**3GPP TSG-RAN WG3 Meeting #111-eR3-211201**

**Online, January 25th – February 4th 2021**

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Title: pCR for TR 38.890: QoE Visibility at the RAN

Document for: Agreement

# Introduction

This pCR was produced in the **CB: # NRQoE5-RAN\_visible.**

# pCR to TR 38.890

-------------------------------------------Change 1-------------------------------------------

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**QoE measurement:** An application layermeasurement configured by OAM, see details in [3] [4] [5] [6] for different service type.

**QoE report:** The result of a QoE measurement.

**Radio-related measurements:** Measurements on the radio layer, whose purpose is to help network to further evaluate and improve the QoE.

**Radio-related information:** Information other than “radio-related measurements”, e.g. feature info, mobility history info or dual connectivity status. FFS on Radio related information only from UE or RAN node or both.

**RAN-visible QoE:** Includes RAN-visible QoE metrics and RAN-visible QoE values.

**RAN-visible QoE metrics:** A subset of QoE metrics data collected from UE, which are useful for RAN.

**RAN-visible QoE values:** A set of values derived from QoE metrics data through a model/function defined by RAN3 in collaboration with SA4.

Editor’s NOTE: The above three definitions may subject to further refinements once further consensus are reached.

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## 6.7 RAN visible QoE information reporting by UE

Editor's NOTE: This section describes the procedure for UE to report RAN visible QoE information.

The RAN may not be able to understand or make use of the legacy QoE metrics, as they are assembled by the OAM, sent inside containers and intended to be processed by the Measurement Collection Entity in the network. For the RAN to be able to understand and make use of the QoE concept, QoE information visible by the RAN is introduced. RAN-visible QoE information is a simplified QoE information abstracted from QoE metrics by UE, which the RAN may use for various types ofQoE optimizations.

The RAN-visible QoE metrics can be derived from individual SA4-defined QoE metrics deemed useful for the RAN, such as buffer level. RAN-visible QoE metrics can be simplified values derived from individual useful SA4-defined QoE metrics or combinations of these values in the form of e.g. (details FFS):

* A numeric value on a scale between 0 to x, or
* An objective qualitative representation (“good QoE”, “moderate QoE”, “bad QoE”), or
* A binary flag.

The following holds:

* The RAN-visible QoE can be used for all services.
* The RAN is responsible for assembling the RAN-visible QoE measurement configuration.
* The RAN is responsible for triggering i.e. activating the RAN-visible QoE measurement.
* FFS whether RAN can explicitly ask the UE to report certain RAN-visible QoE metrics or just an indication to report the fixed set of RAN-visible QoE metrics predefined per service type.
* The RAN should be able to configure RAN-visible QoE autonomously for a given service type only if the application layer QoE for the same service type is already configured.
* The application receives the RAN-visible QoE configuration and derives the RAN-visible QoE values per each RAN-visible QoE metric, and sends the values to the UE RRC via an AT command, so that UE RRC compiles and sends the RAN-visible QoE metrics to the network. Other options are FFS (RAN, QoE server).
* The RAN-visible QoE values are delivered to the RAN as a separate IE, visible to the RAN.
* The RAN is not allowed to change the existing configuration of legacy QoE metrics specified by SA4 (i.e. the metrics not visible at the RAN).

Figure 6.7-1 shows the message flow for RAN visible QoE information reporting.

**QoE**

**Server**



**RAN node**



**UE**

Figure 6.7-1: RAN-visible QoE information reporting

1. A RAN node assembles and sends the RAN visible QoE configuration to a UE, which may be sent along with the QoE measurement configuration container transmitted from CN or OAM.

2. The UE receives and applies the RAN-visible QoE configuration and/or QoE measurement configuration container. The RAN visible QoE configuration may be so that the corresponding RAN visible QoE information that is reported can be a unique value or a combination of values reflecting the QoE metrics useful for RAN (such as buffer level). The RAN-visible report is provided from the application layer of the UE to the UE’s RRC layer by means of an AT command. The UE’s RRC layer then includes the RAN-visible report, along with the QoE report container, but as a separate IE, in the *MeasReportAppLayer* IE, and sends it to the RAN.

3. The RAN node reads the RAN-visible QoE information and/or forwards the (legacy) QoE report container to the QoE server accordingly.

### 6.7.1 Initial analysis on RAN-visible QoE metrics

The table below shows some QoE parameter for different services, with some initial analysis of potential benefits. These parameters could be classified into two different types, i.e. related to RAN and not related to RAN according to their relationship with RAN.

As could be seen from the table below, some of QoE metrics may have nothing to do with RAN, some of them are user behaviour related, and some may be related with RAN behaviour. Whether any metric is beneficial for RAN and could be visible to RAN, should be studied per metric.

**Table 1: Initial analysis on relation of QoE metrics with the RAN**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Parameters** | **Potential benefits** | **Remark** |
| **Related to RAN** | * Round-trip time… | Not clear | If Round-trip time is large, RAN could try to compensate based on RAN part delay, but the cost might be significant. RTT is also related with many factors like UE capability, radio quality, radio load, etc., to adjust radio transmission delay for one user may impact other users, and the effect for the whole system performance is unpredictable. |
| * Jitter duration | Not clear | there are other factors affecting jitter, e.g. buffer size available at UE side, processing delay etc., if RAN already fulfil QoS requirement, not sure what else RAN could do. |
| * Corruption duration | Not clear | If the RAN can know the results of this metric, the RAN can adjust the resource allocation of the UE to satisfy the user experience |
| * Average Throughput | Not clear | RAN could measure RAN side throughput by itself and make adjustment accordingly, so this metric has some relation with RAN though, the benefit seems unclear. |
| * Initial playout delay | Not clear |  |
| * … |  |  |
| **Not related to RAN** | * Device information… | NA | this metric may have potential privacy issues because it exposes the user information |
| * Rendered viewports | NA | This metric may have potential privacy issues because it exposes the user behaviour |
| * Codec Information | NA |  |
| * Buffer level | Might be useful. | If the RAN can know the results of buffer level, the RAN can adjust the resource allocation of the UE to ensure there is enough buffer for the streaming. |
| * … |  |  |

-------------------------------------------End of changes-------------------------------------------