3GPP TSG-RAN WG1 Meeting #116bis-e Tdoc R2-22xxxxx

January 17th - 25th, 2022

Agenda: 8.14.3

Source: Ericsson

Title: Feature summary for 8.14.3

Document for: Discussion, Decision

# 1 Introduction

In this document the following offline is discussed:

* [AT116bis-e][030][QoE] Other open issues (Ericsson)

 Scope: List the remaining other open issues not related to Mobility, Pause Resume, RV QoE or UE cap. Determine agreements (agreed offline), and points for online CB, if any.

 Intended outcome: Report

 Deadline: Friday W1 (can CB Mon W2 if needed).

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# 2 Discussion

## 2.1 Multiple QoE reports in one message

The following proposals are related to the possibility to include multiple QoE reports in one *MeasurementReportAppLayer* message.

* It is not allowed to add multiple QoE reports in one RRC message.
* Select one option among:
- Option 1. MeasurementReportAppLayer message includes a single QoE report with a MeasConfigAppLayerID.
- Option 2. MeasurementReportAppLayer message includes multiple QoE reports with the same MeasConfigAppLayerID.
- Option 3. MeasurementReportAppLayer message includes multiple QoE reports with different MeasConfigAppLayerID.
* RAN2 to agree that it is up to UE implementation whether or not transmit multiple QoE reports in one RRC msg, and ASN.1 should support including more than one QoE report and measConfigAppLayerId in the one RRC msg.
* Multiple QoE report containers can be included in one *MeasReportAppLayer* message, and it is up to UE implementation on whether to include multiple QoE report container in one message.
* Multiple QoE reports can be included in a single QoE report message.
* allow multiple QoE reports in the same RRC message, and discuss in what scenrios QoE report aggeration should be performed.
* Allow multiple QoE reports in the same MeasurementReportAppLayer message.
* Add the report of QoE measurements by means of list to enable report of multiple simultaneous measurements.

Based on the proposals above, the following questions are asked:

Question 1: Do you think ASN.1 should support including multiple QoE reports in one *MeasurementReportAppLayer* message? If so, do you think there should be multiple QoE reports with different *measConfigAppLayerId* or multiple QoE reports with the same *measConfigAppLayerId* or both?

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| **Company** | **Yes/No** | **Comments** |
| Huawei, HiSilicon | Yes | For the 1st question, we are okFor the 2nd question, we think both situations may happen in theory and the UE can simply include the reports it currently has in its buffer, regardless of their corresponding ID.For “QoE reports”, we think the meaning can be container based QoE for now. Whether the discussion can be applied to RAN visible QoE can be checked later. |
| Apple | Yes | Depends on RRC segmentation |
| Qualcomm | Yes | From specification point of view, it should support both; how to generate the message is up to UE implementation. |
| CMCC | Yes | Both.We think such flexibility should be provided to UE. |
| Lenovo | Yes | Firstly, the question is independent on whether UL segmentation is supported or not. Even if UL segmentation is not supported the UE should be allowed to include multiple QoE reports into a single MeasurementReportAppLayer message as long as the max PDCP SDU size is not exceeded.Furthermore, in view of the latest agreements we made in the Thursday QoE online session wrt to pause/resume (AS layer storage of QoE reports, minimum storage requirement of 64kB, leave to UE how AS layer discards QoE reports if minimum storage requirement is exceeded) the inclusion of multiple QoE reports into a single MeasurementReportAppLayer message can be left to UE as well. At least the ASN.1 of MeasurementReportAppLayer message should allow the UE to both include QoE reports with different and same measConfigAppLayerId. |
| vivo | Yes | As we already support pause&resume, multiple QoE reports shall be supported. |
| CATT | Yes | Should support both |
| Ericsson | Yes |  |
| Nokia | Yes, but | For multiple reports several messages could be used, but having Pause/Resume it might be indeed useful |
| ZTE | No,but **fine to follow majority** | We do not think this function is necessary. But we are fine to follow majority’s view and are not intend to disturb discussion. As we explained in our tdoc(2200267), UE can only use this function in very rarely cases. we doubt whether it is valuable to add this function but rarely be used by UE.From another hand, it is clear that based on SA4 understanding, the new added service type or the enhancement of the current supported service types will have larger reports. That’s the reason they ask RAN2 to extend the upper limit of the reporting container. With the larger and larger report container, it is hard to say whether this function can be frequently used in the future. For simplicity and future proof perspective, we do not prefer to support this one. |
| China Unicom | Yes | Yes, we can support both. |
| OPPO | Yes | Both should be supported. |
| Samsung | Yes | Both are fine for flexibility |
| LGE | Yes | It is agreed to support the Pause/Resume in R17. When QoE reporting is resumed, UE should be able to report the stored QoE reports at once. For this case, the reporting message should be able to contain the multiple QoE reports even with the different IDs. |

Summary:

Almost all companies think that it should be possible to send multiple QoE reports in one *MeasurementReportAppLayer* message. Most companies think there can be both multiple QoE reports with different *measConfigAppLayerId* and multiple QoE reports with the same *measConfigAppLayerId*.

1. Mulitple QoE reports can be sent in one *MeasurementReportAppLayer* message.
2. There can be both multiple QoE reports with different *measConfigAppLayerId* and multiple QoE reports with the same *measConfigAppLayerId* in the *MeasurementReportAppLayer* message.

## 2.2 Container size limitations

The following proposals are related to container size limitations and how to capture them in the specification.

* Maximum size of the QoE configuration container should be specified as 8000 bytes in RRC, to account for an overhead of other fields that may need to be included in the RRC Reconfiguration message.
* To avoid oversized QoE reports from being provided from application layer to the AS layer, AS layer should inform application layer whether the reports larger than 8000 bytes can be transmitted by the UE (i.e. depending on whether the UE is capable of and configured with RRC segmentation or not).
* Add a Note in field description of measConfigAppLayerContainer saying that the message containing the QoE configuration container(s) cannot exceed 9000 bytes.
* Add a Note in the field description of MeasurementReportAppLayerContainer saying that the message containing the QoE report container(s) cannot exceed 144 000 bytes.
* Send the reply LS to SA4 with the new size limitations for QoE configuration and report.

It is assumed that RAN2 sends a reply LS with the relevant RAN2 agreements related to size limitations as the size limitations are currently captured also in SA4 specifications and a reply LS has not been sent so far. Regarding the other proposals, the following questions are asked :

Question 2: Do you think the container size limitations should be captured as a maximum size of the BITSTRING in ASN.1 or in the field description with a maximum size of the RRC messages containing the containers?

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| **Company** | **Comments** |
| Huawei, HiSilicon | This should be captured as the maximum size of the container. Field descriptions are not a good place to capture such limitations in our opinion. Furthermore, we need to decide about the maximum size of the QoE configuration which in our opinion should be 8 kBytes. |
| Apple | Ok to limit the maximum size to 8K. Neutral on how it is specified. |
| Qualcomm | Seems it is more straight-forward to capture the maximum size of the container. |
| CMCC | For QoE configuration container, we agree with Huawei.For QoE report, we think it depends on Q3, i.e. whether UE capability of RRC segmentation is conditionally mandatory or not. If so, the message containing QoE reports cannot exceed 144KB. If not, i.e. RRC segmentation is optionally supported, then there are two sub-cases: 1. if RRC segmentation is supported by UE, then the message containing QoE reports cannot exceed 144KB; while 2. If RRC segmentation is not supported by UE, then the message containing QoE reports cannot exceed 9KB. |
| Lenovo | On the limit for single measConfigAppLayerContainer:* We think that the agreed value of “size of one PDCP SDU” is overdimensioned, so we are ok to reduce it to a lower value. Although we are not convinced of a value of 8000 bytes either, we can accept it and can be specified in ASN.1.

On the limit for single measurementReportAppLayerContainer: * A value of 144kB is overdimensioned. SA4 did reply that a QoE report may exceed 8kB for advanced NR services (e.g. 18kB for VR in case of 10min reporting interval), but they didn’t say anything of a value of 144kB.
* The value of 144kB is only relevant for the MeasurementReportAppLayer message if we allow concatenation of multiple QoE reports and UL segmentation is supported by both UE and NW.
* So, to properly reflect SA4 reply and to support QMC for advanced NR services we suggest not to specify a limit for measurementReportAppLayerContainer in ASN.1.
 |
| vivo | Considering the margin, ok to limit the maximum size to 8 KB and the maximum size of the BITSTRING in ASN.1 is a straightforward way. |
| CATT | Share with CMCC |
| Ericsson | We prefer an explanation in field description as it is the total size of the message that cannot exceed the size limitations, not the container.  |
| Nokia | It’s ok to clarify that the RRC message for QoE reporting, together with the associated information should not exceed the “size of one PDCP SDU” |
| ZTE | Same view with Apple |
| China Unicom | We slightly prefer to capture as the maximum size of the container, which is more clearly. |
| OPPO | ASN.1 is OK for us. |
| Samsung | Agree with CMCC |
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Summary:

Most companies think the limit of the configuration container can be defined as a maximum size of the OCTET STRING (not BITSTRING as incorrectly indicated earlier) in ASN.1 and many companies are fine with the proposal 8000 bytes.

1. The maximum size of the QoE configuration container is specified as a maximum size 8000 (Bytes) of the OCTET STRING in ASN.1.

Regarding the QoE report, some companies commented that the maximum size depends on the UE capability, which is true. However, ASN.1 needs to support the maximum size that can be transmitted by some UEs, even if not all UE’s are capable of such a large size. One company commented that it is better not to specify any max size of the QoE report container. Many companies did not comment on how to capture the max size of the report. According to the RRC rapporteur some encoders may have problems with a very large max size of an OCTET STRING being defined. Therefore, it is proposed that no max size is specified of the OCTET STRING for the QoE report.

1. No max size of the OCTET STRING for the QoE report container is specified in ASN.1.

SA4 previously sent an LS to RAN2 where they suggested RRC segmentation to be supported for QoE and the current size limitations to be removed. RAN2 has not replied to that LS yet. SA4 currently have the LTE size limitations specifieded in their specifications and they need to be informed of the RAN2 agreements. It is therefore proposed ot reply to SA4 of the RAN2 agreements related to RRC segmentation and container size limitations.

1. Reply to SA4 with the RAN2 agreements related to RRC segmentations and container size limitations.

Question 3: In case the UE capability of RRC segmentation is not conditionally mandatory, do you think application layer needs to be informed of the UE capability to support RRC segmentation?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Additional comments** |
| Huawei, HiSilicon | Yes | Informing APP layer about the segmentation capability allows avoiding oversized QoE reports from being provided from application layer to the AS layer. To be specific – what APP layer needs to understand is the maximum size of the report that it can provide (i.e. either 8kBytes which is a legacy maximum size or more than that, e.g. calculated based on the maximum number of RRC message segments). |
| Apple | Maybe | Need to solicit SA4 input on whether such a limitation is even possible. |
| Qualcomm |  | Actually, we want to discuss whether all capabilities related parameters need to be interacted between AS layer and application layer, that means we will specify in AT command for all capabilities? For example, AS layer needs to know whether application layer supports QoE, RAN visible QoE, per-slice QoE, do we need to specify this? |
| CMCC | Yes | If not, QoE measurement configuration has to guarantee that APP layer must not generate oversized QoE report. |
| Lenovo | No | We think that it can be left to AS layer how to handle QoE reports if they exceed the max PDCP SDU size limit and UL segmentation is not enabled by NW (i.e. drop the QoE report). We think APP layer shall create QoE reports in accordance with the received QoE measurement configuration, e.g. based on periodic reporting interval (if configured by OAM) or at the end of the session. |
| vivo | No if APP layer will not change the size of the report. | If the UE does not support RRC segmentation and the report exceeds 8 KB, the report will be discarded no matter APP layer knows the capability or not.That is, the APP just sends the report to AS layer no matter it exceeds 8 KB. |
| CATT | Yes | It is better inform App layer about this capability. The app may create the report effcicient |
| Ericsson | No | The purpose would be to discard too large reports in the application layer, but we think they can equally well be discarded in the RRC layer. Seems like this is not really necessary. |
| Nokia | No | This is Radio UE capability for handling the reports over radio, thus it is sufficient once the Network discovers the use of segmentation when receiving the reports |
| ZTE | No | Share the same view with Ericsson. We do not think inform this UE capability to app layer is necessary. RRC layer can discard the oversized report at RRC layer. |
| China Unicom |  | We support application layer needs to be informed of the UE capability to support RRC segmentation. But if APP layer still generate the report exceeds 8 KB, RRC layer can discard the oversized report at RRC layer. |
| OPPO | Yes | I wonder why we should pursue a solution that discards large-size QoE measurement reports, which makes QoE measurement reporting no sense. |
| Samsung | Yes | We would like to note "discard" should be avoided as much as possible. Discarding reports makes all the QoE procedures (i.e., configuration/measurement/report) wasted. Therefore, depending on the RRC segmentation availability, application layer needs to make report within 9KB or 144 KB. Besides, it is not a big deal for AS layer to indicate RRC segmentation availability to App layer (e.g., 1-bit indication)  |
| LGE | Yes | If not, APP layer may forward the QoE reports larger than the limitation to RRC even though the RRC doesn’t support segmentation.Basically, we think the UE capability of RRC segmentation should be conditionally mandatory to avoid such a complex interaction between RRC and APP layer. |

Summary:

There are split view on whether the support for RRC segmentation needs to be indicated to the application layer. This also depends on how the UE capability for RRC segmentation is defined, which is not decided yet. Therefore, it is proposed to wait for the decision on the UE capability first, before agreeing on whether it needs to be forwarded to the application layer.

## 2.3 AT-commands

The following proposals are related to AT commands and what to request CT1 to add in TS 27.007.

* Discuss whether the service type needs to be included in the AT command at release.
* Ask CT1 to define the QoE configuration in terms of a list.
* Ask CT1 to define the possibility to release all QoE configurations in an AT command.

The service type is used in the UE for routing the QoE configuration to the right application. The question is whether it is also needed at release to route the release command to the right application. In such case, the AS layer in the UE needs to store the service type together with the *measConfigAppLayerId*. Alternatively, the *measConfigAppLayerId* may be sufficient to route the release command to the right application.

RAN2 has agreed to support multiple QoE configurations, but the AT-command currently only supports one QoE configuration.

The AT command for release all QoE configurations seems to be needed e.g. in the case where an *RRCSetup* is triggered in a gNB not supporting QoE measurements and where the RRC layer has been cleared and does not know which QoE configurations that are configured in the application layer. In LTE, only one QoE configuration can be configured and then the release command also has the meaning release all.

Based on the proposals above, the following questions are asked:

Question 4: Do you think the service type needs to be forwarded to the application layer at release?

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| **Company** | **Yes/No** | **Additional comments** |
| Huawei, HiSilicon | Probably yes | It depends on how AS and APP co-ordinate during the QoE measurement setup phase, but as mentioned above, in order to route the release to a proper application, this may be needed. We can check with CT1. |
| Apple | No | measConfigAppLayerId should be sufficient. |
| Qualcomm | No | There should be two questions here.When UE AS layer receives one QoE configuration with service type and measConfigAppLayerId, UE should determine the concerned applications based on service type and only forward measConfigAppLayerId to concerned application layer.When RAN release one QoE configuration, RAN only indicates *measConfigAppLayerId* for the to be release QoE configuration. So, anyway, UE AS layer needs to store the association of service type and *measConfigAppLayerId,* and then UE will forward release command to the concerned applications based on service type. |
| CMCC | No | Agree with Apple. |
| Lenovo | Yes | In LTE QoE the same AT command +CAPPLEVMC is used for both setup and release of QoE measurement configuration. We think the same approach should be adopted for NR as well. We don’t see the stringent need to specify different AT commands for setup and release. |
| vivo | No | Agree with Apple. |
| CATT | Yes (shall) | The app layer use it to match the application service to start the QoE. Application layer cannot know which QoE reference mapping to which application if no such information You may find in 28.4056. When the application in the serviceType starts, the QMC is initiated.i.e. if several QoE reference configure same service type, the UE will start all these QoE reference with same service type |
| Ericsson | No | Agree with QC. |
| Nokia | No | The Application Layer receives the RRC ID during the configuration. For the release, if RRC ID is given, App. Layer can release the right configuration. |
| ZTE | No | Agree with Apple. |
| China Unicom | No | We are not clear on the benefits to transfer the service type to APP layer. From our view, measConfigAppLayerId is the is the minimum granularity used to setup and release QoE measurements. |
| OPPO | No | Agree with Apple |
| Samsung | No | Agree with QC. If UE stores the mapping between service type and *measConfigAppLayerId*, UE can send release command to the right application using only *measConfigAppLayerId*. However, it is different from LTE, so prefer to ask CT1 if there is any issue on it. |
| LGE | No | UE can determine a proper application based on the service type, so only measConfigAppLayerId needs to be forwarded to the application. |

Summary:

Most companies think that the service type does not need to be forwarded to the application layer at release. This means that the service type can be optional in the AT-command.

1. Inform CT1 that the service type does not need to be forwarded to the application layer at release.

Question 5: Do you agree that the AT-command needs to include QoE configurations in terms of a list, i.e. corresponding to the list in the RRC message? If you don’t agree, please explain why it is not needed.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Additional comments** |
| Huawei, HiSilicon | Up to CT1 | AT command design is up to CT1 in general, so there is no need for RAN2 to discuss this. It can be left up to CT1 discussions whether they would like to have a single AT command with a list of configurations or they prefer to indicate each configuration separately. E.g. if AT command is anyway sent to a specific application, then it is not clear how the list would work for different services. |
| Apple | Yes | But can leave CT1 to take final decision |
| Qualcomm |  | Can leave to CT1 decision |
| CMCC |  | Agree with Huawei. |
| Lenovo | Yes | Anyway, we need to introduce a new AT command for NR. Due to this, we can ask CT1 to define a new AT command that includes a list of QoE measurement configurations. |
| vivo |  | Agree with Huawei. |
| CATT |  | Agree with Huawei. |
| Ericsson | Yes | We could let CT1 decide on how to define the AT-command, but we need to tell them the intention of what we want, i.e. a list. |
| Nokia | No | Up to CT1 |
| ZTE |  | Out of RAN2 scope. We prefer to leave this to CT1. |
| China Unicom |  | Leave it to CT1. |
| OPPO |  | Leave to CT1 to decide |
| Samsung |  | Better to ask CT1 |
| LGE |  | Up to CT1. |

Summary:

Most companies think it is up to CT1 whether the to include QoE configurations in terms of a list in the AT-command. However, CT1 needs to be informed that the QoE configurations are configured as a list in RRC in NR.

1. Inform CT1 that the QoE configurations can be configured as a list in NR and ask them to take this into account when specifying the AT-command.

Question 6: Do you agree that the AT-command needs to include the option to release all QoE configurations? If you don’t agree, please explain why it is not needed.

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| **Company** | **Yes/No** | **Additional comments** |
| Huawei, HiSilicon | Up to CT1 | Similarly as above, if AT command is sent to a specific application, then a single AT command may not be feasible. From RAN2 perspective we need to indicate to higher layers that the QoE configurations are released (either all or one). How this is communicated to application layer depends on CT1.  |
| Apple | Maybe | But can leave CT1 to take final decision.  |
| Qualcomm | Yes | For easy implementation in case of all QoE release. |
| CMCC |  | Agree with Huawei. |
| Lenovo | No | We prefer that the same AT command should be used to setup and release a list QoE measurement configurations, see also our comment to Q4 above. Therefore, we don’t see the stringent need to support the option to release all QoE configurations. |
| vivo |  | Agree with Huawei. |
| CATT |  | Agree with Huawei. |
| Ericsson | Yes | The exact definition can be up to CT1, but we think the functionaliy is needed when the measConfigAppLayerId’s have been cleared in AS layer and where the measurements in the application layer need to be released. Then the measConfigAppLayerId’s cannot be included in the AT-command. |
| Nokia | No | Up to CT1 |
| ZTE | No | Up to CT1 |
| China Unicom |  | Up to CT1, but we support this due to easy implementation. |
| OPPO | Up to CT1 | Agree with Huawei |
| Samsung |  | Better to ask CT1 |
| LGE |  | Up to CT1. |

Summary:

Most companies think it is up to CT1 how to specify the AT-command. However, CT1 needs to be informed that all QoE configurations may need to be released without any *measConfigAppLayerId* being indicated from the AS-layer.

1. Inform CT1 that all QoE configurations may need to be released without any *measConfigAppLayerId* being indicated from the AS-layer and ask them to take this into account when specifying the AT-command.

RAN2 previously agreed to send an LS to CT1 with all agreements related to AT-commands at the end of the work item.

1. Send an LS to CT1 and inform them of the RAN2 agreements with impact on AT-commands.

## 2.4 Other proposals

These are the remaining proposals:

* 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.
* 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.
* Categorize all QoE measurement in different sets/containers by service type and assgin the set/container with unique identify.
* Prioritize the use of identify of set/container to indicate gNB which QoE configurations should be kept.
* For QoE reporting control, RAN node is made aware of the reporting interval applied for QoE data collection as an assistance information to help RAN decide whether to pause or release the QoE.
* To support QoE measurement reporting control, RAN supports optionally configuration of QoE data collection cycle in AS layer.

The proposals seem not to be strictly needed in rel-17 in order to complete the WI with the defined scope and they are also not proposed by more than one company.

Question 7: Would you like to proceed with any of the proposals above? Which ones? Please motivate.

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| **Company** | **Yes/No** | **Additional comments** |
| Huawei, HiSilicon | No | These proposals do not seem essential to complete the work and many of them have also impact on RAN3. We prefer not to discuss them in this release.  |
| Apple | No | Agree with Huawei. |
| Qualcomm | No | Agree with Huawei. |
| CMCC | No | Some proposals can be postponed. |
| Lenovo | No | We agree with the rapporteur. All proposals are minor enhancements which are not stringent needed. |
| vivo | No |  |
| CATT | No |  |
| Ericsson | No |  |
| Nokia | Yes,but | Making RAN node aware of the @reportInterval (which is included in the container) could ease collection of the reports in a regular case and Pause/Resume. Though maybe postponed to Rel-18 |
| ZTE | No |  |
| China Unicom | No |  |
| Samsung | No |  |
| LGE | No | Agree with Huawei. |
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Summary:

No proposal got support from any another company than the proponing company. It is therefore proposed to leave these proposals for now and perhaps get back to them later, e.g. in rel-18.

# 3 Conclusion

Based on the discussion in the previous sections we propose the following:

[Proposal 1 Mulitple QoE reports can be sent in one *MeasurementReportAppLayer* message.](#_Toc93913184)

[Proposal 2 There can be both multiple QoE reports with different *measConfigAppLayerId* and multiple QoE reports with the same *measConfigAppLayerId* in the *MeasurementReportAppLayer* message.](#_Toc93913185)

[Proposal 3 The maximum size of the QoE configuration container is specified as a maximum size 8000 (Bytes) of the OCTET STRING in ASN.1.](#_Toc93913186)

[Proposal 4 No max size of the OCTET STRING for the QoE report container is specified in ASN.1.](#_Toc93913187)

[Proposal 5 Reply to SA4 with the RAN2 agreements related to RRC segmentations and container size limitations.](#_Toc93913188)

[Proposal 6 Inform CT1 that the service type does not need to be forwarded to the application layer at release.](#_Toc93913189)

[Proposal 7 Inform CT1 that the QoE configurations can be configured as a list in NR and ask them to take this into account when specifying the AT-command.](#_Toc93913190)

[Proposal 8 Inform CT1 that all QoE configurations may need to be released without any *measConfigAppLayerId* being indicated from the AS-layer and ask them to take this into account when specifying the AT-command.](#_Toc93913191)

[Proposal 9 Send an LS to CT1 and inform them of the RAN2 agreements with impact on AT-commands.](#_Toc93913192)

# 4 References

1. [R2-](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200267.zip)[2200267](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200267.zip)**,** Discussion on QoE configuration, ZTE Corporation, Sanechips
2. [R2-2200548](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200548.zip)**,** Remaining QoE issues, Samsung
3. [R2-2200557](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200557.zip)**,** Discussion on QoE measurement collection configuration in NR, OPPO
4. [R2-2200684](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200684.zip)**,** Leftover issues of QoE configuration, reporting, pause, resume and mobility, Qualcomm Incorporated
5. [R2-2200820](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200820.zip)**,** Discussion on QoE open issues, Huawei, HiSilicon
6. [R2-2200851](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200851.zip)**,** Remaining open issues on QoE measurement and mobility, CMCC
7. [R2-2200997](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200997.zip)**,** Configuration and reporting of QoE measurements, Ericsson
8. [R2-2201046](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201046.zip)**,** Discussion on open issues for QoE, Nokia, Nokia Shanghai Bell
9. [R2-2201421](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201421.zip)**,** Discussion on the remaining open issues, CATT