

ETSI TS 128 404 V17.1.0 (2022-05)



**Universal Mobile Telecommunications System (UMTS);
LTE;
5G;
Telecommunication management;
Quality of Experience (QoE) measurement collection;
Concepts, use cases and requirements
(3GPP TS 28.404 version 17.1.0 Release 17)**



Reference

RTS/TSGS-0528404vh10

Keywords

5G,LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2022.
All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

| | |
|---|-----------|
| Intellectual Property Rights | 2 |
| Legal Notice | 2 |
| Modal verbs terminology..... | 2 |
| Foreword..... | 4 |
| Introduction | 4 |
| 1 Scope | 5 |
| 2 References | 5 |
| 3 Definitions and abbreviations..... | 5 |
| 3.1 Definitions | 5 |
| 3.2 Abbreviations | 5 |
| 4 Concepts and background | 6 |
| 4.1 Concepts | 6 |
| 4.2 Background | 6 |
| 5 Business Level Requirements | 6 |
| 5.1 Requirements..... | 6 |
| 5.1.1 Collecting QoE information from end user services..... | 6 |
| 5.2 Actor roles | 7 |
| 5.3 Telecommunication resources | 7 |
| 5.4 High-level use cases | 7 |
| 5.4.1 Collecting QoE information from a specific end user service type | 7 |
| 5.4.2 Void | 8 |
| 5.4.3 Collecting QoE information from end user service type of specific streaming sources | 8 |
| 5.4.4 Indication of QoE information collection | 8 |
| 5.4.5 Change collecting QoE information | 9 |
| 5.4.6 Void | 10 |
| 5.4.7 Collecting QoE information from end user service type from a specific user | 10 |
| 5.4.8 Temporary stop and restart of QoE information reporting during NR overload..... | 11 |
| 6 Specification level requirements | 11 |
| 6.1 Requirements..... | 11 |
| Annex A (informative): Change history | 12 |
| History | 13 |

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management, as identified below:

TS 28.404: "Quality of Experience (QoE) measurement collection; Concepts, use cases and requirements";

TS 28.405: "Quality of Experience (QoE) measurement collection; Control and configuration";

TS 28.406: "Quality of Experience (QoE) measurement collection; Information definition and transport";

One main motivation of mobile network evolution is to improve the user experience why the evaluation of the user experience at the UE side is vital to network operators, especially when the operators provide some real-time services which require for example high data rate and low latency like streaming services (typically video services) , where even intermittent quality degradation is very annoying. Many of these streaming services are a significant part of the commercial traffic growth rate, therefore the focus is on the end users' experience .

Quality of Experience (QoE) information collection provides detailed information at call level on a number of UEs.

The capability to log information within a UE, and in particular the QoE of an end user service, initiated by an operator, provides the operator with QoE information. The collected information (specified in 3GPP TS 26.247 [2]) cannot be deduced from performance measurements in the mobile network.

The QoE information is information collected by the end user application in the UE.

The collected QoE information is collected by the management system for analysis and/or KPI calculations.

1 Scope

The present document addresses concepts, business level use cases and requirements for the function Quality of Experience (QoE) measurement collection in 3GPP networks. The measurements that are collected are DASH [2], MTSI [3], and Virtual Reality (see TS 26.118 [X]) measurements.

The function includes collecting QoE information from UEs frequenting a specified area or an individual UE for a specified end user service/end user service type.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 26.247: " Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".
- [3] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".
- [4] 3GPP TS 28.307: "Quality of Experience (QoE) measurement collection Integration Reference Point (IRP); Requirements".
- [5] 3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

3 Definitions and abbreviations

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].

3.2 Abbreviations

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

| | |
|-----|-----------------------|
| QoE | Quality of Experience |
| NR | NR Radio Access |
| VR | Virtual Reality |

4 Concepts and background

4.1 Concepts

A network request session is a session in the mobile network when the network checks for UEs that have the capability to provide requested information.

An UE request session is a session in the network when the network has found an UE that has the capability to provide the requested information and the request is forwarded to the UE.

A recording session is a session in the UE when it initiates recording of the requested end user service/end user service type and record the requested information.

4.2 Background

The collection of QoE information for a specified end user service/end user service type either from UEs in a specified area or specific UE. The collected information is transported to a collection centre, where it can be analysed and/or KPIs can be calculated.

A collection can be requested by an operator technician via the management system to the traffic network. As the network do not have any knowledge which UEs have the capability to record the requested data, therefore the UEs will report whether they have this capability or not when a session set up. UEs that has this capability that match the request from the management system will be requested to start recording the requested information when the request constraints are met. The UE will make the recorded data available for management system.

5 Business Level Requirements

5.1 Requirements

5.1.1 Collecting QoE information from end user services

REQ-EUSPC-CON-1: The operator shall have a capability to request collection of QoE information per end user service/end user service type for a specified area. The request may include an address of a collection centre to which the collected information shall be delivered.

REQ-EUSPC-CON-2: The application providing the end user service performance information should have the capability to provide this information to a collection centre.

REQ-EUSPC-CON-3: It should be possible to restrict the QoE information collection to a subset of the sessions in a UE using an end user service/end user service type.

REQ-EUSPC-CON-4: The management system shall have a capability to request collection of end user service performance information for one specified UE. The request may include an address of a collection centre to which the collected information shall be delivered.

REQ-EUSPC-CON-5: The management system shall have a capability to request collection of end user service performance information for a specific service type provided by specific streaming sources. The request may include information of streaming sources for which the information shall be collected.

REQ-EUSPC-CON-6: The 3GPP network shall have a capability to forward an indication to the management system that a recording session has been started.

REQ-EUSPC-CON-7: The operator shall have a capability to stop the collection of QoE information job.

REQ-EUSPC-CON-8: In 5G the operator shall have a capability to order several QoE measurement collections from each UE simultaneously, e.g. for different end user services.

REQ-EUSPC-CON-9: The RAN, with exception of UTRAN and E-UTRAN, shall have the capability to temporarily stop QoE measurement reporting at RAN overload.

REQ-EUSPC-CON-10: The RAN, with exception of UTRAN and E-UTRAN, shall have the capability to restart temporary stopped QoE measurement reporting when RAN overload has ended.

NOTE: The QoE information to be collected are specified in ref. 3GPP TS 26.247 [2] and TS 3GPP TS 26.114 [3].

5.2 Actor roles

See each use case in clause 5.4.

5.3 Telecommunication resources

See each use case in clause 5.4.

5.4 High-level use cases

5.4.1 Collecting QoE information from a specific end user service type

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|--|---|-------------------------|
| Goal | Allow the operator to obtain QoE information for an end user service type based on a 5 % of those sessions in a UE(s) in a specified area using a specific end user service type, in a specified collection centre. | |
| Actors and roles | The operator which is the requester of the QoE information. | |
| Telecom resources | The management system, the mobile network and the UE. | |
| Assumptions | The application providing an end user service type is able to provide QoE information about its end user service performance. | |
| Pre-conditions | Selected end users are using the specified end user service type. | |
| Begins when | The management system receives a request from the operator. | |
| Step 1 (M) | The management system receives a request from the operator and transfers it to the mobile network. | |
| Step 2 (M) | The mobile network receives the request, starts a network request session and starts to check which connections fulfil the request. | |
| Step3 (M) | When a connection is found that fulfils the request, the mobile network starts an UE request session and transfers the request to the UE. | |
| Step 4 (M) | When the requested end user service type is started in the UE, it records the requested information for 5% of sessions of the requested service type and sends the recorded information to the specified collection centre. | |
| Ends when | The network request session expires. | |
| Exceptions | | |
| Post-conditions | The collected information is present in the specified collection centre. | |
| Traceability | REQ-EUSPC-CON-1, REQ-EUSPC-CON-2 and REQ-EUSPC-CON-3 | |
| NOTE Step 2 to 4 is repeated for all UEs that access the network in the specified area during the network request session. | | |

5.4.2 Void

5.4.3 Collecting QoE information from end user service type of specific streaming sources

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-------------------|--|-------------------------|
| Goal | Allow the operator to obtain QoE information from end user service type from specific streaming sources. | |
| Actors and roles | The operator which is the requester of the QoE information. | |
| Telecom resources | The management system, the mobile network and the UE. | |
| Assumptions | The application providing streaming video service is able to provide QoE information about its end user performance. | |
| Pre-conditions | The selected end users are using the specified end user service type from the specified streaming sources. | |
| Begins when | The operator requests a QoE information collection for a specific service type from specific streaming sources. | |
| Step 1 (M) | When the management system receives a request from the operator, it transfers the request to the mobile network. | |
| Step 2 (M) | When the mobile network receives the request it starts a network request session and starts to check which connections fulfil the request. | |
| Step3 (M) | When a connection is found, the mobile network starts a UE request session and transfers the request to the UE. | |
| Step 4 (M) | When the specified service type is started in the UE, the UE checks whether the streaming source is consistent with any of the streaming sources set by the request, and if yes, the UE collects relevant QoE information and send to the network. | |
| Ends when | The network request session expires. | |
| Exceptions | | |
| Post-conditions | The collected information is present in the specified collection center. | |
| Traceability | REQ-EUSPC-CON-2, REQ-EUSPC-CON-3 and REQ-EUSPC-CON-5. | |

5.4.4 Indication of QoE information collection

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-------------------|--|-------------------------|
| Goal | Provide the OAM system with an indication that a recording session has started and subsequently allow the OAM system to modify the QoE measurement configuration e.g. the QoE configured area if the number of sessions are too small or too large. The indication may also be used to determine whether or not to terminate the QoE information collection if sufficient number of recording sessions have been started. | |
| Actors and roles | The operator which is the requester of the QoE information. | |
| Telecom resources | The management system and the RAN node. | |

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-----------------|---|-------------------------|
| Assumptions | | |
| Pre-conditions | Selected end users have been requested to provide QoE Information when the specified end user service type is used. | |
| Begins when | The application layer sends AT command including streaming indication to access stratum. | |
| Step 1 (M) | When the RAN node receives the streaming indication from the UE access stratum, the RAN node sends an indication to the triggering OAM system that a recording session has been started. | |
| Ends when | The management system has received the indication that a recording session has been started. | |
| Exceptions | | |
| Post-conditions | The OAM system is able to decide if the ongoing QoE measurement collection needs modification and if sufficient data has been obtained for analysis. The OAM system can use the indications to trigger evaluation of collected data. | |
| Traceability | REQ-EUSPC-CON-6 | |
| | | |

5.4.5 Change collecting QoE information

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-------------------|---|-------------------------|
| Goal | Allow the operator to change an ongoing QoE information collection job. | |
| Actors and roles | The operator which is the requester of changing the QoE information collection job. | |
| Telecom resources | The management system, the mobile network and the UE. | |
| Assumptions | - | |
| Pre-conditions | The QoE collection job is active. | |
| Begins when | The operator has information that QoE information collection job needs to have more information as collected data will not be sufficient or that the collected information is enough. | |
| Step 1 (M) | The management system receives a request from the operator to terminate the ongoing QoE information collection job. | |
| Step 2 (M) | For all connections where the UE has been requested to start the QoE job, the mobile network transfer the termination request to the UE, which terminates the specified QoE collection information job. | |
| Step 3 (M) | When all QoE collections are terminated in the UEs for the specified QoE information collection job, the mobile network finish to terminate the QoE information collection job. | |

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-----------------|---|---|
| Step 4 (O) | If collected information will not be sufficient, the operator initiates a new QoE information collection job. | Collecting QoE information from a specific end user service type, or Collecting QoE information from end user service type from a specific user. |
| Ends when | The network request session is terminated (when sufficient amount of data is collected), or when the new network request is started (when the collected data will not be sufficient). | |
| Exceptions | | |
| Post-conditions | The network request session is terminated or the new network request is started . | |
| Traceability | REQ-EUSPC-CON-1 and REQ-EUSPC-CON-7 | |
| | | |

5.4.6 Void

5.4.7 Collecting QoE information from end user service type from a specific user

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-------------------|---|-------------------------|
| Goal | Allow the operator to obtain QoE information for end user service type for an individual user due to customer complaint or testing of the quality for a new end user service type before launching a service broadly. | |
| Actors and roles | The operator which is the requester of the QoE information. | |
| Telecom resources | The management system, the mobile network and the UE. | |
| Assumptions | The application providing an end user service type is able to provide QoE information about its end user service performance. | |
| Pre-conditions | The selected end user is using the specified end user service type. | |
| Begins when | The operator requests a QoE information collection for a specified UE. | |
| Step 1 (M) | When the management system receives a request from the operator, it transfers the request to the mobile network. | |
| Step 2 (M) | When the mobile network receives the request, it starts a network request session and starts to check for the connections from the specified UE. | |
| Step3 (M) | When a connection is found, the mobile network starts a UE request session and transfers the request to the UE. | |
| Step 4 (M) | When the requested end user service type is started in the UE, it collects the requested information and send it to the specified collection centre. | |
| Ends when | The network request session expires. | |
| Exceptions | | |
| Post-conditions | The collected information is present in the specified collection centre. | |

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|----------------|---|-------------------------|
| Traceability | REQ-EUSPC-CON-2 and REQ-EUSPC-CON-4. | |

5.4.8 Temporary stop and restart of QoE information reporting during NR overload

| Use case stage | Evolution/Specification | <<Uses>> Related use |
|-------------------|---|-------------------------|
| Goal | At RAN overload RAN may stop or delay the QoE information reporting from the UEs that has started it. | |
| Actors and roles | The RAN node which is the requester of delaying the QoE information reporting. | |
| Telecom resources | The RAN node and the UE. | |
| Assumptions | - | |
| Pre-conditions | Selected UEs have started QoE information collection. | |
| Begins when | The RAN node detects that it is overloaded. | |
| Step 1 (M) | The RAN node sends a request to temporarily stop the reporting to the UEs that has started the QoE information collection. An indication about the temporary stop is sent to the management system. | |
| Step 2 (M) | When the UE receives the request from the RAN node to temporarily stop reporting, the UE access stratum informs the application that reporting has temporarily been stopped. The application continues any ongoing recording and stores the recorded information until a restart request is received. | |
| Step 3 (M) | When the RAN overload situation is ended, the RAN node sends a request to restart the reporting to the UEs that has temporarily stopped the QoE information reporting. An indication about the restart is sent to the management system. | |
| Step 4 (M) | When the UE receives the request from the RAN node, the UE access stratum informs the application to restart the QoE information reporting. | |
| Ends when | The management system has received the indication that a recording session has been restarted. | |
| Exceptions | The recording time expires before the RAN overload is ended. | |
| Post-conditions | The QoE information collection is active. | |
| Traceability | REQ-EUSPC-CON-9, REQ-EUSPC-CON-10 | |

6 Specification level requirements

6.1 Requirements

Specification level requirements for the management of QoE Measurement Collection is specified in [4].

Annex A (informative): Change history

| Change history | | | | | | | |
|----------------|---------|-----------|------|-----|-----|--|-------------|
| Date | Meeting | TDoc | CR | Rev | Cat | Subject/Comment | New version |
| 2019-09 | SA#85 | | | | | Change control version | 16.0.0 |
| 2019-12 | SA#86 | SP-191179 | 0001 | - | F | Revise the Introduction | 16.1.0 |
| 2020-03 | SA#87E | SP-200177 | 0002 | - | C | Removing Signalling Based Activation | 16.2.0 |
| 2021-09 | SA#93e | SP-210883 | 0004 | - | F | Aligning with RAN specifications 36.331 and 25.331 | 16.3.0 |
| 2021-09 | SA#93e | SP-210873 | 0005 | - | B | Adding Signalling Based Activation (SBA) and 5G requirements to 28.404 | 17.0.0 |
| 2022-03 | SA#95e | SP-220181 | 0006 | - | B | Adding VR measurements | 17.1.0 |

History

| Document history | | |
|-------------------------|----------|-------------|
| V17.1.0 | May 2022 | Publication |
| | | |
| | | |
| | | |
| | | |