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Kakovost prenosa govora in večpredstavnih vsebin (STQ) - Metrika kakovosti storitev (QoS) in zmogljivosti omrežja ter merilne metode - 4. del: Indikatorji za nadzorovanje storitev za več udeležencev

Speech and multimedia Transmission Quality (STQ) - QoS and network performance metrics and measurement methods - Part 4: Indicators for supervision of Multiplay services

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ETSI Standard

**Speech and multimedia Transmission Quality (STQ);
QoS and network performance metrics
and measurement methods;
Part 4: Indicators for supervision of Multiplay services**

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Contents

Intellectual Property Rights	5
Foreword.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	7
3 Symbols and abbreviations.....	7
3.1 Symbols.....	7
3.2 Abbreviations	7
4 General Overview.....	8
5 Measurement type	9
6 List of Internet service indicators	10
6.1 Availability of Internet Access.....	10
6.2 Internet Download Bit Rate.....	11
6.3 Internet Upload Bit Rate.....	13
6.4 Unsuccessful FTP Download session Ratio	14
6.5 Unsuccessful FTP Upload session Ratio.....	14
6.6 Unsuccessful HTTP session Ratio.....	15
6.7 Ping Delay	16
6.8 Internet Login Time.....	17
6.9 Web page download Speed	18
6.10 FTP download Speed.....	18
6.11 FTP upload Speed	20
7 List of voice service indicators.....	20
7.1 Voice messaging availability.....	21
7.2 Post Dialling Delay	21
7.3 Pick Up Delay	21
7.4 Message Provisioning Delay	22
7.5 Voice message quality.....	22
8 List of IPTV indicators.....	23
8.1 Channel Availability.....	23
8.2 Service Group Channel Availability.....	24
8.3 Video Quality	25
8.4 Audio Quality.....	25
8.5 "Black Screen" Occurrences.....	26
8.6 Blockiness Occurrences	26
8.7 Frozen Picture Occurrences.....	27
8.8 Lip Desynchronization Occurrences	27
8.9 Zapping Delay	27
8.10 Transmission Delay.....	28
8.11 IPTV service boot delay.....	28
9 List of VoD indicators.....	29
9.1 VoD Service Availability	29
9.2 Request Conformity	29
9.3 VoD failure rate.....	30
9.4 Video Quality	30
9.5 Audio Quality.....	31
9.6 "Black Screen" Occurrences.....	31
9.7 Blockiness Occurrences	32
9.8 Frozen Picture Occurrences.....	32

STANDARD PREVIEW
 (standards.iteh.ai)
 SIST-V ETSI/EG 202 765-4 V1.1.1:2016
<https://standards.iteh.ai/catalog/standards/sist/2ef89147-9c91-4734-9334-79832c3de/sist-v-etsi-eg-202-765-4-v1-1-1-2016>

10	Measurement frequency	33
11	Measurement locations and their distribution	33
12	Results presentation.....	33
Annex A (normative):	Principle of artefact detection algorithms	35
A.1	Detection principle of frozen picture occurrence	35
A.2	Detection principle of "black screen" occurrence	36
A.3	Detection principle of blockiness occurrence.....	37
Annex B (informative):	Comparisons of ES 202 765-4 and TS 102 250-2 (V1.7.1) parameters.....	38
Annex C (informative):	Bibliography	42
History		43

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[SIST-V ETSI/EG 202 765-4 V1.1.1:2016](https://standards.iteh.ai/catalog/standards/sist/2ef89147-9c91-4734-9334-077903f3e3dc/sist-v-etsi-eg-202-765-4-v1-1-1-2016)

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Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Speech and multimedia Transmission Quality (STQ).

The present document is part 4 of a multi-part deliverable covering the QoS metrics for telecommunication services and network performance metrics for transport networks, as identified below:

- EG 202 765-1: "General considerations";
- ES 202 765-2: "Transmission Quality Indicator combining Voice Quality Metrics";
- EG 202 765-3: "Network performance metrics and measurement methods in IP networks";
- ES 202 765-4: "Indicators for supervision of Multiplay services".

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1 Scope

The present document aims at identifying and defining indicators and methodologies for a use in a context of end-user quality characterisation and supervision of Multiplay services.

In this context the measurements and metric determinations are performed by analysing signals accessible on user-end services and not on the network.

The present document concerns: Internet access, voice messaging service, IPTV and VoD.

The assessment methods are intrusive and non intrusive.

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.

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2.1 Normative references (standards.iteh.ai)

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

- [1] ETSI EG 202 057-4: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 4: Internet Access".
- [2] ITU-T Recommendation G.1030: "Estimating end-to-end performance in IP networks for data applications".
- [3] ITU-T Recommendation G.1010: "End-user multimedia QoS categories".
- [4] IETF RFC 792: "Internet Control Message Protocol".
- [5] ETSI TS 102 250-2: "Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in GSM and 3G networks; Part 2: Definition of Quality of Service parameters and their computation".
- [6] ITU-T Recommendation P.800: "Methods for subjective determination of transmission quality".
- [7] ITU-T Recommendation P.862: "Perceptual evaluation of speech quality (PESQ): An objective method for end-to-end speech quality assessment of narrow-band telephone networks and speech codecs".
- [8] ITU-T Recommendation P.862.1: "Mapping function for transforming P.862 raw result scores to MOS-LQO".
- [9] ITU-T Recommendation P.862.2: "Wideband extension to Recommendation P.862 for the assessment of wideband telephone networks and speech codecs".
- [10] ITU-T Recommendation P.862.3: "Application guide for objective quality measurement based on Recommendations P.862, P.862.1 and P.862.2".
- [11] ITU-T Recommendation P.800.1: "Mean Opinion Score (MOS) terminology".
- [12] ITU-T Recommendation P.505: "One-view visualization of speech quality measurement results".

- [13] ETSI ES 202 765-2: "Speech and multimedia Transmission Quality (STQ); QoS and network performance metrics and measurement methods; Part 2 : Transmission Quality Indicator combining Voice Quality Metrics".

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.

- [i.1] ETSI TR 102 607: "Speech Processing, Transmission and Quality Aspects (STQ); TCP IP Stack Parameter Settings for Microsoft Windows XP and Microsoft Windows Vista; Comparison and Recommendations".
- [i.2] ETSI TR 102 505: "Speech Processing, Transmission and Quality Aspects (STQ); Development of a ReferenceWeb page".
- [i.3] ITU-T Recommendation J.144: "Objective perceptual video quality measurement techniques for digital cable television in the presence of a full reference".
- [i.4] ITU-T Recommendation J.247: "Objective perceptual multimedia video quality measurement in the presence of a full reference".

3 Symbols and abbreviations

3.1 Symbols

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

1 kbit/s	1 000 bit/s
1 Mbit/s	1 000 kbit/s
kbps	kilobit per second

3.2 Abbreviations

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

ATM	Asynchronous Transfer Mode
BGP	Border Gateway Protocol
BRAS	Broadband Remote Access Server
CIF	Common Intermediate Format
CPE	Customer Premises Equipment
DHCP	Dynamic Host Control Protocol
DNS	Domain Name System
DSLAM	Digital Subscriber Line Access Multiplexer
ETSI	European Telecommunications Standards Institute
FQDN	Fully Qualified Domain Name
FTP	File Transfer Protocol
GE	Gigabit Ethernet
GSM	Global System for Mobile communications
HDMI	High Definition Multimedia Interface
HGW	Home GateWay
HTTP	Hyper Text Transfer Protocol
ICMP	Internet Control Message Protocol
IP	Internet Protocol
IPTV	Internet Protocol Television
ISP	Internet Service Provider
ITU-T	International Telecommunication Union - Telecommunication standardisation sector
LNS	L2TP Network Server

MOS	Mean Opinión Score
MOS-LQOM	Mean Opinión Score - Listening Quality Objective Mixed bandwidths
MOS-LQOM	Mean Opinión Score-Listening Quality Objective Mixed
MPEG TS	MPEG Transport Stream
MPEG	Moving Picture Experts Group
OLT	Optical Line Termination
PESQ	Perceptual Evaluation of Speech Quality
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RTP	Real Time Protocol
RTT	Round-Trip Time
S/PDIF	Sony Philips Digital Interface
STB	Set Top Box
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VoD	Video On Demand
VoIP	Voice over Internet Protocol

4 General Overview

The present document aims at identifying and defining indicators and methodologies for a use in a context of end-user quality characterization and supervision of multiplay telephony services such as Internet access, IPTV and VoD. It completes ES 202 765-2 [13] that was dedicated to voice telephony services.

The present document gives practical requirements of use in the context of service verification and benchmark on a large and representative scale from the point of view of the potential stakeholders such as the end-users or of the regulatory authorities. This has been made necessary by the current or recent evolutions of the telecommunication sector:

- a competitive environment for the offers of multiplay services with a multitude of service providers, with a quality guarantee not always assured and where clients can very easily change their service providers;
- the development of time varying quality in telecommunications, first in telephony with mobile offers (due to mobility and irregular network coverage), but now also for multiplay services use in residential context (mostly due to IP transmission);
- the cohabitation, interaction and competition between services based on different technologies.

The deployment of multiplay offers is increasing but quality guarantee is not always assured.

To achieve the goal mentioned beforehand, there are several existing possibilities, not fully satisfying:

- Subjective tests, with a few human testers assessing the quality of services. This method is very long to run and not really cheap if we consider that there are many offers to be assessed. And it is not easily applicable in a context of quality changing over time.
- Objective tests. This is the most reliable way, although it is also based on sampling and can cost a lot of money in the case of a large deployment of probes or robots.

The present document assumes that this last family of methodology answers the needs of a reliable comparison of multiplay services.

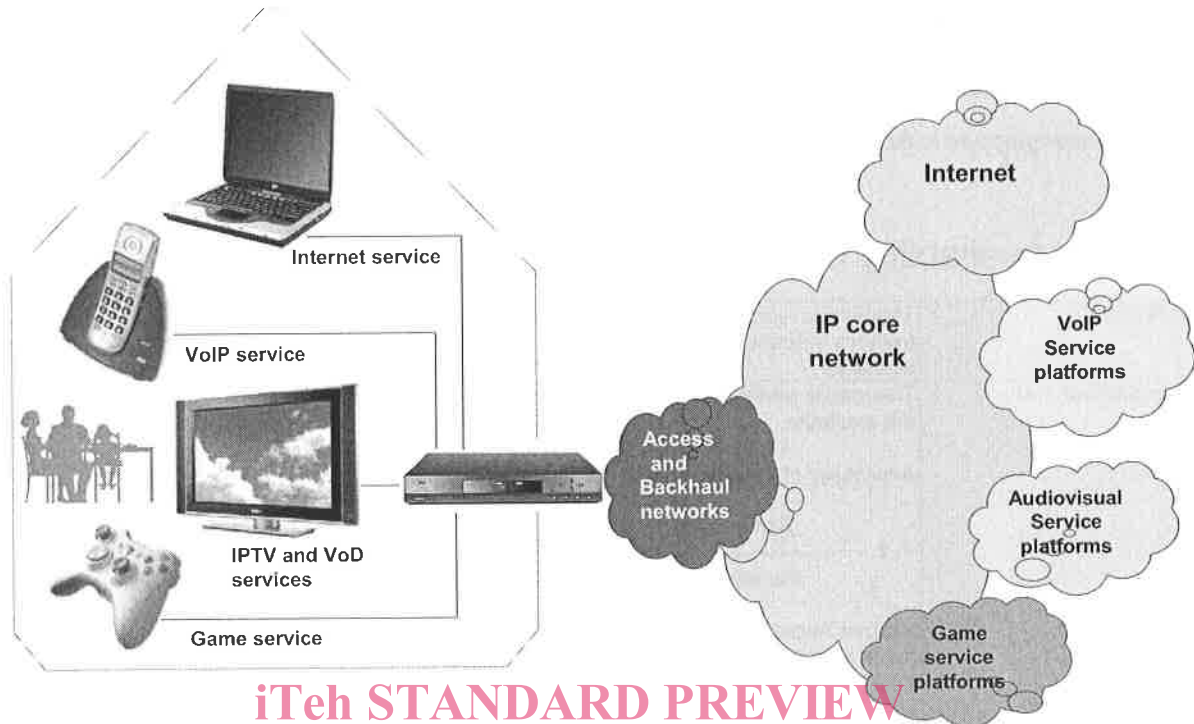


Figure 1: Possible configuration of architecture of multiplay services

The analysis of multiplay offers requires the simulation of user behaviour. In this context, robots and analyzers have to use and seek services in a very close way of a customer usage.

What definitely matters is the point of view of the end-users. What they perceive is not only the result of the transmission across the network, but also artefacts produce by the service platforms or service servers.

In the present document the following services are considered: Internet access, voice messaging (in complement to telephony services addressed in ES 202 765-2 [13]), IPTV and VoD.

Last important aspect that is addressed in the present document is the practical organization of measurement campaigns in order to get a realistic and reliable vision of the services as perceived by the end-users. In particular, the questions of the periodicity of measurement and of the geographical coverage (i.e. more generally the sampling approach). These aspects are specified in clause 5.

5 Measurement type

Considering the specific perimeter for the characterization of multiplay offer quality 24 hours a day and 7 days a week, analyses should be realized by robots. In this context, subjective evaluations are not adapted. The robot has to simulate the use of services by a user.

Besides, the characterization of the offers is considered from the user point of view. So, analyzers shall be connected on the available accesses of the HGW (Ethernet access, analogical phone access) or/and of the STB (HDMI, S/PDIF). So, analyses are performed on electric signals.

In general care should be taken by comparing results from measurements obtained by using different setups (e.g. protocols, service layers).

6 List of Internet service indicators

To determine the indicators of internet service, it is necessary to manage the measurements with a Personal Computer (PC) similar to those currently or mostly used by users. Care should be taken when using a PC which is not very powerful. On this matters, recommendations are available in TR 102 607 [i.1].

The indicators proposed in the context of end-user quality survey of Internet services are detailed in the following clauses.

6.1 Availability of Internet Access

Definition	This metric represents the probability for a customer that Internet applications are attainable from his Internet access. It denotes the probability for a customer that his Internet access is available.
Assessment method	<p>This metric provides, for a user, the percentage of time where access to the Internet services are available.</p> <p>Availability of Internet Access = 1 – Unavailability of Internet Access</p> $= 1 - \frac{\sum \text{Unavailability duration}}{\text{Duration of period analysis}} = 1 - \frac{\sum \text{Failure measurement}}{\text{Total time of measurement}}$ <p>Internet Access Availability measurement is an attempt since the user access equipment to reach an Internet service like downloading a web page from a server. To determine the metric, it is important to test the whole transmission chain which allows to access to Internet services outside to ISP network.</p> <p>NOTE: Use the access to ISP mail server does not give a correct view of Internet Access Availability because edge equipments between ISP network and Internet network are not involved.</p>
Guidelines	<p>In practical way, this indicator can be measured, from the user access, by contacting different Web sites (national or/and international) hosted on servers outside and within the ISP network. It is necessary to test the accessibility on several servers to avoid a wrong measurement interpretation due to Web server breakdown.</p> <p>The different attempts to reach web servers and measure the successful or unsuccessful rate should be made periodically. The time interval between 2 sequences of attempts to reach servers does not be more than 15 minutes. It is better to adjust the periodicity of analysis between 5 minutes and 10 minutes.</p>
Unit	% with the resolution of 1 digit after the decimal point
Standardization reference	
Significant	Mandatory

Comment	<p>This availability excludes provisioning, billing or after sales issues that are part of QoS parameters of the Customer relationship stages [i.1].</p> <p>The Internet access availability metric takes into account the availability and the correct functioning of each network element allowing the access to the service. Network elements to consider in this context are:</p> <ul style="list-style-type: none"> • Access node (DSLAM, OLT). • Aggregation nodes and links (ATM and/or GE). • Access server (BRAS, LNS). • Transmission nodes and links. • Service Platform (DHCP server, DNS). <p>A target value for this indicator should be more than 99,95 % Warning: When the Internet Access Availability is determined by reaching Web servers outside the ISP network, this indicator needs to be handled with care. Indeed there are a lot of factors on which the ISP has little or no control: faults in networks of transit providers, faults at interconnection points, BGP routing errors in peer networks, etc.</p>
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6.2 Internet Download Bit Rate

Definition	This metric represents Internet download bit rate available to the user. The indicator evaluates the capacity to use the Internet services.
Assessment method	<p>There are several reasons so that Internet download bit rate supplied to the user is lower than this expected: too long distance between the user and first network access equipment, bad equipment configuration, degraded link between the user and the network,...</p> <p>The Internet download bit rate is evaluated by measuring the bit rate during data transfer from network to user access equipment.</p> <p>It is important to verify that the server used for the measurement has a sufficient output bit rate to make this type of measure. It shall send and receive data flow with bit rates higher than those available on the user access equipment.</p>