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SERIES P: TELEPHONE TRANSMISSION QUALITY,
TELEPHONE INSTALLATIONS, LOCAL LINE
NETWORKS

Subscribers' lines and sets

**Transmission characteristics for wideband
(150-7000 Hz) digital hands-free telephony
terminals**

ITU-T Recommendation P.341



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ITU-T Recommendation P.341

Transmission characteristics for wideband (150-7000 Hz) digital hands-free telephony terminals

Summary

This revised Recommendation provides audio performance requirements for wideband audio (7 kHz) hands-free telephones. Associated test methods for verifying wideband audio performance are contained in Annex A.

Requirements and test methods are specified for the major audio transmission parameters affecting wideband audio, including levels, frequency response, noise, distortion, spurious signals and echo path. Wideband audio represents a considerable departure from traditional telephony, offering significantly improved quality.

The main revision encompassed by this version of the Recommendation is to adopt the wideband loudness rating algorithm as in Annex G/P.79.

Source

ITU-T Recommendation P.341 was approved on 6 June 2005 by ITU-T Study Group 12 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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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ITU-T Recommendation P.341

Transmission characteristics for wideband (150-7000 Hz) digital hands-free telephony terminals

1 Scope

This Recommendation provides audio performance requirements and test methods for hands-free telephones capable of transmitting an audio bandwidth extending beyond the conventional telephony bandwidth of 300 to 3400 Hz, to a bandwidth of approximately 150 to 7000 Hz. Such telephones are known as wideband audio telephones, and will make use of digital encoding schemes such as in ITU-T Rec. G.722 [1]. Wideband audio telephones are expected to be used in new services such as high quality audio conferencing, videoconferencing and multimedia applications.

The requirements listed in this Recommendation are primarily applicable to telephones using G.722 [1] encoding at 64 kbit/s, but should also be used as the basis of requirements for other wideband audio encoding schemes. This is still under study in ITU-T Study Group 12.

The measurement method for delay is still under study.

General information on HFTs, which includes switching characteristics, can be found in ITU-T Rec. P.340 [3] and information on acoustic echo controllers in ITU-T Rec. G.167 [16].

For loudspeaking telephones (see ITU-T Rec. P.10 [15]) which do not provide full hands-free operation, the relevant parts of this Recommendation may be used.

Conventional telephone band (300-3400 Hz) digital hands-free telephones using encoding according to ITU-T Recs G.711 [12] and G.726 [13] are covered by ITU-T Rec. P.342 [7].

2 Normative 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.

- [1] ITU-T Recommendation G.722 (1988), *7 kHz audio coding within 64 kbit/s*.
- [2] ITU-T Recommendation P.310 (2003), *Transmission characteristics for telephone band (300-3400 Hz) digital telephones*.
- [3] ITU-T Recommendation P.340 (2000), *Transmission characteristics and speech quality parameters of hands-free terminals*.
- [4] ITU-T Recommendation P.51 (1996), *Artificial mouth*.
- [5] ITU-T Recommendation P.57 (2002), *Artificial ears*.
- [6] ITU-T Recommendation P.64 (1999), *Determination of sensitivity/frequency characteristics of local telephone systems*.
- [7] ITU-T Recommendation P.342 (2000), *Transmission characteristics for telephone band (300-3400 Hz) digital loudspeaking and hands-free telephony terminals*.
- [8] ITU-T Recommendation P.79 (1999), *Calculation of loudness ratings for telephone sets*.

- [9] IEC 61672-2 (2003), *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*.
- [10] ISO 3:1973, *Preferred numbers – Series of preferred numbers*.
- [11] ITU-T Recommendation G.122 (1993), *Influence of national systems on stability and talker echo in international connections*.
- [12] ITU-T Recommendation G.711 (1988), *Pulse code modulation (PCM) of voice frequencies*.
- [13] ITU-T Recommendation G.726 (1990), *40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)*.
- [14] ITU-T Recommendation P.311 (2005), *Transmission characteristics for wideband (150-7000 Hz) digital handset telephones*.
- [15] ITU-T Recommendation P.10 (1998), *Vocabulary of terms on telephone transmission quality and telephone sets*.
- [16] ITU-T Recommendation G.167 (1993), *Acoustic echo controllers*.
- [17] ITU-T Recommendation P.501 (2000), *Test signals for use in telephony*.

3 Definitions and abbreviations

This Recommendation defines the following terms:

3.1 Acoustic Reference Level (ARL): The acoustic level at MRP which results in a -10 dBm₀ output at the digital interface.

3.2 Hands-free Reference Point (HFRP): A point located on the axis of the artificial mouth, at 50 cm from the outer plane of the lip ring, where the level calibration is made under free-field conditions. It corresponds to measurement point No. 11 defined in ITU-T Rec. P.51 [4].

This Recommendation also uses the following abbreviations.

Relevant abbreviations in ITU-T Rec. P.10 [15] will also apply:

CSS	Composite Source Signal
HFT	Hands-free Terminal
MRP	Mouth Reference Point
RLR	Receiving Loudness Rating
SLR	Sending Loudness Rating
TCL	Terminal Coupling Loss
TCL _w	Weighted Terminal Coupling Loss

4 Sending characteristics

4.1 Loudness rating

Following the approach used for narrow-band hands-free telephones in ITU-T Rec. P.340 [3], the levels in the hands-free send direction are related to those in wideband handset mode (see ITU-T Rec. P.311 [14]) with an allowance of 5 dB for higher talking levels and the difference in speaking position. The value of SLR shall therefore be +9 dB, measured in terms of wideband loudness rating according to Annex G/P.79 [8].

NOTE – The overload point for wideband audio is currently defined as +9 dBm₀ [1]. Should this overload point be changed in future revisions of [1], then the Loudness Rating requirements of this Recommendation should also be revised accordingly. The same concept applies in case this Recommendation is used for