

Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 5: Definition of typical measurement profiles

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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 5 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 criteria";
- 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 of 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 mobile 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 available and not barred for any reason;
- routing is defined correctly without errors; and
- the target subscriber equipment is ready to answer the call.

Further preconditions may apply when reasonable.

The present document describes a set of use cases which are precisely defined to allow for comparability between different measurements, possibly performed by different parties.

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1 Scope

The present document specifies test profiles which are required to enable benchmarking of different digital wireless 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.

NOTE: All timeouts given in the present document are examples from proven experience. These examples are intended to provide guidelines for reasonable choice of timeout values for access technologies other than those given in the present document, mixed scenarios and different characteristics of user equipment.

It should be noted that most timeouts given in the present document do with respect to failure ratios as defined in [1] have a direct impact on measurement results. A timeout value might for example directly relate to the stop trigger point in the sense of the timeout reached event being the point in time where a certain state has not been reached.

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 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".
- [2] ETSI TS 124 008: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (3GPP TS 24.008)".
- [3] IETF RFC 3481: "TCP over Second (2.5G) and Third (3G) Generation Wireless Networks".

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.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Session: continuous usage of a given service, e.g. a speech call or a data session

1 kByte: 1024 Byte

1 MByte: 1024 kByte

3.2 Abbreviations

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

AMR	Adaptive Multi-Rate
BCP	Best Current Practice
DNS	Domain Name Server
FQDN	Fully Qualified Domain Name
FTP	File Transfer Protocol
GPRS	General Packet Radio Service
GR	GPRS Register
HLR	Home Location Register
HTTP	Hyper Text Transfer Protocol
ICMP	Internet Control Message Protocol
IMAP	Internet Messaging Access Protocol
MMS	Multimedia Messaging Service
MO	Mobile Originated
MOC	Mobile Originated Call
MT	Mobile Termination
MTC	Mobile Terminating Call
PDP	Pack Data Protocol
PEP	Performance Enhancement Proxy
POP3	Post Office Protocol version 3
PSD	Packet Switched Data
QoS	Quality of Service
SGSN	Serving GPRS Support Node
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecommunication System
VT	Video Telephony
WAP	Wireless Application Protocol

4 Measurement profiles

Test profiles are required to enable benchmarking of different 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.

It is recognized that many factors will affect comparability:

- number of sessions;
- sessions duration;
- time between sessions;
- demanded QoS settings for data services;
- protocol settings (like TCP/IP settings for data services or AMR-settings for speech services);
- usage profile during the session;
- fixed network test equipment like test servers for data sessions;
- user profile stored in the HLR or the GR;
- geographic location;
- type of location (indoor, hotspot, city, suburban, rural, train, etc.);
- speed when mobile;
- type of vehicle;
- type of antenna;
- handset type;
- handset hardware and firmware version;
- service being tested and limitations of service;
- network configuration;
- mobile users' population density.

For the points mentioned above where there is no recommendation or requirement in the present document, the settings experienced by a normal customer of the service under test in the network under test shall be used as a guideline.

As far as possible all particular values, e.g. timeout values, are named preserving the name of the respective Quality of Service parameters as defined in TS 102 250-2 [1].

4.1 Classification of measurement environments

For interpretation and comparability of test results it is important to know in which measurement environment the tests were performed. The environment classifications described below shall be used. Since the type of the measurement locations may be interpreted differently, the particular understanding of the location type determining a category shall be described in the results report.

Table 1: Stationary Tests

Category	Location Type	Additional information
S10:	airports/railway stations/shopping centres and malls business districts and exhibition areas	outdoor measurement
S11:	airports/railway stations/shopping centres and malls business districts and exhibition areas	indoor measurements

Table 2: Drive Tests/Walk Tests

Category	Location Type	Additional information
D1:	Train Measurements	
D2:	Urban Areas (medium cities)	
D3:	Highways	
D4:	Rural Areas (country roads)	
D5:	Large cities	
W1:	Walk Tests (indoor measurements)	
W2:	Walk Tests (outdoor measurements)	
NOTE:	Drive tests may be performed by incar using external antenna with an appropriate attenuation.	

4.2 Service profiles

This clause describes recommended service profiles used for testing.

4.2.1 Telephony

For all Telephony services it has to be stated, if the results were generated using MOC, MTC or a mix of both. The results for both types should be reported separately and should not be mixed.

The default call duration used for telephony measurements should be 120 seconds.

To achieve comparable statistics when performing a benchmark, there should be no fixed pause between calls. Instead, a fixed call window is defined in which the call has to be performed. If the call fails or drops, the next call attempt shall only be made when the next call window arrives.

The minimum pause interval between two call attempts should be 30 seconds to prevent network related problems between connection release and the next establishment (e.g. signalling in the PSD or mobility management).

4.2.1.1 Speech Telephony

Speech Telephony should be tested either in MOC or in MTC direction. The following call durations shall be used:

- CD1: 10 seconds for call setup testing;
- CD2: 120 seconds for typical tests, default call duration;
- CD3: 300 seconds for stability tests.

Call Window: Call Duration + 30 seconds, (for the setup and release phases) + 30 seconds (for the minimum pause interval), for the default call duration this results in 180 seconds.

Timeout values:

- Telephony Service Non-Accessibility Timeout: 20 seconds;
- Telephony Setup Time Timeout: 20 seconds.

NOTE: Since the Telephony Setup Time corresponds, with respect to the trigger point definition, to the Telephony Service Non-Accessibility, both of timeout values above need to be chosen identically.

4.2.1.2 Video Telephony

Video Telephony should be tested either in MOC or in MTC direction. The following call durations shall be used:

- CD1: 10 seconds for call setup testing;
- CD2: 120 seconds for typical tests, default call duration;
- CD3: 300 seconds for stability tests.

Call Window: Call Duration + 30 seconds, (for the setup and release phases) + 30 seconds (for minimum pause interval), for the default call duration this results in 180 seconds.

Timeout values:

- VT Service Non-Accessibility Timeout: 20 seconds;
- VT Service Access Time Timeout: 20 seconds;
- VT Audio/Video Setup Time Timeout: 30 seconds.

NOTE: Since the VT Service Access Time corresponds, with respect to the trigger point definition, to the VT Service Non-Accessibility, both of timeout values above need to be chosen identically.

4.2.2 Messaging Services

For all messaging services it is important that the recipient of a message is not interrupted by the next message while retrieving the previous one. For this reason it is important that the interval between sending two messages is larger than the 95 % percentile of the end-to-end duration, unless measures are taken to avoid this kind of interference.

It should be noted, that mobility of either the sender or the receiver or both of a message can have an impact on the results. Therefore it is recommended that measurements are not only performed stationary, but also with mobility of one or both participants. In all cases the used scenario has to be stated.

4.2.2.1 SMS

SMS should be tested either in MO or in MT direction with respect to the mobiles used as measurement probes. The SMS should be 120 characters long and use different characters to test content integrity. The interval between two consecutive SMS shall be 70 seconds.

The time window of measurements for calculating the Completion Rate SMS shall be 175 seconds.

Timeout-values:

- Service Accessibility SMS MO Timeout: 65 seconds;
- Access Delay SMS MO Timeout: 65 seconds;
- End-to-end Delivery Time SMS Timeout: 175 seconds.

4.2.2.2 MMS

MMS should be tested end to end. That means a MMS send by A-Party should be received by B-Party using also a mobile phone. The advantage of this testing is, that the MO direction at A-Party and the MT direction at B-Party can be measured. Both directions together are the end-to-end Parameters described in TS 102 250-2 [1].

The following MMS sizes shall be used:

- MMS1: 2 kBytes;
- MMS2: 28 kBytes;
- MMS3: 90 kBytes.