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SERIES P: TERMINALS AND SUBJECTIVE AND
OBJECTIVE ASSESSMENT METHODS

Voice terminal characteristics

Transmission characteristics for narrow-band digital loudspeaking and hands-free telephony terminals

Recommendation ITU-T P.342

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Recommendation ITU-T P.342

Transmission characteristics for narrow-band digital loudspeaking and hands-free telephony terminals

Summary

Recommendation ITU-T P.342 provides audio performance requirements for digital hands-free and loudspeaking telephony terminals using, in the telephone band (300-3400 Hz), the waveform encoding according to Recommendations ITU-T G.711 (PCM at both 64 kbit/s and 56 kbit/s) and ITU-T G.726 (ADPCM 32 kbit/s).

This Recommendation does not deal with audio performance requirements for digital telephones using coding schemes other than waveform encoding and at bit rates lower than 32 kbit/s.

Source

Recommendation ITU-T P.342 was approved on 22 June 2009 by ITU-T Study Group 12 (2009-2012) under Recommendation ITU-T A.8 procedures.

FOREWORD

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In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation ITU-T P.342

Transmission characteristics for narrow-band digital loudspeaking and hands-free telephony terminals

1 Scope

This Recommendation provides audio performance requirements for hands-free and loudspeaking telephones using, in the telephone narrow-band (300-3400 Hz), the waveform encoding according to [ITU-T G.711] (PCM at both 64 kbit/s and 56 kbit/s) and [ITU-T G.726] (ADPCM 32 kbit/s). Audio performance requirements for headset terminals are included in [ITU-T P.310]. IP terminals are not included in this Recommendation.

Audio performance requirements for digital telephones using coding schemes other than waveform encoding and at bit rates lower than 32 kbit/s are under study.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T G.122] Recommendation ITU-T G.122 (1993), *Influence of national systems on stability and talker echo in international connections.*
- [ITU-T G.131] Recommendation ITU-T G.131 (1996), *Control of talker echo.*
- [ITU-T G.223] Recommendation ITU-T G.223 (1988), *Assumptions for the calculation of noise on hypothetical reference circuits for telephony.*
- [ITU-T G.711] Recommendation ITU-T G.711 (1988), *Pulse Code Modulation (PCM) of voice frequencies.*
- [ITU-T G.726] Recommendation ITU-T G.726 (1990), *40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM).*
- [ITU-T O.41] Recommendation ITU-T O.41 (1994), *Psophometer for use on telephone-type circuits.*
- [ITU-T P.51] Recommendation ITU-T P.51 (1996), *Artificial mouth.*
- [ITU-T P.57] Recommendation ITU-T P.57 (2005), *Artificial ears.*
- [ITU-T P.58] Recommendation ITU-T P.58 (1996), *Head and torso simulator for telephonometry.*
- [ITU-T P.64] Recommendation ITU-T P.64 (2007), *Determination of sensitivity/frequency characteristics of local telephone systems.*
- [ITU-T P.79] Recommendation ITU-T P.79 (2007), *Calculation of loudness ratings for telephone sets.*
- [ITU-T P.310] Recommendation ITU-T P.310 (2003), *Transmission characteristics for telephone-band (300-3400 Hz) digital telephones.*

- [ITU-T P.340] Recommendation ITU-T P.340 (2000), *Transmission characteristics and speech quality parameters of hands-free terminals*.
- [ITU-T P.501] Recommendation ITU-T P.501 (2000), *Test signals for use in telephony*.
- [ITU-T P.581] Recommendation ITU-T P.581 (2000), *Use of head and torso simulator (HATS) for hands-free terminal testing*.
- [ISO 266] ISO 266:1997, *Acoustics – Preferred frequencies*.
- [IEC 61672-1] IEC 61672-1:2002, *Electroacoustics – Sound level meters – Part 1: Specifications*.

3 Definitions and abbreviations

3.1 Definitions

This Recommendation defines the following terms:

- 3.1.1 double talk:** An operation mode, where two users are speaking simultaneously.
- 3.1.2 ear-drum reference point (DRP):** A point located at the end of the ear canal, corresponding to the ear-drum position.
- 3.1.3 ear reference point (ERP):** A virtual point for geometric reference located at the entrance to the listener's ear, traditionally used for calculating telephony loudness ratings.
- 3.1.4 group-audio terminal:** A speakerphone set primarily designed for use by several users, which will not be equipped with a handset.
- 3.1.5 hands-free reference point (HFRP):** A point located on the axis of the artificial mouth, at 50 cm from the lip ring, where the level calibration is made in free field. It corresponds to the measurement point 11, as defined in [ITU-T P.51].
- 3.1.6 hands-free terminal (HFT):** A telephone set that does not require the use of hands during the communications session. Examples are headset, speakerphone and group-audio terminal.
- 3.1.7 HATS hands-free reference point (HATS HFRP):** Corresponds to a reference point "n" from [ITU-T P.58], where "n" is one of the points numbered from 11 to 17 and defined in Table 6A of [ITU-T P.58] (coordinates of far-field front point). The HATS HFRP depends on the location(s) of the microphones of the terminal under test: the appropriate axis lip-ring/HATS HFRP shall be as close as possible to the axis lip-ring/HFT microphone under test.
- 3.1.8 loudspeaking function:** Function of a handset telephone using a loudspeaker associated with an amplifier as a telephone receiver. It shall be used with a handset to transmit send signals.
- 3.1.9 single talk:** An operation mode, where only one user is speaking.
- 3.1.10 speakerphone set:** A telephone set using a loudspeaker as a telephone receiver with or without an embedded microphone as a transmitter; it may be used without a handset.

3.2 Abbreviations

This Recommendation uses the following abbreviations:

AEC	Acoustic Echo Control
AGC	Automatic Gain Control
CSS	Composite Source Signal
DRP	ear-Drum Reference Point
ERP	Ear Reference Point
HATS	Head And Torso Simulator

HFRP	Hands-Free Reference Point
HFT	Hands-Free Terminal
LRGP	Loudness Rating Guard-ring Position
LST	LoudSpeaking Terminal
MRP	Mouth Reference Point
RLR	Receiving Loudness Rating
SLR	Sending Loudness Rating
TCL	Terminal Coupling Loss
TCLw	Weighted Terminal Coupling Loss

4 Test configuration

4.1 Electrical interface specifications

Clauses 4.1 to 4.2 of [ITU-T P.310] shall apply in this Recommendation.

4.2 Test arrangement

By choosing different test equipments, two methods can be used to make hands-free and loudspeaking measurement objectively: the conventional method (using a free-field microphone together with a discrete P.51 artificial mouth) and the HATS method.

The artificial mouth shall conform to [ITU-T P.51].

All measurement values produced by HATS are intended to be free-field equalized. If not specified, HATS's right ear is used for the receive measurement. More details such as the exact calibration and equalization procedures as well as the combination of the two ear signals for the purpose of measurements can be found in [ITU-T P.581].

All effects including test table and measurement equipment are considered a part of the measurement.

NOTE – It is recognized that the two test methods may give different results. While the HATS is intended to simulate the hands-free situation in a more realistic way, the conventional set-up is less sensitive to e.g., asymmetric constructions of devices under test. Differences in the tests results may result from the different orientation of the artificial mouth, from the diffraction effect of the HATS in sending and receiving and from the different physical position of the artificial head compared to the position of the free-field microphone. These effects and their impact on the measurement are still under study.

4.2.1 Desktop hands-free terminal

4.2.1.1 Conventional method

If a free-field microphone together with a discrete P.51 artificial mouth is used, the desktop HFT is placed on a test table according to [ITU-T P.340]. As shown in Figure 1, the mouth axis and the microphone axis are coincident with the straight line drawn between point C and point B. For measurements in the sending direction, the artificial mouth is positioned at point C. For receiving direction, the artificial mouth shall be replaced by the measuring microphone. The centre of the microphone grid shall be positioned at point C, with its axis coincident with line CB.