

ETSI TS 126 132 V17.2.0 (2023-04)



**Universal Mobile Telecommunications System (UMTS);
LTE;
5G;
Speech and video telephony terminal acoustic test
specification
(3GPP TS 26.132 version 17.2.0 Release 17)**



ReferenceRTS/TSGS-0426132vh20

Keywords5G,LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
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Foreword

This Technical Specification has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the specification.

Introduction

The present document specifies test methods to allow the minimum performance requirements for the electro-acoustic characteristics of GSM, 3G, LTE, NR and WLAN terminals when used to provide narrowband, wideband, super-wideband or fullband telephony to be assessed.

The objective for narrowband services is to reach a quality as close as possible to ITU-T standards for PSTN circuits. However, due to technical and economic factors, there cannot be full compliance with the general characteristics of international telephone connections and circuits recommended by the ITU-T.

The performance requirements are specified in TS 26.131; the test methods and considerations are specified in the main body of the text.

1 Scope

The present document is applicable to any terminal capable of supporting narrowband, wideband, super-wideband or fullband telephony, either as a stand-alone service or as the telephony component of a multimedia service. The present document specifies test methods to allow the minimum performance requirements for the electro-acoustic characteristics of GSM, 3G, LTE, NR and WLAN terminals when used to provide narrowband, wideband, super-wideband or fullband telephony to be assessed.

NOTE For 3G, LTE, NR and WLAN, acoustic requirements are specified in TS 26.131, test methods are specified in TS 26.132. For GSM, most acoustic requirements are specified in TS 43.050, test methods are specified in TS 51.010. These specifications are in many cases harmonized with or even refer to TS 26.131 and TS 26.132. See TS 43.050 and TS 51.010 for details. The reason for including GSM, UMTS, LTE, NR and WLAN terminals within the scope of the present specification is to avoid, whenever possible, duplication of test method descriptions for terminals supporting multiple access technologies..

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 26.131: "Terminal Acoustic Characteristics for Telephony; Requirements".
- [2] ITU-T Recommendation B.12 (1988): "Use of the decibel and the neper in telecommunications".
- [3] ITU-T Recommendation G.103 (1998): "Hypothetical reference connections".
- [4] ITU-T Recommendation G.111 (1993): "Loudness ratings (LRs) in an international connection".
- [5] ITU-T Recommendation G.121 (1993): "Loudness ratings (LRs) of national systems".
- [6] ITU-T Recommendation G.122 (1993): "Influence of national systems on stability and talker echo in international connections".
- [7] Void.
- [8] ITU-T Recommendation P.11 (1993): "Effect of transmission impairments".
- [9] ITU-T Recommendation P.38 (1993): "Transmission characteristics of operator telephone systems (OTS)".
- [10] ITU-T Recommendation P.50 (1993): "Artificial voices".
- [11] 3GPP TS 43.058 : "Digital Cellular Telecommunications System Characterization test methods and quality assessment for hands-free mobiles".
- [12] VOID.
- [13] ITU-T Recommendation P.51 (1996): "Artificial mouth".
- [14] ITU-T Recommendation P.57 (12/2011): "Artificial ears".
- [15] ITU-T Recommendation P.58 (05/2013): "Head and torso simulator for telephonometry."

- [16] ITU-T Recommendation P.79 (11/2007) with Annex A: "Calculation of loudness ratings for telephone sets."
- [17] 3GPP TS 46.077 : "Minimum Performance Requirements for Noise Suppressor Application to the AMR Speech Encoder".
- [18] ITU-T Recommendation P.64 (06/2019): "Determination of sensitivity/frequency characteristics of local telephone systems".
- [19] ITU-T Recommendation P.581 (02/2014): "Use of head and torso simulator (HATS) for hands-free and handset terminal testing".
- [20] ITU-T Recommendation P.340 (05/2000): "Transmission characteristics and speech quality parameters of hands-free terminals".
- [21] ITU-T Recommendation G.712 (11/2001): "Transmission performance characteristics of pulse code modulation channels".
- [22] ITU-T Recommendation P.501 (06/2015): "Test signals for use in telephony".
- [23] ITU-T Recommendation O.41 (10/1994): "Psophometer for use on telephone-type circuits".
- [24] ITU-T Recommendation O.131 (11/1988): "Quantizing distortion measuring equipment using a pseudo-random noise test signal".
- [25] Void.
- [26] ISO 3745: "Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for anechoic and hemi-anechoic rooms".
- [27] ITU-T Recommendation O.132 (11/1988): "Quantizing distortion measuring equipment using a sinusoidal test signal".
- [28] ETSI TS 103 737 (2010-08) V1.1.2: "Transmission requirements for narrowband wireless terminals (handset and headset) from a QoS perspective as perceived by the user".
- [29] ETSI TS 103 738 (2010-09) V1.1.2: "Transmission requirements for narrowband wireless terminals (handsfree) from a QoS perspective as perceived by the user".
- [30] ETSI TS 103 739 (2010-09) V1.1.2: "Transmission requirements for wideband wireless terminals (handset and headset) from a QoS perspective as perceived by the user".
- [31] ETSI TS 103 740 (2010-09) V1.1.2: "Transmission requirements for wideband wireless terminals (handsfree) from a QoS perspective as perceived by the user".
- [32] ITU-T Recommendation P.380 (11/2003): "Electro-acoustic measurements on headsets".
- [33] ITU-T Recommendation P.501 Amendment 1 (2012): "Test signals for use in telephony".
- [34] ETSI TS 103 106(2013-03) V1.2.1: "Speech Quality performance in the presence of background noise: Background noise transmission of mobile terminals-Objective test methods".
- [35] ETSI ES 202 396-1 (2012-10) V1.4.1: "Speech quality performance in the presence of background noise; Part 1: Background noise simulation technique and background noise database".
- [36] ETSI EG 202 396-3 (2011-02) V1.3.1: "Speech quality performance in the presence of background noise; Part 3: *Background noise transmission – objective test methods*: Background noise simulation technique and background noise database".
- [37] ITU-T Recommendation P.56 (12/2011): "Objective measurement of active speech level".
- [38] IEC 61672: "Electroacoustics – sound level meters - part 1: specifications".
- [39] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

- [40] 3GPP TS 43.050: "Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".
- [41] 3GPP TS 51.010: "Mobile Station (MS) conformance specification; Part 1: Conformance specification".
- [42] 3GPP TS 23.203: "Policy and charging control architecture".
- [43] ETSI TS 103 224 (2015-08): V1.2.1 "A sound field reproduction method for terminal testing including a background noise database".
- [44] ITU-T Recommendation P.863 (09/2014): "Perceptual objective listening quality assessment".
- [45] ITU-T Recommendation P.863.1 (09/2014): "Application guide for Recommendation ITU-T P.863".
- [46] 3GPP TS 36.521-1: "User Equipment (UE) conformance specification Radio transmission and reception; Part 1: Conformance Testing".
- [47] 3GPP TR 21.905: "Vocabulary for 3GPP specifications".
- [48] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [49] 3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks; Stage 3".
- [50] ETSI TS 103 281(2017-04) V1.1.1: "Speech quality in the presence of background noise: Objective test methods for super-wideband and fullband terminals".
- [51] ITU-T Recommendation P.10/G.100 (06/2019).
- [52] 3GPP TR 26.921: "Investigations on ambient noise reproduction systems for acoustic testing of terminals".
- [53] ITU-T Recommendation P.381: "Technical requirements and test methods for the universal wired headset or headphone interface of digital mobile terminals", 10/2020.
- [54] ISO 3: "Preferred numbers — Series of preferred numbers", 1995.
- [55] ITU-T Recommendation P.383: "Technical requirements and test methods for headsets or headphones with wired or wireless digital interfaces and associated terminals", 06/2021.
- [56] USB Implementers Forum: "USB Type-C® Cable and Connector Specification", Release 2.0, August 2019.
- [57] Bluetooth SIG: "Hands-free Profile: Bluetooth® Profile Specification", v1.8, April 2020.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document the terms *narrowband*, *wideband*, *super-wideband* and *fullband* refer to signals associated with the corresponding operating modes of the speech codecs specified in 5.2.

For the purposes of the present document, the terms dB, dBr, dBm0, dBm0p and dBA, shall be interpreted as defined in ITU-T Recommendation G.100 [51]; the term dBPa shall be interpreted as the sound pressure level relative to 1 pascal expressed in dB (0 dBPa is equivalent to 94 dB SPL).

A 3GPP softphone is a telephony system running on a general purpose computer or PDA complying with the 3GPP terminal acoustic requirements (TS 26.131[1] and 26.132).