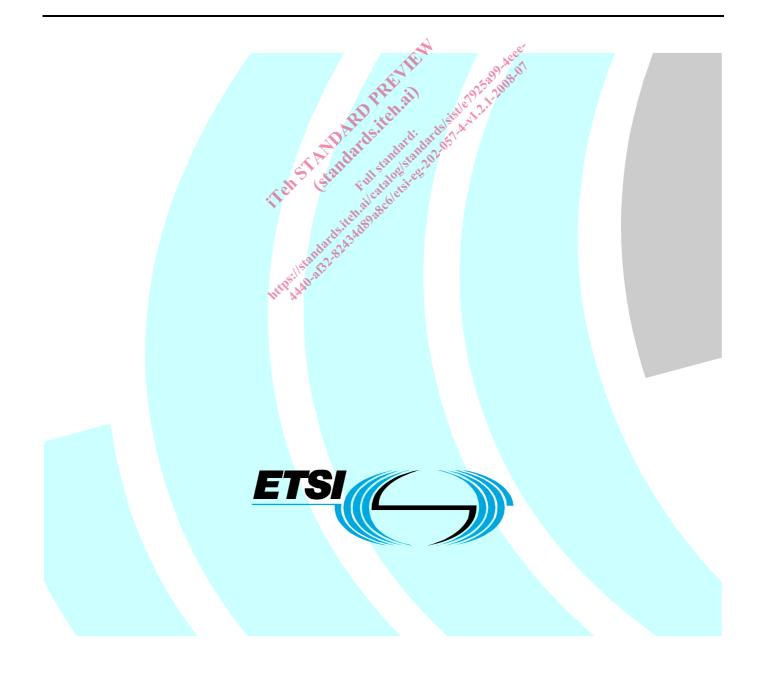Final draft ETSI EG 202 057-4 V1.2.0 (2008-05)

# Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 4: Internet access

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# Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Speech Processing, Transmission and Quality Aspects (STQ), and is now submitted for the ETSI standards Membership Approval Procedure.

The present document is part 4 of a multi-part deliverable covering Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements, as identified below:

Part 1:    "General";

Part 2:    "Voice telephony, Group 3 fax, modem data services and SMS";

Part 3:    "QoS parameters specific to Public Land Mobile Networks (PLMN)";

**Part 4:    "Internet access".**

EG 202 057-1 [10] contains general user related QoS parameter definitions and measurement methods that can be applied to any service as well as user related QoS parameter definitions and measurement methods for voice, data and fax services accessed via the public telecommunications network.

EG 202 057-2 [11] contains user related QoS parameter definitions and measurement methods for voice, modem data, fax services and SMS accessed via the public telecommunications network. The data parameters are specified for the case where a V.9x series modem is used since this kind of modem is in common use.

EG 202 057-3 [12] contains user related QoS parameter definitions and measurement methods specific to public land mobile telecommunication networks (PLMN).

EG 202 057-4 (the present document) contains user related QoS parameter definitions and measurement methods specific to Internet access.

The present document takes into account as far as practicable the following eight principles:

1)    QoS parameters should be easily understood by the public, and be useful and important to them.

2)    All parameters are applicable at the network termination point (where appropriate).

3)    Where measurements are possible they should be made on the customer's premises, using in-service lines.

NOTE:    Literally principles 2 and 3 imply that all measurements are carried out at the NTP. However, the NTP in PLMNs is not precisely defined. Other methods are used to achieve an adequate representation of the quality that would be perceived at the NTP for the parameters defined in the present document.

4)    To be as realistic as possible, real traffic rather than test calls should be used as a basis of the measurements, wherever possible.

5)    Parameters should be capable of verification by independent organizations. This verification might be made by direct measurements or by audit of service provider's measurements.

6)    The accuracy of QoS values should be set to a level consistent with measurement methods being as simple as possible with costs as low as possible.

7) The parameters are designed for both statistical and individual application. The statistical values should be derived by the application of a simple statistical function to the individual values. The statistical function should be specified in this multi-part deliverable. This multi-part deliverable should also contain guidelines on how statistically significant samples should be selected.

8) The statistical functions should be designed so QoS figures from different service providers can be compared easily by users and in particular consumers.

# Introduction

The present document provides definitions and measurement methods for various QoS parameters for Internet access. The parameters were developed on the basis of the user's Quality of Service criteria identified in the TR 102 276 [9].

# 1      Scope

The present document contains definitions and measurement methods for a range of user perceivable Quality of Service (QoS) parameters. The purpose of these parameters is to define objective and comparable measures of the QoS delivered to users/customers for use by users/customers. The present document applies to any telecommunication service however some parameters may have a limited application.

The present document is intended to provide a menu from which individual items can be selected. There is no obligation to use any or all of the parameters.

The QoS parameters are related primarily to services and service features and not to the technology used to provide the services. Therefore the parameters should be capable of use when the services are provided on new technologies such as IP and ATM or other packet switched technologies as well as on circuit switched technologies.

The establishment of target values for QoS is outside the scope of the present document. The QoS parameters listed in the present document are also not intended to assess the complete QoS of a telecommunication service. The present document provides a set of QoS parameters that covers specific user related QoS aspects rather than a complete list of QoS parameters. This set has been chosen to address areas where monitoring of QoS is likely to be most worthwhile, i.e. the areas that are most likely to be affected by any QoS problems.

If stakeholders wish to examine other QoS aspects they are recommended to follow the general approach of the present document - as far as practicable - as a basis for the development of definitions and measurement methods for new specific QoS parameters.

The set of QoS parameters is designed to be understood by the users of various telecommunications services. Sub-sets of these parameters can be selected for use in different circumstances. For example a specific parameter might be relevant for many users in some countries or markets but the same parameter might not be of relevance in others. Therefore stakeholders - users, customers, regulators, service providers, network operators and other parties interested in the use of QoS parameters - should decide in co-operation, which parameters should be used in their particular situation. This decision should take account of:

- The precise purpose for which they will be used.

- The general level of quality achieved by most operators.

- The degree to which the parameters will provide a reliable comparison of performance.

- The cost of measuring and reporting each parameter.

The parameters defined in the present document are applicable to any kind of Internet access independently of the underlying technology.

# 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.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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 102 250-5: "Speech Processing, Transmission and Quality Aspects (STQ); QoS aspects for popular services in GSM and 3G networks; Part 5: Definition of typical measurement profiles".

[2]        ETSI TS 102 250-6: "Speech Processing, Transmission and Quality Aspects (STQ); QoS aspects for popular services in GSM and 3G networks; Part 6: Post processing and statistical methods".

[3]        ITU-T Recommendation G.1010: "End-user multimedia QoS categories".

[4]        ITU-T Recommendation G.1020: "Performance parameter definitions for quality of speech and other voiceband applications utilizing IP networks".

[5]        ITU-T Recommendation Y.1540: "Internet protocol data communication service - IP packet transfer and availability performance parameters".

[6]        ITU-T Recommendation Y.1541: "Network performance objectives for IP-based services".

[7]        IETF RFC 792: "Internet Control Message Protocol".

[8]        ITU-T Recommendation I.350: "General aspects of quality of service and network performance in digital networks, including ISDNs".

## 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.

[9]        ETSI TR 102 276: "User Group; Users' Quality of Service Criteria for Internet Access in Europe".

[10]       ETSI EG 202 057-1: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 1: General".

[11]       ETSI EG 202 057-2: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 2: Voice telephony, Group 3 fax, modem data services and SMS".

[12]       ETSI EG 202 057-3: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 3: QoS parameters specific to Public Land Mobile Networks (PLMN)".

# 3          Definitions and abbreviations

## 3.1          Definitions

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

NOTE:          Since the purpose of the present document is to formulate definitions for QoS parameters, these definitions are given in the main body of the text and are not repeated here.

**authentication:** process of verifying a claimed identity to ensure that the stated identity of a user is correct

**authorization:** process of determining if the presenter of certain credentials is authorized to access a resource or make use of a service

**call:** generic term to describe the establishment, utilization, and release of a connection (bearer path) or data flow

**email:** messages automatically passed from one computer user to another, often through computer networks and/or via modems over telephone lines

**File Transfer Protocol (FTP):** protocol that allows users to copy files between their local system and any system they can reach on the network

**host:** computer that provides client stations with access to files and printers as shared resources to a computer network

**Internet:** computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange

**Internet access:** making available of facilities and/or services for the purpose of providing an access to the public Internet in order to provide a user with access to services or resources of the Internet

NOTE 1:          The Internet access can be separated in two parts, the physical and the logical access.
The physical access provides a connection form the user's premises to, but not including, the POP (normally a dial-up circuit or broadband link or leased line) whereas the logical access consist of the setting up of an account that later on enables the user by a login process with the ability to access to the services and resources of the Internet (normally by assigning an IP address).

NOTE 2:          The physical and logical access may be provided by different service providers.

NOTE 3:          The function of the physical access may be provided by several interconnected networks.

**Internet Access Provider (IAP):** organization that provides users with an Internet access

**Internet Protocol (IP):** main internetworking protocol used in the Internet. Used in conjunction with the Transfer Control Protocol (TCP) to form TCP/IP

**IP address:** four-byte number uniquely defining each host on the Internet, usually written in dotted-decimal notation with periods separating the bytes

EXAMPLE:          217.111.27.1 for IP Version 4.

**login process:** multi-step process which includes both authentication and authorization as well as other system start-up tasks in order to provide a user with access to services or resources

**public Internet:** part of the Internet that is available to the general public

NOTE:          The access is normally provided by Internet access and Internet service providers.

**physical access provider:** organization that arranges the provision of physical access from the user's premises to the POP

> NOTE 1:  Excluding, the POP.

> NOTE 2:  Usually a dial-up circuit or an ADSL link or leased line are used.

> NOTE 3:  The function of the physical access provider may be provided by several interconnected networks.

**Public Telecommunications Network (PTN):** telecommunications network used wholly or partly for the provision of publicly available telecommunications services

**router:** device which forwards packets between networks

> NOTE:     The forwarding decision is based on network layer information and routing tables, often constructed by routing protocols. An IP router forwards data based on IP source and destination addresses.

**stakeholder:** party having an interest in the level of quality of a service

**telecommunications:** technical process of sending, transmitting and receiving any kind of message in the form of signs, voice, images or sounds by means of telecommunications systems

**telecommunication services:** provision of telecommunications and the provision of other additional services that are closely related to the provision of telecommunications like e.g. billing, directory services

**telecommunications systems:** technical equipment or systems capable of sending, transmitting, switching, receiving, steering or controlling as messages identifiable electromagnetic signals

**user:** individuals, including consumers, or organizations using or requesting publicly available telecommunications services

## 3.2      Abbreviations

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

| | |
|---|---|
| DSL | Digital Subscriber Line |
| FQDN | Fully Qualified Domain Name |
| FTP | File Transfer Protocol |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile communications |
| IAP | Internet Access Provider |
| ICMP | Internet Control Message Protocol |
| IP | Internet Protocol |
| kbit/s | kilobit per second |
| NTP | Network Termination Point |
| OS | Operating System |
| PC | Personal Computer |
| PING | Packet InterNet Groper |
| PLMN | Public Land Mobile Network |
| POP | Point Of Presence |
| PTN | Public Telecommunications Network |
| QoS | Quality of Service |
| SMS | Short Message Service |
| UMTS | Universal Mobile Telecommunications System |
| WLAN | Wireless Local Area Network |
| xDSL | generic Digital Subscriber Line |

# 4        General considerations

## 4.1        Scope

### 4.1.1        Understanding of the term "Internet access"

Unlike to other (traditional) telecommunication services the Internet access - as it is used in these days - consists of different connections and services that have to be available in combination in order to allow for a functional Internet access. All these different connections and services can be understood as separate telecommunication services with their own QoS aspects. However, the quality of services as perceived by the user accessed via the Internet like e.g. web browsing and email will be influenced by the quality of each single element of the end-to-end connection/service.

Furthermore the term "Internet access" is not only understood by the naive user as an access in the real meaning of the word, i.e. the provision of a physical connection and being able to establish connections to other parts or accesses of the network. The user understands Internet access as having access to (end-to-end) services that rely on the transport mechanisms of the Internet. This is because for most users the pure (physical) access to the internet is of no practical use; only if the user gains access via e.g. web browsing to information and applications available on servers he can use the "Internet".

However, from a technical point of view the (end-to-end) services/applications are offered independently to the (physical) Internet access. This is also reflected in the fact that in many cases end users may need to have two contracts in order to have full Internet access: one for an access to the PTN in order to get a physical connection to an IAP and another one with an IAP/ISP in order to access services provided via the Internet.

In order to use the Internet, the user needs first to have access to the Internet (via the public PTN or via dedicated broadband accesses). Technically spoken, he must be able to have access to the transport mechanisms of the Internet, i.e. having access to IP layer transmission. This provides him with the ability to connect to other entities of the Internet (IP based network). From there on the user may access advanced services that involve higher layers (above the IP layer) of communication. These services may be offered totally independent of the physical access. Thus Internet access can be understood as a (transportation) platform to access advanced services.

Therefore the term Internet access should primarily be understood as physical and logical access to the core of the Internet, i.e. the access includes all functionalities that are needed to enable the user to establish connections to other entities within the Internet and engage advanced services. All issues beyond that basic understanding of an Internet access are highly dependent on the specific end-to-end service used and therefore should be subject to additional service specific considerations.

### 4.1.2        Internet accesses covered

The present document provides QoS and network performance parameters for assessing the quality of Internet access as perceived by the user. The purpose of the parameters is to inform the user on the transmission performance of the assessed Internet access.

The term Internet access includes the physical access between the user's terminal equipment and the access to the network of the IAP who is providing the end user with access to the Public Internet itself. The scope of the parameters is limited to the Internet access itself, i.e. the connection between end user and IAP and the availability and reliability of the access. The quality of end-to-end services accessed via this connection is outside the scope of the present document.

Internet access is normally not provided by a single service or network provider as it is possible in the case of other telecommunication services like telephony services. The Internet access consists of a combination of different connections and services.

The user gains access to the Public Internet via a suitable terminal equipment e.g. a PC that can be connected to the PTN. The Internet access itself is normally provided by an IAP. The connection between the terminal equipment and the IAP is established via a transit network. In most cases this will be the PTN, but it may also be a LAN or WLAN. The overall quality of the Internet access is a combination of the performance of each element of this connection.

Annex A provides an reference scenario for the Internet access and illustrates the application of the QoS parameters.