

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

P.382

(10/2020)

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

Voice terminal characteristics

Technical requirements and test methods for multi-microphone wired headset or headphone interfaces of digital wireless terminals

Recommendation ITU-T P.382

ITU-T P-SERIES RECOMMENDATIONS

TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

Vocabulary and effects of transmission parameters on customer opinion of transmission quality	P.10–P.19
Voice terminal characteristics	P.30–P.39
Reference systems	P.40–P.49
Objective measuring apparatus	P.50–P.59
Objective electro-acoustical measurements	P.60–P.69
Measurements related to speech loudness	P.70–P.79
Methods for objective and subjective assessment of speech quality	P.80–P.89
Voice terminal characteristics	P.300–P.399
Objective measuring apparatus	P.500–P.599
Measurements related to speech loudness	P.700–P.709
Methods for objective and subjective assessment of speech and video quality	P.800–P.899
Audiovisual quality in multimedia services	P.900–P.999
Transmission performance and QoS aspects of IP end-points	P.1000–P.1099
Communications involving vehicles	P.1100–P.1199
Models and tools for quality assessment of streamed media	P.1200–P.1299
Telemeeting assessment	P.1300–P.1399
Statistical analysis, evaluation and reporting guidelines of quality measurements	P.1400–P.1499
Methods for objective and subjective assessment of quality of services other than speech and video	P.1500–P.1599

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T P.382

Technical requirements and test methods for multi-microphone wired headset or headphone interfaces of digital wireless terminals

Summary

Recommendation ITU-T P.382 specifies critical physical and electroacoustical characteristics for a universal headset interface with more than four terminals and provides corresponding test methods. Headset or headphone (HP) interfaces of diameter 3.5 mm and 2.5 mm have been widely used in digital mobile terminals during recent years. Nowadays, the consumer is free to choose either the headset or HP originally provided by the terminal manufacturer or others that are offered separately. However, the quality of service/quality of experience (QoS/QoE) perceived by users is influenced by both the electrical performance of the interface and the compatibility between the terminal and the connected headset or HP.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T P.382	2016-07-29	12	11.1002/1000/12971
2.0	ITU-T P.382	2020-10-14	12	11.1002/1000/14466

Keywords

Connector, headphone, headset, interface, terminals.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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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.

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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.

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Table of Contents

		Page
1	Scope	1
2	References.....	1
3	Definitions	2
	3.1 Terms defined elsewhere	2
	3.2 Terms defined in this Recommendation.....	2
4	Abbreviations and acronyms	3
5	General description.....	3
6	Physical characteristics.....	4
	6.1 General rules.....	4
	6.2 Pin assignments	4
	6.2.1 Recommended pin assignment	4
	6.2.2 Alternative pin assignment	5
7	Terminal electrical interface specification.....	5
	7.1 Communication mode (terminal)	5
	7.1.1 Test set-up for the communication mode (terminal)	5
	7.1.2 Delay for the communication mode (terminal)	6
	7.1.3 Level in Send for nominal speech input level for the communication mode (terminal)	6
	7.1.4 Level in Receive for nominal speech input level	6
	7.1.5 Level in Send for low and high speech input levels for the communication mode (terminal)	6
	7.1.6 Linearity in Receive for the communication mode (terminal)	7
	7.1.7 Sending frequency response for the communication mode (terminal).....	7
	7.1.8 Receiving frequency response for the communication mode (terminal).....	7
	7.1.9 Sidetone loss for the communication mode (terminal).....	7
	7.1.10 Sidetone delay for the communication mode (terminal)	7
	7.1.11 Noise in Send for the communication mode (terminal)	7
	7.1.12 Noise in Receive for the communication mode (terminal)	7
	7.1.13 Sending distortion for the communication mode (terminal)	7
	7.1.14 Receive distortion for the communication mode (terminal).....	7
	7.1.15 Noise cancellation test in Send for the communication mode (terminal)	7
	7.1.16 One-way speech quality in Send for the communication mode (terminal)....	7
	7.1.17 One-way speech quality in Receive for the communication mode (terminal)	7
	7.1.18 Terminal coupling loss weighted (TCLw) for the communication mode (terminal)	8
	7.1.19 Temporal echo effects for the communication mode (terminal)	8
	7.1.20 Double talk performance for the communication mode (terminal).....	8
	7.1.21 Activation in Send for the communication mode (terminal).....	8

	Page
7.2 Multimedia playback (terminal)	8
7.2.1 Test set-up for the multimedia playback mode (terminal)	8
7.2.2 Output level for the multimedia playback mode (terminal)	8
7.2.3 Frequency response for the multimedia playback mode (terminal)	8
7.2.4 Noise for the multimedia playback mode (terminal).....	8
7.2.5 Distortion for the multimedia playback mode (terminal).....	8
7.2.6 Receiving crosstalk for the multimedia playback mode (terminal).....	9
7.3 Multimedia record (terminal)	9
7.3.1 Test set-up for the multimedia record mode (terminal).....	9
7.3.2 Input level for the multimedia record mode (terminal)	10
7.3.3 Frequency response for the multimedia record mode (terminal)	10
7.3.4 Acoustic input range for the multimedia record mode (terminal).....	10
7.3.5 Phase response for the multimedia record mode (terminal).....	11
7.3.6 Distortion at maximum acoustic input in multimedia record mode	11
7.3.7 Cross-talk for the multimedia record mode (terminal).....	11
7.3.8 Time offset and sampling accuracy for the multimedia record mode (terminal)	12
8 Headset specification.....	12
8.1 Communication mode (headset).....	12
8.1.1 Test set-up (headset).....	12
8.1.2 Sensitivity in Send (headset)	12
8.1.3 Sensitivity in Receive (headset)	12
8.1.4 Sending frequency response (headset)	12
8.1.5 Receiving frequency response (headset)	12
8.1.6 Idle channel noise in Send (headset)	13
8.1.7 Distortion in Send (headset)	13
8.1.8 Headset terminal coupling loss weighted (HTCLw) (headset) [for further study]	13
8.2 Multimedia playback mode (headset)	13
8.2.1 Test set-up (headset).....	13
8.2.2 Sensitivity for the multimedia playback mode (headset)	13
8.2.3 Distortion for the multimedia playback mode (headset)	13
8.2.4 Receiving crosstalk for the multimedia playback mode (headset).....	13
8.3 Multimedia record mode (headset).....	14
8.3.1 Test set-up (headset).....	14
8.3.2 Frequency response for the multimedia record mode (headset).....	15
8.3.3 Maximum acoustic input for the multimedia record mode (headset).....	15
8.3.4 Distortion at maximum acoustic input for the multimedia record mode (headset)	16
9 Function requirements for terminals with the universal headset interface	16

	Page
Annex A Interpolation method for diffuse-field correction.....	17
Appendix I – Audio connectivity for sockets with five contact points.....	18
I.1 Plug connector of diameter 2.5 mm with five poles.....	18
I.2 Socket connector of diameter 2.5 mm with five contact points	18
I.3 Plug connector of diameter 3.5 mm with five poles.....	18
I.4 Socket connector of diameter 3.5 mm with five contact points	18
Appendix II – Audio connectivity for sockets with six contact points.....	20
Appendix III – Audio connectivity for sockets with fewer than five contact points	21
Appendix IV – Other considerations	22
Bibliography.....	23

Recommendation ITU-T P.382

Technical requirements and test methods for multi-microphone wired headset or headphone interfaces of digital wireless terminals

1 Scope

This Recommendation specifies electrical requirements and test methods for a multi-microphone headset or headphone (HP) interface used in digital mobile terminals. It is also applicable to terminals with a digital headset interface combined with an external adapter for an analogue (universal) headset interface. The combination is measured as one device.

The principle of this Recommendation is to ensure adequate compatibility between the digital mobile terminal and the universal and multi-microphone wired analogue headset or HP, and to provide better user experience. The universal multi-microphone headset or HP interface enables the separation of sales between digital mobile terminals and headsets or HPs. One benefit is that users are free to choose their favourite type of headset or HP in the market, which in the long run will reduce E-waste.

Furthermore, the universal interface can be used as the electric coupling design in hands-free systems and hearing aids for wider harmonization.

To provide instructions to manufacturers and encourage them to adopt the universal headset interface, the mechanical dimensions are shown in an appendix for at least configurations with five poles.

This Recommendation applies to digital mobile terminals with a physical analogue audio output and input interface that needs to support headsets with >1 microphone. Other similar information and communication technology (ICT) equipment may also lie within the scope of this Recommendation.

This Recommendation does not apply to terminals designed solely for digital headset or HP usage.

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 P.56] Recommendation ITU-T P.56 (2011), *Objective measurement of active speech level*.
- [ITU-T P.57] Recommendation ITU-T P.57 (2011), *Artificial ears*.
- [ITU-T P.58] Recommendation ITU-T P.58 (2013), *Head and torso simulator for telephonometry*.
- [ITU-T P.64] Recommendation ITU-T P.64 (2019), *Determination of sensitivity/frequency characteristics of local telephone systems*.
- [ITU-T P.380] Recommendation ITU-T P.380 (2003), *Electro-acoustic measurements on headsets*.
- [ITU-T P.381] Recommendation ITU-T P.381 (2020), *Technical requirements and test methods for the universal wired headset or headphone interface of digital mobile terminals*.

- [ITU-T P.501] Recommendation ITU-T P.501 (2020), *Test signals for use in telephony and other speech-based applications*.
- [ITU-T P.863] Recommendation ITU-T P.863 (2018), *Perceptual objective listening quality prediction*.
- [IEC 60268-1] IEC 60268-1:1985, *Sound system equipment – Part1: General*.
- [IEC 61260-1] IEC 61260-1:2014, *Electroacoustics – Octave-band and fractional-octave-band filters – Part I: Specifications*.
- [EN 50332-1] EN 50332-1:2013, *Sound system equipment: Headphones and earphones associated with personal music players – maximum sound pressure level measurement methodology – Part 1: General method for “one package equipment”*.
- [EN 50332-2] EN 50332-2:2013, *Sound system equipment: Headphones and earphones associated with personal music players – Maximum sound pressure level measurement methodology – Part 2: Matching of sets with headphones if either or both are offered separately, or are offered as one package equipment but with standardised connectors between the two allowing to combine components of different manufacturers or different design*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

- 3.1.1 eardrum reference point (DRP)** [b-ITU-T P.10]: A point located at the end of the ear canal, corresponding to the eardrum position.
- 3.1.2 earphone** [b-IEC 60268-7]: Electroacoustic transducer by which acoustic oscillations are obtained from electric signals and intended to be closely coupled acoustically to the ear.
- 3.1.3 headset** [b-ITU-T P.10]: A device which includes telephone receiver and transmitter which is typically secured to the head or the ear of the wearer.
- 3.1.4 mouth reference point (MRP)** [b-ITU-T P.10]: Point 25 mm in front of and on the axis of the lip plane of the artificial mouth or a typical human mouth (see Figure A.1 of [ITU-T P.64]).

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

- 3.2.1 artificial ear:** A device that incorporates an acoustic coupler and a calibrated microphone for measuring sound pressure, and which has an overall acoustic impedance similar to that of the average adult ear over a given frequency band.

NOTE – This definition is based on that in [b-ITU-T P.10].

- 3.2.2 codec:** A combination of an analogue-to-digital encoder and a digital-to-analogue decoder operating in opposite directions of transmission in the same equipment.

NOTE – This definition is based on that in [b-ITU-T G.701].

- 3.2.3 head and torso simulator (HATS) for telephonometry:** A manikin that extends downwards from the top of the head to the waist. It is designed to simulate the sound pick-up characteristics and the acoustic diffraction produced by the average adult, and to reproduce the acoustic field generated by the human mouth.

NOTE – This definition is based on that given in [b-ITU-T P.10].

3.2.4 headphone (HP): An object based on the assembly of one or two earphones on a headband or chinband, the use of which may be optional (e.g., with intra-concha earphones).

NOTE – This definition is based on that given in [b-IEC 60268-7]).

3.2.5 mean opinion score-listening-only quality objective (MOS-LQO): The score is calculated by means of an objective model which aims to predict the quality for a listening-only test situation. Objective measurements made using the model given in [ITU-T P.863] give results in terms of MOS-LQO.

NOTE – This definition is based on that given in [b-ITU-T P.800.1].

3.2.6 Receive: The receiving direction of the signal transmission, usually from the measurement system to the device under test (DUT).

3.2.7 Send: The sending direction of the signal transmission, usually from the device under test (DUT) to the measurement system.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DC	Direct Current
DRP	eardrum Reference Point
DUT	Device Under Test
ERP	Ear Reference Point
ESD	Electrostatic Discharge
FFT	Fast Fourier Transform
GND	Ground
HATS	Head and Torso Simulator
HP	Headphone
HTCL _w	Headset Terminal Coupling Loss weighted
ICT	Information and Communication Technology
L	Left
MIC	Microphone
MOS-LQO	Mean Opinion Score-Listening only Quality Objective
MRP	Mouth Reference Point
POI	Point of Interconnection
QoE	Quality of Experience
QoS	Quality of Service
R	Right
RMS	Root Mean Square
TCL _w	Terminal Coupling Loss weighted
THD	Total Harmonic Distortion

5 General description

Generally, if a headset or HP is used, the overall user experience during a call highly depends on both the terminal and the connected headset or HP. Although the acoustic quality of the headset or HP is