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**Speech and multimedia Transmission Quality (STQ);
QoS aspects for popular services in mobile networks;
Part 3: Typical procedures for Quality of Service
measurement equipment**

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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.....	7
3 Definition of terms, symbols and abbreviations.....	8
3.1 Terms.....	8
3.2 Symbols.....	8
3.3 Abbreviations	8
4 Aim of measurement	9
5 Classification of services.....	10
5.1 Classification guidelines.....	10
5.2 General structure of service descriptions.....	10
6 General aspects for all types of services.....	10
6.1 Set-up and control	10
6.2 Phase and result classification.....	11
7 Telephony measurements	11
7.1 General aspects.....	11
7.1.1 Transaction definition and transaction types.....	11
7.1.2 Parameter overview	12
7.1.3 Additional transaction result definitions	12
7.1.4 Content quality.....	13
7.1.5 Verification of usable two-way connection	13
7.2 Speech telephony.....	13
7.2.1 Transaction definition and transaction types for speech telephony	13
7.2.2 Parameter overview for speech telephony	14
7.2.3 Additional transaction results for speech telephony	14
7.2.4 Content quality for speech telephony.....	14
7.2.5 Verification of usable two-way connection for speech telephony	14
7.3 Video telephony	14
7.3.1 Transaction definition and transaction types for video telephony	14
7.3.2 Parameter overview for video telephony	14
7.3.3 Additional transaction result definitions for video telephony.....	15
7.3.4 Content quality for video telephony	15
7.3.5 Verification of usable two-way connection for video telephony	15
7.3.6 Call setup considerations for MTSI calls.....	15
7.4 Group Call.....	15
7.4.1 Transaction definition and transaction types for group calls	15
7.4.2 Parameter overview for group calls	16
7.4.3 Additional transaction result definitions for group calls.....	16
7.4.4 Content quality for group calls	16
7.4.5 Verification of usable connection for group calls	16
8 Store-and-forward services measurement	17
8.1 Transaction description	17
8.1.1 General aspects - Transaction phase and parameter overview.....	17
8.1.2 Additional transaction result definitions.....	18
8.1.3 Content quality for Store-and-Forward Services	18
8.2 SMS measurements	18

8.2.1	General aspects of SMS measurements	18
8.2.2	Transaction definitions and transaction types for SMS	19
8.2.3	Testing mode for SMS-MT	19
8.2.4	Testing mode for SMS-MO	20
8.2.5	Transaction phase and parameter overview for SMS	20
8.2.6	Possible transaction results for SMS	20
8.2.7	Content quality for SMS	20
8.3	MMS	20
8.3.1	General aspects of MMS measurements	20
8.3.2	Transaction definitions and transaction types for MMS	20
8.3.3	Transaction phase and parameter overview for MMS	21
8.3.4	Additional transaction result definitions for MMS	22
8.3.5	Content quality for MMS	22
8.4	E-Mail	22
8.4.1	Transaction definitions for E-Mail	22
8.4.1.1	Overview and Protocols	22
8.4.1.2	Reference content	23
8.4.1.3	Content integrity	23
8.4.1.4	Push functionality	24
8.4.1.5	Header only download	24
8.4.1.6	Timeouts	24
8.4.1.7	General requirements and limitations	24
8.4.2	Transaction scenarios for E-mail	24
8.4.2.1	Overview and Upload scenario	24
8.4.2.2	Download scenario	25
8.4.2.3	End-to-end scenario with IMAP4	26
8.5	SDS	27
8.5.1	General aspects of SDS measurements	27
8.5.2	Transaction phase and parameter overview for SDS	28
8.5.3	Possible transaction results for SDS	28
8.5.4	Content quality for SDS	28
9	Data measurements	28
9.1	Common aspects	28
9.1.1	Transaction definition and transaction types for data measurements	28
9.1.2	Server types	28
9.1.3	Test data content	29
9.1.4	Transaction phase and parameter overview	29
9.1.4.1	General	29
9.1.4.2	Packet-switched access	30
9.1.4.3	Circuit-switched access	30
9.1.4.4	Direct Services	30
9.1.5	Possible transaction results	31
9.1.6	Content quality	31
9.1.7	Content integrity	31
9.2	FTP	32
9.2.1	Transaction definition and transaction types for FTP	32
9.2.2	Transaction phase and parameter overview for FTP	32
9.2.3	Possible transaction results for FTP	32
9.2.4	Content quality for FTP	32
9.2.5	Content integrity for FTP	32
9.3	HTTP	32
9.3.1	Transaction definition and transaction types for HTTP	32
9.3.2	Transaction phase and parameter overview for HTTP	32
9.3.3	Possible transaction results for HTTP	32
9.3.4	Content quality for HTTP	33
9.3.5	Content integrity for HTTP	33
9.4	E-mail	33
9.5	WAP	33
9.5.1	Transaction definition and transaction types for WAP	33
9.5.2	Transaction phase and parameter overview for WAP	34
9.5.3	Possible transaction results for WAP	35

9.5.4	Content quality for WAP	35
9.5.5	Content integrity for WAP	36
9.6	Streaming Video	36
9.6.1	Transaction definition and transaction types for streaming video	36
9.6.2	Transaction phase and parameter overview for streaming video	36
9.6.3	Possible transaction results for Streaming Video	36
9.6.4	Content quality for Streaming Video	36
9.6.5	Content integrity for Streaming video	36
9.7	Media Download	37
9.7.1	Overall description	37
9.7.1.1	Transaction definition and types for Media Download - OMA network elements	37
9.7.1.2	OMA download use cases	38
9.7.1.2.1	Combined OMA download use case	38
9.7.1.2.2	Separate OMA download use case	39
9.7.1.3	DRM use cases	40
9.7.1.3.1	Combined delivery DRM use case	40
9.7.1.3.2	Separate delivery DRM use case	40
9.7.2	Transaction phase and parameter overview for Media Download	41
9.7.2.1	Overview of basic parameters for Media Download	41
9.7.2.2	Media Download subphases	42
9.7.2.3	Combined OMA download and combined delivery DRM use case	43
9.7.2.4	Separate OMA download and combined delivery DRM use case	43
9.7.2.5	Combined OMA download and separate delivery DRM use case	43
9.7.2.6	Separate OMA download and separate delivery DRM use case	44
9.7.2.7	Additional information about parameters for Media Download	44
9.7.2.8	Recommended Testing Method for Media Download	44
9.7.3	Possible transaction results for Media Download	44
9.7.4	Content quality for Media Download	44
9.7.5	Content integrity for Media Download	44
Annex A (informative): Bibliography		45
History		46

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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 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [4].

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).

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Introduction

The present document describes the measurement procedures needed to perform the measurements of QoS parameters in line with the definitions given in part 2 [i.5], applying the test profiles defined in part 5 [3].

The aim of standardization of QoS measurements is to ensure that measurements done at different times and with different equipment produce comparable results. To reach this goal, not only computation rules have to be standardized. Since the result of measurements will depend on the way these measurements are performed, well-defined procedure definitions are also required to ensure comparable data.

1 Scope

The present document describes typical procedures used for QoS measurements on mobile communication networks, along with settings and parameters for such measurements.

Where possible, existing ITU-T or ETSI definitions are referenced. In some cases ITU-T or ETSI definitions do not exist or are considered too generic, then a more service and mobile network specific definition is chosen.

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 referenced document (including any amendments) applies.

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- [1] Recommendation ITU-T P.56: "Objective measurement of active speech level".
- [2] Void.
- [3] 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".
- [4] 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".

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.

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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] IETF RFC 3501: "Internet message access protocol - version 4rev1".
- [i.2] IETF RFC 2177: "IMAP4 IDLE command".
- [i.3] IETF RFC 2821: "Simple Mail Transfer Protocol".
- [i.4] IETF RFC 1939: "Post Office Protocol - Version 3".
- [i.5] 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".
- [i.6] ETSI TS 100 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

A-party: in direct transactions, the party initiating the transaction (calling party)

NOTE: In store-and-forward transactions, the party sending content.

B-party: in direct transactions, the termination or counterpart of a transaction

NOTE: In store-and-forward transactions, the party receiving content.

content: entirety of information transferred within a transaction, seen from the user's perspective

NOTE: In case of services requiring entrance procedures (e.g. server login with FTP), information flow to achieve the state of being able to transfer actual user data is not counted as content.

EXAMPLE: Single text message in SMS service; single multimedia message consisting of video, audio, and text components in MMS service.

direct transaction: real-time transaction between two entities

maximum expected delivery time: time within a message has to be received by the B-party to rate the transaction successful from the user's perspective

service family: group of services having main characteristics in common

EXAMPLE: Speech and Video Telephony, as well as SMS and MMS, are assumed to form a service family.

store-and forward transaction: transaction where information is sent from one party A to another party B using an entity C to store information sent from A and attempting to deliver it to B

transaction: single, complete, typical usage of a particular service

NOTE 1: At the beginning of each clause describing a particular service or family of services, the typical transaction for this particular service is described.

NOTE 2: Each type of transaction has parameters. The sum of all parameters describes the transaction completely. A parameter set is assumed to be complete if, under constant outer conditions, all transactions using this parameter set provide the same result.

transaction result: set (list) of possible outcomes for a particular transaction

NOTE: Services belonging to the same service family share the same set of transaction results.

3.2 Symbols

Void.

3.3 Abbreviations

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

AOV	Angles Of View
APN	Access Point Name
CS	Circuit Switched
CSD	Circuit Switched Data
DNS	Domain Name Server
DRM	Digital Rights Management
FR	Failure Rate

FTP	File Transfer Protocol
GC	Group Call
GGSN	Gateway GPRS Support Node
GSM	Global System for Mobile communications
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
ICMP	Internet Control Management Protocol
IP	Internet Protocol
MEDT	Maximum Expected Delivery Time
MMS	Multimedia Messaging Service
MOF	Mobile Originated to Fixed
MOM	Mobile Originated to Mobile
MT	Mobile Terminated
MTM	Mobile Terminated, originator is also a Mobile unit
MTSI	Multimedia Telephony over IMS
MTU	Maximum Transmission Unit
NAT	Network Address Translation
OMA	Open Media Access
OS	Operating System
PC	Personal Computer
PDP	Packet Data Protocol
PDU	Packet Data Unit
POP3	Post Office Protocol Version 3
PS	Packet Switched
PSD	Packet Switched Data
QoS	Quality of Service
RTP	Realtime Transport Protocol
S&F	Store and Forward
SDP	Service Delivery Platform
SDS	Short Data Service
SDS-TL	Short Data Service Transport Layer
SMS	Short Message Service
SMSC	Short Message Service Centre
SMS-MO	SMS Mobile Originated
SMS-MT	SMS Mobile Terminated
SMTP	Simple Mail Transfer Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TETRA	Terrestrial Trunked Radio
UDP	User Datagram Protocol
UE	User Equipment
URL	Uniform Resource Locator
WAP	Wireless Application Protocol

4 Aim of measurement

The aim of measurements described in the present document is to assess the network under test for its Quality of Service (QoS) parameters as defined in ETSI TS 102 250-2 [i.5]. This is to determine the network quality for the respective transactions from the user's view.

5 Classification of services

5.1 Classification guidelines

For the purpose of the present document, services are classified using what is considered to be their dominating property. The first distinction is made between direct and store-and-forward services:

- Direct-transaction services are services where there is - in the user's perception - a direct end-to-end connection.
- Store-and-forward services are services where content is stored in the network and delivered to the recipient at a later point in time.

As a technically usable differentiation, a service is considered to be direct if it is possible to decide on end-to-end content transfer success from the initiating party (A-party) of the connection within the scope of the transaction itself.

NOTE: e-Mail is a special case since it has both aspects of direct and of store and forward services. In the present document, it is, as in part 2 [i.5] of this multi-part deliverable, treated in the clause on store and forward services.

5.2 General structure of service descriptions

In the following, each service family description will contain the following structural elements:

- A general part defining:
 - the basic transaction definition and if applicable, transaction types;
 - a description of the transaction phase combined with a table of parameters governing transaction behaviour in this phase;
 - a description of all possible outcomes of a single transaction;
 - a description of content quality measurement definitions (if applicable).
- In case there are service-dependent differences, a service-dependent part having the same structure as above.

6 General aspects for all types of services

6.1 Set-up and control

Measurements should be conducted in a way that user behaviour is realistically modelled. Parameters and settings which have substantial influence on results need to be under control of the measurement equipment.

The testcase design (configuration and user profile) - to the degree necessary to fully reproduce the test - shall be part of the measurement documentation.

It is assumed that for all types of services under test, a testcase consists of a number of single identical transactions. The measurement equipment and control shall ensure that the starting conditions are the same for each transaction. This includes, among other things, that pause times are sufficiently long that the equipment is in a stable (idle) state again. The parameter "guard time" sets a minimum value for the pause between transactions.

It is assumed that all QoS-relevant transaction parameters are recorded for proper post-processing and are kept constant during measurements. If a measurement contains more than one parameter set, evaluation shall be made for each parameter set separately.

6.2 Phase and result classification

In order to ensure common wording, the following clause defines terms and definitions for service measurements.

It is assumed that each transaction can be described at least by one seamless sequence of phases. There may exist several Angles Of View (AOV), each leading to a different phase description.

EXAMPLE: Internet services (as described by its QoS parameters defined in ETSI TS 102 250-2 [i.5] model A and B). AOV differ here by different assumptions on start of service usage. Each AOV, however, is a consistent description by seamlessly connected phases.

Phases may be further described having sub-phases.

Pauses between transactions are not explicitly mentioned in this picture, but are relevant with respect to parameter reporting. Typically, there is a minimum pause (guard time) ensuring that the system under test is in a stable starting condition for the next test.

Depending on the used radio access technology the duration of required pauses may differ significantly.

However, this duration may be adjusted to local conditions or special testing goals, but this shall be reported.

If the pause duration is too short, side effects may occur, resulting in all kinds of transient effects and distortions in measurement data. It should be made certain that all the QoS parameters to be measured are not affected by the pause time.

Tables 1 to 4 void

7 Telephony measurements

7.1 General aspects

7.1.1 Transaction definition and transaction types

Clause 7 deals with telephony services. In general, the term "content" will be used throughout this clause for the information flow exchanged between participating users during a call. Depending on the type of service, content can be audio or audio and video.

The basic transaction for telephony testing is equivalent to a single call to a counterpart extension.

7.1.2 Parameter overview

Table 5: Parameter overview for telephony measurements

Phase	Parameters
Service Access	Call counterpart. This includes the type of equipment (dedicated unit, unique identifier (e.g. called party number), automatic answer with taped message, etc.).
	Call type.
	Time-out value.
Service Usage	Call duration.
	Content flow direction: This is an inner parameter for a transaction. Basically, all combinations of uplink/downlink dynamics are possible: <ul style="list-style-type: none"> - Uplink only; - Downlink only; - Conversational (alternating uplink and downlink). This is the recommended standard testing mode. Other testing modes are considered to be used only for special purposes; - "Duplex" (uplink and downlink flow simultaneously).
	Codec settings.
	Algorithm and scale used for speech quality evaluation.
Call clear-down	Guard time.
Pause	Pause duration.

The last transaction within a measurement sequence does not require a pause.

7.1.3 Additional transaction result definitions

For call set-up assessment beyond QoS data acquisition, typically a state model driven by suitable trigger-events information combined with information from the call control engine is being used. This state model may also be used to determine timing information for each phase.

Service usability, i.e. presence of a usable two-way connection, shall be verified by a procedure based on content test transmissions within a given time window. If within this time window no connection can be verified, the setup attempt shall be considered as failed and the call attempt be terminated.

A call is active only as long as both sides consider it to be active. A call is therefore considered to be dropped if either side detects a dropped call.

Above definitions lead to the following decision tree for the outcome of a call (figure 1 includes the end-of-call cases).