



IEEE Standard Telephone Loop Performance Characteristics

IEEE Power Engineering Society

Sponsored by the
Power System Communications Committee

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**Power System Communications Committee
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IEEE Power Engineering Society**

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Abstract: Common denominators for subscriber line performance, independent of facility types, construction processes or equipment, and circuit provisioning methods are provided in this standard.

Keywords: performance characteristics, performance classifications, telephone loop

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Introduction

This introduction is not part of IEEE Std 820-2005, IEEE Standard for Telephone Loop Performance Characteristics.

Telecommunication operating companies generally agree on the requirements that control the performance of telephone loops, a major factor in the overall performance of the network. This control has been accomplished through a combination of techniques, which depend on the characteristics of the commonly used telephone sets and loop facility design rules. However, no industry performance standards have resulted. With the increasingly innovative application of emerging technologies and the current trend toward the interconnect of privately-owned devices with the public network, it is essential that appropriate standards be established. This is one such standard. This standard will provide for the characterization of loops at customer terminal and switching equipment interfaces and the objective performance evaluation of loop facilities.

This standard was originally prepared in 1984 by the Loop Performance Working Group of the IEEE Transmission Systems Committee of the IEEE Communications Society. This Working Group later merged with the Inductive Coordination Electrical Protection (ICEP) subcommittee, then became part of the Communications Society Transaccess Committee. Over time, most of the members of the ICEP SC moved to the Wire-line Subcommittee, under the Power System Communications Committee (PSCC) of the IEEE Power Engineering Society. The Wire-line Subcommittee assumed ownership of this standard during the reaffirmation process in 1999.

This standard was revised and updated by the Wire-line Subcommittee of the Power System Communications Committee of the IEEE Power Engineering Society.

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Participants

The Wire-line Subcommittee acknowledges the contributions of the Optical and Electrical Access Subcommittee (T1E1.3) of the Alliance for Telecommunications Industry Solution (ATIS) Network Interface, Power and Protection Committee (NIPP), formerly T1E1, toward the revision of this standard.

The Wire-line Subcommittee also acknowledges the individual contributions of Roger Tokarz and Trone Bishop.

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IEEE Standard Telephone Loop Performance Characteristics

1. Overview

1.1 Scope

This standard covers the general parameters and characteristics associated with telephone loops from the subscriber signaling and analog voice frequency interface to the local Class 5 switch interface. It includes only those business and residential lines in the North American public switched network where no special performance requirements are involved.

This standard provides common denominators for subscriber line performance, independent of facility types, construction processes or equipment, and circuit provisioning methods.

1.2 Purpose

The purpose of this standard is to describe quantitatively the performance characteristics of telephone loops and indicate current acceptable performance criteria.

2. References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI/TIA 470.210-C-2004, Telecommunications—Telephone Terminal Equipment—Resistance and Impedance Performance Requirements for Analog Telephones.¹

IEEE Std 661TM, IEEE Standard Method for Determining Objective Loudness Rating of Telephone Connections.^{2, 3}

¹ANSI/TIA publications are available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA (<http://global.ihs.com/>).

²IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (<http://standards.ieee.org/>).

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IEEE Std 743TM, IEEE Standard Equipment Requirements and Measuring Techniques for Analog Transmission Parameters for Telecommunications.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this standard, the following terms and definitions apply. *The Authoritative Dictionary of IEEE Standard Terms* [B14]⁴ should be referenced for terms not defined in this clause.

3.1.1 analog switch: A switch capable of switching analog and digital signals without converting them into a set digital format. Most analog end office switches are two-wire systems that have simple interfaces with the loop.

3.1.2 battery feed: The dc supply and coupling circuit powering the loop.

3.1.3 bridged tap: Any portion of a metallic circuit which is not in the direct current (dc) path between the end office (or central office) and the customer network interface. A bridge tap occurs when a branching conductor is connected or spliced into a conductor of the main cable. The bridged tap may be connected at an intermediate location or be an extension of the metallic circuit beyond the customer location. The pair associated with the bridged tap introduces a frequency-dependent *bridging loss* in the loop.

3.1.4 central office (CO): The building, one or more switching systems, and related equipment contained therein that provide telephone service.

3.1.5 C-Notched filter: A filter used in front of the noise detector in conjunction with the measurement of noise in certain systems. A tone is transmitted in these systems to activate signal-dependent noise sources, but the tone power should not be included in the measurement. The C-Notched filter has a C-Message weighting transfer function with a sharp notch, which removes this tone from the received signal before its power is measured.

3.1.6 customer premises equipment: Any equipment connected by customer premises wiring to the customer side of the network interface.

3.1.7 digital switch: A switch that, internally, performs switching only of digital signals of a set format. It is inherently a four-wire entity, requiring a two-wire to four-wire hybrid at the channel interface when accepting analog signals from two-wire channels.

3.1.8 dual-tone multifrequency (DTMF) signaling: Voiceband signaling by simultaneous transmission of two tones, one from a low-frequency group and one from a high-frequency group. Each of these groups consists of four voiceband frequency tones, no two of which are harmonically related.

3.1.9 end (Class 5) office (EO): A switching system to which customer premises equipment is directly connected by loops. The switch connects loops to loops and loops to trunks.

3.1.10 four-wire channel: Consists of two unidirectional channels carrying signals in opposite directions.

3.1.11 idle circuit: The condition of a transmission channel in the talk state when no signal is present.

3.1.12 idle line: The state of a loop when the customer premises equipment connected to it is on-hook.

⁴The numbers in brackets correspond to those of the bibliography in Annex A.