

RAN-R18-WS-crossFunc-China_Unicom - Version 0.0.5
RAN

3GPP TSG RAN Rel-18 workshop

RWS-210613

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.3

Source: China Unicom

Title: Email discussion summary for [RAN-R18-WS-crossFunc-China_Unicom]

Document for: Information

1 Introduction

This email discussion summary covers the following documents:

RWS-210386 Motivation of NR QoE enhancement in R18

RWS-210388 Motivation of Interference Coordination for Flexible Frame Configuration

RWS-210390 Motivation of RIS requirement in R18

Questions and comments followed responses from China Unicom will be collected in this document as per the deadlines provided by the RAN chair. Feedback forms will be opened and closed according to those deadlines.

Round 1 Q&A: Questions: June 14 08:00 UTC – June 17 8:00 UTC; Answers: June 17 8:00 UTC – June 18 23:59 UTC.

Round 2 Q&A: Questions: June 21 08:00 UTC – June 23 8:00 UTC; Answers: June 23 8:00 UTC – June 24 18:00 UTC.

2 General comments and questions

For general comments and questions, please use the feedback form below.

Feedback Form 1: General comments and questions for 1st Round

3 NR QoE enhancement

3.1 1st Round Comments/Questions

Feedback Form 2: Comments and questions on NR QoE enhancement

1 – Motorola Mobility UK Ltd.

In general, it's ok to continue work in R18 with leftovers from R17 but we have following questions on the following proposals:

To P2: Why is the focus on RRC_IDLE? What about RRC_INACTIVE?

To P5: TSN is mentioned as new service type in the context of new RVQoE metrics. Where does the need for TSN come from? Its support was not discussed during the NR QoE study.

2 – vivo Mobile Communication Co.

We are also fine to continue work on QoE in Rel-18. But one question is: We assume Per-slice QoE will be specified in R17 WI, we would like to check what kind of enhancement is considered here? And the corresponding use case(s)?

3 – CATT

Thanks for the contribution. Some comments from our side are as below:

1) Based on the previous discussion, enhancement for LTE from SA5 is not included in Rel-17 WI, we think it could be considered in R18.

2) QoE for RRC_Inactive is also one aspect which could be considered in Rel-18.

4 – ZTE Corporation

Thanks for the contributions, we also fine to continue work on QoE in Rel-18 and we agree P1-3. Other proposals depends on Rel-17 progress.

5 – China Mobile International Ltd

We are fine to continue the QoE discussion in Rel-18 and most of the proposals. We also think the radio-related information correclation with QoE report not replying on MDT mechanism can also be considered in Rel-18

6 – Nokia

Regarding P1 (inter-RAT continuity), LTE QoE and NR QoE have certain differences and continuity is not always possible (e.g. for slicing or RRC INACTIVE). Thus, what should be the main scenario or service that is critical for inter-RAT QoE continuity?

7 – Samsung R&D Institute UK

Thanks for the contributions, we have below questions:

For P2, do operators really care about QoE for MBS services? if we have a preference to support to perform QoE measurement in IDLE/INACTIVE for MBS service in R18, why we need to support configuration and reporting in RRC inactive/idle? Isn't it more logical to configure and report in RRC active mode? (i.e. only the measurement is performed in RRC inactive/idle)

For P3, we think it's better to keep the QoE context in MN, supporting flexibility QoE configuration and reporting will bring complexity, so we are wondering how worth to support flexible QoE configuration and reporting in MRDC by introducing complexity?

For P4-P6, we're fine to support those features, but if some of them e.g. per-slice QoE and radio-related information are finished in R17, what else we can do in R18?

8 – Huawei Tech.(UK) Co.. Ltd

Thank you for the contribution could you please provide feedback on the following questions:

- Does XR QoE should be more investigate in relation with SA4, SA2 and in RAN to provide relevant metrics that could be analyzed E2E and beneficial in context of RVQoE?
- Do you see specific progress in rel-18 on vertical QoE particularly V2X, V2X SL, but also IIoT, NTN, eHealth etc ...

9 – China Telecommunications

We think the features deprioritized in R17 QoE WI should be continued to work in Rel-18, please clarify “what the New radio related QoE parameters and information are and what kind of service characteristics these parameters represent?”

10 – Samsung Electronics Polska

Thanks for the paper. We have few questions for RWS-210386:

For P2, why we need to support configuration and reporting in RRC inactive/idle?

For P3, how worth to support flexible QoE configuration and reporting in MRDC by introducing complexity?

11 – Ericsson LM

Thanks for the paper.

About P2, what is the service type in IDLE that you have in mind?

About P4, does it mean that you leave the possibility that RVQOE maybe not be specified in Rel17?

12 – Xiaomi Communications

We are also fine to continue the QoE discussion in Rel-18, but we think the exact scope of Rel-18 QoE may also have some dependencies on the Rel-17 QoE progress.

3.2 1st Round Answers

To Motorola Mobility's question:

Thank you for your questions.

1. We mainly consider the QoE measurement for MBS service in RRC_IDLE state. And the QoE measurement in RRC_INACTIVE state is also should be considered in R18. In R17, only QoE measurement handling in RRC_INACTIVE state is specified, and the QoE measurement is paused in RRC_INACTIVE without considering MBS service, it should be enhanced in R18.

2. TSN is not discussed in R17 QoE SI, and for operators, TSN is a very important service type to support vertical scenarios, and RVQoE should be considered to support RAN optimization and applicable to time sensitive service type. It is open to discuss new service types for NR QoE in R18.

To vivo's question:

Thank you for your questions.

From RAN3's perspective, in R17 QoE WI, the Per-slice QoE is included in QoE measurement configuration. However for RAN side, which entity is responsible to check the slice related information, and which entity is responsible to correlate the slice to the APP is also not clear. Besides, how to corresponding the per-slice QoE measurement and per-DRB MDT measurement also should be considered in the per-slice QoE. At this stage, it is not sure all the issues could be resolved perfectly in R17, and the final R18 scope for per-slice QoE should depend on the outcome of R17 NR QoE WI.

To CATT's question:

Thank you for your questions.

1. We are open to add the LTE QoE in R18, but the NR QoE will be the first priority. If time is allowed, the LTE QoE can be included in R18.
2. We share the same view that the QoE measurement in RRC_INACTIVE should also be considered in R18. Since in R17, only QoE measurement handling in RRC_INACTIVE is specified, and the QoE measurement is paused in RRC_INACTIVE without considering MBS service, it should be enhanced in R18.

To ZTE's question:

Thanks for your continuous support. Some proposals depends on Rel-17 progress and the final scope for R18 can be stable when Rel-17 QoE is completed.

To CMCC's question:

Thanks for your continuous support. We also think RVQoE is very important part for NR QoE.

To Nokia's question:

Thank you for your questions.

Since LTE and NR will coexistence for a certain time, and the inter-RAT QoE continuity needs to be considered to guarantee the integrity of QoE report, and provide better QoE optimization for users moving between LTE and NR. For some differences between LTE QoE and NR QoE, it can further discussed in the normative phase.

To Samsung's question:

Thank you for your questions.

1. For P2, "QoE configuration, measurement collection and reporting in RRC_IDLE state", we want to support QoE measurement collection in RRC_IDLE/RRC_INACTIVE state, and the QoE configuration and reporting for RRC_IDLE/RRC_INACTIVE state may still in RRC_ACTIVE state. It is proposed to modify the description "in RRC_IDLE state" to "for RRC_IDLE state".

2. For the APP layer QoE configuration and reporting, the MN is enough, but considering the RVQOE and radio related QoE, the flexibility QoE configuration and reporting will be useful for RAN optimization.
3. The Per-slice QoE should be included in QoE measurement configuration in R17. However for RAN side, which entity is responsible to check the slice related information, and which entity is responsible to correlate the slice to the APP is also not clear. Besides, how to corresponding the per-slice QoE measurement and per-DRB MDT measurement is also should be considered in the per-slice QoE. At this stage, it is not sure that all the issues could be resolved perfectly in R17, and the final R18 scope for per-slice QoE should depend on the outcome of R17 NR QoE WI.
4. For radio related parameters and information, since the service type for QoE in R17 is limited, and for future network deployment, especially for 2B scenarios, more and more service types will need QoE measurement. Now in MDT measurement, some of the measurement may not defined, such as jitter, etc. And these parameters may very important for QoE optimization.
5. QoE measurements in RRC_IDLE and RRC_INACTIVE have been studied in R17 SI for MBS service, and it should be supported in R18.
6. MRDC is an important deployment scenario, and it has been studied in R17 QoE SI. QoE can be used to optimize the performance for each leg and for network optimization purpose, such as decide whether to use MRDC for a certain UE to provide better service without unnecessarily drain the UE's battery, etc.

To Huawei's question:

Thank you for your questions.

RAN-visible QoE metrics may be values derived from individual SA4-defined QoE metrics or combinations of these values. In R17, SA is studying to define a new data collection architecture, including the QoE information, it may have impacts on SA2, if so we may also need to take SA2 into consideration for RVQoE study.

We propose RVQoE metrics used by RAN and the SA QoE metrics should be studied simultaneously. RVQoE shouldn't wait for SA normative result. If some useful RVQoE metric have been identified in RAN, sending LS between RAN and SA is a good manner to synchronize the work progress.

In R17, the generic RVQoE configuration and reporting mechanism should be defined, and in R18 necessary metrics and service types can be introduced based on the basic mechanism.

The specific progress on vertical services (V2X, V2X SL, but also IIoT, NTN, eHealth etc) should be further studied both in SA and RAN.

To CT's question:

Thank you for your questions.

Since the service type for QoE in R17 is limited, and for future network deployment, especially for 2B scenarios, more and more service types will need QoE measurement. Now in MDT measurement, some of the measurement may not defined, such as jitter for TSN service, etc. And these parameters may very important for QoE optimization.

To Ericsson's question:

Thank you for your questions.

1. At this stage, we think in RRC_IDLE state is related with MBS service.
2. In R17, the RVQOE should be specified, the generic RVQOE configuration and reporting mechanism should be defined, and also some of the metrics will be specified. In R18, we propose to support more service types for QoE, and more RVQOE metrics should be extracted for the current service types and new service types.

To Xiaomi's question:

Thank you for your questions. We are glad to discuss the specific R18 QoE work scope.

3.3 2nd Round Comments/Questions

Feedback Form 3: 2nd Round Comments/Questions

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3.4 2nd Round Answers

There is no 2nd round comments.

4 Interference Coordination for Flexible Frame Configuration

4.1 1st Round Comments/Questions

Feedback Form 4: Comments and questions on Interference Coordination for Flexible Frame Configuration

1 – CATT

Thanks for the contribution and we have following question for clarification:

Q1: Regarding interference measurement and reporting for UEs, what enhancement is needed on top of Rel-16 CLI measurement?

2 – ZTE Corporation

Thanks for the contribution and analysis of the scenarios for flexible frame configuration and BS-BS interference. In Rel-16 CLI WI, only UE-UE interference was specified. It is reasonable to further consider solutions to mitigate the BS-BS interference.

As it is mentioned in the justification section in RWS-210389, the misalignment of DL and UL timing between the adjacent cells would impact the interference suppression techniques, do you think the timing offset need to be considered in the CLI management?

3 – Rakuten Mobile

Thanks for contribution.

We feel there is good scope to utilize dynamic TDD DL/UL slot configuration by mitigating inter-gNB interference. We support RAN1 to investigate to decrease inter-gNB interference.

4 – Futurewei Technologies

We think the contribution is well-motivated, i.e., severe interference problem exists when flexible frame structure is allowed for adjacent gNBs. Scenarios that require flexible frame structure are increasing, such that reference signals for measurement or new mitigation schemes are needed;

It is recommended that beyond schemes that mitigate interference, new approach to harness the interference also be investigated to further improve the performance;

For the proposed objective on possible new type of reference signal for interference measurement, it would be good to clarify if this would add too much overhead for the benefit it may lead to;

In principle, we are supportive of the study and proposed similar views in our contribution. Please take a look at our contribution RWS-210036 (https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_AHs/2021_06_RAN_Rel18_210036.zip) and feel free to comment at: <https://nwm-trial.etsi.org/#/documents/4580>

5 – Nokia Corporation

We share your view to study cross-link interference between gNBs for flexible frame structure. In our view, exact solution for BS-2-BS CLI should not be limited to coordinated beamforming. Could you consider studies also for different BS-2-BS CLI solutions?

6 – Qualcomm Incorporated

In section 3, is the exchange of TA offset to align UL slot timing across gNBs? Would be good to elaborate a bit more.

7 – Samsung Electronics Polska

'Simple question for the interference mitigation between BS-BS as described in slide 9. It is mentioned the reusing of CSI-RS to measure interference between gNBs, does this mean UE assisted measurement of interference between gNBs, or the enhancement of legacy CSI-RS to directly measure interference between gNBs?

8 – Xiaomi Communications

We are interested in this topic. We are just wondering whether Beam-based coordination would have some overlapping work with the potential MIMO work item.

4.2 1st Round Answers

To CATT's question:

Thanks for your question. Comparing to Rel-16 CLI measurement, potential enhancements for UE-UE CLI in R18 include:

1. Timing offset issue may exist between sender and receiver during SRS-RSRP measurement. If a UE does not support DL channel/signal and CLI SRS FDMed reception, the UE will prioritize SRS for CLI measurement, which will reduce UPT and spectrum efficiency.
2. Beamforming was not considered in Rel-16 CLI measurement.

3. Rel-16 CLI adopted L3-RSRP measurement/reporting, but L1-RSRP is also worth study. The period of L3-RSRP measurement/reporting is not suitable for beam management. Optimization can be considered in R18.

4. The coordination between gNBs for UE-UE CLI measurement resources has not been specified in Rel-16, which can be considered for further enhancement.

To ZTE's question:

Thanks for your question. Timing offset needs to be considered in BS-BS CLI management.

To Rakuten's question:

Thank you for your support. We can cooperate to study inter-gNB interference coordination for 5G-advanced.

To Futurewei's question:

Thanks for your support. The interference will affect the performance of 5G practical network. It is important to improve the performance when flexible frame structure is deployed.

We are open to discuss new approach to mitigate interference and further discuss in details. For the design of reference signal, it is still open for discussion. The intension of reference signal mentioned here is to find a suitable to measure the interference between gNBs. Whether to define a new type of reference signals or reuse the NR signals, it is open to discuss the potential solutions and standards impacts.

To Nokia's question:

Thanks for your question. Different approach to solve BS-BS CLI are encouraged for detail discussion. In addition to beamforming, we noticed that timing offset issues of gNBs may introduce severer interference. It would be good to study the candidate solutions.

To Qualcomm's question:

Thanks for your question. Exchanging TA offset information, adjacent gNBs can sync on slot timing.

To Samsung's question:

Thanks for your question. The potential solutions for interference measurement are open for discussion.

To Xiaomi's question:

Thanks for your question. Beam-based intercell coordination is potentially related with interference measurement and inter-cell coordination related procedures and new IEs if needed. It need further discuss on the standard impacts.

4.3 2nd Round Comments/Questions

Feedback Form 5: 2nd Round Comments/Questions

1 – ZTE Corporation

Thanks for the detailed clarification of the timing issue in the 1st round reply. Regarding the enhancements on the Rel-16 CLI, our Tdoc also provides some consideration of more exchange information between gNBs in RWS-210487(AI 4.3 <https://nwm-trial.etsi.org/#/documents/4776>). In this sense, we think RAN3 should also be involved in the objectives of “Interference measurement and reporting for UEs”.

2 – Futurewei Technologies

Thank you for your response to our questions. Interference management is an important area for flexible UL/DL configuration as well as for flexible duplex. In our contribution RWS-210036, we proposed to cope with this interference in spatial domain via cooperative MIMO to fully utilize the massive MIMO capability of the TRPs and UEs.

3 – China Telecommunications

Thanks for your contribution. We think the interference issue exists not only for flexible frame configuration but also for dynamic TDD/FDD and full duplex as well. We think interference coordination/cancelling can be studied for these cases.

4 – CATT

Thanks for the response. Is performance evaluation on the coordination schemes also part of the study?

4.4 2nd Round Answers

To ZTE’s question:

Thanks for your comment. We agree that RAN3 need to be involved for interference coordination part. For BS-BS CLI, gNBs need to exchange some information to achieve cooperative transmission and reduce the interference correspondingly. And for UE-UE CLI, it is beneficial that exchanging necessary information between gNBs under the objective of “interference measurement and reporting for UEs”.

To Futurewei ’s question:

Thanks for your comment. In your contribution, the potential solution shows good performance gain and it reduces interference in spatial domain which is one of beam-based interference coordination solutions. Thus, we support to further discuss on how to include the potential solutions.

To CT’s question:

Thank you for your support and we share the same view to solve these issues related with network deployment.

To CATT’s question:

Thanks for your comment. At least, system-level simulation should be considered for performance evaluation. Further discuss on the performance evaluation assumptions are needed.

5 Reconfigurable Intelligent Surface(RIS)

5.1 1st Round Comments/Questions

Feedback Form 6: Comments and questions on Reconfigurable Intelligent Surface(RIS)

1 – CATT

This is an interesting topic, and we have following questions for clarification:

Q1: Is RIS transparent to UE or not?

Q2: Is the configuration of RIS (e.g., phase of each element) expected to be fixed or adaptively adjusted?

2 – ZTE Corporation

Thanks for your proposal. We also share strong interests on this topic as proposed in our contribution (RWS-210465 in AI 4.1) including the justification on the performance gain observed from both simulation and field measurement. According to our understanding, it's the right time to initialize the corresponding study on this technique and take the channel model as the first step. We appreciate if you can elaborate your views more on the scenarios and frequency range for the potential deployment.

3 – Rakuten Mobile

Thanks for proposal.

We can support Reconfigurable Intelligent Surface (RIS) for RAN1 which will be useful in various aspects.

4 – vivo Mobile Communication Co.

We think this is an interesting topic to be further exploited in 3GPP.

One question from our side: For the mentioned control interface between gNB and RIS, is it also expected to be studied within the SI?

”Other potential impacts • e.g., beam management, CSI enhancement, control interface between gNB and RIS, RACH enhancement, interference coordination”

5 – Sony Corporation

Thank you for your proposal on RIS. We also share a genuine interest in RIS, as witnesses in our contribution RWS-21306. In order to better understand your proposal, here are a few questions on some of the material in your contribution:

1. Could you please elaborate on the edge user/interference coordination scenario in slide 3? How is the RIS operating to achieve, e.g., interference coordination?

2. The stadium trial with RIS looks highly interesting. Is it possible to share some details on the result of the trial, such as the improvement afforded by the RIS units?

2. In slide 7, we also see similar areas of the standard that might be potentially impacted by the introduction of RIS. In this context, could you please comment on which CSI enhancements and RACH enhancements that you foresee necessary?

6 – China Telecommunications

Thanks for proposal.

We can support a SI for RIS in RAN1 to study its performance and the impact of specification.

7 – KDDI Corporation

Thank you very much for your proposals. We are also interested in RIS, as mentioned in our contribution (RWS-210300). In order to understand your proposal more concretely, let us ask you a few questions below.

<Q1>

In Slide 3, you presented various scenarios, which we think are very beneficial for discussion. Among those scenarios, do you envision that one RIS can collaborate with multiple gNBs in the interface coordination scenario?

<Q2>

In Slide 6, you have presented an example of a stadium scenario. We are very interested in this kind of usage scenario. On the other hand, in the case of stadium, there is a problem of insufficient system capacity, and we may have to install many gNBs instead of RIS. What are your thoughts on this?

8 – Xiaomi Communications

We have interesting in the topic. Is RIS transparent to UE or not in R18 scope?

5.2 1st Round Answers

To CATT's question:

Thank you for your questions.

A1: Yes. Generally, RIS is transparent to UE.

A2: Both of fixed and adaptively adjusted manners are expected, since there are different requirements for RIS configuration in different scenarios.

To ZTE's question:

Thank you for your questions. We'd like to study on typical scenarios of sub6G and mmwave RIS for 5G-advanced, such as blind coverage enhancement, throughput enhancement, indoor coverage enhancement and other scenarios listed in the slide. Furthermore, we also interested in channel model, control information transmission mechanism and interface of RIS for 5G-Advanced.

To Rakuten's question:

Thank you for your support. We can cooperate to study typical scenarios of RIS for 5G-advanced.

To vivo's question:

Thank you for your question. RIS can obtain more performance gain with control information. It is important and desirable to study control interface between gNB and RIS. However, it is a complicated issue to study control information transmission between gNB and RIS, including control interface and impacts on standards.

Hence, we can develop this issue step by step.

To SONY's question:

Thank you for your questions.

A1: RIS can improve edge user experience and reduce interference with control information assistance. For example, RIS is deployed at the edge of cell A and its adjacent cell B. gNB A and gNB B cooperate through Xn and send interference coordination results to RIS, including synchronizing signal, codebook parameters. Hence, RIS can digitally control the signal power and beam direction of cell A and B to coordinate interference. Other information, such as CSI enhancement and RACH enhancement can be considered with more adaptive requirements if necessary.

A2: From our trials, RIS is a good solution for blind coverage area with blockage, especially for FR2. Passageway are typical blind coverage area in stadium with deep blockage. Trial results show that transmission loss is above 30dB concrete blockage, and above 10dB for body blockage. Compared with blocked LOS path, more than 10dB gain can be obtained by deploying RIS to construct NLOS paths.

A3: As mentioned above, control information is useful for performance improvement, such synchronizing signal, codebook parameters are basic and necessary information. Other information, such as CSI enhancement and RACH enhancement can be considered with more adaptive requirements if necessary.

5.3 2nd Round Comments/Questions

Feedback Form 7: 2nd Round Comments/Questions

1 – ZTE Corporation

Thanks for your replies and it's really useful for us to identify the essential work for future based on common interests.

As following up questions, it seems that both blind coverage enhancement and throughput enhancement are considered for study. In our view, for enabling the former one, maybe the interface between gNB and RIS is not needed or the frequency for information exchange is relative lower comparing to the latter one for throughput. Then, any views from your on how to design this kind of interface? Do we need to design the unified one or end up with different mechanism?

2 – China Telecommunications

Thanks for your replies and clarifications. We have some additional comments:

Q1) In slide 2 of your contribution, it says: "RIS is a kind of digitally-controlled meta surface". Thus, in your view, does RIS consist of some digital processors? But if digital component is included, then the cost of RIS may be high. As far as we know, one of the advantages of RIS is its low cost and low power consumption. So, can you make some clarification on the component of RIS?

Q2) In slide 3, one typical reflection scenarios of RIS is "Physical layer security". Is this scenario mainly for FR1 or FR2?

Q3) In slide 4, it says "RIS works similar as relay to extend coverage radius". In our view, there may be some difference between them. Thus, we suggest that you can just say "Extend coverage radius". As for exactly how RIS works, it can be left for further discussion.

3 – Sony Corporation

Thank you for your answers and for sharing details of your RIS trial. On a more practical note, and with regard to TUs available for new topics in Rel-18, we wonder what is your opinion on the degree to which RIS and smart repeaters can be driven jointly in 3GPP, what are your preferences here?

4 – CATT

Thanks for the response. If RIS is transparent to UE, then the listed objectives such as beam management, CSI enhancements, are for the link between gNB and RIS, is that correct? Another question is whether the legacy UE would benefit from the RIS deployment?

5 – KDDI Corporation

We are sorry that our questions for the 1st round were submitted just before the deadline. If it is possible, please answer the questions that we entered in the 1st round.

5.4 2nd Round Answers

To ZTE's question:

Thank you for your questions. There are different requirements in different scenarios with RIS for 5G-Advance. However, as a digitally controlled meta-surface, synchronization and codebook are basic information for RIS adaptive control. We prefer to offload the computing task to gNB instead of RIS. From the perspective of specification, it is more straightforward to design the unified interface. Hence, we propose to adopt the unified interface and mechanism between gNB and RIS for different scenarios.

To CT's question:

Thank you for your questions.

A1: There is no need to have one digital processor to support for digitally-controlled feature for RIS. RIS is consist of meta-surface control board. The control board is consisted of massive units and it can be configured with codebook to change the response of meta-surface. The control board configured with codebook is defined as digitally-controlled. So, RIS is designed without digital processors, which is low cost and low power consumption.

A2: Most scenarios of RIS are independent with a dedicated frequency band. RIS can provide physical layer security for both FR1 and FR2.

A3: Thanks for your suggestion and we will modify the wording.

To SONY's question:

Thank you for your question. From our side, we prefer to firstly discuss on the common aspects and difference between RIS and smart repeater. After that, we can discuss whether to have individual SI/WIs or merge into one SI/WI for RAN work management.

6 Summary

6.1 NR QoE enhancement

12 companies raised comments on this contribution and most of them showed interest on QoE enhancement for Rel-18. Hence, for Rel-18, QoE measurement configuration, reporting can be further enhanced, including the leftover features not included in R17 normative, and the potential enhancements on the R17 normative work.

1. The inter-RAT QoE continuity for 4G/5G needs to be supported in R18.
2. Both RRC_IDLE and RRC_INACTIVE state shall be supported in R18.
3. MRDC scenario has been studied in R17 QoE SI. QoE can be used to optimize the performance for each leg and for network optimization purpose, the flexibility QoE configuration and reporting will be utilized for RAN optimization.
4. The Per-slice QoE is included in scope of R17 WI, and the R18 scope for per-slice QoE is depend on the outcome of R17 NR QoE WI.
5. The generic RVQoE configuration and reporting mechanism need to be defined in R17, and supporting for some new types of services, i.e. some vertical service, the service metrics can be introduced based on the RVQoE mechanism.
6. For radio related QoE in R18, ToB scenarios and new service types are considering to be supported in QoE measurement and reporting. The radio related information correlation with the QoE report need to be further studied in R18.
7. Supporting for the enhancement for LTE QoE in R18 is pen for disucssion. If time is allowed, the LTE QoE can be included in R18.

Companies are interested on QoE enhancements in R18, and the potential scope of QoE enhancement in R18 will be updated according to RAN workshop disucssion.

6.2 Interference Coordination for flexible Frame Configuration

9 companies raised comments on this contribution and most of them showed interest on Interference Coordination in R18. Hence, i.e. interference measurement between adjacent cells, interference mitigation scheme, interference measurement and reporting for UEs.

1. 4 companies had concerns/comments on interference measurement between adjacent cells. For two rounds discussion, the following topics have been disucssed, including measurement in CSI-RS, cooperative MIMO, BS-2-BS CLI solutions other than beamforming and overlapping work with the potential MIMO work item.
2. 2 companies had concerns/comments on Interference mitigation, and timing offset for the CLI management and exchanging of TA offset to align UL slot timing across gNBs have been discussed.
3. 1 company had concerns/comments on interference measurement and reporting for UEs, focusing on different with Rel-16 CLI measurement.
4. 2 companies showed support of this contribution. 1 company commented on performance evaluation.

6.3 RIS

7 companies share their views and support on the motivation of RIS for 5G-Advanced. RIS for can be further studied in R18, including scenarios of RIS for 5G-Advanced, channel model and adaptive control. Most of companies propose RAN1 needs to study the RIS performance and potential impacts on specification.

7 Reference

[1] RWS-210386 Motivation of NR QoE enhancement in R18

[2] RWS-210388 Motivation of Interference Coordination for Flexible Frame Configuration

[3] RWS-210390 Motivation of RIS requirement in R18