ETSI TS 102 250-5 V2.4.1 (2013-06)

Technical Specification

**Speech and multimedia Transmission Quality (STQ);
QoS aspects for popular services in mobile 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 mobile networks, as identified below:

Part 1:   "Assessment of Quality of Service";

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 7:   "Network based Quality of Service measurements".

Part 1 builds an umbrella document for this multi-part deliverable. It summarizes the basics of Quality of Service, always seen from the user's perspective. Differences to Quality of Experience (QoE) are also discussed. In extension to generic definitions, specific definitions for this multi-part deliverable are stated here. Furthermore, it gives guidance to assure that QoS assessments can be conducted in a meaningful way and proposes an according process.

Part 2 defines QoS parameters and their computation for popular services in mobile networks. The parameter definition is split into several parts. It contains an abstract definition which gives a generic description of the parameter, an abstract equation and the corresponding user and technical trigger points.
The harmonized definitions given in part 2 are considered as prerequisites for the comparison of QoS measurements and measurement results.

Part 3 describes the measurement procedures needed to perform the measurements of QoS parameters in line with the definitions given in part 2, applying the test profiles defined in part 5.

Part 4 defines the minimum requirements of QoS measurement equipment for mobile 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.

The present document specifies typical measurement profiles which are required to enable benchmarking of different mobile networks both within and outside national boundaries.

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

Part 7 describes how Quality of Service measurements should be done inside the network without direct access to the end point terminal.

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 typical measurement profiles which are precisely defined to allow for comparability between different measurements, possibly performed by different parties.

It is necessary to have these profiles so that when a specific set of measurements are carried out then users are comparing "like for like" performance.

1 Scope

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

All timeouts (as part of the profiles) given in the present document are examples from proven experience. 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 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 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 necessary for the application of the present document.

[1] 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".

[2] ETSI TS 124 008 (V9.6.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (3GPP TS 24.008 Release 9)".

[3] IETF RFC 3481: "TCP over Second (2.5G) and Third (3G) Generation Wireless Networks".

[4] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

2.2 Informative references

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.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

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

1 kByte: 1 024 Byte

1 MByte: 1 024 kByte

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

3.2 Abbreviations

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

AMR	Adaptive Multi-Rate
BCP	Best Current Practice
DL	Down Link
DNS	Domain Name Server
FQDN	Fully Qualified Domain Name
FTP	File Transfer Protocol
GPRS	General Packet Radio Service
GR	GPRS Register
GSM	Global System for Mobile communications
HLR	Home Location Register
HTML	Hypertext Markup Language
HTTP	Hyper Text Transfer Protocol
ICMP	Internet Control Message Protocol
IE	Information Element
IMAP	Internet Messaging Access Protocol
IP	Internet Protocol
MD5	Message-Digest algorithm 5
MMS	Multimedia Messaging Service
MO	Mobile Originated
MOC	Mobile Originated Call
MT	Mobile Termination
PDP	Pack Data Protocol
PEP	Performance Enhancement Proxy
PLMN	Public Land Mobile Network
POP3	Post Office Protocol version 3
PSD	Packet Switched Data
QoE	Quality of Experience
QoS	Quality of Service
SDS	Short Data 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
TETRA	TErrestrial Trunked RAdio
UDP	User Datagram Protocol
UE	User Equipment
UL	Up Link
UMTS	Universal Mobile Telecommunication System
VT	Video Telephony
WAP	Wireless Application Protocol
XML	Extensible Markup Language

4   Measurement profiles

Measurement 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 is 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 regular user 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
S1O:	airports/railway stations/shopping centres and malls business districts and exhibition areas	outdoor measurement
S1I:	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 in car using external antenna with an appropriate attenuation.	

4.2 Service profiles

This clause describes recommended service profiles used for testing.

4.2.1 Telephony

The service profiles defined for telephony might be applicable for different scenarios, e.g. mobile-to-mobile or mobile-to-fixed, and the respective results should not be compared directly, if so.

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 one single 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.

A minimum pause interval between two call attempts should be applied 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

The following call durations shall be used:

- CD1: 10 seconds   for call setup testing;
- CD2: 120 seconds   for typical tests, default call duration for PLMN;
- CD3: 300 seconds   for stability tests;
- CD4: 60 seconds   for typical tests, default call duration for TETRA individual calls.

Call Window: Call duration + 30 seconds, (for the setup and release phases) + 30 seconds (for the minimum pause interval), for the default call duration CD2 this results in 180 seconds call window.

Timeout values:

- Telephony {Service Non-Accessibility | Setup Time} Timeout: 20 seconds.

4.2.1.2 Video Telephony

Video Telephony should be tested in mobile-to-mobile scenarios. 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 CD2 this results in 180 seconds call window.

Timeout values:

- VT Service {Non-Accessibility | Access Time} Timeout: 20 seconds;

- VT Audio/Video Setup {Failure Ratio | Time} Timeout: 30 seconds.

4.2.1.3 Group Call

Group Calls should be tested in mobile-to-mobile(s) scenarios. The following call durations shall be used:

- CD1: 20 seconds   for typical tests, default call duration;

- CD2: 60 seconds   for stability tests.

Call Window: Call duration + 20 seconds (for the setup and release phases), + 20 seconds (for minimum pause interval), for the default call duration CD1 this results in 60 seconds call window.

Timeout values:

- Group Call Service Non-Accessibility Timeout: 5 seconds.

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 of a message or the receiver of a message 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 | SDS}

{SMS | SDS} should be tested in mobile-to-mobile scenarios and without concatenation. Thus the user data should be chosen in a way that it will fit into a single message.

The interval between two consecutive {SMS | SDS} shall be 60 seconds.

The transmission window of measurements shall be 175 seconds.

Timeout-values:

- {SMS | SDS} Service Non-Accessibility Timeout: 20 seconds;

- {SMS | SDS} Completion Failure Ratio Timeout: 30 seconds;

- {SMS | SDS} Receive Confirmation Failure Ratio Timeout: 60 seconds;