

IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

IEEE Standards Coordinating Committee 20

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

IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

Sponsor

**IEEE Standards Coordinating Committees on
Test and Diagnosis for Electronic Systems (SCC20)**

Approved 23 August 2013

IEEE-SA Standards Board

Abstract: This standard is intended to promote and facilitate interoperability between components of SIMICA. The standard defines EXPRESS information models and XML schemas that together define the common information elements supporting these interfaces.

Keywords: automated test system (ATS), eXtensible markup language (XML), IEEE 1636.99™, session information, Software Interface for Maintenance Information Collection and Analysis (SIMICA), test results, XML schema

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

Copyright © 2013 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 8 November 2013. 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.

W3C is a registered trademark of the World Wide Web Consortium.

PDF: ISBN 978-0-7381-8652-8 STD98392
Print: ISBN 978-0-7381-8653-5 STDPD98392

IEEE prohibits discrimination, harassment, and bullying.

For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

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.

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Standards Documents.”

Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (“IEEE-SA”) Standards Board. IEEE (“the Institute”) develops its standards through a consensus development process, approved by the American National Standards Institute (“ANSI”), which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, 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.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. IEEE standards documents are supplied “AS IS” and “WITH ALL FAULTS.”

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.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own 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.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official statements

A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, or be relied upon as, a formal position of 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 of IEEE.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive 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 comments or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in revisions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

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

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document 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.

Copyrights

IEEE draft and approved standards are copyrighted by IEEE under U.S. and international copyright laws. They are made available by IEEE and are adopted 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 these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

Photocopies

Subject to payment of the appropriate fee, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, 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.

Updating of IEEE Standards Documents

Users of IEEE Standards documents 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.

Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, 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 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-SA website at <http://ieeexplore.ieee.org/xpl/standards.jsp> or contact IEEE at the address listed previously. For more information about the IEEE-SA or IEEE's standards development process, visit the IEEE-SA website at <http://standards.ieee.org>.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA website at the following URL: <http://standards.ieee.org/findstds/errata/index.html>. Users are encouraged to check this URL for errata periodically.

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 by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at <http://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. 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 Patents 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 IEEE standard was completed, the Diagnostic and Maintenance Control Subcommittee SIMICA Common Working Group had the following membership:

Mike Seavey, *Chair*

Chris Gorringer
Teresa Lopes

Ion Neag

John Sheppard
Timothy Wilmering

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

Michael Bodkin
Bill Brown
Malcom Brown
Keith Chow
David Droste
Chris Gorringer
Randall Groves
Werner Hoelzl
Noriyuki Ikeuchi
Anand Jain

Teresa Lopes
Greg Luri
William Maciejewski
Mukund Modi
Charles Ngethe
Leslie Orledge
Peter Richardson
Robert Robinson
Bartien Sayogo
Mike Seavey
Krishna Seeburn

John Sheppard
Gil Shultz
Joseph Stanco
Walter Struppler
Ronald Taylor
Benton Vandiver
John Vergis
Timothy Wilmering
Oren Yuen
Daidi Zhong

When the IEEE-SA Standards Board approved this standard on 23 August 2013, it had the following membership:

John Kulick, *Chair*

David J. Law, *Vice Chair*

Richard H. Hulett, *Past Chair*

Konstantinos Karachalios, *Secretary*

Masayuki Ariyoshi
Peter Balma
Farooq Bari
Ted Burse
Wael William Diab
Stephen Dukes
Jean-Philippe Faure
Alexander Gelman

Mark Halpin
Gary Hoffman
Paul Houzé
Jim Hughes
Michael Janezic
Joseph L. Koepfinger*
Oleg Logvinov

Ron Petersen
Gary Robinson
Jon Walter Rosdahl
Adrian Stephens
Peter Sutherland
Yatin Trivedi
Phil Winston
Yu Yuan

*Member Emeritus

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

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Don Messina
IEEE Standards Program Manager, Document Development

Kathryn Bennett
IEEE Standards Program Manager, Technical Program Development

Introduction

This introduction is not part of IEEE Std 1636.99™-2013, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements.

Maintainers of complex systems require the ability to capture and share historical test and maintenance-related information in a way that supports such activities as performance analysis, post-production product improvement, maintenance process improvement, and diagnostic maturation. Principal stakeholders of this project include but are not limited to maintenance organizations within various Departments/Ministries of Defense, the commercial airlines, the automotive industry, and the telecommunications industry. This standard is being developed as a component of the IEEE 1636™ Software Interface for Maintenance Information Collection and Analysis (SIMICA) project. SIMICA's purpose is to specify a software interface for access, exchange, and analysis of product diagnostic and maintenance information. Maintenance action information provides a subset of the data needed to satisfy SIMICIA requirements.

The use of formal information models will facilitate exchanging historical maintenance information between information systems and analysis tools. The models will facilitate creating open system software architectures for maturing system diagnostics.

The XML schema described in this standard where appropriate utilizes and references components of the IEEE Std 1671™ schema set.

It is anticipated that these schemas will be used throughout industries that utilize diagnostic and maintenance data as an exchange format that can be understood by humans or machines. In order to ensure wide acceptance throughout the user community, the schemas have been designed to encompass a broad range of use cases. To accommodate use cases beyond the released design, the schemas provide means for user extensibility.

Contents

1. Overview	1
1.1 General	1
1.2 Application of this documents annexes	2
1.3 Scope	2
1.4 Referenced IEEE Standards.....	2
1.5 Application	2
1.6 Conventions used in this document	2
2. Normative references.....	4
3. Definitions, acronyms, and abbreviations	4
3.1 Definitions	4
3.2 Acronyms and abbreviations	5
4. SIMICA common elements	5
4.1 SIMICA common element partitioning	5
4.2 Use of the IEEE Std 1671 Common.xsd schema.....	6
5. EXPRESS model, EXPRESS-G diagram, and XML schema names and locations	6
6. Conformance	8
7. XML schema extensibility.....	8
Annex A (normative) SimicaCommon XML schema	10
A.1 SIMICACommon.xsd.....	10
Annex B (normative) SimicaCommon EXPRESS models.....	17
B.1 SIMICA_COMMON_MODEL_DOT_99	17
B.2 SIMICACommon model EXPRESS-G diagrams	50
Annex C (informative) Bibliography.....	58

IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements

IMPORTANT NOTICE: IEEE Standards documents are not intended to ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. Implementers of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

1. Overview

1.1 General

This standard, which is a component of the Software Interface for Maintenance Information Collection and Analysis (SIMICA) standard, was developed by the Diagnostic and Maintenance Control Subcommittee of the IEEE Standards Coordinating Committee 20 (SCC20) on Test and Diagnosis for Electronic Systems to provide standard, unambiguous definitions of common SIMICA element semantics, and interrelationships.

This standard specifically describes a set of formal specifications consisting of the logical representation of the information that is common between IEEE Std 1636.1TM and IEEE Std 1636.2TM, which may be used during related diagnostic and maintenance processes. The information model contained in this document provides a normative formal specification of the information concepts and precise semantics that support the unambiguous exchange of information between producers and consumers in a platform-independent manner.

The schemas described in this document are intended to be shared by all SIMICA “dot” standards. The Express schema in this standard is based on ISO 10303-11:1994 [B9]¹. The XML schema associated with this standard is based on the W3C eXtensible Markup Language (XML) 1.0 Recommendation [B1]².

1.2 Application of this documents annexes

This document includes three annexes. Of these three, two are normative (Annex A and Annex B).

Annex A contains the description of each of the XML schema elements and types.

Annex B contains the description of the EXPRESS and EXPRESS-G model elements.

Annex C is informative, and thus is provided strictly as information, for both users and maintainers of this document.

1.3 Scope

The SIMICA family of standards provides an implementation-independent software interfaces to information systems containing data pertinent to the diagnosis and maintenance of complex systems consisting of hardware, software, or any combination thereof. This standard defines EXPRESS information models and XML schemas that together define the common information elements supporting these interfaces.

1.4 Referenced IEEE Standards

SIMICA Common makes reference to IEEE Std 1671TM-2010 Annex B.1. This normatively referenced IEEE standard, when utilized, is therefore considered part of the SIMICA definition.

1.5 Application

This standard provides a specification for information shared by SIMICA “dot” standards (e.g., IEEE Std 1636.1, IEEE Std 1636.2). Anticipated users of this standard include the following:

- a) System developers
- b) System maintainers
- c) Reliability, maintainability, and diagnostic analytical applications

1.6 Conventions used in this document

1.6.1 General

In accordance with *IEEE Standards Style Manual* [B3], any schema examples will be shown in Courier font. In cases where instance document examples are necessary to depict clearly use of a schema type or element, such examples will also be shown in Courier font. When the characters “...” appear in an example, it indicates that the example component is incomplete.

¹ The numbers in brackets correspond to those of the bibliography in Annex C.

² W3C is a registered trademark of the World Wide Web Consortium.