3GPP TSG-RAN WG1 Meeting #116e Tdoc R2-21xxxxx

November 1st - 12th 2021

Agenda: 8.14.2.1

Source: Ericsson

Title: Feature summary for 8.14.2.1

Document for: Discussion, Decision

# 1 Introduction

In this document the following offline is discussed:

* [AT116-e][042][eQOE] Configuration and reporting (Ericsson)

      Scope: Items: MeasConfigAppLayerId handling e.g. provided to/from application?, Segmentation further details e.g. can it be mandatory, if not, indicate to application?,

      Whether application need to inform AS session start stop,

      RRC handling at Resume, Handover etc, delta config and fullconfig, can use R2-2108967 as baseline for discussion.

      Intended outcome: Report, RRC TP for agreeable parts.

      Deadline: Tuesday W2

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# 2 Discussion

## 2.1 MeasConfigAppLayerId

The following proposals are related to measConfigAppLayerId and multiple QoE configurations and modification of QoE measurements.

* UE RRC layer forwards RRC *MeasConfigAppLayerId* together with QoE configuration container to applcation layer.[1]
* Application layer forwards the *MeasConfigAppLayerId* together with QoE report container to RRC layer, and RRC layer includes the *MeasConfigAppLayerId for each QoE report container* in MeaReportAppLayer message.[1]
* RAN2 suggests SA5 to support multiple QoE measurement configurations by 1:1:1 mapping between QoE session, QoE reference, and QoE measurement configuration.[2]
* Multiple MeasConfigAppLayerId can be configured simultaneously to support one certain service type with multiple QoE measurement configurations.[2]
* The RRC layer forwards the MeasConfigAppLayerId together with the QoE configuration to UE’s application layer. MeasConfigAppLayerId is also sent to UE’s AS layer together with QoE measurement report container from UE’s application layer.[2]
* QoE configuration modification procedure is supported.[2]
* Reply LS to SA5 to consider QoE configuration modification in NR QoE.[2]
* Forward the measConfigAppLayerId to the application layer.[4]
* Send an LS to CT1 and ask them to add measConfigAppLayerId in the AT commands carrying the QoE configuration and the QoE report.[4]
* The *MeasConfigAppLayerId* should be sent together with the corresponding QMC configuration container from AS layer to the APP layer.[6]
* RAN2 to agree that multiple QoE configuration per service type could be supported by UE simultaneously.[8]
* RAN2 to agree that the RRC layer forwards the MeasConfigAppLayerId together with the QoE configuration to the application layer[8]
* The UE RRC layer forwards the MeasConfigAppLayerId together with the QoE configuration to the application layer. The application layer sends the MeasConfigAppLayerId together with the QoE report to the UE RRC layer.[9]
* RRC layer forwards the MeasConfigAppLayerId together with the QoE configuration to the application layer for further association of the QoE reports.[10]
* Modification of NR QoE configuration is not supported.[11]
* RAN2 shall support to provide multiple QoE measurement configurations for one certain service type in NR QoE.[11]
* RAN2 shall postpone discussion on whether forward the QoE RRC level ID to app layer until SA5 further clarifies the mapping relationship of QoE reference ID .[11]
* Confirm that RRC forwards the MeasConfigAppLayerId to UE APP upon reception of the QoE configuration message over Uu.[13]
* The OAM can provide multiple NR QoE measurement configurations for one certain service type. Detailed procedures can be further discussed.[16]

Based on the proposals above, the following is summarized :

Rapporteur’s comment : RAN3/SA5 replied that there may be multiple QoE configurations for the same service type. The reason for the question from RAN2 was to understand whether the measConfigAppLayerId or the service type should be forwarded to the application layer together with the QoE configuration. Based on the replies, the service type is not sufficient, but the measConfigAppLayerId needs to be used to identify a configuration and report.

So far no reply from other working groups has indicated that modification of QoE configurations is needed.

Question 1 : Do you agree that the measConfigAppLayerId is forwarded from the AS layer to the application layer together with the QoE configuration ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes but | The AS layer and the APP layer need to unambiguously identify a QoE configuration. The measConfigAppLayerId seems to be the natural choice. But this seems to be a level of detail that can be left to UE implementation without the need for any specification. |
| vivo | Yes | As multiple QoE measurement configurations for one certain service type will be supported, it is not feasible to distinguish different QoE configurations or reports using only service type.  Besides, SA4 should be informed to introduce the ID during the information exchange between AS layer and LPP layer. |
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Question 2 : Do you agree that the measConfigAppLayerId is forwarded from the application layer to the AS layer together with the QoE report ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes, but | See previous comment |
| vivo | Yes, | Same as above, SA4 should be informed. |
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## 2.2 Container size and RRC segmentation

The following proposals are related to RRC segmentation and container size.

* Multiple QoE measurement reports can be included in one SRB 4 message.[1]
* RAN2 concludes which option as following should be adopted.
  + Option 1: RRC segmentation is not applied for SRB4
  + Option 2: RRC segmentation is applied for SRB4 with optional support by the UE. The UE RRC layer indicates to application layer SRB4 segmentation capability, and application layer determines whether to deliver QoE container larger than 8000bytes to AS layer.[1]
* RRC segmentation of the MeasurementReportAppLayer message is supported when the message size exceeds the 9000 bytes size limit. Each segment of the message is then carried on the ULDedicatedSegment message.[3]
* Only event-triggered reporting of QoE reports is supported.[3]
* In case QoE reporting is triggered and multiple QoE reports are available, then those QoE reports are processed in order and are concatenated into a single MeasurementReportAppLayer message. If the resulting size of the MeasurementReportAppLayer message exceeds the 9000 bytes size limit, the message is segmented.[3]
* Support UL RRC segmentation for transmission of QoE reports.[4]
* RRC segmentation should also apply to *MeasurementReportAppLayer* message.[6]
* RAN2 to agree that the size limits and/or the minimum periodicity for each QoE measurement configuration should be set by the RAN.[8]
* Support the RRC segmentation for MeasReportAppLayer message.[9]
* The maximum size of the QoE configuration container should be 8 kBytes to ensure all UEs are able to receive it.[9]
* QoE report container can be specified as OCTET STRING with no maximum size in RRC signalling.[9]
* Application layer should be informed by the UE whether UE supports sending QoE reports with the size exceeding the previous limitation of 8 kBytes (which depends on whether UE supports RRC segmentation).[9]
* Simultaneous QoE configurations over RRC do not exceed 8188 octets. RAN2 discuss which option is selected.[10]
* It is proposed for RAN2 to support for removing the limitation of NR QoE container size. How to perform the NR QoE data segmentation can base on lower layers implementation.[11]
* Add the report of QoE measurements by means of list to enable report of multiple simultaneous measurements.[12]
* Apply the RRC segmentation for QoE report and configuration transmitting.[12]
* RAN2 is requested to accept SA4's request to remove QoE container size limit in QoE configuration and QoE report.[15]
* RAN2 is requested to study RRC segmentation for MeasurementReportAppLayer (named in running CR) message.[15]
* RAN2 can discuss NR QoE configuration and reports size limits based on the below options:[16]
  + Option 1: RAN2 keeps the size limits for NR QoE measurements configuration and single QoE report.
  + RAN2 reuses from LTE the maximum container size of 1000 bytes for QoE measurements configuration and the maximum container size of 8000 bytes for one QoE report.
  + RAN2 reuses from LTE the maximum container size of 1000 bytes for QoE measurements configuration and to redefine the maximum container size for one QoE report (e.g. 9000bytes).
  + Option 2: RAN2 removes the size limits for NR QoE measurements configuration and single QoE report.
* RAN2 sends an LS to inform SA4 if RAN2 decide the NR QoE configuration and single report size limits.[16]

Based on the proposals above, the following is summarized :

SA4 replied that they would like to remove the size limitations for the QoE configuration and report. RAN2 agreed to support RRC segmentation for the transmission of the QoE report. It is the rapporteur’s understanding that RRC segmentation is already supported for the RRCReconfiguration message, i.e. it can be used for transmission of the QoE configuration, if needed.

Some companies raised the question whether support for RRC segmentation of MeasurementReportAppLayer should be mandatory or optional.

Some companies proposed to forward the capability of segmentation to the application layer. It is the rapporteur’s understanding that the application layer sends the reports according to what is indicated in the QoE configuration. Therefore, information about capability of RRC segmentation is of no use, as the application layer anyhow cannot impact how the reporting is done.

In general, UE capabilities are sent to the network to help the network to prepare a correct configuration. A capability about support of RRC segmentation can be used by the network to prepare QoE configurations that generates sizes of the reports that can be transmitted by the UE. A capability for RRC segmentation is known by the network in the same way as a capability for support of QoE.

Question 3 : Do you agree to reply to SA4 that the size limitations can be removed ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes | We should inform SA4 and other groups (SA5, RAN3, CT1) of RAN2 decision to support RRC segmentation. We think it is also important to spell out the consequences of this decision. If the OAM expects that QoE measurements/configuration is likely to trigger RRC segmentation, then it should be aware of the capability of the UEs and gNBs that are involved. We agree with the rapporteur that applications cannot take into account the UE’s support of RRC segmentation. |
| vivo | Yes | The corresponding description in SA4 may need to update. |
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Question 4 : Do you agree that multiple QoE reports can be included in the same message ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes |  |
| vivo | No strong motivation to support | - The probability of different reports reaching the AS layer at the same time is relatively low  - The reports themselves are quite large, with a small percentage of overhead in the packet headers. Therefore, the gain of sending multiple QoE reports in the same message is limit. |
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Question 5 : Do you think the support for RRC segmentation should be mandatory or optional ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Optional | In downlink, the existing UE capability for (downlink) RRC segmentation suffices since QoE configuration is part of the RRCReconfiguration message (which is one of the DL messages that can be segmented).  In uplink, segmentation of the *MeasurementReportAppLayerMessage* is not currently supported*.* Also we do not have a UE capability for segmentation in the uplink. |
| vivo | Optional |  |
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Question 6 : Do you agree that it is sufficient that a UE capability for RRC segmentation is sent from the UE to the network ?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple |  | We didn’t fully understand the question. Segmentation is optional for both the UE and the gNB, and the OAM needs to know the capability of both.  Note that the gNB is already aware of whether the UE supports RRC segmentation in the downlink (this is part of UE NR capability). For the uplink, a new capability is needed. |
| vivo | Yes | I guess the question is about whether the APP layer should be informed about the capability for segmentation.  We think there is no need, the AS layer that does not support the RRC segmentation can just discard the oversize QoE report from APP layer. |
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## 2.3 Fulfilment of SA4 requirement at mobility

The following proposals are related to mobility and fulfilment of SA4 requirement.

* gNB does not need to know the QoE configurations for which there are ongoing QoE session to enable QoE configuration handling upon mobility.[1]
* Specify Session Start Indication and Session End Indication.[5]
* Send an LS to CT1 group to specify Session Start indication and Session End Indication in their specification.[5]
* The gNB provides explicit out-of-area indication to the UE while releasing QoE measurement configuration.[7]
* For signaling based QoE activation, the configuration propagates during Handover.[10]
* For management based QoE activation, the configuration does not propagate during Handover and can be removed at Handover.[10]
* The recording session start indication should be sent to RAN from UE via report message e.g. MeasReportAppLayer.[12]
* Introduce a specific modification operation instead of release/setup for QoE configurations to satisfy the service continuity requirement from SA4.[13]

Based on the proposals above, the following is summarized :

SA4 have replied in R2-2109384 that the SA4 requirement described in TS 26.114 clause 10.1, TS 26.247 clause 16.3, which was defined for QMC in UMTS and LTE, regarding configuration changes of ongoing QMC sessions is still applicable. Therefore, a solution for ensuring that the measurements are not interrupted in the middle of the session when e.g. the UE comes to an area border, needs to be implemented.

One solution is to send the area scope to the UE, but that option has already been excluded by RAN3 in earlier discussion.

Two more solutions have been proposed :

* The UE sends an indication when the session in the application layer starts and when it stops, so that the network knows when it can release the measurements.
* The network sends an indication to the UE when the measurements should be released and the UE releases the measurements when the session is completed.

A comment on the first solution is that the session start/stop indications can be used for other purposes also, like e.g. alignment with MDT.

A comment on the second solution is that it is not sufficient to just send the release indication to the UE, as the UE may perform handover before the session is completed. Therefore, the QoE configuration still needs to be forwarded at handover to the target gNB together with an indication that the there is a pending release in the UE. There must also be a possibility to cancel the pending release, in case the UE comes back to the area again before the session has ended.

Question 7 : Do you prefer session start/stop indication or pending release indication as solution to fulfill the SA4 requirement ?

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| **Company** | **Solution** | **Additional comments** |
| Apple | Explicit out-of-area scope indication | This is not the same as sending area scope to the UE which was excluded |
| vivo | No | We have different understanding on the LS reply from SA4.   |  | | --- | | *Q2: Does “QoE configuration changes” also include a QoE configuration release scenario i.e. should logging and reporting criteria for ongoing session be unaffected even if the client receives a release of the QoE configuration?*  Answer2: No. For QoE configuration change, the network still wants the QoE reports from the UE side, but for QoE configuration release, the network does not want the UE to perform QoE measurements and reporting. The QoE configuration release has been defined in RAN2/RAN3, and it depends on network when to send the indication to the UE. Based on the difference, the logging and reporting criteria for ongoing session should be affected when the client receives a release of the QoE configuration. |   Based on the above reply from SA4, the QoE configuration can be released even when there is an ongoing QoE session. Therefore, no need to indicate from UE to gNB on whether there is an ongoing QoE session. |
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## 2.4 Handling of delta and fullConfig

The following proposals are related to handover, resume and reestablishment and the use of delta and fullConfig.

* gNB should be able to resume all QoE configurations using one-bit flag e.g.*restoreQoE* indication in *RRCResume* message.[1]
* gNB should be able to resume parts for QoE configurations using *fullconfig* configurationin *RRCResume* message.[1]
* If the network uses delta signalling at Resume, only possible differences compared to the latest configuration are indicated. The network does not indicate anything in Resume for QoE configurations that remain the same as in the latest UE configuration.[5]
* When the UE resumes the connection in a gNB supporting QoE, the target gNB should explicitly indicate which QoE measurement configurations should be kept by the UE during RRC resume procedure if full configuration is used, e.g. in RRCResume message. The UE shall release all QoE measurement configurations not indicated by the gNB for restoration.[5]
* In case the UE resumes the connection in a gNB not supporting QoE, i.e. in case RRCSetup is received in response to RRCResumeRequest, the UE should release all QoE measurement configurations.[5]
* Similar to resume, if full configuration is triggered after re-establishment, the network indicates the measConfigAppLayerId’s of the QoE measurements that should continue after the re-establishment.[5]
* In case the UE reestablishes the connection and RRCSetup is received in response to RRCReestablishmentRequest, the UE should release all QoE measurement configurations.[5]
* The QoE configuration file is optionally included in RRCReconfiguration.[5]
* Similar to resume, at handover with full configuration, the network indicates the measConfigAppLayerId’s of the QoE measurements that should continue and the measConfigAppLayerId’s of the QoE measurements that should be relased after the handover.[5]
* The UE releases the QoE configurations if no measConfigAppLayerId is indicated in the Handover Command.[5]
* R2-2109105 (RAN2#115e):[14]
* Select one option regarding QoE handling upon receiving full configuration[14]
* When the UE resumes the connection in a gNB supporting QoE, the target gNB indicates whether UE should keep or release each QoE configuration (i.e., per QoE configuration).[14]
* During the handover to target gNB which supports QoE, the target gNB indicates whether UE should keep or release each QoE configuration (i.e., per QoE configuration).[14]
* One common indicator can be used to keep all QoE configurations during the RRC Resume procedure.[11]
* For the indication that indicates which QoE configurations should be kept,[13]
  + If the QoE configuration has already been stored at UE and no modification/release is required, even at full configuration, it is enough to just provide the indication (i.e. no QoE configuration container is needed to be provided) for QoE configuration within RRC Resume or RRC Reconfiguration message.
  + The indication is provided per QoE configuration, and MeasConfigAppLayerId could be reused.

Based on the proposals above, the following is summarized :

There are proposals related to resume, handover and re-establishment. An attempt is made to have similar handling at delta configuration and full configuration for the different use cases.

In RAN2#115 RAN2 agreed that the network explicitly indicates which QoE configurations to keep at Resume, but it was not clear whether it applies to the delta case or the fullConfig case.

In existing specification at fullConfig, the RRC layer configurations are released and the higher layer configurations are maintained. It would be simplest to keep the same principle for QoE configurations. That would mean that the UE can release the RRC part of the QoE configuration, but keep the QoE configuration in the application layer.

Some companies proposed a common indicator to keep all QoE configurations at Resume. If the same principle is used as in legacy, such an indicator seems not to be needed for delta configuration as only possible differences in the configuration are indicated. At fullConfig such an indication would require that the UE stores also part of the RRC configuration.

The understanding is that the measurements are released if QoE measurements are not supported in the target node. No support in the target node triggers RRCSetup at resume and re-establishment and fullConfig with no measurements indicated at handover.

Question 8: Do you agree that the network indicates only possible differences between the QoE configurations at resume, handover and re-establishment when delta configuration is used, i.e. similar as legacy?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes |  |
| vivo | Yes |  |
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Question 9: Do you agree that the network indicates the measConfigAppLayerId of the configurations that should continue and of the configuration that should be released at fullConfig at handover, resume and re-establishment, to enable the same UE behaviour as today at fullConfig? This means that the QoE configuration container may be omitted in the RRCReconfiguration message.

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | No | We understand the motivation of this proposal is to reduce unnecessary signalling of QoE configuration. Given that we support delta configuration, it is not clear to us that further optimization for full configuration is needed. |
| vivo | No | Agree with Apple, delta configuration is enough to reduce the signalling. For full configuration, the AS layer shall release the current configuration and apply the new one. |
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Question 10: Do you agree that the UE releases the QoE measurements if no measConfigAppLayerId is indicated in the Handover Command, i.e. when the target node does not support QoE measurements?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes |  |
| vivo | Yes | When the target node does not support QoE, the mapping relation info of RRC ID and QoE reference will get lost and the potential report will be useless. |
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Question 11: Do you agree that the UE releases the QoE measurements if RRCSetup is received in response to RRCResumeRequest or RRCReestablishmentRequest, i.e. when the target node does not support QoE measurements?

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes |  |
| vivo | Yes | Same as above. |
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## 2.5 Other proposals

The following proposals submitted to AI 8.14.2.1 are not treated in this discussion due to out of scope of the discussion.

* The gNB sends the slice info as an explicit IE in RRC QoE configuration. The QoE configuration container should not include the slice info.[9]
* For the legacy QoE measurement reporting, there is no need to include slice information in the RRC signalling. The slice ID should be included in the QoE report container.[9]
* SRB4 release implies QoE configuration release, notifying upper layer about the release, discarding any pending or not reported QoE data.[10]
* QoE correlation with MDT / Trace PM data collection is handled in networks side.[10]
* RAN2 send a reply LS to SA4, including following contents:[2]
* Reply SA4 that “The duration of a RAN overload may last long. However, RAN should guarantee the temporary stop does not last long by controlling the buffer size limitation for stored QoE measurement report. ”[2]
* Reply SA4 that “Configuring UE with a limited duration or a limited buffer size for storing QoE report during QoE pause could help to avoid RAN overload recurrence during QoE resume”.[2]
* Reply SA4 that “From RAN2 point of view, QoE pause may not reduce overload situation at NG-RAN if the required average QoE load per application is smaller than 100bits/sec. RAN2 suggests SA4 to check with SA5 on the purpose and effectiveness of introducing QoE pause during RAN overload”.[2]
* During QoE pause, QoE reports are stored at AS layer with a limited buffer size.[2]
* RAN2 to agree that source gNB should send the information of the air-interface resource consumption for transmission of the measurement report for each QoE configuration towards the target gNB to assist the target gNB to choose which QoE measurement configuration should be released.[8]
* For the RRC resume scenario, RAN2 to agree that the granularity of the indication of the release is of per QoE configuration, and the source gNB should send the historical information of the air-interface resource consumption for transmission of the measurement report for each QoE configuration towards the target gNB when UE context is retrieved.[8]
* gNB can resume some of the QoE measurement configurations selectively from the list of complete QoE measurement configurations (previously sent to the UE) based on RRC identifier and own priorities.[10]
* Support measConfigAppLayer to be set to pause the QMC upon temporary stop procedure.[13]
* Support measConfigAppLayer to be set to restart the QMC upon QMC restart procedure.[13]
* Use SRB1 for transmission of RAN Visible parameters.[4]
* Add the RAN Visible QoE parameters in MeasurementReportAppLayer.[4]
* Send a reply LS to RAN3 with the agreements on RAN Visible parameters.[4]
* RAN-visible QoE is limited to the indication of separate parameters in QoE configuration (e.g. service type).[10]
* RAN2 does not specify extracting of the entire XML-report.[10]
* RV QoE data shall be transported via SRB4.[11]
* RAN2 shall define UE capability for RAN visible QoE measurement in Rel-17.[11]
* Add the information of RVQOE supporting and QoE Measurement Collection service type supporting in UE-NR-Capability in UECapabilityInformation.[12]
* Use the short RRC ID to identify a RAN-visible QoE measurement in RRC message[12]
* RAN2 design the format of RAN-visible QoE configuration according RAN3 agreements.[12]
* RAN2 design the format of the RAN-visible report with RRC IEs format.[12]

# 3 Conclusion

# 4 References

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