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Speech and multimedia Transmission Quality (STQ); Transmission Requirements for IP-based Narrowband and Wideband Home Gateways and Other Media Gateways from a QoS Perspective as Perceived by the User

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Foreword

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

Introduction

Traditionally, the analogue and digital telephones were interfacing switched-circuit 64 kbit/s PCM networks. With the fast growth of IP networks, packet-switched networks (VoIP) interfacing PSTN networks and mobile networks, as well as different types of IP-terminals, are being rapidly introduced. Different types of gateways are used to interconnect to such IP networks. Since the IP networks will be in many cases interworking with the traditional PSTN and private networks, many of the basic transmission requirements have to be harmonized between these different types of network from an end-to-end perspective, including specifications for the edge points.

The present document covers IP-based narrowband and wideband home gateways and other media gateways. It aims to enhance the interoperability and end-to-end quality.

In contrast to other standards which define minimum performance requirements, it is the intention of the present document to specify gateway equipment requirements which enable manufacturers and service providers to enable end-to-end speech performance as perceived by the user. These requirements are absolutely necessary to ensure a good quality, but they are not sufficient. They have to be combined with requirements (and associated relevant measurement methods) for other elements in the transmission chain (core IP network, PSTN, terminals), as well as for the whole mouth-to-ear transmission path.

1 Scope

The present document provides speech transmission performance requirements for narrowband and wideband media gateways from a QoS perspective as perceived by the user. Media gateways can be network or home based, they may include a transcoding function. The present document covers the following types of IP-based media gateways:

- ATA (Analogue Terminal Adapter), home gateway IP to POTS
- ITA (ISDN Terminal Adapter), home gateway IP to ISDN
- IAD (Integrated Access device), home router including ATA or ITA
- Network based ATA and ITA
- Carrier grade media gateway, network gateway IP to TDM
- IP-to-IP media gateway, network gateway with transcoding and/or other media processing

DECT interfaces of media gateways are excluded from the present document and should be measured according to the relevant DECT standards.

Interfaces of media gateways used together with terminals as a system (i.e. connected via Ethernet or with a proprietary interface) are excluded in the present document and should be measured according to the relevant terminal standard.

If a media gateway includes more than one interface type (e.g. POTS and ISDN), each interface has to be dealt with differently.

The requirements available in the present document will ensure a high compatibility with IP-and TDM-based fixed and wireless terminals and networks, including DECT and mobile terminals.

It is the aim to optimize interoperability, the listening and talking quality and the conversational performance. Related requirements and test methods are defined in the present document.

The present document does not apply to media gateways with 4-wire analogue interfaces.

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.

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2.1 Normative references

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

[1] ETSI EN 300 726: "Digital cellular telecommunications system (Phase 2+) (GSM); Enhanced Full Rate (EFR) speech transcoding (GSM 06.60)".

[2] ETSI TS 126 171: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); AMR speech codec, wideband; General description (3GPP TS 26.171 version 6.0.0 Release 6)".

[3] ITU-T Recommendation G.107: "The E-model, a computational model for use in transmission planning".

[4] ITU-T Recommendation G.108: "Application of the E-model: A planning guide".

[5] ITU-T Recommendation G.109: "Definition of categories of speech transmission quality".

[6] ITU-T Recommendation G.100.1: "The use of the decibel and of relative levels in speechband telecommunications".

[7] ITU-T Recommendation G.111: "Loudness Ratings (LRs) in an international connection".

[8] ITU-T Recommendation G.122: "Influence of national systems on stability and talker echo in international connections".

[9] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

[10] ITU-T Recommendation G.723.1: "Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s".

[11] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".

[12] ITU-T Recommendation G.729: "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP)".

[13] ITU-T Recommendation G.729.1: "G.729-based embedded variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729".

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

[15] ITU-T Recommendation P.50: "Artificial voices".

[16] ITU-T Recommendation P.340: "Transmission characteristics and speech quality parameters of hands-free terminals".

[17] ITU-T Recommendation P.501: "Test signals for use in telephonometry".

[18] ITU-T Recommendation P.502: "Objective test methods for speech communication systems using complex test signals".

[19] 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".

[20] ISO 3 (1973): "Preferred numbers - Series of preferred numbers".

[21] ITU-T Recommendation P.800.1: "Mean Opinion Score (MOS) terminology".

[22] ETSI TS 102 971: "Access and Terminals (AT); Public Switched Telephone Network (PSTN); Harmonized specification of physical and electrical characteristics of a 2-wire analogue interface for short line interface".

[23] ETSI ES 201 970: "Access and Terminals (AT); Public Switched Telephone Network (PSTN); Harmonized specification of physical and electrical characteristics at a 2-wire analogue presented Network Termination Point (NTP)".

[24] ITU-T Recommendation G.168: "Digital network echo cancellers".

[25] ITU-T Recommendation P.863: "Perceptual objective listening quality assessment".

[26] ITU-T Recommendation G.722: "7 kHz audio-coding within 64 kbit/s".

[27] ITU-T Recommendation G.722.1: "Low-complexity coding at 24 and 32 kbit/s for hands-free operation in systems with low frame loss".

[28] ITU-T Recommendation G.722.2: "Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB)".