

IEEE Standard Definitions of Switching System Performance in a Telecommunications Environment

Circuits and Devices

Communications Technology

Sponsored by the
Switching Committee of the
IEEE Communications Society

Computer

*Electromagnetics and
Radiation*

Energy and Power

Industrial Applications

*Signals and
Applications*

*Standards
Coordinating
Committees*

IEEE Std 973-1990



Published by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017, USA.

April 20, 1990

SH13219

IEEE Standard Definitions of Switching System Performance in a Telecommunications Environment

Sponsor
**Switching Committee
of the
IEEE Communications Society**

Approved February 15, 1990
IEEE Standards Board

Abstract: IEEE Std 973-1990, *IEEE Standard Definitions of Switching System Performance in a Telecommunications Environment*, addresses 35 performance parameters for a telecommunications switching system. The parameters encompass factors that affect system operations, administration, and maintenance, as well as customer service. They are generic and are formulated from the point of view of the user.

Copyright © 1990 by

**The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, USA**

*No part of this publication may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.*

IEEE Standards documents are developed within the Technical Committees of the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Board. Members of the committees serve voluntarily and without compensation. They are not necessarily members of the Institute. The standards developed within IEEE represent a consensus of the broad expertise on the subject within the Institute as well as those activities outside of IEEE that have expressed an interest in participating in the development of the standard.

Use of an IEEE Standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE Standard is subjected to review at least every five years for revision or reaffirmation. When a document is more than five years old and has not been reaffirmed, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE Standard.

Comments for revision of IEEE Standards are welcome from any interested party, regardless of membership affiliation with IEEE. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments.

Interpretations: Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of IEEE, the Institute will initiate action to prepare appropriate responses. Since IEEE Standards represent a consensus of all concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason IEEE and the members of its technical committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration.

Comments on standards and requests for interpretations should be addressed to:

Secretary, IEEE Standards Board
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
USA

IEEE Standards documents are adopted by the Institute of Electrical and Electronics Engineers without regard to whether their adoption may involve patents on articles, materials, or processes. Such adoption does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the standards documents.

Foreword

(This foreword is not a part of IEEE Std 973-1990, IEEE Standard Definitions of Switching System Performance in a Telecommunications Environment).

This standard is prepared in conformance with the IEEE Standards Manual of December 1982 and defines performance in accordance with parameters used in the North American telephone network.

This standard addresses 35 performance parameters for a telecommunications switching system. They encompass factors that affect system operations, administration, and maintenance, as well as customer service. They are generic (independent of design or implementation of the switching system). They are formulated from the point of view of the user, looking at the reactions expected by a customer or an administrator.

The telecommunications field is expanding rapidly. Parameters covering new services such as ISDN, broadband, and packet switching have not been fully established. Many parameters in this standard are broad enough to define performance in a new telecommunications service. Others are limited primarily to traditional voice Public Telephone Service or analog services.

The definitions are organized according to groups that have a similar impact on the user. If they are alphabetized, then their category should be noted. "Performance" includes both service standards and reliability. Service standards generally apply to elements of a switching system that are engineered as the load on the system changes or growth occurs. Reliability generally applies to the inherent design and manufacture of a system to minimize internal failures and their impact on the customer. Although the confidence of analysis may vary considerably between software and hardware problems, the reliability parameters do not distinguish between the two, and the boundaries chosen should apply to both.

Each parameter is described in detail, its dimensions and constraints defined. However, numerical values are omitted. The actual numerical values can vary from one network to another. They may be allocated among network elements in different ways, and the needs of customers differ for different applications.

This standard was authorized July 27, 1982, as Project 973. It was prepared by the Switching Performance Standards Subcommittee of the IEEE Communications Switching Committee. Suggestions for improvement of this standard are welcome. Members of the subcommittee are:

Karl A. Greenhagle, *Chairman*

G. T. Clark
Russell G. DeWitt
James C. Ewin
Thomas F. Gillett
A. Bruce Hoadly

William Karas
Alan W. King
Jack Kinn
E. Paul Lange
Benjamin Leon

Fred J. Ricci
Howard Shimokura
Ralph Showers
R. Willoughby
Brian J. Wilson

The following persons were on the balloting committee that approved this document for submission to the IEEE Standards Board:

Vladimir A. Bolotin
Steve Bootman
Dean A. Dion
John S. Edwards
J. C. Ewin
Larry Gitten
Jürgen Haag

H. Scott Hinton
Ronald W. Horn
Joe G. Kappel
Sal Lederman
John Lemp, Jr.
John Mahoney

John J. O'Connor
Nigel Reynolds
Anna A. Robrock
Randy Sanders
Nobuhiko Shimasaki
David Vlack
David P. Worral

When the IEEE Standards Board approved this standard on February 15, 1990, it had the following membership:

Marco W. Migliaro, *Chairman*

James M. Daly, *Vice Chairman*

Andrew G. Salem, *Secretary*

Dennis Bodson
Paul L. Borrill
Fletcher J. Buckley
Allen L. Clapp
Stephen R. Dillon
Donald C. Fleckenstein
Jay Forster*

Thomas L. Hannan
Kenneth D. Hendrix
John W. Horch
Joseph L. Koepfinger*
Michael A. Lawler
Donald J. Loughry
John E. May, Jr.
Lawrence V. McCall

L. Bruce McClung
Donald T. Michael*
Stig Nilsson
Roy T. Oishi
Gary S. Robinson
Terrance R. Whittemore
Donald W. Zipse

*Member Emeritus

Contents

SECTION	PAGE
1. Introduction.....	7
1.1 Scope.....	7
1.2 Purpose.....	7
1.3 References.....	7
2. Customer Access.....	7
2.1 Dial-Tone Delay.....	7
2.2 Blocked Dial Tone.....	7
2.3 Postdialing Delay.....	7
2.4 Cross-Office Delay.....	8
2.5 Answer Supervision Delay.....	8
3. Switching System Availability and Reliability.....	8
3.1 Downtime.....	8
3.2 Reliability.....	9
3.3 Initialization.....	10
4. Billing.....	10
4.1 Charge Delay.....	10
4.2 Timing Accuracy.....	10
4.3 Billing Error.....	10
5. Transmission.....	10
5.1 Idle Channel Noise.....	10
5.2 Signal-to-Distortion Ratio (C-Notched Noise).....	11
5.3 Impulse Noise.....	11
5.4 Quantizing Noise.....	11
5.5 Crosstalk.....	11
5.6 Signal Propagation Delay or Transmission Delay.....	11
5.7 Digital Synchronization Slip.....	11
5.8 Clock Accuracy.....	11
5.9 Buffer Storage.....	11
6. Operating Company Parameters.....	12
6.1 Service Order Process Time.....	12
6.2 Diagnostic Resolution.....	12
6.3 Roll Back.....	12
6.4 Measurement Accuracy.....	12
6.5 Capacity Measurements and Definitions.....	13
6.6 Energy Consumption.....	14
7. Customer Signaling.....	14
7.1 Timing.....	14
7.2 DTMF and Dial-Pulse Signaling Characteristics.....	15
8. Network Service.....	15
8.1 Incoming Matching Loss.....	15
8.2 Outgoing Blocking.....	16
8.3 Intra-Office Blocking.....	16

8.4	Tandem Blocking	16
8.5	Service Circuits	16
Appendix	Glossary of Acronyms.....	17
Index		18