

For the bullet "Support RAN-visible and radio related measurement configuration, measurement reporting for MN/SN.", is it a typo by including "and radio related measurement" in this bullet? if not, could moderator please clarify what does this bullet mean, is it for the alignment or something else.

If it's for RVQoE or the alignment of radio related measurements and QoE, MR-DC can be considered.

10 – Qualcomm Technologies Int

1. On the support for new service types, we are not sure whether SA4 has even discussed and defined QoE metrics for IIoT/ TSN, V2X, cloud gaming in Rel-17. Even if SA4 defines QoE metrics for these service types in Rel-18, it will be difficult for RAN3 to identify RVQoE metrics in parallel with SA4 work. We therefore propose to mention only AR/MR/XR in scope and leave it open for other service types e.g., by saying RAN3 can support other service types in future by TEIs. Also we are not clear on why we need any QoE enhancements for high mobility scenarios e.g., High Speed Trains.

2. Regarding the support for QoE in MR-DC, we have the following comments:

- As QoE are intended for application layer measurements, there is not much motivation for MN and SN to both configure QoE at a UE i.e., only single QoE configuration should be configured at the UE at a given time. This could be similar to the Rel-17 agreement on allowing just one logged MDT configuration for a UE in MR-DC.
- Further it can be seen whether there is benefit to have independent RVQoE configurations by MN and SN and how to handle the scenario where management based QoE configuration is received independently on the SN.
- Bullets 3c/3d should be considered as part of the scope only after consensus on bullet 3a/3b. Propose to reword bullet 3 as follows:

3. *Specify the handling for QoE in MR-DC i.e.,*

a) Specify whether and how to handle the scenario where management based QoE configuration is received on SN e.g., whether SN can configure QoE to UE independently without MN involvement or whether SN should propagate the QoE configuration to MN which should configure the UE or some other handling

b) Specify whether and how to support independent RAN-visible QoE configuration and reporting for MN and SN

NOTE 1: Only single QoE configuration should be configured at the UE at a given time i.e., MN and SN should not configure QoE simultaneously.

11 – Intel Deutschland GmbH

- Objective 1: For objective 1a), as responded in initial round, we think AR/MR for RAN visible QoE should be studied after Rel-18 XR concluded how to support XR in NG-RAN. Besides, for V2X, we are wondering whether SA4 has QoE measurement requirement defined for these use cases. It would be good to focus on service types which are already supported/defined by SA4 first.
- Objective 2: As proposed by moderator's summary Proposal 7, we think QoE for MBS, especially for *RRCIDLE and RRCINACTIVE* UEs should be studied after Rel-18 MBS WI.
- Objective 3: Considering the TU of Rel-18 WI, we think it would be good to focus on NR-DC only. Also see our comment in next question.
- Objective 4: Agree.

12 – Huawei Technologies France

We have some comments on the wording of some bullets:

- i) 1.a) maybe there is no need to have “RAN visible QoE” here, since it was reflected in 1.b);
- ii) 3.a) suggest to delete “independently” here, since we are not sure if the coordination between MN and SN may be needed or not;
- iii) 3.b) ok, but the concrete measurement details could also be discussed in SON/MDT WI, but this could be left for further check during WI phase; radio link related info should also be considered here, suggest to update “Support RAN-visible and radio related measurement/radio related information configuration, measurement reporting for MN/SN.”
- iiii) for others, we are in general fine.

13 – CATT

We are generally fine with the objectives. Several small comments are as below:

- 1) For the first bullet, we propose to not list all the service type. Instead, we could state that Support for new service type defined by SA4, since the metrics is always defined in SA4.
- 2) For the bullet on MR-DC, we propose to remove the e.g. in sub-bullet a) considering there is no requirement for the application layer to differentiate MN and SN.

14 – Ericsson LM

Regarding the **WI Justification**:

- Some of the service types listed above are quite broad (“umbrella-like”, such as XR, V2X, IIoT), covering a large number of sub-services. Hence, at the beginning of the WI, we need to determine specific sub-services within these broad service types that should be supported. We notice that the list of candidate services to be supported has grown a lot, so perhaps some downscoping is needed.
- We think that at least basic mechanisms for RAN-visible QoE and the radio related measurements with QoE measurements should be specified in Rel-17. So, we propose to remove “RAN-visible QoE” and “radio related measurements” from the text that questions their specification in Rel-17 (“*Some important features were carefully studied with lots of interests, such as RAN-visible QoE, Per-slice QoE, radio related measurements, etc. If these R17 features cannot be fully completed to standardization, the left-over issues will continue to complete in Rel-18*”).
- The MBS support for *RRCIDLE* and *RRCINACTIVE* is still being discussed in the context of Rel-18 WID content. Let us wait for the outcome of that before we include this in the WID. So, we should remove this for now.

Regarding the **WI Objectives** (the numbering below mirrors to the numbering of objectives):

- 1. Some of the service types listed above are quite broad (“umbrella-like”, such as XR, V2X, IIoT), covering a large number of sub-services. Hence, at the beginning of the WI, we need to determine specific sub-services within these broad service types that should be supported.

We propose to rewrite

“Support for new service type, such as AR, MR, MBS, IIoT/ TSN, V2X, cloud gaming etc, as well as the high mobility scenarios e.g., High Speed Trains.”

to

“Support for new service type, such as AR, MR, MBS, IIoT/ TSN, V2X, cloud gaming etc, also combined with high mobility scenarios e.g., High Speed Trains.”

2. The MBS support for *RRCIDLE* and *RRCINACTIVE* is still being discussed in the context of Rel-18 WID content. Let us wait for the outcome of that before we include this in the WID – let us remove this part for now.

3. Our view:

a) We are concerned about the feasibility and complexity of configuration and reporting for MN and SN independently, since it would need to be distinguished at the App level which leg is used for which part of the App session. So, the focus should be on how to deliver the QoE report (in one piece, pertaining to the entire App session) over the “other” leg when the node terminating the leg configured for reporting is in overload. We propose to rewrite the bullet to: “*Specify the QoE measurement reporting over the other DC leg when the network node configured with receiving the reports is in overload*”.

b) We propose to rewrite the bullet to “Support RAN-visible and radio related measurement configuration, measurement reporting in NR-DC scenarios.”

c) Agree

d) Agree

4. We propose to change the Note 1, by changing “shall” to “may”. For Note 2, we wonder why CT3 should be involved?

3.3 Open issues

Moderator’s proposal: Companies are invited to provide the justifications for each open issues for understanding their motivations in the feedback form. Companies can provide their additional inputs for the scope with the justification descriptions in the feedback form.

1. Whether to support the inter-system mobility and inter-RAT handover in R18.
2. Whether to support per-DRB or per-interface (MN or SN) QoE configuration and reporting for MR-DC.
3. Whether to support sidelink related QoE enhancement, e.g., UE can indicate to MCE/NG-RAN whether an application is using Uu-DRB or SL-DRB.
4. Whether to focus on NR-DC only and exclude other scenarios for MR-DC.

Feedback Form 11: Comments on open issue

1 – China Unicom

China Unicom comments:

1. We think inter-RAT as well as inter-system mobility are very useful for QoE enhancement because most operators will deploy NR and LTE, and they will coexistence for quite a long time. From our view, the inter-RAT and inter-system enhancement will bring some advantages for operator network optimization and maintenance. To ensure the QoE reporting continuity, it would be beneficial to discuss on how to support the interoperability between NR and LTE for QoE reporting. If time allowed in R18, we think inter-RAT inter-system mobility for QoE should be considered. 2. For MR-DC, in our view, if per-slice QoE can be supported in R17, per-DRB QoE configuration and reporting will be supported, and if the QoE configuration and RVQoE configuration can be configured and reported separately for MN and SN, per-interface QoE will be supported.

2 – China Unicom

Motorola Mobility UK Ltd. comments:

To 1) LTE QoE functionality is limited to streaming and MTSI services. Furthermore, various QoE functionalities have been specified by SA5 for LTE which are currently not supported in LTE AS (e.g. pause/resume). Therefore, support of inter-system mobility and inter-RAT handover in R18 would require that LTE QoE is on par with NR QoE. But this would require significant updates to LTE QoE and workload for RAN2/RAN3. We wonder whether there is a real interest for it.

To 2) We would be ok with the per-interface (MN or SN) QoE configuration and reporting for NR-DC. But we are hesitant about the per-DRB option. What is the use-case and value of it?

To 3) We wonder about the value of this reporting.

To 4) We prefer to focus on NR-DC, see comments to bullet point 1) above.

3 – China Unicom

ZTE Corporation comments:

1:) LTE QoE is quite different from NR QoE in terms of Services, Activation/Deactivation procedure, alignment of radio related measurement. Take radio related measurement as an example, to support inter system QoE would mean LTE node needs to consider radio related enhancement otherwise the data analysis is hard to enforce between LTE and NR.

2:) per-DRB configuration seems to benefit RRM in case of RVQoE, but more clarification is needed.

4 – China Unicom

Nokia comments:

We don't see any compelling need for the above 4 items. Regarding #1, this requires QMC support on the LTE side which may not be available in UEs. Regarding item #3, this does not seem like QoE since it is more access stratum oriented than application layer.

5 – China Unicom

Samsung R&D Institute UK comments:

For inter-system mobility and inter-RAT handover, it can be deprioritized.

For per-DRB or per-interface (MN or SN) QoE configuration and reporting for MR-DC, we prefer to deprioritize this.

For sidelink related QoE enhancement, it can be discussed after we reach a stable and complete solution for normal NR system. Too early to discuss it now.

For focus on NR-DC only, we agree to focus on NR-DC only if DC is considered in some features such as RVQoE and the alignment of MDT and QoE.

6 – China Unicom

China Mobile Com. Corporation comments:

Regarding bullet 1-3, our understanding is that these topics are more like the future work potentially in e.g. R19, since the scope discussed in section 3.2 for R18 has already been rich enough. And we are not sure whether we can complete all these topics if we also involve bullet 1-3 in R18.

Regarding bullet 4, we think it is still a little early to scope out other MR-DC scenarios. As a way forward, we can start with NR-DC case.

7 – China Unicom

Qualcomm Technologies Int comments:

1. OK to have in scope the handling of QoE during inter-system mobility and inter-RAT handover.
2. Whether to support per-DRB or per-interface (MN or SN) QoE configuration and reporting for MR-DC is related to QoE support for MR-DC and whether DRB related information should be part of RVQoE report. I think we can discuss this topic in that scope.
3. Open issue #3 is on whether to support sidelink related QoE enhancement, e.g., UE can indicate to MCE/NG-RAN whether an application is using Uu-DRB or SL-DRB. The motivation is that an application can use either the Uu link (MN Uu DRB or SN Uu DRB) or a sidelink connection (i.e., a SL-DRB) based on sidelink URSP rules and legacy URSP rules. If this can be distinguished (whether Uu or PC5 link is being used) via QoE reports, this can help finetune either Uu DRB or SL DRB configurations appropriately while optimizing QoE. Spec impacts can include either some kind of indicator in QoE report or AS-APP interactions to correlate QoE report with DRB information.
4. First, we need to finalize on the scope of QoE support for MR-DC. QoE support for NR-DC can be the highest priority followed by EN-DC. NE-DC and NGEN-DC can be deprioritized.

8 – China Unicom

Intel Deutschland GmbH comments:

- Open issue 1: Considering the TU of Rel-18 WI, we think inter-system and inter-RAT mobility is low priority.
- Open issue 2: We think these aspects can be further discussed during WI phase.
- Open issue 3: We prefer not to include sidelink related QoE enhancement in R18 scope, as it is not clear what use case scenario QoE measurement is needed. We prefer to focus on use cases (with QoE measurement) defined by SA4 first.
- Open issue 4: During initial round, it was asked about QoE support in MR-DC with 5GC, where EN-DC is not in the scope of the discussion. Among different MR-DC deployment options with 5GC, NR-DC receives more interests in real deployment, compared to (NG)EN-DC and NE-DC. Additionally, for EN-DC, (NG)EN-DC and NE-DC, it is desired to avoid specification impact to LTE. Hence, we propose to focus on NR-DC only and this should also be reflected in Objective 3 listed in section 3.2.

9 – China Unicom

Huawei Technologies France comments:

For 1, in our understanding, the issue is mainly about whether QoE measurement task and QoE report should be kept during inter-system or inter-RAT handover process, maybe we could update the bullet like “support the continuity of QoE measurement task during inter-system or inter-RAT handover process”?

For 2, Agree to support per-interface (MN or SN) QoE configuration and reporting for MR-DC. In our understanding, the MN/SN do not know the service type of each DRB. Therefore the per-DRB QoE configuration is not needed.

For 3 and 4, We agree to support the sidelink related QoE measurement, and it is also useful that RAN needs to inform application layer that some QoE measurements are done via side link but not Uu link
We think the NR node in EN-DC may also configure the QoE measurement. Therefore we think at least EN-DC could also be considered.

10 – China Unicom

Ericsson LM comments:

1. Agree

2. We propose to remove the per-interface reporting ,as explained above, i.e., to rewrite the:

“Whether to support per-DRB or per-interface (MN or SN) QoE configuration and reporting for MR-DC.”

To *“Whether to support per-DRB QoE configuration and reporting for MR-DC.”*

3. This should be of low priority, as we do not understand the benefits of the proposal. We suggest removing this point.

3.4 Moderator summary of intermediate Round and recommendation

3.4.1 Justification for NR QoE enhancement

According to comments, moderator propose to revise the justification part as below for final round discussion.

5G-Advanced is designed for providing a large number of various types of new services. The enhancement of QoE management is aiming to specify the generic framework/mechanism to support QoE configuration, QoE related measurement collection and reporting, and optimizations of the radio-related parameters for various types of 5G service defined in SA4, including 5G eMBB service, as well as the new 5G service, i.e. AR/VR, cloud gaming, etc.

Proposal 1 : removal “XR, URLLC, TSN” service.

In Rel-17, the generic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement, including all relevant entities (e.g. UE, network entities), have been fully discussed in SI and WI phase. Some important features were carefully studied with lots of interests, such as Per-slice QoE, etc. If these R17 features cannot be fully completed to standardization, the left-over issues will continue to complete in Rel-18. The NR QoE enhancement is extended to support for RRC_INACTIVE and RRC_IDLE state for MBS service. For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed, as well as support RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

Proposal 2: revoval “RAN-visible QoE” and “radio related measurements”, “e.g.” before MBS service.

RAN3 is considering as the leading group, and RAN2 is considered as the secondary working group.

3.4.2 Scope for NR QoE enhancement

For bullet 1, companies comment on 5G service types, and the common view is that SA4 will define the 5G new service for NR QoE in R18. For sub-bullet 1a), companies concern this sub-bullet is for justification and propose to removal 1a). Considering other comments in intermediate round, moderator propose to revise the bullet 1 as below.

1. Support for new service type, such as AR, MR, MBS and other new service type defined by SA4, also combined with high mobility scenarios e.g., High Speed Trains. Support RAN-visible parameters for additional service types, and the coordination with SA4 is needed.

For bullet 2, companies comment on description part. Considering other comments in intermediate round, moderator propose to revise the bullet 2 as below.

2. Specify for QoE configuration, measurement collection and reporting in RRC_INACTIVE and RRC_IDLE state for MBS broadcast service.

a) Specify the QoE measurement configuration, collection and reporting , including both legacy QoE and RAN visible QoE.

b) Specify the mechanism to support the alignment of radio related measurement and QoE reporting.

For bullet 3, companies have consensus to focus on NR-DC instead of MR-DC. As clarified by companies, the QoE is agnostic to NR-DC architecture, moderator propose to revise the bullet 3 as below.

3. Specify to support for QoE in NR-DC.

a) Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg when the network node configured with receiving the reports is overload.

b) Support RAN-visible and radio related measurement configuration, collection and reporting in NR-DC scenarios.

c) Specify the QoE measurement continuity in mobility scenarios in MR-DC.

d) Specify the alignment of QoE and radio related measurements in MR-DC.

For bullet 4, according to companies comments in intermediate round, moderator propose to revise the bullet 4 as below.

4. Left-over features which are not included in Rel-17 normative phase.

Note1 : If there are any left-over issues in R17, these features **may** be supported to continue to complete them in R18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI.

Note2 : If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1.

3.4.3 Open issue

According to comments in intermediate round, the open issue 3 is not very clear and this bullet is with less support, and open issue 4 is agreed to support NR-DC.

For open issue 1 and issue 2, **moderator propose to revise and for final round discussion.**

1. Whether to support the continuity of QoE measurement job during inter-system or inter-RAT

handover process?

2. Whether to support per-DRB QoE configuration and reporting for NR-DC?

Please provide your views whether to support adding bullet 1 and/or bullet 2 into the scope in the feedback form.

Feedback Form 12: Whether to add bullet 1 and/or bullet 2 into the scope

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3.4.4 Reply for RAN2 Chair's comments

Feedback by R17 NR QoE WI Rapporteur 's feedback (China Unicom)

Q1: Is the intention to collect by QoE signalling mechanism measurements that can also be collected by MDT? We usually try to avoid such overlaps, to avoid double work and avoid a confusing product.

A1: NR QoE measurement is used to collect application layer QoE measurement result which is different from MDT measurement. There is no overlap of signaling-based QoE measurement and MDT.

Q2: Regardless if there is a current overlap, maybe we need to think about the future as well. Is there a need for architectural principles QoE vs MDT? i.e. addressing what is collected by which mechanism, and if the plan is indeed to have overlap, for which cases or reasons such overlap is justified?

A2: The answer is the same as Q1.

Q3: What is the Alignment of QoE and Radio related measurements? is it about the ability do correlation? if so, is this then a SA5 matter? e.g. to specify a common correlation ID that can be used together with time stamps?

A3: The purpose of alignment of QoE and radio related measurements is used for post processing in OAM and gNB side which is still discussed in R17. This is related with SA5, but RAN3 is discussing whether to specify the correlation ID or other solutions.

Q4: Shall RV QoE collection now be adopted for ALL cases of QoE? If no is there a selection process with selection criteria in this work? Which purposes shall be addressed for the RV QoE (would be good to mention in the WID if possible)? If yes, why don't we then change the architecture in the ongoing R17 to make all QoE reporting visible to gNB?

A4: If I understand correctly, "for ALL cases of QoE" refer to all service type, I think the new 5G service type in R18 should be discussed case by case for supporting RAN visible QoE report, this is related with SA4.

According to R17 QoE WI, not all QoE reporting metrics are useful for gNB, so there is no need to make all QoE reporting visible to gNB.

If further clarification is needed, please provide your views in the feedback form.

Feedback Form 13: Further Q&A if needed

4 Final Round

4.1 Justification

5G-Advanced is designed for providing a large number of various types of new services. The enhancement of QoE management is aiming to specify the generic framework/mechanism to support QoE configuration, QoE related measurement collection and reporting, and optimizations of the radio-related parameters for various types of 5G service defined in SA4, including 5G eMBB service, as well as the new 5G service, i.e. AR/VR, cloud gaming, etc.

In Rel-17, the generic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement, including all relevant entities (e.g. UE, network entities), have been fully discussed in SI and WI phase. Some important features were carefully studied with lots of interests, such as Per-slice QoE, etc. If these R17 features cannot be fully completed to standardization, the left-over issues will continue to complete in Rel-18. The NR QoE enhancement is extended to support for RRC_INACTIVE and RRC_IDLE state for MBS service. For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed, as well as support RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

RAN3 is considering as the leading group, and RAN2 is considered as the secondary working group.

Please provide your views for the justification part in the feedback form.

Feedback Form 14: Comments on justification part

1 – MediaTek Inc.

The motivation to have "support QoE in NR-DC" is still not clear. The sentence "For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed" simply saying that we intend to support but does not mention why.

2 – Samsung R&D Institute UK

As many companies mentioned, the benefit from configuration/report via SN is unclear, and we already have QoE report pausing mechanism to solve the RAN overload issue. so we still have doubt on this sentence "For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed, as well as support RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.", we suggest to revise it to "For NR-DC, the enhancement to support for QoE configuration, measurement reporting over MN/SN are designed, as well as support RAN visible QoE report over MN/SN, mobility continuity, and the alignment of QoE report and MDT, etc."

3 – ZTE Corporation

We are fine with the moderator's proposal. But "RAN3 is considering as the leading group, and RAN2 is considered as the secondary working group." is not needed in justificatoin part.

4 – Verizon UK Ltd

We are in general fine with the justification proposed by the moderator.

5 – Motorola Mobility UK Ltd.

The text can be further improved (to elaborate more in detail on the features which will be supported in R17 and what will be missing) but for the time being it is ok for us to take it as baseline for drafting the WID. Further updates can be considered in accordance with the work progress in the WGs after their November meetings. We agree with the comment to remove the last sentence since this is not needed in the justification part. This is normally defined in clause „Work item leadership“ of the WID.

6 – Intel Deutschland GmbH

We are fine with the proposal.

7 – Huawei Technologies France

In general looks fine.

8 – Ericsson LM

The text mentions MBS only in the sense of *RRCINACTIVE* and *RRCIDLE* states. Should it not be stated that this is in addition to the Rel-18 support for *RRC_CONNECTED* state for MBS?

The list of supported services listed in the Justification and Objective parts should be aligned, now they are different.

We would like to leave the list of supported services open for now. We prefer that the list is not final, it can be finalized in the coming meetings.

Some services, such as AR and IIoT, could have many subtypes with different requirements and, as such, each subtype may need different metrics. We need to address this issue in the normative phase in cooperation with SA4, e.g., by selecting specific service subtypes to support.

With respect to questions from MediaTek and Samsung about the usefulness of reporting over SN, we think that overload is a very interesting case for QoE management and we should exploit the benefits of DC to deliver the reports to the network.

9 – Nokia

In order to align with the objectives, we suggest to update one of the sentences as follows: ”The NR QoE enhancement is extended to support for *RRC_INACTIVE* and *RRC_IDLE* state for MBS service in collaboration with SA4.”

4.2 Scope for NR QoE enhancement

The objectives of this R18 NR QoE enhancement WI are summarized as below.

1. Support for new service type, such as AR, MR, MBS and other new service type defined by SA4, also combined with high mobility scenarios e.g., High Speed Trains. Support RAN-visible parameters for additional service types, and the coordination with SA4 is needed.
2. Specify for QoE configuration, measurement collection and reporting in *RRC_INACTIVE* and *RRC_IDLE* state for MBS broadcast service.

a) Specify the QoE measurement configuration, collection and reporting , including both legacy QoE and RAN visible QoE.

b) Specify the mechanism to support the alignment of radio related measurement and QoE reporting.

3. Specify to support for QoE in NR-DC.

a) Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg when the network node configured with receiving the reports is overload.

b) Support RAN-visible and radio related measurement configuration, collection and reporting in NR-DC scenarios.

c) Specify the QoE measurement continuity in mobility scenarios in MR-DC.

d) Specify the alignment of QoE and radio related measurements in MR-DC.

4. Left-over features which are not included in Rel-17 normative phase.

Note1: If there are any left-over issues in R17, these features may be supported to continue to complete them in R18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI.

Note2: If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1.

Please provide your views for the scope part in the feedback form.

Feedback Form 15: Comments on scope part

1 – MediaTek Inc.

RAN2 Chair: Thanks for the reply to my previous questions. It was clarified that there will be no overlap between MDT and QoE. I still find it confusing that in the objectives QoE includes reporting of radio measurements, which is exactly the scope of MDT. Is there any possibility to make this more clear in the WID?

2 – Nokia

Objective 1: The connection between “high mobility scenarios” and the listed service types is not clear. We suggest removing high mobility scenarios (or rephrase it in a separate bullet) and cleanup objective 1 as follows:

- Support for new service type, such as AR, MR, MBS and other new service type defined by SA4. Support RAN-visible parameters for additional service types in coordination with SA4.

Objective 2: QMC in RRC_IDLE has not been studied, and multiple solutions could be envisioned (e.g. whether to reuse the same mechanism as RRC_INACTIVE, or introduce a logged MDT like mechanism, or something else). We think a short study phase for RRC_IDLE within the WI would be beneficial and could be RAN2-led (due to UE impacts).

Objectives 3c and 3d: “MR-DC” should be changed to “NR-DC”.

3 – Samsung R&D Institute UK

Proposal 1 and 4 are fine for us.

Proposal 2 is generally OK, but we're not sure whether RVQoE is needed for MBS.

For proposal 3, we suggest to remove 3 a) and 3 c), as we commented above, many companies don't see the benefits of 3 a), and regarding 3c), in case of MN change (i.e., handover) case, we understand the mechanism in single connectivity can apply to DC for QoE continuity. In case of SN change, no new mechanism is required, with our understanding that SN is not involved in QoE configuration/report (i.e., MN still has QoE configuration and UE reports QoE report to MN). And there's a typo in 3 d), MR-DC should be NR-DC.

4 – ZTE Corporation

3c): MR-DC to NR-DC

3d): MR-DC to NR-DC

4: Prefer to rephrase as "Left-over features without controversial in Rel-17 normative phase" to our understanding, not all features discussed in Rel-17 should be continue in Rel-18, only those features was agree to postpone to Rel-18 should be captured in Rel-18.

5 – CATT

Similar comments as othe companies on 3c) and 3d). Agree with ZTE that whether the leftover in Rel-17 should be included in Rel-18 depends on further discussion e.g if it is already controversial in Rel-17, then further consideration on whether it should be specified in Rel-18 is needed.

6 – Verizon UK Ltd

We are in general fine with the scope proposed here.

In 3c) and 3d) MR-DC should be changed to NR-DC. We prefer to keep both 3c and 3d.

7 – MediaTek Inc.

Unfortunately, our concern in intermediate round is not addressed. we are NOT ok with current objectives as the impact to "radio related measurement" is unclear. Could we clarify in the WID that "no new radio related measurements is introduced for QoE"? Or can proponent clarify what kind of new radio measurement is needed (and why) for QoE?

Objective 2: We are not sure how to support QoE in IDLE mode, so maybe a study phase as proposed by Nokia is needed.

Objective 3: Current description is still ambiguous. We assume that QoE reporting to MN is supported in NR-DC in R17, isn't it? So, why "support for QoE in NR-DC" ? Is the intention mainly for reporting to SN ?

The behavior "*QoE measurement reporting over the other DC leg when the network node configured with receiving the reports is overload*" could already be supported in current split SRB operation. In current split SRB configuration, the UE could already send the RRC message via both legs according to network configuration. So, what need to be improved? In short, we also think remove 3 a) could be removed as suggested by Samsung.

8 – Intel Deutschland GmbH

In general, we are ok with the proposal. Additional comments:

- Bullet 2 on QoE measurement for broadcast service, we suggest following changes to be taken into account:

Specify for QoE configuration, measurement collection and reporting in for MBS broadcast service reception in RRCINACTIVE and RRCIDLE state ~~for MBS broadcast service~~.

- Bullet 3-c) and 3-d), as summarized during intermediate phase by moderator, it should be NR-DC instead of MR-DC.

9 – Motorola Mobility UK Ltd.

On objective 2) we also think that a study phase may be needed in order to get to know how QoE in inactive/idle states should work.

On objectives 3c) and 3d) we agree with comments from other companies.

10 – China Unicom

In general, we are fine with moderator's proposals, except for the typos in 3c and 3d (Change MR-DC to NR-DC in these two sub-bullets).

1. Radio related measurement report should be specified in the SON/MDT WI. For NR-DC scenarios, RAN visible QoE report and radio related measurement report are beneficial for RAN side optimization, to align with the ongoing discussion in R17.
2. MBS broadcast service in RRCIDLE and RRCINACTIVE state should be supported, and the detailed configuration and reporting mechanisms can be further discussed in WI phase by the leading work group.

11 – Ericsson LM

Objective 1:

We propose to include possible additional RAN visible QoE metrics for services already supported in Rel17.

We propose to leave the list of supported services open for now.

Some services that were discussed, such as AR and IIoT, could have many subtypes with different requirements and, as such, each subtype may need different metrics. We need to address this issue in the normative phase in cooperation with SA4, e.g., by selecting specific service subtypes to support.

Objective 2:

The text mentions MBS only in the sense of RRCINACTIVE and RRCIDLE states. Should it not be stated that this is in addition to the Rel-18 support for RRC_CONNECTED state for MBS?

Objective 3:

a) In our understanding, the bullet means that the QoE report refers to both legs together, i.e., for a QoE measurement configuration, the measurements are not performed per leg. They are performed at the UE application layer for the session as a whole. The MN/SN aspect is related only to which leg is used to send the configuration and the report. This should be clarified in the bullet.

b) As it stands, the bullet implies that RAN visible QoE measurements are performed per leg, which we disagree with. We propose to clarify, as commented in bullet a) and to remove the word "collection".

c) It should say "NR-DC"?

d) It should say “NR-DC”?

Objective 4:

Agree.

12 – Qualcomm Technologies Int

On Bullet 1, it is not clear what new service types will be supported by SA4 in Rel-17/Rel-18 (even AR, MR and MBS are not yet defined in Rel-17 SA4 specifications) and why any enhancement is needed for high mobility scenarios. We therefore propose to reword bullet 1 as follows:

1. *Support for new service types for which QoE metrics will be defined by SA4 in Rel-17 and Rel-18. Support RAN-visible QoE parameters for additional service types, and the coordination with SA4 is needed.*

On bullet 2, as SA4 still hasn't defined QoE for MBS, so we propose to reword it as follows:

2. *Specify QoE configuration, measurement collection and reporting in RRCINACTIVE and RRCIDLE state, if SA4 defines QoE framework for MBS service.*

On bullet 3, we haven't discussed whether there is benefit in UE reporting QoE over the other DC leg when there is overload vs. using the existing pause/resume mechanism and report QoE later once overload is resolved. We therefore propose to not explicitly state this as part of the objectives and discuss this in WI phase. We propose to keep this objective as generic and reword as follows:

3. *Specify to support for QoE in NR-DC.*

a) *Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture*

Also don't see the need for bullet 3d) i.e., *Specify the alignment of QoE and radio related measurements in MR-DC.* Don't see how the alignment approaches would differ whether UE is in MR-DC or not.

4.3 Open issue related

There are two open issues left for final round discussion.

1. Whether to support the continuity of QoE measurement job during inter-system or inter-RAT handover process?
2. Whether to support per-DRB QoE configuration and reporting for NR-DC?

If any of the open issues is agreeable, please provide your comments on how to capture in the WID.

Feedback Form 16: Comments on how to add the agreeable open issue into scope

1 – Nokia

We should avoid having too many topics in the Rel-18 scope, to ensure that we have sufficient time to complete the work item. We think that the above two issues should not be included in Rel-18, but could be reconsidered in a later release.

2 – MediaTek Inc.

Similar view as Nokia. The current is already large and we prefer not to extend it to ensure the work quality.

3 – Samsung R&D Institute UK

For Issue 1, it can be supported with 2nd priority.

For Issue 2, we tend to no, as we don't think this proposal is clear, our understanding is that the QoE configuration is from OAM, OAM is not aware of the relation between the DRB and the service types, neither is gNB, we don't understand how this per DRB QoE configuration work.

4 – Verizon UK Ltd

Same view as Samsung above. We can support issue 1 with lower priority and issue 2 is not clear.

5 – Intel Deutschland GmbH

No.

For bullet 1, the TU of Rel-18 QoE is already occupied by above proposed objectives. We don't think there will be enough time to consider inter-system or inter-RAT handover for QoE measurement job.

For bullet 2, it can be discussed during WI phase. There's no need to specify it in the objective.

6 – Motorola Mobility UK Ltd.

On issue 1) we agree with others that it would overload the R18 work. Furthermore, during this email discussion some companies proposed to support inter-system/inter-RAT HO for QoE, but w/o giving explanation on the essential need.

On issue 2) we also think that the need and value of this enhancement is not clear.

7 – China Unicom

We support at least bullet 1. The reason is that inter-system/inter-RAT mobility should be supported in R18 since NR and LTE will coexist for a long time, and both NR and LTE can support the legacy QoE measurement and reporting. And we think it doesn't need to update LTE to be on par with NR, but at least legacy QoE report continuity should be supported.

8 – Huawei Technologies France

1. For inter-RAT/system, in our understanding, the issue is mainly about whether QoE measurement task and QoE report should be kept during inter-system or inter-RAT handover process, maybe we could update the bullet like "support the continuity of QoE measurement task during inter-system or inter-RAT handover process"?

2. For per-DRB QoE configuration, as commented, the MN/SN do not know the service type of each DRB. Therefore the per-DRB QoE configuration is not needed.

9 – Ericsson LM

Issue 1: This should be supported, or at least feasibility should be studied.

Issue 2: No, due to the inherent complexity and unclear use case.

10 – Qualcomm Technologies Int

1. OK to support this. Maybe we can even restrict to intra-system inter-RAT handover. Maybe we can add the following as an additional objective:

Specify the mechanism to ensure QoE measurement collection continuity during intra-system inter-RAT handovers

2. OK to discuss this as part of QoE support for MR-DC. No need to have a separate objective.

4.4 Summary and conclusion

4.4.1 Justification

For the justification part, the 5G service supported in NR QoE enhancement in R18 will be aligned with other 3GPP WGs(i.e. SA4) progress, and it is a good way to leave the list of supported service open for now. We can further refresh this part in the upcoming meeting.

For supporting the NR QoE in NR-DC architecture, there are very good progress to focus on the justification and the new case for overload may be useful for network maintainance. At this stage, there is no need to preclude for this and leave more time for further consideration in detail.

For the MBS, it is very clear for supporting RRC_INACTIVE, RRC_IDLE as well as the RRC_CONNECTED state, in collaboration with SA4.

Moderator will update the justification part according to the above feedbacks in final round.

4.4.2 Scope for NR QoE enhancement

As summarized in the justification part for final round, the list of supported services are open for further discussion in collaboration with SA4. Some other services are not listed can be further discussed if defined in SA4.

For IDLE mode case, it is not practical to have a study phase in WI or a separate SI for this bullet. It is considered as one of the objectives for supporting MBS QoE in RRC_INACTIVE, RRC_IDLE as well as the RRC_CONNECTED state, and details issues can be identified and discuss on how to support this feature. If SA4 doesn't study to define the new 5G service in R18, the types of 5G service supported in QoE will be quite limited.

For NR-DC bullet, it is more clearly to say that the QoE measurements are not performed per-leg, and the measurement is performed at the APP layer of UE side. Radio related measurement report should be considered as parts of SON/MDT WI.

Moderator will update the objective part according to the above feedbacks in final round.

4.4.3 Open issues

According to the final round comments, there is more support for open issue 1. There is some time left for the next RAN plenary, companies are encouraged to consider more details for these two scenarios.

Moderator propose to add the bullet in the scope to support the usecase of the continuity of QoE measurement job during inter-system or inter-RAT handover process.

5 Conclusion for the new WID of NR QoE enhancements

5.1 Justification

5G-Advanced is designed for providing a large number of various types of new services. The enhancement of QoE management is aiming to specify the generic framework/mechanism to support QoE configuration, QoE related measurement collection and reporting, and optimizations of the radio-related parameters for various types of 5G service defined or to be supported in SA4, including 5G eMBB service, as well as the new 5G service, i.e. AR/VR, cloud gaming, etc.

In Rel-17, the generic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement, including all relevant entities (e.g. UE, network entities), have been fully discussed in SI and WI phase. Some important features were carefully studied with lots of interests, such as Per-slice QoE, etc. If these R17 features cannot be fully completed to standardization, the left-over issues will continue to be completed in Rel-18.

MBS broadcast service has been studied in LTE and NR. It is a very important service. The NR QoE enhancement is extended to support for RRC_INACTIVE and RRC_IDLE state as well as the RRC_CONNECTED state for MBS broadcast service, in collaboration with SA4. Since MBS broadcast service should be supported, and the QoE of MBS service are need to be collected for optimization. The mechanism of how to configure and report legacy QoE and RAN visible QoE(if needed), and how to align the QoE with radio related measurement should be specified in R18.

For NR-DC, it is an important deployment scenario for operator, to ensure to provide better QoE for 5G users, the network should be aware of the quality provided by MN and SN separately, and optimize the network more effectively. R18 QoE should be enhanced to support QoE configuration, measurement reporting over MN/SN, as well as support RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

5.2 Objective

- Support for new service type, such as AR, MR, MBS and other new service type defined or to be supported by SA4, also combined with high mobility scenarios e.g., High Speed Trains. Support RAN-visible parameters for additional service types, and the coordination with SA4 is needed.
- Specify for QoE configuration, measurement collection and reporting in RRC_INACTIVE, RRC_IDLE and RRC_CONNECTED state for MBS broadcast service, in collaboration with SA4.
 - Specify the QoE measurement configuration, collection and reporting, including both legacy QoE and RAN visible QoE.
 - Specify the mechanism to support the alignment of radio related measurement and QoE reporting.

- Specify to support for QoE in NR-DC.
 - Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg when the network node configured with receiving the reports is overload.
 - Note 1: The QoE measurements are not perform for per-leg.
 - Support RAN-visible and radio related measurement configuration and reporting in NR-DC scenarios.
 - Specify the QoE measurement continuity in mobility scenarios in NR-DC.
 - Specify the alignment of QoE and radio related measurements in NR-DC.
- Left-over features which are not included in Rel-17 normative phase.
- Support the continuity of QoE measurement job during inter-system or inter-RAT handover process(FFS).
 - Note2: If there are any left-over issues in R17, these features may be supported to continue to complete them in R18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI.
 - Note3: If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1.
 - Note4: Radio related measurement report should be specified in the SON/MDT WI.

Moderator will submit the above justification and objective part for the WID of QoE enhancement for RAN plenary.

6 References

- [1] RP-212657, “Additional Guidance on RAN Rel-18 Email Discussion during October 20th to 29th”, RAN Chair.
- [2] RP-211666, ”Moderator’s summary for discussion [RAN93e-R18Prep-16] Additional RAN1/2/3 candidate topics, Set 3”, RAN2 chair (MediaTek).
- [3] RP-212608, ”RAN Chair’s Summary for RAN Release 18”,RAN Chair (Qualcomm)