**3GPP TSG-RAN2 Meeting # 118-e *R2-22xxxxx***

**Online, 9 May - 20 May, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.300** | **CR** | **0441** | **rev** | **1** | **Current version:** | **17.0.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | 38.300 CR Correction for Introduction of QoE measurements in NR | | | | | | | | | |
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| ***Source to WG:*** | China Unicom, Huawei, HiSilicon, Ericsson, Apple | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_QoE-Core | | | | |  | ***Date:*** | | | 2022-04-21 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | Correction CR for introduction of QoE measurements in NR. The following issues have been focused:  The following description should be common for the QoE Measurement Collection function:  *The QoE measurement collection is supported in RRC\_CONNECTED state only.*  NG-RAN is used in stage-2 text, but this WI NR QoE is only related to SA, i.e. gNB, so NG-RAN should be gNB.  The following descriptions have been covered by other places, so they can be removed:  - RAN visible application layer measurement is supported only for streaming and VR services. The gNB can use RAN visible application layer measurement configurations to instruct the UE to collect application layer measurements for RRM purposes.  - gNB configures the required RAN visible QoE metrics in the RAN visible application measurement configuration for the UE to report.  - Each application layer measurement configuration is encapsulated in a transparent container. The gNB forwards the corresponding QoE measurement configuration(s) to the UE in a downlink RRC message containing AppLayerMeasConfig, as specified in TS38.331 [12].  - The UE reports QoE measurement results to the NG-RAN node in an uplink RRC message, as specified in TS38.331 [12]. The NG-RAN node transmits the QoE report and the corresponding QoE Reference ID to the MCE.  Some wordings/sentences may need improvements. | | | | | | | | |
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| ***Summary of change:*** | | The CR correct some typo and grammatical errors based on 38.300 v17.0.0, including:  Replace the term “higher layer” with “application layer” and replace the “measConfigAppLayerId” with “RRC identifier”.  “The QoE measurement collection is supported in RRC\_CONNECTED state only.” is moved to the overview part so that it covers the whole QoE fuction.  The wording NG-RAN is changed into gNB.  For QoE Measurement Collection and RAN visible QoE, some descriptions are removed as they are duplicated with others.  Some editorial corrections and simplified text. | | | | | | | | |
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| ***Consequences if not approved:*** | | Some small issues still exist. | | | | | | | | |
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| ***Clauses affected:*** | | 21 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

*Start of change*

# 21 Application Layer Measurement Collection

## 21.1 Overview

The QoE Measurement Collection function enables collection of application layer measurements from the UE. The supported service types are:

- QoE Measurement Collection for streaming services;

- QoE Measurement Collection for MTSI services;

- QoE Measurement Collection for VR services.

The QoE measurement collection is supported in RRC\_CONNECTED state only. Both signalling based and management based QoE measurement collection are supported.

NOTE: The naming QoE Measurement is used in NG, Xn, and interfaces between OAM and RAN. In the Uu interface, the naming application layer measurement is used and it is equal to QoE Measurement.

## 21.2 QoE Measurement Configuration

### 21.2.1 QoE Measurement Collection Activation and Reporting

The feature is activated in the gNB either by direct configuration from the OAM system (management-based activation), or by signalling from the OAM via the Core Network (signalling-based activation), containing UE-associated QoE configuration. One or more QoE measurement collection jobs can be activated at a UE per service type, and each QoE measurement configuration is uniquely identified by a QoE Reference.

For signalling-based QoE measurements, the OAM initiates the QoE measurement activation for a specific UE via the Core Network, and the gNB receives one or more QoE measurement configurations by means of UE-associated signalling. The QoE measurement configuration for signalling-based activation includes an application layer measurement configuration list and the corresponding information for QoE measurement collection, e.g., QoE Reference, service type, MCE IP Address, Slice Scope, Area Scope, MDT Alignment Information and the indication of available RAN visible QoE metrics.

For management-based QoE measurement activation, the OAM sends one or more the QoE measurement configurations directly to the gNB. The QoE measurement configuration for management-based activation also includes an application layer measurement configuration list and the corresponding information for QoE measurement collection. Each application layer measurement configuration is encapsulated in a transparent container. The gNB selects UE(s) that meet the required QoE measurement capability, Area Scope and Slice Scope.

Application layer measurement configuration received by the gNB from OAM or CN is encapsulated in a transparent container, which is forwarded to a UE as Application layer configuration in the *RRCReconfiguration* message (there can be multiple configurations in the same message). Application layer measurement reports received from UE's application layer are encapsulated in a transparent container and sent to the network in the *MeasurementReportAppLayer* message, as specified in TS 38.331 [12]. The UE can send multiple application layer measurement reports to the gNB in one *MeasurementReportAppLayer* message. In order to allow the transmission of application layer measurement reports which exceed the maximum PDCP SDU size, segmentation of the *MeasurementReportAppLayer* message may be enabled by the gNB. An RRC identifier conveyed in the RRC signalling is used to identify the application layer measurement configuration and report between the gNB and the UE. The RRC identifier is mapped to the QoE Reference in the gNB and the gNB forwards the application layer measurement report is forwarded to OAM/MCE together with the QoE Reference ID. The gNB can release one or multiple application layer measurement configurations from the UE in one *RRCReconfiguration* message at any time. The UE may additionally be configured by the gNB to report when a QoE measurement session starts or stops for a certain application layer measurement configuration.

### 21.2.2 QoE Measurement Collection Deactivation

The QoE Measurement Collection deactivation permanently stops all or some of the QoE measurement collection jobs towards a UE, resulting in the release of the corresponding QoE measurement configuration(s) in the UE. The deactivation of QoE measurement collection is supported by using UE-associated signalling. A list of QoE Reference is used to deactivate the corresponding QoE measurement collection job(s).

Upon reception of the QoE release command in an application layer measurement configuration, the UE discards any unsent application layer measurement reports corresponding to the released application layer configuration. The UE discards the reports received from application layer when it has no associated application layer measurement configuration configured.

The network can replace a configuration with another one by deactivating an existing measurement and configuring another measurement of the same configuration type.

### 21.2.3 Handling of QMC during RAN Overload

The QoE measurement collection pause/resume procedure is used to pause/resume reporting of one or multiple QoE configurations in a UE in RAN overload situation.

The gNB can use the *RRCReconfiguration* message to temporarily stop the UE from sending application layer measurement reports associated with one or multiple application layer measurement configurations. When the UE receives the QoE measurement collection pause indication, the UE temporarily stores application layer measurement reports in AS layer. When the UE receives the QoE measurement collection resume indication, the UE sends the stored application layer measurement reports to the gNB.

### 21.2.4 QoE Measurement Handling in RRC\_IDLE and RRC\_INACTIVE States

If the UE enters RRC\_INACTIVE, the UE AS configuration for the QoE is stored in the UE Inactive AS context.

If the UE enters RRC\_IDLE state, the UE releases all the application layer measurement configurations.

### 21.2.5 Per-slice QoE Measurement

When a service is provided within a configured slice, the QoE Measurement for this service type could also be configured together with the corresponding slice scope, so that the user experience of this service could also be evaluated on a per-slice basis. Multiple QoE measurement configurations can be configured for the same service type with different slices, where each QoE measurement configuration is identified with a QoE Reference.

The UE includes the slice ID inside the QoE report container when reporting QoE measurement.

## 21.3 QoE Measurement Continuity for Mobility

The QoE measurement collection continuity for intra-system intra-RAT mobility is supported, with the Area Scope parameters configured by the OAM, where the network is responsible for keeping track of whether the UE is inside or outside the Area Scope. A UE continues an ongoing measurement even if it leaves the Area Scope, unless the network indicates to the UE to release the QoE configuration.

For RRC\_CONNECTED state mobility, the source gNB may transmit the QoE measurement configuration(s) and/or the information related to the configuration(s) of a specific UE to the target gNB via XnAP or NGAP. For signalling-based QoE, QoE Reference, MCE IP Address, Measurement Configuration Application layer ID, MDT Alignment Information, Area Scope, Slice Scope and Measurement Status are passed to the target node. For management-based QoE, Measurement Configuration Application Layer ID, MCE IP Address and Measurement Status are passed to the target node. For RRC\_INACTIVE state mobility, QoE measurement configuration(s) of a specific UE can be restored from the node hosting the UE context when it resumes to RRC\_CONNECTED state. Multiple sets of QoE measurement configurations should be supported during mobility.

For signalling based QoE, at handover to a target gNB that supports QoE, the target gNB decides which of the application layer measurement configurations should be kept or released, e.g. based on application layer measurement configuration information received from the source gNB in Xn/NG signalling.

When the UE resumes the connection with a gNB that does not support QoE, the UE releases all application layer measurement configurations.

## 21.4 RAN Visible QoE Measurements

RAN visible QoE measurements are configured by the gNB, where a subset of QoE metrics is reported from the UE as an explicit IE readable by the gNB. The RAN visible QoE measurements can be utilized by the gNB for network optimization. The RAN visible QoE measurements are supported for the DASH streaming and VR services. The gNB configures the RAN visible QoE measurement to collect all or some of the available RAN visible QoE metrics, where the indication of metric availability is received from the OAM or CN. The set of available RAN visible QoE metrics is a subset of the metrics which are already configured as part of QoE measurement configuration encapsulated in the transparent container. The PDU session ID(s) corresponding to the service that is subject to QoE measurements can also be reported by the UE along with the RAN visible QoE measurement results.

The RAN visible QoE measurements can be reported with a reporting periodicity different from the one of regular QoE measurements. If there is no reporting periodicity defined in the RAN visible QoE configuration, RAN visible QoE reports are sent together with the non-RAN visible QoE reports.

Multiple simultaneous RAN visible application layer measurements configuration and reports can be supported for RAN visible application layer measurement, and each RAN visible application layer measurement configuration and report is identified by the same RRC identifier as the application layer measurement configuration and measurement report. After receiving the RAN visible application layer measurement configuration, the UE RRC layer forwards the configuration to the application layer, indicating the service type, the RRC identifier and the periodicity. RAN visible application layer configuration can only be configured if there is a corresponding application layer measurement configuration for the same service type configured at the UE. The application layer sends the RAN visible application layer measurement report associated with the RRC identifierto the UE’s AS layer. UE can send both RAN visible application layer measurement reports and the application layer measurement reports to the gNB in the same *MeasurementReportAppLayer* message. The gNB can release one or multiple RAN visible application layer measurement configurations from the UE in one RRC message at any time.

During RAN overload, the UE continues to report the configured RAN visible application layer measurements, when the corresponding non RAN visible application layer measurement reporting is paused.

## 21.5 Alignment of MDT and QoE Measurements

The radio-related measurements may be collected via immediate MDT for all types of supported services for the purpose of QoE analysis. The MCE/TCE performs the correlation of the immediate MDT results and the QoE measurement results collected at the same UE.

The following is supported:

- Alignment between a signalling-based QoE measurement and a signalling-based MDT measurement. In this case, the signalling-based QoE configuration sent to the gNB includes the NG-RAN Trace ID of the signalling-based MDT measurement.

- Alignment between a management-based QoE measurement and a management-based MDT measurement.

The UE configured with QoE measurements can send an indication to inform the gNB about the start or the stop of a session of configured QoE measurements. The gNB can activate the MDT measurements that are to be aligned with the QoE measurements performed by the UE upon/after receiving the session start indication from the UE. The gNB may activate the MDT measurements upon/after receiving the MDT activation message from OAM. The gNB can deactivate the aligned MDT measurements according to OAM command which may, e.g., be triggered by the session stop indication.

The gNB includes time stamp information to the QoE reports to enable the correlation of corresponding measurement results of MDT and QoE at the MCE/TCE. In addition, the gNB includes the MDT session identifiers (Trace Reference and Trace Recording Session Reference) to the corresponding QoE report.

*End of change*