[94e-27-R18-QoEEnh]
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RAN

3GPP TSG RAN#94e **RP-213507**

Electronic Meeting, December 6 - 17, 2021

Agenda Item: 8.6.3

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Title: Moderator's summary for discussion [94e-27-R18-QoEEnh]

Document for: Report

1 Initial Round

This email discussion is to discuss WID on NR QoE enhancements. A draft based on October email discussion was submitted in RP□212681 and the objectives of draft WID are provided in RP-212721 which are now uploaded in the draft folder. **For the initial round, please comment in NWM, and DO NOT add comments on the draft WID in the draft folder.**

Please take a look at the following contributions related with NR QoE enhancements.

RP□213233, RP□213171, RP□213288, RP□213406.

1.1 Justification

Please comment on justification section of the draft WID.

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.

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 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, and how to align the QoE with radio related measurement should be specified in R18.

As NR-DC is one of important commercial deployment scenarios for 5G network, it is critical to consider to extend the applicable scenarios for the enhancement of NR QoE framework. R18 QoE should 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.

Feedback Form 1: Comments on Justification section of draft WID

1 – vivo Mobile Communication Co.

For the MBS part, we prefer to simplify as follows:

MBS broadcast service has been studied in NR, which can work in RRC_INACTIVE and RRC_IDLE. To collect the QoE of MBS service for optimization, the NR QoE collection in RRC_INACTIVE and RRC_IDLE should be specified in R18.

For the MR-DC part, we prefer to simplify as follows:

As NR-DC is one of the important commercial deployment scenarios for 5G network, it is critical to consider extending the applicable scenarios for the enhancement of NR QoE framework. R18 QoE should consider supporting flexible QoE configuration and reporting by either MN and/or SN in NR-DC.

2 – Samsung R&D Institute UK

We are generally OK but there're two wording issues.

Regarding MBS, we prefer change the "MBS broadcast service" to "MBS service", which is more general, besides, the MBS multicast service in RRC*INACTIVE and RRC*IDLE state has high possibility to be supported in R18 with majority support (based on ongoing discussion in 94e-23-R18-MBS in NWM).

Regarding NR-DC, we prefer change "over MN/SN" to "in NR-DC", which is more general without any solution-like description.

So we suggest to revise the statements as below:

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 RRCINACTIVE and RRCIDLE 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, and how to align the QoE with radio related measurement should be specified in R18.

As NR-DC is one of important commercial deployment scenarios for 5G network, it is critical to consider to extend the applicable scenarios for the enhancement of NR QoE framework. R18 QoE should enhanced to support QoE configuration, measurement reporting in NR-DC ~~over MN/SN~~, as well as support RAN visible QoE report in NR-DC ~~over MN/SN~~, mobility continuity, the alignment of QoE report and MDT, etc.

3 – Motorola Mobility UK Ltd.

We suggest to revise the paragraph about MBS due to following reasons:

- MBS is currently not in the scope of R18 SON/MDT enhancements.
- The justification part can be kept generic and details can be described in the objectives part.

Therefore, we suggest to revise the description for MBS as per below:

The resource-efficient delivery of multicast/broadcast services in NR has been specified in Rel-17. From RAN perspective multicast services are supported in RRC_CONNECTED state only whereas broadcast

services are supported in all RRC states. Currently, there are no means specified which enable the network to verify and optimize the performance of broadcast services at a given location. Therefore, it is important to extend the QoE framework for broadcast services in Rel-18.

4 – ZTE Corporation

In RP□213288, the company (Nokia) provide the revision version of the justification part, which fine to us.

Copied here for easy reference:

The detailed objectives of the work item are as follows:

· Support for new service type, such as AR, MR, MBS and other new service type defined or to be supported by SA4. Support RAN-visible parameters for additional service types, and the coordination with SA4 is needed [RAN3, RAN2].

· 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 [RAN3, RAN2].

− 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 [RAN3, RAN2].

− Specify the QoE configuration and measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg (if needed).

Note 1: The QoE measurements are not performed 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 [RAN3, RAN2].

· [Support the continuity of QoE measurement job during inter-system or inter-RAT handover process] [RAN3, RAN2].

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 are to be decided at RAN#95.

Note3: If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1.

Note4: Radio related measurement report, if any, should be specified in the SON/MDT WI.

5 – Ericsson LM

First, we propose the following simplification to the Objectives text (removing some redundancies and grouping the parts that belong together):

- The Rel18 work on QoE management is aiming to introduce enhancements to the existing NR QoE framework and to introduce the support for additional services, such as AR, MR, cloud gaming, as well as the support for RRC*INACTIVE and RRC*IDLE for the MBS service.

- In Rel-17, the basic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurements have been specified. The features, including the enhancements of the specified features that were discussed but not completed in Rel-17 should be discussed in Rel-18.

- As NR-DC is one of important commercial deployment scenarios for 5G network, it is critical to support it in the NR QoE framework. Rel-18 QoE should therefore address the support for QoE configuration, measurement reporting over MN/SN, support for RAN visible QoE reporting over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

On top of the above, we have the following comments:

- We propose to include IIoT/TSN to the list of new services to be supported.
- For NR-DC, we disagree with Samsung's proposed change to delete "MN/SN" – using the other leg for reporting has been discussed since the SI, and this is one of the main motivations for considering the NR-DC scenario.

6 – Intel Deutschland GmbH

We agree with the justification.

7 – Apple AB

Looks good to us.

1.2 Objective 1

The proposed objective 1 is the following below:

– *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[RAN3, RAN2].*

Please add your comments on objective 1.

Feedback Form 2: Comments on Objective 1

1 – vivo Mobile Communication Co.

The proponent shall clarify why high mobility scenario needs to be emphasized as the QoE shall be irrelevant to the scenario. If the motivation is not clear, then we prefer to remove ", also combined with high mobility scenarios e.g., High Speed Trains".

2 – Samsung R&D Institute UK

The description looks fine.

3 – Qualcomm Technologies Int

We do not think the inclusion of high mobility scenarios has been justified or studied , and have already made this comment. Hence we prefer not to include unclear objectives, and therefore remove "also combined with high mobility scenarios e.g., High Speed Trains".

4 – Motorola Mobility UK Ltd.

We agree with others that the part about „high mobility scenarions“ can be removed since it is not clear why such combination is needed. Furthermore, it gives the wrong impression that Rel-17 NR QoE does not support high mobility scenarios.

5 – Huawei Technologies France

we also failed to understand the ”high speed train” description, suggest to remove, as we already commented, application layer will not know the moving speed, if we would like them to be aware of such status, we may need to discuss the ”radio related information” which is still of no consensus in R17 now.

6 – Ericsson LM

High speed mobility scenario is of high commercial interest. Maintaining the sufficient QoE in such scenarios can be challenging due to the specificities of high-speed train deployments (i.e., High Speed Data Network). For example, in these scenarios, handovers are frequent and fast, potentially hundreds of UEs need to be handed over simultaneously, which may have a strong impact on the QoE.

7 – ZTE Corporation

The scenario ”*High Speed Trains* ” is still unclear to us. Because application layer does not aware this scenario. Based on the co-related radio related measurements (MDT), the MCE can identify the mobile UE in a high speed train. The location information in the MDT reports can be leveraged for this purpose.

8 – MediaTek Inc.

After checking XR SID/WID, we think that ”AR/MR” reference should be removed. The XR work should be initialed by XR WID/SID. If ANY measurement for XR is needed this must first be concluded by XR (See objective 5 in XR SID/WID). Therefore, to avoid duplicate work, we strongly recommend to add the following Note in the WID.

NOTE: any work on XR is subject to conclusion in XR SID/WID

9 – CATT

We share the simialr veiw with others on the high speed train sceanrio.We perfer to not include this part.

10 – Intel Deutschland GmbH

In general, we are ok with the objective 1. For High Speed Train, we share the similar view with other companies that it is not clearly defined. It would be good to either remove it or to provide more detailed requirement to HST as the new scenario, as it is not defined by SA4 as a service type. Besides, if HST is included as a new scenario for QoE, we also wonder whether HST is only supported in RV QoE and metrics will be decided by RAN, considering SA4 has not defined QoE metrics for HST?

For XR, we share the same view with MediaTek that QoE work on XR is subject to the conclusion in Rel-18 XR SI/WI.

11 – Nokia

We agree that ”*also combined with high mobility scenarios e.g., High Speed Trains*” is unclear and should be removed from the objective.

12 – Apple AB

We also think that ”high speed trains” can be removed.

1.3 Objective 2

The proposed objective 2 is the following below:

- *Specify for QoE configuration, measurement collection and reporting in RRC_INACTIVE, RRC_IDLE and RRC_CONNECTED statestate for MBS broadcast service, in collaboration with SA4[RAN3, RAN2].*
  - *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.*

Please add your comments on objective 2.

Feedback Form 3: Comments on Objective 2

1 – Guangdong OPPO Mobile Telecom.

In our opinion, for the RRC*connected state, the QoE measurement collection/configuration job shallbe supported in R17, could the moderator please clarify the intention/reason of including the MBS in the RRC*_Connected state in the Objective?

2 – China Unicom

To OPPO Oct. email discussion, companies propose that *RRC_INACTIVE, RRC_IDLE* for MBS should be stated that this is in addition to the Rel-18 support for *RRC_CONNECTED* state for MBS. If there is no potential enhancements for MBS in *RRC_CONNECTED* state, we can focus on *RRCINACTIVE, RRCIDLE* for MBS. This is depending on RAN plenary discussion.

3 – China Unicom

Modarator proposal: According to appendix 2 in RP-213469, the 2nd sub-bullet is updated as

”**Specify the mechanism to support the alignment of <u>the existing</u> radio related measurement and QoE reporting**.”

4 – vivo Mobile Communication Co.

The QoE for MBS in RRC_CONNECTED state has been included in Objective 1. Therefore, we prefer to focus on RRC_INACTIVE and RRC_IDLE in this objective.

5 – Samsung R&D Institute UK

We support this objective. Just one small typo “*~~state~~state for MBS broadcast service*” needs to be fixed.

6 – Qualcomm Technologies Int

We support this objective.

7 – Motorola Mobility UK Ltd.

We support this objective in general (listing all RRC states for broadcast service) but think that the below subbullet should be set in brackets for now and we need to wait for the discussion/decision for the SON/MDT WI since MBS is currently not in scope of the R18 draft SON/MDT WI.

- *Specify the mechanism to support the alignment of radio related measurement and QoE reporting.*

8 – LG Electronics Polska

The QoE configuration and reporting RAN2 has specified in R17 is applicable to MBS broadcast service in RRC_CONNCTED.

Considering the QoE results are reported via SRB4 with the lowest priority, we think the intention of the objective is not to facilitate the QoE configuration/reporting in IDLE/INACTIVE.

We need to discuss only the measurement collection in IDLE/INACTIVE to support the QoE measurement for MBS broadcast service in IDLE/INACTIVE.

9 – Huawei Technologies France

In general we are fine, but for the RAN visible QoE value, maybe we just need to focus on CONNECTED state, since the RAN visible QoE is used to optimize the scheduling which mainly applies to CONNECTED state.

10 – Ericsson LM

Same view as Vivo and OPPO

We are also OK with the update of the second sub-bullet as proposed by CU.

11 – ZTE Corporation

Same view as Vivo and OPPO& Ericsson.

12 – CATT

We also think that MBS for connected UE has already been coverred by the first bullet and we could focus on Idle/Inactive UE here

13 – Intel Deutschland GmbH

We are ok with objective 2.

14 – Apple AB

Looks good.

1.4 Objective 3

The proposed objective 3 is the following below:

- *Specify to support for QoE in NR-DC[RAN3, RAN2].*
    - *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.*

Please add your comments on objective 3.

Feedback Form 4: Comments on objective 3

1 – China Unicom **Companies are invited to check whether the 1st sub-bullet is it already supported currently? If so, this bullet can be removed.**
2 – vivo Mobile Communication Co. Sub-bullet one can be simplified as: Specify flexible QoE configuration and reporting by either MN and/or SN in NR-DC. For the other sub-bullet, proponent shall clarify the difference between DC and SA.
3 – Samsung R&D Institute UK Regarding the first sub-item, i.e. QoE reporting over SN when overload, although the pause/resume mechanism is considered to solve the QoE reporting issue when RAN overload, it is possible that the cached QoE report may be discarded due to UE's low storage budget or the release request from gNB. So we are open to further study QoE reporting over SN.
4 – Qualcomm Technologies Int We would in addition ask to clarify the scope of the 3rd sub-bullet ("*Specify the QoE measurement continuity in mobility scenarios in NR-DC* "). Is this referring to QoE context transfer source MN- target MN, or something else ?
5 – Motorola Mobility UK Ltd. On the 1st subbullet: In Rel-17 we support NR QoE in standalone mode, so it's our understanding that QoE is supported for MN only in case of NR-DC.
6 – LG Electronics Polska The QoE reporting to SN can be useful, but we can see no benefit of QoE configuration over SN.
7 – Huawei Technologies France looks fine to us, but as also commented, we would like to have EN-DC as well, since it is straight forward way to just reuse what is concluded in NR-DC.

8 – Ericsson LM

The first sub-bullet is **not** currently supported. For example, the reports cannot be forwarded from SN to MN when the reporting leg is switched.

We propose the following edits:

- Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg in order to maintain the reporting continuity at overload.

- Insert "QoE" after "RAN visible" in the second sub-bullet.

Regarding Vivo's question on 2nd sub-bullet: as of today, it has not been decided whether RVQoE and legacy QoE shall be reported separately (e.g., in different messages). So, we need to make sure that RVQoE reporting can also be switched to another leg in case it is decided that RVQoE and legacy QoE can be reported separately.

Regarding Note 1, we think that the following rewording is needed:

- Note 1: The QoE measurements are not performed separately for each leg.

As per QC's question, mobility does not only comprise handovers, but also other scenarios such as, e.g., PSCell Change involving a change of SN.

9 – ZTE Corporation

Would ask clarifiation on the 3rd bullet "*Specify the QoE measurement continuity in mobility scenarios in NR-DC* ".

What is the specifcation impact for e.g "PSCell Change involving a change of SN". Does this mean the QoE measurement configuration need to be propagate to SN?

10 – MediaTek Inc.

Clarification is still needed.

For first bullet, reporting via another DC leg should already been supported based on split bearer architecture. It is not clear what to be enhanced ? Is the proposal to report the measurement to SN directly (i.e. via SRB3) ? Or is the proposal that MN will forward the QoE reporting to SN?

For 3rd bullet, we would also like ask similar question as QC and ZTE. Is the proposal on inter-node forwarding or there is change on UU interface ?

11 – CATT

Similar view with QC and ZTE,it seems the 3rd bullet is not quite clear to us.

12 – Nokia

1st sub-bullet: It is unclear why enhancement is needed for overload, since SA4 has indicated that QoE reports should not generate much load, and pause/resume enhancement is also on the table. Therefore, the first sub-bullet can be simplified to "Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture".

3rd sub-bullet: We are also unclear about what is needed. The 3rd sub-bullet should be clarified or removed.

13 – Apple AB

We do not think the first sub-bullet is currently supported. Having said that we don't see the need to super-optimize measurement configuration and reporting since these are expected to entail relatively low data rates. So we would be fine to only support only the MN (i.e., no change needed) and drop this sub-objective.

1.5 Objective 4

The proposed objective 4 is the following below:

- Left-over features which are not included in Rel-17 normative phase[RAN3, RAN2].

  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.

Please add your comments on objective 4.

Feedback Form 5: Comments on objective 4

1 – China Unicom

Considering the progress of R17 NR QoE by now, there are no Rel-17 leftover features for NR QoE WID. But some R17 enhancement should be considered, such as:

a) RAN visible QoE need to be enhanced to support more new parameters for Rel-17 service type.

b) In Rel-17, the fundamental RAN visible configuration and reporting mechanisms are defined. RAN visible QoE configuration and reporting need to be enhanced in Rel-18, e.g. event-trigger RAN visible reporting for specific service type.

2 – vivo Mobile Communication Co.

Left-over features which are not specified in Rel-17 normative phase, if needed.

3 – Samsung R&D Institute UK

We agree with this objective.

4 – Qualcomm Technologies Int

We think it may be preferable not to have an additional objective, but instead to have a general note similar to Note 2, for example: "After completion of the Rel-17 NR QoE WI, WID modifications or additions may be considered taking into account the rel-17 outcome". This is business as usual, companies can propose such changes based on actual status, and these can be discussed on their merits.

5 – Motorola Mobility UK Ltd.

Pause/resume functionality is a potential R17 leftover feature which may need to be taken into account after RAN discussion and decision.

In general, the objectives part should be clear on what is intended to do in the WI. Therefore, we suggest to set this bullet point in brackets.
6 – Ericsson LM We propose a rewording: Left-over features from Rel-17, as well as the enhancements of existing features which are not included in Rel-17 normative phase, should be discussed in Rel-18.
7 – ZTE Corporation We are in general fine with this objective. Although at current stage, it seems there would not be much left issues at the end of R17, we can check the details by the end of R17 as mentioned in Note 2.
8 – MediaTek Inc. We are in general okay but would like to revisit it once R17 item is done.
9 – CATT We prefer to check the Rel-17 leftover at the end of Rel-17 since the dsicussion is still ongoing
10 – Intel Deutschland GmbH For objective 4, we think the left-over feature should be discussed case-by-case, rather than capturing a particular objective in Rel-18.
11 – Nokia Similar to the discussion under R18 SON/MDT, it may be preferable to wait until completion of the R17 work item (RAN#95) when leftovers can be looked at in a complete/comprehensive way. So our preference is to leave this objective as it is, for now.
12 – Apple AB Looks good for now.

1.6 Objective 5

The proposed objective 5 is the following below:

- *[Support the continuity of QoE measurement job during inter-system or inter-RAT handover process] [RAN3, RAN2]*

  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.

Please add your comments on objective 5.

Feedback Form 6: Objective 5

1 – Guangdong OPPO Mobile Telecom.

For LTE, QoE measurement job is only supported for restricted service types, compared with 5G NR. I wonder if such inter-system or inter-RAT QoE continuity will not be specified for the service types just agreed to be introduced in R17, such as XR, etc?

2 – China Unicom

Inter-system and/or inter-RAT mobility is considered to be supported since LTE and NR will coexistent for a long time. Considering the limited impact to LTE QoE, only MTSI service and streaming service supported by LTE QoE need to be supported for inter-system and/or inter-RAT mobility scenarios.

3 – vivo Mobile Communication Co.

No strong motivation to support the QoE continuity for inter-system/inter-RAt mobility, which will introduce massive spec impact.

4 – Samsung R&D Institute UK

This objective can be low priority and only for streaming service and MTSI service, which are the only two services supported in both LTE and NR.

5 – Qualcomm Technologies Int

No strong view on this, but if there is support to go in this direction, maybe scope should be limited anyway to avoid large impacts (e.g. we wonder if inter-RAT scope is sufficient).

6 – LG Electronics Polska

We wonder whether it is needed to support the continuity of QoE measurement job during inter-system or inter-RAT handover process because the service types defined in NR cannot be supported in LTE (i.e., XR).

7 – Motorola Mobility UK Ltd.

We are not convinced in having this objective even for the case of limitation to streaming and MTSI services. Furthermore, we wonder about the implications of this objective: are the QoE configurations outside the QoE configuration container valid in the other RAT and system, e.g. the QoE reference identity, RVQoE.

8 – Huawei Technologies France

we think it would be good to support at least inter-RAT mobility, it would be good to have a unified experience evaluation when UE move between LTE and NR, of cause, the service types to be supported could be discussed, e.g., MBMS service could be considered.

9 – Ericsson LM

This is OK.

10 – ZTE Corporation We would prefer to remove the support for continuity during inter-RAT/inter-system handover from R18 WI. As has been confirmed in RAN3#114-e, NR QoE would be deployed with the function separation and framework separation between QMC and Trace, which means the activation mechanism and signaling design are totally different with the LTE QoE. Thus, it would not be easy to ensure the continuity during inter-RAT/inter system handover under different mechanisms. One more concern is that the MCE of NR and LTE might not be in the same node, so it would also be a problem for MCE in different systems to perform post analysis.
11 – MediaTek Inc. As proposed in RAN Chair's summary Tdoc, we suggest to remove this objective. The motivation is not strong and SPEC change seems large.
12 – CATT Simiar view with ZTE,we prefer to remove this bullet in Rel-18
13 – Intel Deutschland GmbH Considering the limited TU, we think this objective can be deprioritized in Rel-18.
14 – Nokia The work item scope should be kept reasonable, and we are concerned that this objective has quite large impact/effort while having limited applicability. So we prefer to remove this objective.
15 – Apple AB Can be de-prioritized.

1.7 Summary of initial Round

1.7.1 Justification

There are 7 companies participating in the 1st round discussion on the justification section. For the justification part, companies focus on the wording issues, e.g. MBS service, and the justification part in RP-213288 will be merged for intermediate round discussion. Further modifications on removing some redundancies and new addition of the list of new service are needed. All the above issues will be updated for intermediate round discussion.

Moderator Proposal: Further check the update version of the justification section during intermediate round.

1.7.2 Objective

1. Objective 1: There are 12 companies participating in the 1st round discussion. Companies raise the question on the clarification to support high mobility scenario. Some companies raise the concerns that XR QoE may be related with the parallel R18 XR SI, while this part is quite closed to SA4 work as

RAN3 will follow the metrics defined by SA4.

2. Objective 2: There are 14 companies participating in the 1st round discussion. As *RRC_CONNECTED* state is supported in R17, the *RRC_CONNECTED* state is removed. Some typos and wording will be updated for next round review.
3. Objective 3: There are 13 companies participating in the 1st round discussion. Companies shows concerns on overload for sub-bullet 1, as well as sub-bullet 3. For sub-bullet 2 and 4 seems stable with some update of wording. Further discuss on whether to support EN-DC in Rel-18 during next round.
4. Objective 4: There are 12 companies participating in the 1st round discussion. Rewording for objective 4 is needed and this objective is proposed to revisit at the end of R17 (RAN#95).
5. Objective 5: There are 15 companies participating in the 1st round discussion. Companies shows concerns on service type, specification impacts to support continuity etc.

Feedback Form 7: Comments on initial round summary

1 – MediaTek Inc. On summary of objective 1, it is not clear to us what Rapporteur intend to deal with the overlapping scope with XR. Our concern remains, we think some NOTE like below is really needed. **NOTE: any work on XR is subject to conclusion in XR SID/WID** I copy the draft objective from XR SID/WID below for reference. It looks like very similar to RV-QoE. Objectives on XR-awareness in RAN (RAN2): - Study and identify the XR traffic (both UL and DL) characteristics, QoS metrics, and **application layer attributes beneficial for the gNB to be aware** of, e.g. [the QoS flow association, frame-level QoS, ADU-based QoS, XR specific QoS].
2 – Ericsson LM The summary is OK.

2 Intermediate Round

2.1 Justification

The Rel-18 QoE enhancement is aiming to introduce enhancements to the existing NR QoE framework and to introduce the support for new types of 5G services,, such as AR, MR, cloud gaming, IIoT/TSN, as well as the support for RRC_INACTIVE and RRC_ IDLE for the MBS service.

In Rel-17, the basic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement have been specified. Some important features were carefully studied with lots of interest, such as per-slice QoE, etc. If standardization work of these Rel-18 features, including the enhancements of the specified features that were discussed but not fully completed in Rel-17 will continue to complete in Rel-18.

MBS service (i.e. broadcast) 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 for MBS service in

collaboration with SA4. Since MBS service should be supported, the QoE measurement for MBS service needs to be collected for optimization. The mechanism of how to configure and report legacy QoE and RAN visible QoE measurements, and how to align the QoE with radio related measurements should be specified in R18.

As NR-DC is one of the important commercial deployment scenarios for 5G networks, it is critical to support it in the NR QoE framework. Therefore, R18 QoE should address the support for QoE measurement configuration, measurement reporting over MN/SN, as well as support for RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

Feedback Form 8: Comments on the Justification section

1 – ZTE Corporation

We propose the following changes:

- delete 'IIoT/TSN', we wonder why IIoT/TSN is added again. During the previous email discussion, it has been removed.

- some rewording on the last sentence of the second paragraph.

- some clarification on MBS service and MBS broadcast service, i.e, delete'(i.e., broadcast)' , and add '(at least broadcast)'.

- delete 'over MN/SN' for QoE configuration and reporting in NR-DC. In our mind, it should be the MN to be configured with QoE.

We provide a version with our revision here:

The Rel-18 QoE enhancement is aiming to introduce enhancements to the existing NR QoE framework and to introduce the support for new types of 5G services, such as AR, MR, cloud gaming, ~~IIoT/TSN~~, as well as the support for RRC*INACTIVE and RRC* IDLE for the MBS service.

In Rel-17, the basic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement have been specified. Some important features were carefully studied with lots of interest, such as per-slice QoE, etc. ~~If s~~Standardization work of ~~these~~ corresponding Rel-18 features, including the enhancements of the specified features that were discussed but not fully completed in Rel-17, will continue to be discussed and complete in Rel-18.

MBS service ~~(i.e. broadcast)~~ 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 for MBS service (at least broadcast service) in collaboration with SA4. Since MBS service should be supported, the QoE measurement for MBS service needs to be collected for optimization. The mechanism of how to configure and report legacy QoE and RAN visible QoE measurements, and how to align the QoE with radio related measurements should be specified in R18.

As NR-DC is one of the important commercial deployment scenarios for 5G networks, it is critical to support it in the NR QoE framework. Therefore, R18 QoE should address the support for QoE measurement configuration, measurement reporting ~~over MN/SN~~, as well as support for RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

2 – Samsung R&D Institute UK

We have two comments.

- For "MBS service (i.e. broadcast)", we suggest to remove "~~(i.e. broadcast)~~" or revise to "(i.e. broadcast and multicast)". On the initial round discussion in 94e-23-R18-MBS, it was found that all com-

panies have consensus that multicast in at least RRC*INACTIVE should be supported and included in R18 (while whether to support multicast in RRC*IDLE will be discussed in intermediate round). Accordingly, there is no need to have such restriction (i.e., MBS only for broadcast).

- For NR-DC, this 2nd sentence is almost the same as the objective, and for the wording *"configuration and reporting over MN/SN*" looks like solution options, i.e. configuration over MN and/or SN, reporting over MN and/or SN. we don't think it's a good idea to have solution-like description in justification.

So we propose to revise it as below:

Therefore, R18 QoE should ~~address the~~ support ~~for~~ QoE measurement configuration, measurement reporting in **NR-DC scenarios**~~over MN/SN~~, as well as support **the important features of NR QoE in NR-DC scenarios**, such as RAN visible QoE report ~~over MN/SN,mobility continuity,~~ the alignment of QoE report and MDT, etc.

3 – CATT

For MBS part,we have some doubt on whether multicast should be included or not. If multicast is also in the scope,tight inter-action between Rel-18 QoE and Rel-18 MBS WI is needed since support of multicast in INACTIVE(maybe also Idle)state would only be discussed in Rel-18.

4 – Huawei Technologies France

we are fine with moderator's updates to justification.

5 – MediaTek Inc.

For the last paragraph, we are not sure what's the gap in NR-DC. In Rel-17, could MN configure the QoE measurement while UE is configured in NR-DC ? We assume MN configured QoE and reporting to MN is already possible in R17, isn't it ?

6 – Intel Deutschland GmbH

We are fine with the current justification.

7 – Apple AB

We are mostly fine with this revision. We agree that there is no need to mention IIOT/TSN. The applications listed in the justification section should not be considered exhaustive.

8 – Ericsson LM

Rewording is needed, as below:

o The Rel-18 QoE Work Item is aiming to introduce enhancements to the existing NR QoE framework and to introduce the support for new types of 5G services,, such as AR, MR, cloud gaming, IIoT/TSN, as well as the support for RRC*INACTIVE and RRC* IDLE for the MBS service.

o In Rel-17, the basic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement have been specified. The features, including the enhancements of the specified features that were discussed but not completed in Rel-17 should be discussed in Rel-18.

o The MBS service (i.e. broadcast) has been studied in LTE and NR. The Rel-18 should support the QoE for RRC*INACTIVE and RRC*IDLE state for MBS service in collaboration with SA4. The mechanism for

configuring and reporting legacy QoE and RAN visible QoE measurements, and how to align the QoE with radio related measurements for the MBS service should be specified in Rel-18.

o As NR-DC is one of the important commercial deployment scenarios for 5G networks, it is critical to support it in the NR QoE framework. Therefore, Rel-18 QoE should address the support for QoE measurement configuration, measurement reporting over MN/SN, as well as support for RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE reports and MDT reports, etc.

2.2 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 [RAN3, RAN2].

Moderator Proposal: For objective 1, clarify the motivation of supporting high speed scenario, and more companies (i.e. vendors, operators, etc.) are encouraged to input their views and interests.

Feedback Form 9: Comments and justification on HST

1 – ZTE Corporation

We still don't see the need for scenarios like High Speed Trains. Can companies provide more clarification on it?

2 – China Unicom

High mobility scenario is very important for operator and the QoE report could be utilized for network optimization. NR specs support high speed up to 500km/h in FR1, and 350km/h in FR2.

3 – Samsung R&D Institute UK

We support to keep "high speed scenarios" in the objective 1 (fine to remove the "i.e. high speed trains" part), as we know that high speed scenario (including not only high speed trains, but also highways or mobility cars) is one of the most important optimization scenarios for operators, collecting QoE measurement only in the high speed scenario will be very helpful for operator to optimize targeted those special scenarios.

As per companies' concerns on "application layer is not aware moving speed", considering "high speed scenario" in QoE collection doesn't mean the application should be aware of the speed, even in my understanding application is capable to know the speed level, as the application is aware of the serving cell ID by AT command, so it is capable to identify the speed level according to the serving cell change frequency.

4 – Qualcomm Technologies Int

We would still propose to remove any mentions of "high speed". We have seen no real clarification of what this practically means for this WID. Also it was clearly far from consensual in the first round, so not sure why it is kept.

5 – CATT

If there is strong requirement from the operator to adress the high speed sceanrio,we prefer to have a separate bullet for it.It seems the requirement on high speed sceanrio is not tied with the new service type.

6 – Huawei Technologies France

We are still confused about specifically including ”high speed trains”, we also agree that high speed would affect experience, just like poor coverage would also do, but we are not clear what we would like to achieve here, since application layer is unaware of moving speed but the network is, and we are not sure what the impact on the specification is. Adding the trigger event for the QoE measurement or collecting the radio related information (e.g. the UE mobility history information)? We think RAN3 had discussed these solutions in R17. Also Why only consider the high mobility case in these new service types? say, frequent handover also have a strong impact on the QoE of R17 service types. Therefore we think it can be considered as the leftover issues, if needed (No need to add the high mobility case in the scope of R17 leftover. Companies can discuss it directly in R18 as the leftover issues).

7 – MediaTek Inc.

We have no strong view on HST part. But we do have strong concern on the XR related work. Please see our previous comment for objective 1.

8 – Nokia

We don’t see the need to explicitly mention high mobility scenarios, particularly within the objective that focuses on new service types.

9 – Apple AB

We also see no real need to mention high mobility scenarios.

10 – Intel Deutschland GmbH

Based on companies’ reply, it is still not clear to us what need to be done to support HST scenario (which is not a service type), is this objective for HST to define new QoE metrics? or the objective is to consider enhancement of QoE measurement to support different service types’ QoE measurement in HST?

For XR, we also share the same view with MTK, especially for RV QoE of XR service, which may depends on the outcome of Rel-18 XR RAN WI/SI.

11 – Ericsson LM

We notice that the companies argue that the High-speed train (HST) scenario is unclear, and that the App layer is unaware of high speed. One company also commented that this scenario is already supported in Rel-17. In our understanding, the importance of maintaining a good QoE onboard high-speed trains and the challenges resulting from the high speed are not being questioned. So, we will focus our reply only on clarifying the scenario and the claim that the scenario is already supported in Rel-17.

In our view, the HST scenario is not supported as of today, and some enhancements may be needed to support the scenario. For example, according to the current specifications, it is not possible for a network operator to collect QoE measurements only from HSDN cells deployed alongside the high-speed rails, which are aimed to serve the UEs onboard HSTs. Given that high speed trains travel long distances, it may not be feasible to provide a list of all the cells along the very long route in the configuration. Please also note that the HST scenario is not tied to any particular service, i.e., it should be supported for all services for which the QoE is supported.

- Specify for QoE configuration, measurement collection and reporting in RRC_INACTIVE, ~~RRC_IDLE and~~ RRC_IDLE state for MBS broadcast service, in collaboration with SA4 [RAN3, RAN2].
    - Specify the QoE measurement configuration, collection and reporting, including both legacy QoE and RAN visible QoE.
    - Specify the mechanism to support the alignment of the existing radio related measurement and QoE reporting.
- Specify to support for QoE in NR-DC [RAN3, RAN2].
    - **Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg in order to maintain the reporting continuity at overload.**
      Note 1: The QoE measurements are not perform separately for each leg.
    - Support RAN-visible QoE 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.

Moderator Proposal: For objective 3, further clarification are needed for sub-bullet 1 and 3 about overload, mobility. Discuss on whether could reuse the concolusion of NR-DC for EN-DC, if needed, whether to support EN-DC as well.

Feedback Form 10: Comments on sub-bullet 1 and 3

1 – ZTE Corporation

we are generally fine with the first bullet. It would be better if 'over MN/SN' can be removed, as we commented above, it should be MN that is configured with QoE.

For the third bullet, we think firstly the 'mobility scenarios' needs to be further clarified, and then the corresponding enhancement can be considered if needed.

In our understanding, the mobility scenarios in NR-DC include:

- inter MN handover without SN change

- inter MN handover with SN change

- SN change

Considering the MN handover, the mobility solution in SA architecture can be applied, so maybe no more enhancement is needed. When it comes to SN change, if our understanding is right, when the source SN is changed to the target SN, the target SN should be notified to be prepared for QoE reporting, e.g., set up 'SRB5', in the case that QoE reports are propagated to SN. In such case, enhancement is needed and we can agree with the bullet. We wonder companies views on our understanding.

2 – China Unicom

For sub bullet one, in our perspective, overload need to be supported, and SA5 already defined the RAN overload high level use case. QoE configuration, measurement reporting over MN/SN for NR-DC architecture should be supported in R18.

For sub bullet three, since the QoE report will be transferred by MN or SN, and the SN will keep the QoE context, so it need to support the QoE continuity in mobility scenarios for MN change and SN change.

3 – Samsung R&D Institute UK

For MBS,

- As we commented in Justification section, we propose to use ”*MBS service”* rather than ”*MBS broadcast service”* in objective 2.

For NR-DC,

- For the 1st bullet in NR-DC, we support this and prefer the original wording with a simplified version like “Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg at overload.”
- For the 3rd bullet in NR-DC, we only see DC-specific impact relating to QoE measurement reporting continuity, so we propose to revise it to “Specify the QoE measurement **reporting** continuity in mobility scenarios in NR-DC.”
- Regarding EN-DC, we perfer not consider it in R18, because the solution for NR-DC is not clear, it’s hard to say we could reuse the concolusion of NR-DC for EN-DC.

4 – LG Electronics Polska

For the first bullet, we also think QoE doesn’t need to be configured by SN. Furthermore, it is already possible to use SCG to report the QoE result, e.g. using MN terminated SCG bearer.

For the third bullet, if QoE cannot be configured by SN, there would be no issue for mobility in NR-DC.

5 – Qualcomm Technologies Int

We subscribe to the comments / questions about the 3rd bullet as made by ZTE and others; this is still unclear.

For EN-DC maybe this could be a ”if time permits after MR-DC, and if possible by mapping MR-DC mechanisms” type of objective?

6 – Huawei Technologies France

1. As commented in the first round, we think the RAN visible QoE should not apply to the QoE measurement in RRC*IDLE/RRC*INACTIVE.

2. For EN-DC, we could take MDT as an example. In the MDT, both the MN and SN can configured the management based immediate MDT. For the same reasons, we think the SN also can configured the management based QoE. Also we think the SN can configure the RAN visible QoE in order to optimize the scheduling in the SN. Therefore it is reasonable for the SN to configure the management based QoE measurement.

Even for the signaling based QoE measurement, the MN can inform the SN to configure and report the QoE measurement in order to avoid the overload and the signaling overhead in the MN.

In NR-DC, the SN also will be changed. As commented in sub-bullet 1, the SN also may configure the QoE measurement. Therefore we think the QoE measurement continuity should be considered in NR-DC.

For EN-DC, same to the comments above, we think the SN also can configure the QoE, especially for the RAN Visible QoE. In order to reduce the impacts on specification. We can limit that the SN only can configure the management based QoE in EN-DC. We think the solution in NR-DC can be reused.

7 – MediaTek Inc.

For NR-DC part, the objective is still quite vague and companies seems have different understanding. Some questions below.

<1> We think MN configure QoE measurement and reporting is already supported in NR-DC in R17. Isn't it ?

<2> Is "Reporting via other leg" to be done with existing split bearer configuration ? Isn't that already doable in R17 ?

<3> The 3rd sub-bullet remains unclear on the intention. Is the impact on UU interface or inter-node ? We would prefer to remove it.

<4> Is the intention to allow SN to configure the QoE measurement in NR-DC ? We don't think it is needed.

Considering the work load, we prefer to focus on NR-DC only. (i.e. no EN-DC)

We also think motivation to have NR-DC enhancement is not so strong. Clarification is needed before the objective could be agreed.

8 – Nokia

For the 1st sub-bullet, we still believe it is strange to say "in order to maintain the reporting continuity at overload" when overload enhancement is nowhere motivated in the justification section.

Also, it is unclear/doubtful that NR-DC outcome can be reused for EN-DC, at least not without some study/evaluation. We prefer to exclude EN-DC (as concluded during the October email discussion) to keep the WI within reasonable scope.

9 – Intel Deutschland GmbH

As discussed in October email discussion, EN-DC was deprioritized due to lack of support. Additionally, we should avoid the impact to LTE in order to reduce the overload. Hence, we don't think EN-DC need to be supported.

10 – Apple AB

For NR-DC, we think that the first objective can be removed. We think that overload handling is already over-engineered in Release 17, and we should not be developing new mechanism that have little practical utility.

11 – Motorola Mobility UK Ltd.

On Objective 2 we disagree with removing *RRC_CONNECTED* state for MBS. Referring to the NR QoE SR RP-213473, RAN3 made the following agreement in their #114-e meeting:

- *MBS and XR would not be supported in R17.*

On objective 3 we agree with others not to include EN-DC. We don't see the need to repeat the discussion we had on MR-DC support in previous email discussions.

12 – Ericsson LM

For the MBS paragraph, there is no reporting in RRC*INACTIVE and RRC*IDLE state, so "*reporting*" should be removed.

Clarification for **sub-bullet 1** for NR-DC:

- To Apple and Nokia 1st round replies: the enhancement for overload exploiting NR-DC is not aimed to alleviate the overload but to enable reporting continuity during the overload by sending the reports via the leg not originally configured for delivering the reports. Why should we not exploit the advantages of NR-DC to keep reporting continuity? We think that this is especially important for RVQoE reports where the actions taken by the RAN based on the reports may be more dynamic than the actions taken by the OAM on legacy QoE reports. Moreover, accumulating too many reports at the UE due to paused reporting may cause report discarding, meaning that the QoE measurements were done in vain.

- To MediaTek 1st round reply: as mentioned earlier, even if there is split bearer, the SN cannot forward the reports to MN in case MN is configured with QMC and is using SN-terminated bearers for QoE reporting. So, the scenario is not supported, and the proposal is to address inter-node forwarding of the reports for the NR-DC scenario.

Clarification for **sub-bullet 3** for NR-DC: for SN-initiated SN change, where the SN is configured with QMC, the information about the configuration needs to be passed from source SN to target SNs.

We prefer to prioritize the NR-DC case and then consider the EN-DC, rather than working in parallel.

– Left-over features from Rel-17, as well as the enhancements of existing features which are not included in Rel-17 normative phase, should be discussed in Rel-18. [RAN3, RAN2]

  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(RAN#95).

– **Support the continuity of QoE measurement job for streaming and MTSI service during ~~inter-system or~~ inter-RAT handover process. [RAN3, RAN2]**

Moderator Proposal: For objective 5, refine the description of supporting the continuity of QoE measurement job for inter-RAT handover process for some specific service type if agreeable.

Feedback Form 11: Comments on objective 5

1 – ZTE Corporation

We agree to remove inter-system handover. When it comes to inter-RAT handover, further clarification of the user case still needs to be done if we want to support this. For example, under 5GC, if a UE handovers from gNB to ng-eNB, how can the target node (ng-eNB) with LTE radio access technology be able to handle the configuration and reporting for NR QoE is a problem, and it is under the scope of RAN2 to introduce corresponding enhancements in 36.331. Not only configuration and reporting, the related features like pause/resume, alignment with MDT would also need enhancement.

If this scenario is confirmed to be supported, in our view, RAN2 should be the leading group since the major work is in RAN2.

2 – Samsung R&D Institute UK

Considering the weak motivation, large spec impact and limited TU, we are also fine to remove this objective.

3 – LG Electronics Polska Taking Rel-17 QoE WI into account, we are not sure how this support impacts the specification though only streaming and MTSI services are considered. So, we prefer to remove this bullet.
4 – CATT We prefer to remove this bullet.If it is desired to keep it,it should be low prioritized.
5 – Huawei Technologies France We agree to remove inter-system handover. For inter-RAT, we think it could be included since anyway it is part of NG-RAN.
6 – MediaTek Inc. Consider the limited TU, we also prefer to remove this objective.
7 – Nokia We prefer to remove this objective, since it has quite large impact/effort while having limited applicability. At a minimum, inter-system should be removed.
8 – Intel Deutschland GmbH We suggest to deprioritize inter-RAT handover process in the objective due to limited TU.
9 – Apple AB Can be de-prioritized.
10 – Motorola Mobility UK Ltd. On Objective 5 on inter-system or inter-RAT HO mobility support we still have doubts on the value. Is there any harm if QoE configurations are released upon inter-system/inter-RAT HO?
11 – Ericsson LM This is OK, but we propose a rewording of Note2 to: - Note2: If there are any issues not concluded in Rel-17, the corresponding features should be discussed in Rel-18 to ensure that the QoE feature is stable and useful. The details could be decided by the end of Rel-17 NR QoE WI(RAN#95).

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.

If there are comments on the wording of the rest bullets of objective, please add your comments in the following table.

Feedback Form 12: Comments on the rest bullets of objective

1 – Ericsson LM

This is OK, but we propose a rewording:

- Note4: Radio related measurement reporting should be specified in the SON/MDT WI.

2.3 Way forward on NR QoE Enhancement WI

Moderator Proposal: Agree on the justification section for intermediate round if there is no modifications on wording.

Moderator Proposal: Review the update version of objective section during intermediate round and converge on objective 1, 3 and 5.

Moderator Proposal: Approve the WID in this meeting.

2.4 Summary of intermediate Round

2.4.1 Justification

There are 8 companies participating in the intermediate round discussion on the justification section. During the intermediate round discussion, comments are mainly related with IIoT/TSN, MBS service as well as the suggestions on rewording. The update version of justification will be provided for final round review.

2.4.2 Objective

1. Objective 1: Some companies comment on supporting the high speed scenario, and the clarifications on the motivation and benefits are provided by Ericsson for better understanding. There are two companies raising concerns on the XR service related with R18 SI of XR enhancement, although no overlapping with these two items are identified, the outcome of XR enhancement could be taken into account.
2. Objective 3: The discussion is mainly focusing on supporting QoE measurement configuration and reporting over MN/SN, but the potential solutions are not encouraged to discuss in detail. According to the intermediate round discussion, the sub-bullet 1 and sub-bullet 3 are clarified clearly. For EN-DC scenario, companies concerns on the standardization work load for supporting this commericial architecture. Some companies propose to complete NR-DC first, after that considering to map/reuse NR-DC solution for EN-DC if time permits.
3. Objective 5: Some companies concern on the limitation of TU and suggest to remove the whole bullet, while some companies point out the inter-RAT handover is one part of NG-RAN. According to initial round discussion, removing the inter-system part will avoid large impacts on specs. Moreover, there are only two types of service as streaming and MTSI for discussion other than open for all 5G service. Companies also propose to treat this bullet in low priority than other objectives.
4. Other objectives:
    a) Objective 2: Company comments on MBS in RRC_CONNECTED state, and this part is covered in objective 1. It is clearly to support MBS service in R18 QoE enhancement for

RRC_CONNECTED, RRC_IDLE and RRC_INACTIVE state. There is some difference in detail for supporting broadcast and multicast.

Companies are invited to review and feedback their views on intermediate round summary.

Feedback Form 13: General comments on the intermediate Round summary

1 – Ericsson LM The summary is good. Thanks!
2 – Huawei Technologies France looks fine to us.

Moderator proposal: Discuss on whether to add a note that ”When NR-DC is completed, after that considering how to map/reuse NR-DC solution for EN-DC if time permits.”

Companies are invited to share views on the additional notes for EN-DC.

Feedback Form 14: Comment on new note for EN-DC

1 – Samsung R&D Institute UK As there are already many items to be discussed in QoE enhancement, we want deprioritize EN-DC in Rel-18. Puting it in the note is fine for us.
2 – Ericsson LM Agree, but with rewording: “*When the support for QMC in NR-DC is completed, how to reuse the NR-DC solution for supporting QMC in EN-DC should be considered, if time permits.”*
3 – MediaTek Inc. We prefer to focus on NR-DC and think the NOTE is not really necessary. But if majorities want to have it, it is acceptable to us.
4 – Huawei Technologies France Ok with E///’s update.
5 – Nokia In the note, ”how to reuse” should be replaced with ”whether and how to reuse”, since we cannot confirm reuse of a solution before knowing what the solution is.

3 Final Round

3.1 Justification

The Rel-18 QoE enhancement is aiming to introduce enhancements to the existing NR QoE framework and to introduce the support for new types of 5G services, such as AR, MR, cloud gaming, as well as the support for RRC_INACTIVE and RRC_ IDLE for the MBS service.

In Rel-17, the basic mechanisms for triggering, configuration, collection, mobility support and reporting of QoE measurement have been specified. The features, including the enhancements of the specified features that were discussed but not fully completed in Rel-17 should be discussed and completed in Rel-18.

MBS service (i.e. broadcast and multicast) 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 for MBS service in collaboration with SA4. The mechanism of how to configure and report legacy QoE and RAN visible QoE measurements, and how to align the QoE with radio related measurements should be specified in R18.

As NR-DC is one of the important commercial deployment scenarios for 5G networks, it is critical to support it in the NR QoE framework. Therefore, R18 QoE should address the support for QoE measurement configuration, measurement reporting over MN/SN for NR-DC scenario, as well as support for RAN visible QoE report over MN/SN, mobility continuity, the alignment of QoE report and MDT, etc.

Companies are invited to review and feedback their views on justification.

Feedback Form 15: Comments on the Jutification

1 – China Unicom We are fine with the update of the justification.
2 – Samsung R&D Institute UK Generally OK, but the wording needs to be revisited if the objectives are changed.
3 – vivo Mobile Communication Co. Generally OK. If we decide to support the QoE continuity during inter-RAT handover, the justification can be updated to reflect the motivation.
4 – China Mobile Com. Corporation The justification looks fine to us.
5 – ZTE Corporation The justification looks fine to us.
6 – Ericsson LM Main comment: given that MBS is not supported in Rel-17, the text needs to be clearer on that Rel-18 needs to support QoE for MBS for RRC_*CONNECTED, RRC*_IDLE and RRC_*INACTIVE states (we noticed a*

*confusion in previous comments). The RRC*_CONNECTED for MBS needs to be mentioned in the first and the third paragraph in the Justification section.

In the third paragraph, it needs to say "*The NR QoE is enhanced to support*"

Another editorial comment is that we should write "*Rel-x*" and not "*Relx*" or "*Rx*" to refer to releases.

7 – Huawei Technologies France

The justification looks fine to us.

8 – Intel Deutschland GmbH

For the third paragraph, we don't think support of multicast service in RRC*INACTIE and RRC*IDLE should be included in the scope, considering Rel-18 MBS WI is still working on the solution. It would be hard to conclude any solution for QoE, as how to support MBS in RRC_INACTIVE and IDLE is still unclear. Hence, we suggest following update for the 3rd paragraph:

"MBS service (i.e. broadcast and multicast) has been ~~studied~~ **specified** 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 for MBS **broadcast** service in collaboration with SA4."

If companies really want to include multicast in Rel-18 QoE, we suggest adding a NOTE that "support of multicast depends on the applicability and re-use of broadcast solution for it".

3.2 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 [RAN3, RAN2].
- Specify for QoE measurement configuration and collection in RRC_INACTIVE and RRC_IDLE states for MBS service.[RAN3, RAN2]
  - Specify the mechanism to support the alignment of the existing radio related measurement and QoE reporting.
- Specify to support for QoE in NR-DC [RAN3, RAN2].
  - Specify the QoE configuration, measurement reporting over MN/SN for NR-DC architecture, and specify the QoE measurement reporting over the other DC leg in order to maintain the reporting continuity at overload.
    Note 1: The QoE measurements are not perform separately for each leg.
  - Support RAN-visible QoE 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 from Rel-17, as well as the enhancements of existing features which are not included in Rel-17 normative phase, should be discussed in Rel-18. [RAN3, RAN2]

  Note2: If there are any issues not concluded in R17, the corresponding features should be discussed 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(RAN#95).

– Support the continuity of QoE measurement job for streaming and MTSI service during inter-RAT handover process. [RAN2, RAN3]

Note3: If needed, co-operate with other working groups, e.g. SA4/SA5/SA2/CT1.

Note4: Radio related measurement reporting should be specified in the SON/MDT WI.

Companies are invited to review and feedback their views on objective.

Feedback Form 16: Comments on Objective part

1 – Samsung R&D Institute UK

We are not sure to remove ”reporting in RRC_INACTIVE and RRC_IDLE states”. It will preclude SDT mechanism, which is one of candidates to report MBS QoE data in RRC_INACTIVE.

2 – vivo Mobile Communication Co.

If we decide to support the QoE continuity during inter-RAT handover, the objective should be further limited to legacy QoE (i.e., exclude RVQoE)

3 – China Mobile Com. Corporation

We are basically supportive of current objective. Regarding HST scenario, we see some potential spec impact at least from the perspective of RAN visible QoE (e.g. identify specific RAN visible QoE values/-parameters, if any, in cases of high mobility scenarios for all supported service types), so it would be better to mention HST scenario in the Objective.

4 – ZTE Corporation

1: For ”High Speed Trains.” Based on the clarifiation of Ericsson in the intermediate round discussion, our understanding is the issue mainly related to the limited area scope based on current specification. The area scope like 32 cells can be easily extended to 64 or 128 if needed. In this way , it seems not to particularly emphasis “high speed Trains” in the objective part unless we find other impact to the current mechanism.

2: For the third sub bullet in the ”Specify to support for QoE in NR-DC”, we think it is better to add some descriptions to clarify scenarios, for example, ”e.g enable QoE report via SN after SN change” can be added. It means that if source SN supports collect QoE report and sends report to MCE, then after SN change, the target SN is able to send report to MCE. An rephrase example shows below:

Specify the QoE measurement continuity in mobility scenarios in NR-DC, e.g. enable QoE report via SN after SN change.

5 – Ericsson LM

Regarding the HST scenario, in addition to our previous motivation, we think that there may also exist spec impact in terms of RAN visible QoE, i.e., new RAN visible QoE metrics and/or values will likely be needed, given the “physics” of the scenario. So, we propose the following rewording of the 1st objective:

- *Support for new service types, such as AR, MR, MBS and other new service types defined or to be supported by SA4. Support for configuration and reporting of QoE under high mobility scenarios, e.g., High Speed Trains. RAN visible QoE parameters/values for high mobility scenarios, for the existing and additional service types, in coordination with SA4 [RAN3, RAN2].*

RRC_CONNECTED needs to be added to the MBS objective

Rewording in Note1: "*are not performed*"

In NR-DC objective, we should reword the 4th sub-bullet as "*Specify the alignment of QoE and RAN visible QoE measurements and radio related measurements in NR-DC.*"

6 – Qualcomm Technologies Int

1: For "High Speed Trains", we have the same understanding as ZTE. This seems a small delta that could be easily be considered as a TEI. Instead adding it here as a major part of the very first objective seems inappropriate - particularly as we are only now discussing what it means. So we see no need to include.

2. For the 3rd objective we also agree with ZTE that some more detail may be useful particularly in the 3rd sub-bullet (QoE measurement continutity in mobility scenarios in NR-DC).

3. In note 2, "may" has been upgraded to "should". As a matter of general 3GPP principle, please revert to "may". There are many reasons why features are not completed in a particular release, and inclusion or not of a feature in a release is always RAN decision, and should not pre-judged. Note also that the chair has already stated that he would prefer such revisions in RAN#96, in order to concentrate on RAN4 items at RAN#95 - so it may be better to remove "(RAN#95)".

7 – Huawei Technologies France

1. for HST, according to the comments in intermdiate round from E///, it seems that E/// wants to collect the QoE measurement only in the HSDN cells deployed alongside the high-speed rails. For this case, the current management based QoE measurement can achieve this purpose (the OAM only sends the QoE measurement configuration to the NG-RAN that provide HST coerage); while for signalling based QoE, as we already commented, HST info or high speed mobility belongs to radio related information. With these understanding, we are afraid the updates from E/// is not suitable, the updates seems focus on HST scenario. maybe the original proposal from moderator already provide a good compromise, or as ZTE suggested, we could just remove "e.g. high speed train", while keep the mentioning of high mobility...

2. for others, we are fine with moderator's proposal.

8 – MediaTek Inc.

We are still not sure whether there is overlapping between this WI and XR SID/WID. Maybe some online GTW discussion will help.

In addition, for the inter-RAT handover, we would like to clarify that it is for intra-5GC case as below.

"Support the continuity of QoE measurement job for streaming and MTSI service during **intra-5GC** inter-RAT handover process"

9 – Intel Deutschland GmbH

We don't think changing objective 2 from MBS broadcast service to MBS service can be acceptable during final round change. As we explained earlier, how to support multicast service in RRC*IDLE and RRC*INACTIVE is still not clear, which will be studied in Rel-18 MBS WI. We think objective 2 should only focus on QoE measurement of broadcast service. Following updates are suggested to be considered:

- Specify for QoE measurement configuration and collection in RRC*INACTIVE and RRC*IDLE states for MBS **broadcast** service.[RAN3, RAN2]
- Specify the mechanism to support the alignment of the existing radio related measurement and QoE reporting.

If companies really want to include multicast in Rel-18 QoE, we suggest adding a NOTE that "support of multicast depends on the applicability and re-use of broadcast solution for it".

10 – Nokia

1st bullet: Regarding “high mobility scenarios e.g., High Speed Trains”, we have similar view as ZTE, Qualcomm, and Huawei that it is not needed as a high-level objective and should be removed. If there is a desire to specifically mention high mobility scenario in the objectives, then a separate bullet or sub-bullet could be considered (with corresponding update in the justification section).

4th bullet: It seems that “leftover features from Rel-17” has been expanded to also include “enhancements of existing features which are not included in Rel-17”. However, this is a very broad statement that goes against the RAN Chairman guidance in RP-213469 to avoid “generic enhancements”-like scope (see slide 8). Therefore, “as well as the enhancements of existing features which are not included in Rel-17 normative phase” should be removed.

11 – MediaTek Inc.

RAN2 Chair: None of my below Questions or comments are of blocking nature, but I observe that this WID still contains many small unclarities.

1. It has been clarified that QoE scope excludes radio measurements e.g. in Note 4, so the following objective seems still wrong: ”Support RAN-visible QoE and radio related measurement configuration and reporting in NR-DC scenarios.” Supporting radio related measurement configuration and reporting should not be the responsibility of this WI.

2. The WID uses the wording ”alignment” of radio measurements and QoE reporting. My understanding is that the timing of MDT collection is not strictly controlled, instead the measurments are just time-stamped to allow loose correlation afterwards. To actually ”align” the measurements would involve strict control of when QoE measurements are taken and reported as well as MDT. Is this really intended? If not I think the wording ”correlation” of radio measurements and QoE reporting would be much better and insinuate lesser and more reasonable work.

3. For NR there has been a number of updates to the QoE reporting framework. To what extent will the support of inter-RAT continuity involve that EUTRA need to be updated to be on par with NR regarding QoE functionality? (i.e. is there substantial work hidden in this bullet, what is the expected impact to LTE TSes).

4. To what extent is it expected that the condition of ”overload” is determined for this WI? I hope it doesnt need to be addressed, and that the UE just follows the gNB configuration for the reporting ..

5. I refrain from repeating comments from other companies ..

12 – China Unicom

Quick feedback for RAN2 chair.

Following the discussion in R17 NR QoE WI□

1. Clarification for radio measurements, this refers to RSRP, SINR, etc. If considering to discuss on supporting RAN visible QoE configuration and reporting, this is part of RAN3.

2. I have followed the discussion in RAN3 NR QoE WI in Rel-17. ”alignment” is used in gNB, while OAM is ponsible for correlation.

3. The E-UTRA side, the potential o TS 36.311 and TS 37.340.

4. Agree to remove ”overload” .

3.3 Summary of final round

Comments on justification and objective section are all taken into consideration. The WID is also updated to add one new note for the coordination between this WI and XR enchancement WI. The new note is ”Specification of RAN visible QoE for XR related Service types shall take into account the outcome of XR SI and XR WI if applicable.” All the updated paragraphs reflect the comment understanding from the whole working group, and thanks for the good discussion and compromise during the discussion.

3.4 Way forward for final Round

Moderator Proposal: Approve the new WID and the TU allocation in RP-213570.