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Technical Specification

Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 4: Requirements for Quality of Service measurement equipment

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Speech and multimedia Transmission Quality (STQ).

The present document is part 4 of a multi-part deliverable covering the QoS aspects for popular services in GSM and 3G networks, as identified below:

- Part 1: "Identification of Quality of Service aspects";
- Part 2: "Definition of Quality of Service parameters and their computation";
- Part 3: "Typical procedures for Quality of Service measurement equipment";
- Part 4: "Requirements for Quality of Service measurement equipment";**
- Part 5: "Definition of typical measurement profiles";
- Part 6: "Post processing and statistical methods";

Part 1 identifies QoS aspects for popular services in GSM and 3G networks. For each service chosen QoS indicators are listed. They are considered to be suitable for the quantitatively characterization of the dominant technical QoS aspects as experienced from the end-customer perspective.

Part 2 defines QoS parameters and their computation for popular services in GSM and 3G networks. The technical QoS indicators, listed in part 1, are the basis for the parameter set chosen. The parameter definition is split into two parts: the abstract definition and the generic description of the measurement method with the respective trigger points. Only measurement methods not dependent on any infrastructure provided are described in the present document. The harmonized definitions given in the present document are considered as the prerequisites for comparison of QoS measurements and measurement results.

Part 3 describes typical procedures used for QoS measurements over GSM, along with settings and parameters for such measurements.

Part 4 defines the minimum requirements of QoS measurement equipment for GSM and 3G networks in the way that the values and trigger-points needed to compute the QoS parameter as defined in part 2 can be measured following the procedures defined in part 3. Test-equipment fulfilling the specified minimum requirements, will allow performing the proposed measurements in a reliable and reproducible way.

Part 5 specifies test profiles which are required to enable benchmarking of different GSM or 3G networks both within and outside national boundaries. It is necessary to have these profiles so that when a specific set of tests are carried out then customers are comparing "like for like" performance.

Part 6 describes procedures to be used for statistical calculations in the field of QoS measurement of GSM and 3G networks using probing systems.

Introduction

All the defined quality of service parameters and their computations are based on field measurements. That indicates that the measurements were made from customers point of view (full End-to-end perspective, taking into account the needs of testing).

It is assumed that the end customer can handle his user equipment and the services he wants to use (operability is not evaluated at this time). For the purpose of measurement it is assumed that:

- the service is not barred for any reason;
- routing is defined correctly without errors; and
- the target subscriber equipment is ready to process the service request.

Speech and video quality values measured should only be applied by calls ended successfully for statistical analysis.

However, measured values from calls ended unsuccessfully (dropped) should be available for additional evaluations and therefore, must be stored.

Further preconditions may apply when reasonable.

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1 Scope

The present document defines the minimum requirements of QoS measurement equipment for digital wireless networks in the way that the values and trigger-points needed to compute the QoS parameter as defined in TS 102 250-2 [3] can be measured following the procedures defined in TS 102 250-3 [4].

Test-equipment fulfilling the specified minimum requirements, will allow performing the proposed measurements in a reliable and reproducible way.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI TS 100 910: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 05.05)".
- [2] ETSI TS 102 250-1: "Speech Processing, Transmission and Quality Aspects (STQ); QoS aspects for popular services in GSM and 3G networks; Part 1: Identification of Quality of Service criteria".
- [3] ETSI TS 102 250-2: "Speech Processing, Transmission and Quality Aspects (STQ); QoS aspects for popular services in GSM and 3G networks; Part 2: Definition of Quality of Service parameters and their computation".
- [4] ETSI TS 102 250-3: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 3: Typical procedures for Quality of Service measurement equipment".
- [5] ETSI TS 102 250-5: "Speech Processing, Transmission and Quality Aspects (STQ); QoS aspects for popular services in GSM and 3G networks; Part 5: Definition of typical measurement profiles".
- [6] IETF RFC 3339: "Date and Time on the Internet: Timestamps".

NOTE: <http://www.ietf.org/rfc/rfc3339.txt>.

[7] W3C Note: "Date and time formats".

NOTE: <http://www.w3.org/TR/NOTE-datetime>

[8] ETSI ETS 300 607-1: "Digital cellular telecommunications system (Phase 2) (GSM); Mobile Station (MS) conformance specification; Part 1: Conformance specification; (GSM 11.10-1 version 4.19.1)".

[9] ETSI TS 125 101: "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 4.9.0 Release 4)".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI TR 102 581: "Speech Processing, Transmission and Quality Aspects (STQ); A Study on the Minimum Additional Required Attenuation on the Antenna Path of the Field Test Equipment".

3 Abbreviations

For the purposes of the present document the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
AD	Access Delay
CI	Cell Identity
DQ	Data Quality
FQT	Fixed QoS Test equipment
FTP	File Transfer Protocol
GPS	General Positioning System
GSM	Global System for Mobile communication
HTTP	HyperText Transfer Protocol
IMAP	Internet Message Access Protocol
IMEI	International Mobile Equipment Identity

NOTE: http://de.wikipedia.org/wiki/International_Mobile_Equipment_Identity

IP	Internet Protocol
ISDN	International Subscriber Digital Network
KPI	Key Performance Indicator
LAC	Location Area Code
MCC	Mobile Country Code
MM	Mobile Mobile call
MMI	Man Machine Interface
MNC	Mobile Network Code
MQT	Mobile QoS Test equipment
MQT-LC	Mobile QoS Test equipment Local Control
MQT-RC	Mobile QoS Test equipment Remote Control
MS	Mobile Station
MSC	Mobile Switching Centre
PDN	Packet Data Network
PMN	Public Mobile Network
POP3	Post Office Protocol version 3
PSTN	Public Switching Telephone Network
PSD	Packet Switched Data
PWR	Power Supply
QoS	Quality of Service
RF	Radio Frequency
SA	Service Access

SMS	Short Message Service
SMSC	Short Message Service Centre
SMTP	Simple Mail Transfer Protocol
SpQ	Speech Quality
ST	Setup Time
TCP	Transmission Control Protocol
TS	Timeslot
UE	User Equipment
WAP	Wireless Application Protocol
WGS-84	World Geodetic System 1984

4 Overview

4.1 General Aspects

All tests are based on emulation of a typical customer using services provided in a public mobile network (PMN). All of the services to be tested (see TS 102 250-2 [3]) can be emulated by the Mobile QoS Test-equipment (MQT) which can be installed in a vehicle, can be carried around by a pedestrian or is installed for semi-stationary use (e.g. office environment).

Test scenarios need to distinguish the following principal user cases.

- 1) User-to-user services (typically telephony).
- 2) Store-and-forward services (e.g. SMS).
- 3) Information services (e.g. accessing the internet or FTP download).
- 4) Push services.

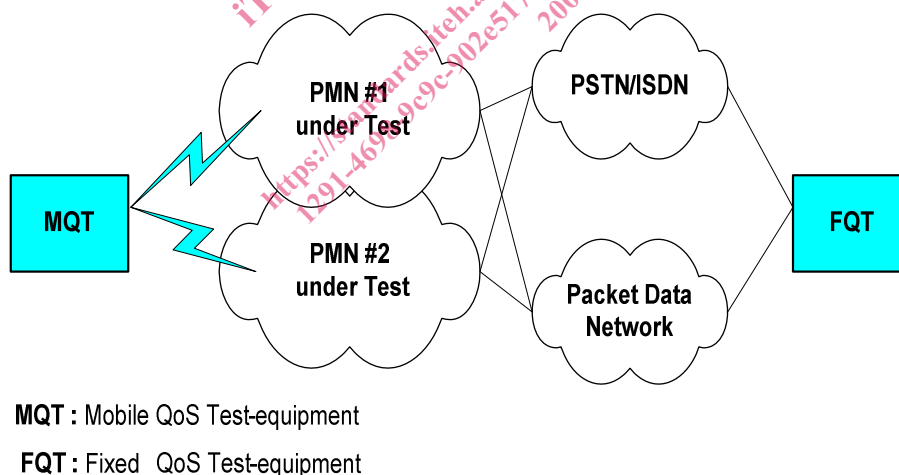


Figure 1

Some of the services require test-equipment connected to a non-mobile network emulating the counterpart of the typical mobile customer or the host offering the service. This part will be called Fixed QoS Test-equipment (FQT). The FQT may be connected via a public network (PSTN, ISDN, PDN) or via a network internal connection point (e.g. at MSC). The FQT for type 3) and 4) services could be composed as a (virtual) Internet Service Provider.

Below, requirements will be described on a per scenario basis. Those requirements not belonging to a specific scenario, e.g. antenna requirements will be grouped together.

Depending on how far the MQT can be automated or not, we can distinguish between:

- MQT-LC: local control and operation; or
- MQT-RC: remote control and operation.

Although the same type of classification (-LC or -RC) can be made for FQT, most of the FQT are remote controlled.

4.2 Considerations on trigger points

Without loss of generality it can be assumed that any feasible test equipment will contain some kind of communication terminal (UE) which may be a special type (e.g. a Trace Phone) or a standard UE. Also, it can be assumed that each such device will provide information from different communication layers, from Application Layer (close to the user interface) down to lower layers, e.g. operating-system events, TCP/IP layer, or Layer 3 signalling information, which is used as trigger points for QOS PARAMETERS processing.

When considering the event chain, action is typically triggered by some emulated user action which finally causes some action on the air interface. This process of event propagation is deterministic, allowing some kind of mapping between layers, in the limits of available information, but will inevitably be associated with some communication and processing delay in each stage.

Therefore, choice of the layer to get trigger point information from determines the view expressed in a QOS PARAMETERS. Generally, choosing lower-level events such as Layer 3 gives a more network-centric view, while events on higher levels tend to produce views more user-related. From this, the following guidelines result:

- Within the same QoS PARAMETERS, the source layer for events used as trigger points should be the same.
- In benchmarking, all networks under test should be tested using the same type of UE, and QOS PARAMETERS for all networks under test should use trigger points from the same layer.
- When changing the source layer for a given trigger point, changes in QOS PARAMETERS should be expected, and respective calibration measurements should be taken to assess influence on QOS PARAMETERS both quantitatively and qualitatively.

5 General requirements

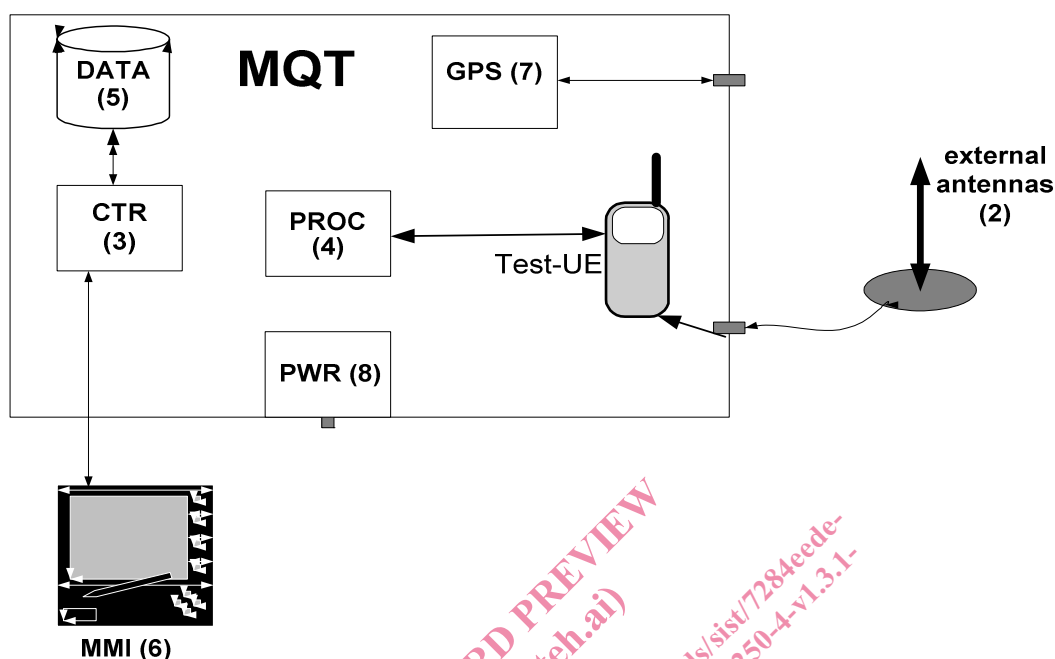
5.1 General requirement for data logging

The measurement system must provide means to collect and store reliably all relevant measurement data. Additionally all configuration parameters have to be stored to be able to reproduce the test.

The system has to provide means to detect and sort out invalid measurement cycles to avoid misrepresenting statistics. The evaluation of the measured values is typically done during post processing. Measurement cycles which are removed from the measured data have to be reported.

5.2 Overview

The typical components of the Mobile QoS Test-equipment (MQT) will be as illustrated in figure 2.



- | | | |
|-----|-------------|---|
| (1) | Test-UE: | Mobile Station emulating the typical customer MS (1...n). |
| (2) | Antenna: | Test-UE antenna or external antenna. |
| (3) | Controller: | Controls all the active parts in MQT. |
| (4) | Processor: | Controlling the Test-UE and Pre-processing measurement data.
Optionally the tasks of the processor can be moved into controller. |
| (5) | Storage: | Storage of measurement data and programs. |
| (6) | MMI: | Man Machine Interface for control and configuration of a MQT-LC or for diagnostics in case of a MQT-RC. |
| (7) | PS: | Positioning System (GPS or Indoor Navigation). |
| (8) | PWR: | Power Supply. |

Figure 2

5.3 Required information for logging

5.3.1 Information on Measurement Setup

Measurement setup needs to be reproduced if necessary. This requires that the configuration of the measurement equipment, with which the measurement has been done needs to be recorded.

NOTE: However, the measurement results not only depend on the configuration of the measurement equipment, also other circumstances like day of the week and time of day influence the measurement results considerably.

5.3.1.1 General Information

The following list is considered to be a required minimum.

Information automatically collected:

- Versions of measurement equipment:
 - Hardware Version.