

IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Information via XML (eXtensible Markup Language): Exchanging UUT (Unit Under Test) Description Information

IEEE Standards Coordinating Committee 20

Sponsored by the
IEEE Standards Coordinating Committee 20 on
Test and Diagnosis for Electronic Systems

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

IEEE Std 1671.3™-2007

IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Information via XML (eXtensible Markup Language): Exchanging UUT (Unit Under Test) Description Information

Sponsor

**IEEE Standards Coordinating Committee 20 on
Test and Diagnosis for Electric Systems**

Approved 5 December 2007
IEEE-SA Standards Board

Approved as a Full-Use Standard 9 December 2009
IEEE-SA Standards Board

Abstract: This document specifies an exchange format, using XML, for identifying all of the hardware, software, and documentation associated with a unit under test (UUT). This UUT may be tested and diagnosed using a test program set (TPS) on an automatic test system (ATS).

Keywords: automatic test equipment (ATE), Automatic Test Markup Language (ATML), ATML instance document, automatic test system (ATS), unit under test (UUT), XML schema

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2014 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 11 July 2014. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-0-7381- 9237-6 STD98735
Print: ISBN 978-0-7381- 9238-3 STDPD98735

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 IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

Use of an IEEE Standard is wholly voluntary. The IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other IEEE Standard document.

The IEEE does not warrant or represent the accuracy or content of the material contained herein, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained herein is free from patent infringement. IEEE Standards documents are supplied “**AS IS**.”

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.

In publishing and making this document available, the IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other IEEE Standards document, should rely upon his or her independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

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 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 societies and Standards Coordinating Committees are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal interpretation of the IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position, explanation, or interpretation of the IEEE.

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. Comments on standards and requests for interpretations should be submitted to the following address:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854
USA

Authorization to photocopy portions of any individual standard for internal or personal use is granted by The Institute of Electrical and Electronics Engineers, Inc., provided that the appropriate fee is paid to Copyright Clearance Center. To arrange for payment of licensing fee, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Introduction

This introduction is not part of IEEE Std 1671.3-2007, IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Information via XML (eXtensible Markup Language): Exchanging UUT (Unit Under Test) Description Information.

The benefits of using standards in test-related applications have long been recognized. The scope for standardization extends from low-level standards associated with test instrument control to high-level standards associated with specifying tests in an implementation-independent manner. In the 1960s, Aeronautical Radio, Incorporated (ARINC) started the development of the Abbreviated Test Language for Avionics Systems. In 1976, management of the ATLAS standard was passed to the IEEE, and the ATLAS acronym was changed to Abbreviated Test Language for All Systems to reflect its broader field of applications.

Within the IEEE, development of ATLAS and ATLAS-related standards was vested in an ad hoc committee, which later became the IEEE Standards Coordinating Committee 20 (SCC20). In the mid-1980s, SCC20 broadened the scope of its activities to embrace other standards projects related to test and diagnosis, including Automatic Test Program Generation (ATPG), Test Equipment Description Language (TEDL), Artificial Intelligence Exchange and Service Tie to All Test Environments (AI-ESTATE), A Broad Based Environment for Test (ABBET), Software Interface to Maintenance Information and Collection Analysis (SIMICA), Receiver Fixture Interface (RFI), Signal and Test Definition (STD), and Automatic Test Markup Language (ATML).

The parent standard, IEEE Std 1671^{TM, a}, provides the framework for a family of standards providing specifications for test-related applications and environments. This family incorporates language-independent elements within a wide variety of test environments, including built-in test (BIT) systems, automatic test systems (ATS), and manual test environments. Each of these interfaces is specified in the form of a XML schema.

This child, or “dot,” standard, also known as an ATML component standard, provides for the definition of the UUTDescription and UUTInstance XML schemas, and contains references to examples. The XML schemas and examples accompany this standard.

These XML schemas provide for the identification and definition of a UUT.

XML schemas define the basic information required within any test application and provide a vehicle for formally defining the test environment by defining a class hierarchy corresponding to these basic information entities and provide several methods within each to enable basic operations to be performed on these entities. ATML component standards within the ATML framework define the particular requirements within the test environment.

Notice to users

Laws and regulations

Users of these documents should consult all applicable laws and regulations. Compliance with the provisions of this standard does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

^a IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08854, USA (<http://standards.ieee.org/>).

Copyrights

This document is copyrighted by the IEEE. It is made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making this document available for use and adoption by public authorities and private users, the IEEE does not waive any rights in copyright to this document.

Updating of IEEE documents

Users of IEEE standards should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE Standards Association Web site at <http://ieeexplore.ieee.org/xpl/standards.jsp>, or contact the IEEE at the address listed previously.

For more information about the IEEE Standards Association or the IEEE standards development process, visit the IEEE-SA Web site at <http://standards.ieee.org>.

Errata

Errata, if any, for this and all other standards can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/updates/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Interpretations

Current interpretations can be accessed at the following URL: <http://standards.ieee.org/reading/ieee/interp/index.html>.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patent Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association

Participants

At the time this standard was submitted to the IEEE-SA Standards Board for approval, the Test Information Integration (TII) Subcommittee had the following membership:

Chris Gorringe, *Co-chair*

Mike Seavey, *Co-chair*

Sherif Abdelwahed
Nasir Ahmed
Hakan Akgun
Stephen Allen
Anthony Alwardt
Jack Amsell
Brian Anderson
Bill Ash
Wesley Barnishan
Keith Beard
Dennis Beaugrand
John Berlekamp
Gregory Bowman
Malcolm Brown
Antonius Bunsen
Darryl Busch
Giampiero Casalegno
Steve Cmiel
Kevin Coggins
Matt Cornish
James Darlington
Bernard Dathy
Timothy Davis
David B. Droste
James Dumser
Gail Edwards
Heiko Ehrenberg
Tamara Einspanjer
William Eklow
Huseyin Ellezer
Keith Ellis
Jennifer Fetherman
Ken Finklea
Melissa Ford
Robert Fox
Kenneth Fox
Brit Frank
Thomas Gaudette

Thomas Gauntner
Scott Gearhart
George E. Geathers
Anthony Geneva
William Gerstein
Gerald Goldemund
Jose Gonzalez
Jay Guruswamy
Michelle Harris
Michael Harrison
Robert Hayes
Alicia Helton
Luis Hernandez
Hans Hopf
Orman Horton
Ashley M. Hulme
John Irizarry
Ivor Isaacs
Anand Jain
Denton Jarvis
Carey Jimmerson
Gary Jones
Patrick Kalgren
Mark Kaufman
John Knowles
Harry Lambert
Guy Larcom
Phillip Liang
Jay Lindsey
Teresa P. Lopes
Michael Malesich
Stephen Mann
Jon McCombs
David Mills
Scott Misha
Mukund U. Modi
Ion A. Neag
Angela Nielson
Steven O'Donnell

Leslie A. Orlidge
Steven Osella
Robert Peterson
Duy-Huan Pham
Dan Pleasant
Hugh Pritchett
John E. Ralph
Narayanan Ramachandran
Rabindranath Raul
Peter Richardson
Robert A. Robinson
David A. Rohacek
John Rosenwald
William Ross
Ace Rossi
Paul Salopek
Thomas Sarfi
Howard Savage
Michel Schieber
John Sheppard
Henry Silcock
Mark Skiba
Roger Sowada
Rob Spinner
Joseph J. Stanco
Michael Stora
Kim Stowers
Walter Struppler
Ronald G. Taylor
David Thomas
Kirk Thompson
Sharayu Tulpule
Vincent J. Tume
Joerg Urban
David Walihermfechtcl
Phil Williams
Timothy J. Wilmering
Todd Zervas

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Bakul Banerjee
Malcom Brown
Keith Chow
C. J. Clark
Timothy W. Davis
Thomas J. Dineen
David B. Droste
James Dumser
Tamara Einspanjer
William B. Frank
David M. Friscia
Thomas Gaudette
Thomas Gauntner
George E. Geathers
Michael D. Geipel

Chris C. Gorringer
Randall C. Groves
Werner Hoelzl
Ashley M. Hulme
Anand Jain
John Knowles
Adam W. Ley
Teresa P. Lopes
William F. Maciejewski
Gary L. Michel
Scott Misha
Mukund U. Modi
Ion A. Neag
Michael S. Newman
Leslie A. Orlidge

Ulrich Pohl
John E. Ralph
Peter Richardson
Gordon D. Robinson
Robert A. Robinson
David A. Rohacek
Stephen Schwarm
Mike Seavey
Joseph J. Stanco
Walter Struppler
Ronald G. Taylor
Vincent J. Tume
John A. Vergis
Timothy J. Wilmering
Oren Yuen

When the IEEE-SA Standards Board approved this standard on 5 December 2007, it had the following membership:

Steve M. Mills, *Chair*
Robert M. Grow, *Vice Chair*
Don Wright, *Past Chair*
Judith Gorman, *Secretary*

Richard DeBlasio
Alex Gelman
William R. Goldbach
Arnold M. Greenspan
Joanna N. Guenin
Kenneth S. Hanus
William B. Hopf
Richard H. Hulett

Hermann Koch
Joseph L. Koepfinger*
John Kulick
David J. Law
Glenn Parsons
Ronald C. Petersen
Tom A. Prevost

Narayanan Ramachandran
Greg Ratta
Robby Robson
Anne-Marie Sahazizian
Virginia C. Sulzberger
Malcolm V. Thaden
Richard L. Townsend
Howard L. Wolfman

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Satish K. Aggarwal, *NRC Representative*
Michael H. Kelley, *NIST Representative*

Don Messina
IEEE Standards Program Manager, Document Development

Bill Ash
IEEE Standards Program Manager, Technical Program Development

Contents

1. Overview	1
1.1 Scope	2
1.2 Purpose	2
1.3 Application	2
1.4 Conventions used within this document	2
2. Normative references.....	4
3. Definitions, acronyms, and abbreviations	4
3.1 Definitions	4
3.2 Acronyms and abbreviations	5
4. Schema—UUTDescription.xsd	5
4.1 General	5
4.2 Elements	6
4.3 Child elements	7
4.4 Complex types	11
4.5 Inherited simple types.....	11
4.6 Inherited complex types.....	11
4.7 Inherited attribute groups.....	11
5. Schema—UUTInstance.xsd	12
5.1 General	12
5.2 Elements	12
5.3 Child elements	13
5.4 Complex types	13
5.5 Inherited simple types.....	13
5.6 Inherited complex types.....	13
5.7 Inherited attribute groups.....	13
6. Conformance	13
7. Extensibility.....	14
Annex A (informative) UUTDescription and UUTInstance instance documents (.XML files).....	15
A.1 UUTDescription	15
A.2 UUTInstance	16
Annex B (informative) User information and examples.....	18
B.1 UUT test descriptions and test cable designs	18
B.2 Widget.xml example	19
Annex C (informative) Glossary	20
Annex D (informative) Bibliography	21