

# ETSI TS 102 250-4 V2.3.1 (2019-11)



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

*Standard PREVIEW*  
*Full standard (TS 102 250-4 V2.3.1-2019-11)*  
*https://standards.iteh.ai/catalog/standards/sist/951067-fa07-4444-bd6e-12588931457b/etsi-ts-102-250-4-v2.3.1-2019-11*



---

**Reference**RTS/STQ-00224-4m

---

**Keywords**3G, GSM, network, QoS, service, speech

---

**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 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**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](http://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/CommiteeSupportStaff.aspx>

---

**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 2019.

All rights reserved.

**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.

# Contents

|   |    |
|---|----|
| Intellectual Property Rights .....                    | 6  |
| Foreword.....   | 6  |
| Modal verbs terminology.....                          | 6  |
| Introduction .....                                    | 6  |
| 1 Scope .....   | 7  |
| 2 References .....                                    | 7  |
| 2.1 Normative references .....                        | 7  |
| 2.2 Informative references.....                       | 8  |
| 3 Definition of terms, symbols and abbreviations..... | 8  |
| 3.1 Terms.....  | 8  |
| 3.2 Symbols.....                                      | 8  |
| 3.3 Abbreviations .....                               | 8  |
| 4 Overview .....                                      | 9  |
| 4.1 General Aspects.....                              | 9  |
| 4.2 Considerations on trigger points.....             | 10 |
| 5 General requirements .....                          | 11 |
| 5.1 General requirement for data logging.....         | 11 |
| 5.2 Overview .....                                    | 11 |
| 5.3 Required information for logging.....             | 11 |
| 5.3.1 Information on Measurement Setup.....           | 11 |
| 5.3.1.1 General Information .....                     | 11 |
| 5.3.1.2 Information on User Equipment in use .....    | 12 |
| 5.3.1.3 Information on Store-And-Forward Setups.....  | 12 |
| 5.3.1.4 Information on Data Test Setups.....          | 13 |
| 5.3.2 Measurement Data .....                          | 13 |
| 5.3.3 Status Information .....                        | 13 |
| 5.3.4 Trigger Points .....                            | 13 |
| 5.3.5 QoS Parameters .....                            | 13 |
| 5.4 Test-UE .....                                     | 13 |
| 5.5 Antennas .....                                    | 13 |
| 5.6 Controller/processor/storage.....                 | 14 |
| 5.7 Man Machine Interface (MMI) .....                 | 14 |
| 5.7.1 Local Controlled Systems.....                   | 14 |
| 5.7.2 Remote Controlled Systems.....                  | 14 |
| 5.8 Time sources .....                                | 14 |
| 5.9 Environmental conditions.....                     | 14 |
| 6 Fixed QoS Test-equipment (FQT) .....                | 15 |
| 6.1 General .....                                     | 15 |
| 6.2 Controller .....                                  | 15 |
| 6.3 Time-sources .....                                | 15 |
| 6.4 Environmental conditions.....                     | 15 |
| 6.5 FQT for Telephony Measurements.....               | 15 |
| 6.5.1 Common Aspects.....                             | 15 |
| 6.5.2 Telephony Speech.....                           | 15 |
| 6.5.3 Telephony Video .....                           | 16 |
| 6.6 FQT for store-and-forward services .....          | 16 |
| 6.6.1 Overview and Common Aspects .....               | 16 |
| 6.7 FQT for Data Measurements .....                   | 16 |
| 7 Mobile QoS Test-equipment (MQT).....                | 16 |
| 7.1 General .....                                     | 16 |
| 7.2 Controller .....                                  | 16 |
| 7.3 Geographical positioning .....                    | 17 |

|   |   |           |
|---|---|-----------|
| 7.3.1   | Format of geographical co-ordinates .....                       | 17        |
| 7.3.2   | Accuracy .....  | 17        |
| 7.4   | Time-sources .....  | 17        |
| 7.5   | Environmental conditions.....                                   | 17        |
| 7.6   | MQT for Telephony Measurements .....                            | 17        |
| 7.6.1   | Common Aspects.....   | 17        |
| 7.6.2   | Telephony Speech.....   | 18        |
| 7.6.3   | Telephony Video: .....  | 18        |
| 7.7   | MQT for store-and-forward services.....                         | 18        |
| 7.8   | MQT for Data Measurements.....                                  | 18        |
| 7.8.1   | Common Aspects.....   | 18        |
| 7.8.2   | MQT for FTP.....  | 18        |
| 7.8.3   | MQT for E-Mail .....  | 18        |
| 7.8.4   | MQT for HTTP.....   | 18        |
| 7.8.5   | MQT for WAP.....  | 19        |
| 7.8.6   | MQT for streaming services .....                                | 19        |
| 8   | Mobile based measurement equipment .....                        | 19        |
| <b>Annex A (informative): QoS parameter export.....</b> |   | <b>20</b> |
| A.1   | Overview .....  | 20        |
| A.2   | XML Bodies .....  | 20        |
| A.2.1   | <measurement> .....   | 20        |
| A.2.2   | Configuration .....   | 22        |
| A.2.2.1   | <fileversion>.....  | 22        |
| A.2.2.2   | <system>.....   | 22        |
| A.2.2.3   | <source> .....  | 22        |
| A.2.2.4   | <setting>.....  | 23        |
| A.2.2.5   | <configuration> .....   | 23        |
| A.2.3   | Measurement Results .....                                       | 24        |
| A.2.3.1   | <sequence> .....  | 24        |
| A.2.3.2   | <trigger> .....   | 24        |
| A.2.3.3   | <reftrigger>.....   | 25        |
| A.2.3.4   | <qsi>.....  | 25        |
| A.2.3.5   | <value> .....   | 26        |
| A.2.4   | Data Dictionary .....   | 27        |
| A.2.4.1   | Overview .....  | 27        |
| A.2.4.2   | GPS.....  | 27        |
| A.2.4.3   | GSM.....  | 28        |
| A.2.4.4   | UMTS .....  | 29        |
| A.2.4.5   | Layer 3 Message PDU Types .....                                 | 31        |
| A.2.4.6   | HSDPA .....   | 33        |
| A.2.4.7   | HSUPA .....   | 34        |
| A.3   | Schema .....  | 38        |
| A.4   | Example.....  | 38        |
| <b>Annex B (informative): RF COMBINER.....</b>          |   | <b>39</b> |
| B.1   | What is blocking?.....  | 39        |
| B.2   | Which parameters have an impact on the effect of blocking?..... | 39        |
| B.3   | The Standards.....  | 39        |
| B.4   | The Situation .....   | 40        |
| B.4.1   | One test mobile transmits, the other one receives .....         | 40        |
| B.4.2   | Antennas on the roof of a car .....                             | 40        |
| B.4.3   | Conclusion.....   | 40        |
| B.5   | Possible Solutions .....  | 41        |
| B.5.1   | Overview - Attenuators .....                                    | 41        |
| B.5.2   | Recommendations .....   | 41        |

|                               |  |           |
|-------------------------------|--|-----------|
| B.5.2.1                       | Benchmarking tests.....                | 41        |
| B.5.2.2                       | Coverage tests.....                    | 41        |
| B.5.3                         | Other equipment involved.....          | 41        |
| B.5.3.1                       | Scanners.....                          | 41        |
| B.5.3.2                       | GPS receiver 1,2/1,5 GHz.....          | 41        |
| B.5.3.3                       | Risk for Scanner and GPS receiver..... | 41        |
| B.5.4                         | Mixed Service GSM/WCDMA.....           | 41        |
| <b>Annex C (informative):</b> | <b>Bibliography.....</b>               | <b>42</b> |
| History.....                  |  | 43        |

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/e95f1067-fa07-4444-bd6e-12588931457b/etsi-ts-102-250-4-v2.3.1-2019-11>

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 IPR Policy, no investigation, 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.

---

# 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. Full details of the entire series can be found in part 1 [2].

---

# 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.

---

# Introduction

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

It is assumed that the end user 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, need to be stored.

Further preconditions may apply when reasonable.

---

# 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 ETSI TS 102 250-2 [3] can be measured following the procedures defined in ETSI 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

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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.

The following referenced documents are necessary for the application of the present document.

- [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 and multimedia Transmission Quality (STQ); QoS aspects for popular services in mobile networks; Part 1: Assessment of Quality of Service".
- [3] ETSI TS 102 250-2: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in mobile 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 mobile networks; Part 3: Typical procedures for Quality of Service measurement equipment".
- [5] ETSI TS 102 250-5: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in mobile networks; Part 5: Definition of typical measurement profiles".
- [6] Void.
- [7] Void.
- [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 4.28.1)".
- [9] ETSI TS 125 101: "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101)".
- [10] ETSI TS 127 007: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; AT command set for User Equipment (UE) (3GPP TS 27.00)".
- [11] ETSI TS 127 005: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS) (3GPP TS 27.005)".

- [12] ETSI EN 300 392-5: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D) and Direct Mode Operation (DMO); Part 5: Peripheral Equipment Interface (PEI)".
- [13] Void.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [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 Definition of terms, symbols and abbreviations

### 3.1 Terms

Void.

### 3.2 Symbols

Void.

### 3.3 Abbreviations

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

|        |  |
|--------|--|
| 3GPP   | 3 <sup>rd</sup> Generation Partnership Project |
| CI     | Cell Identity                                  |
| CTR    | Controller                                     |
| 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        |
| IMSI   | International Mobile Station Identifier        |
| IP     | Internet Protocol                              |
| ISDN   | International Subscriber Digital Network       |
| LAC    | Location Area Code                             |
| LC     | Local Control                                  |
| MCC    | Mobile Country Code                            |
| 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       |
| MSC    | Mobile Switching Centre                        |
| MSN    | Mobile Station Number                          |



|        |  |
|--------|--|
| PC     | Personal Computer                          |
| PDN    | Packet Data Network                        |
| PMN    | Public Mobile Network                      |
| POP3   | Post Office Protocol version 3             |
| PROC   | Processor                                  |
| PSTN   | Public Switching Telephone Network         |
| PWR    | Power Supply                               |
| QoS    | Quality of Service                         |
| QSI    | Quality Sequence Indicator                 |
| RC     | Remote Control                             |
| RF     | Radio Frequency                            |
| RNC    | Radio Network Controller                   |
| SIM    | Subscriber Identity Module                 |
| SMS    | Short Message Service                      |
| SMSC   | Short Message Service Centre               |
| SMTP   | Simple Mail Transfer Protocol              |
| TCP    | Transmission Control Protocol              |
| TETRA  | TErrestrial Trunked RAdio                  |
| TS     | TimeSlot                                   |
| UE     | User Equipment                             |
| UMTS   | Universal Mobile Telecommunications System |
| UTC    | Coordinated Universal Time                 |
| WAP    | Wireless Application Protocol              |
| WCDMA  | Wide band Code Division Multiple Access    |
| WGS-84 | World Geodetic System 1984                 |
| XML    | eXtended Mark-up Language                  |

---

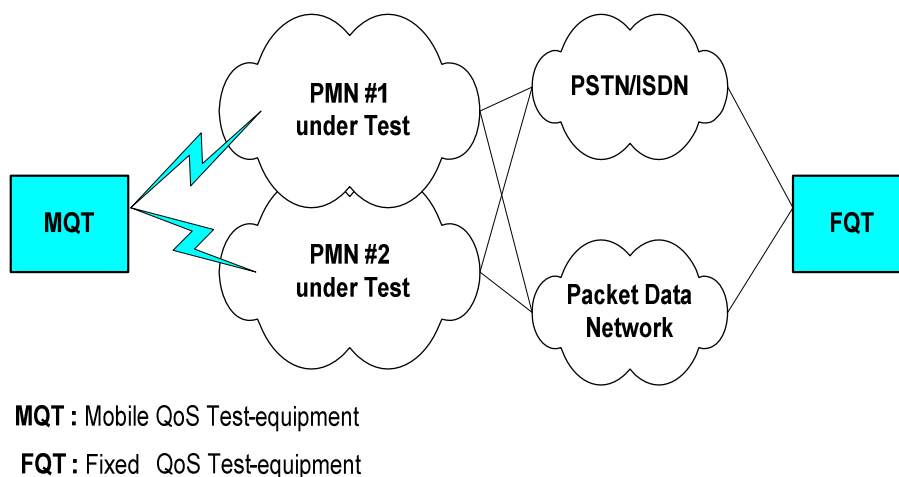
## 4 Overview

### 4.1 General Aspects

All tests are based on emulation of a typical user using services provided in a public mobile network (PMN). All of the services to be tested (see ETSI 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: QoS test scenario overview**

Some of the services require test-equipment connected to a non-mobile network emulating the counterpart of the typical mobile user 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, the following subtypes are distinguished:

- 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

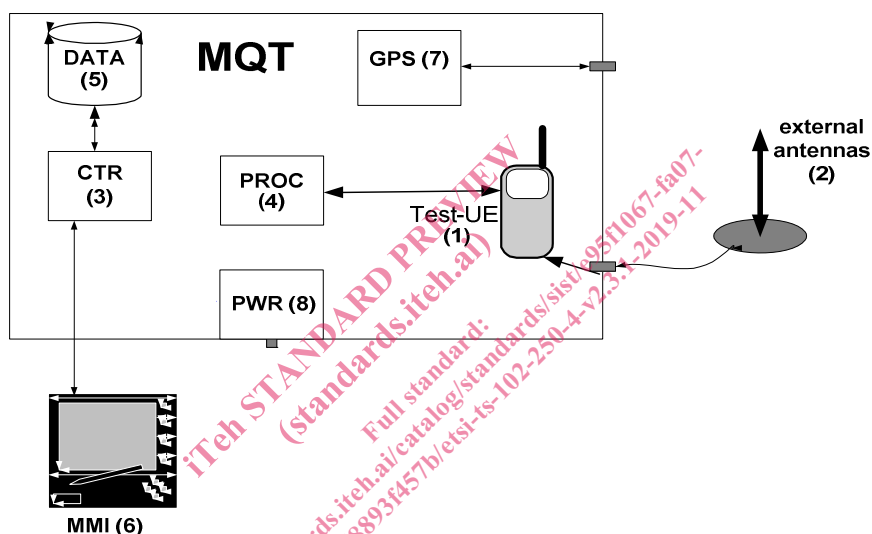
### 5.1 General requirement for data logging

The measurement system shall 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:    | User equipment emulating the typical user device (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.<br>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: Typical components of the mobile QoS test-equipment (MQT)

### 5.3 Required information for logging

#### 5.3.1 Information on Measurement Setup

##### 5.3.1.1 General Information

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.

The following list is considered to be a required minimum.

Information automatically collected:

- Versions of measurement equipment:
  - Hardware Version.
  - Software Version of Measurement Application.
  - Operating System Version (Operation System and Service Pack).
- Date, time of day (UTC time + time zone).

Manually entered information:

- User.
- Comment.
- Any other information on test case control parameters, which is required to re-run the test case under the same conditions, but cannot be collected automatically.

### 5.3.1.2 Information on User Equipment in use

For the setup of the User Equipment in use, the following list of parameters is required as a minimum:

Information automatically collected:

- Type of User Equipment.
- Firmware version.
- Unique UE ID (e.g. IMEI, Serial Number, MAC, etc.).
- IMSI (configuration of SIM card can have a significant influence on the measurement result).
- Software Version of driver for operating system, if used.
- All settings of the control software.

Manually entered information:

- Antenna:
  - Type.
  - Extra attenuation.
  - Total Cable loss (Cables, RF combiners, etc.).

### 5.3.1.3 Information on Store-And-Forward Setups

The following information has to be logged:

- Number of Service Centre.
- Access Parameters.
- Transmitted Message, Video and/or Audio.
- Timeout Values.