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Standard for automatic test markup language (ATML) test configuration

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STANDARD FOR AUTOMATIC TEST MARKUP LANGUAGE (ATML) INSTRUMENT DESCRIPTION

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

Approved 27 March 2014

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Abstract: An exchange format is specified in this standard, using extensible markup language (XML), for identifying the test configuration used to test for and diagnose faults of a unit under test (UUT) on an automatic test system (ATS).

Keywords: ATML instance document, automatic test equipment (ATE), Automatic Test Markup Language (ATML), automatic test system (ATS), IEEE 1671.4™, Master Configuration Control Document (MCCD), Master Test Program Set Index (MTPSI), station configuration file, test configuration, XML schema

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IEEE Introduction

This introduction is not part of IEEE Std 1671.4™-2014, IEEE Standard for Automatic Test Markup Language (ATML) Test Configuration.

This child, or "dot" standard, also known as an automatic test markup language (ATML) component standard, provides for the definition of the *TestConfiguration* XML schema and contains references to an example. The XML schema and example that accompany this standard provide for the identification of all of the hardware, software, and documentation that is required to test and diagnose a unit under test (UUT) on an automatic test system (ATS).

ATML's 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 providing 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.

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1. Overview

1.1 General

Automatic test markup language (ATML) is a collection of IEEE standards and associated eXtensible markup language (XML) schemas that allow automatic test system (ATS) and test information to be exchanged in a common format adhering to the XML standard[1].

The ATML framework and the ATML family of standards have been developed and are maintained under the guidance of the Test Information Integration (TII) Subcommittee of IEEE Standards Coordinating Committee 20 (SCC20) to serve as a comprehensive environment for integrating design data, test strategies, test requirements, test procedures, test results management, and test system implementations, while allowing test program (TP), test asset interoperability, and unit under test (UUT) data to be interchanged between heterogeneous systems.

This standard (as well as the XML schema and XML instance document example[2] that accompany this standard) is intended to be used in documenting the test configuration utilized during the testing of a

[1] This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of this consortium standard. Equivalent standards or products may be used if they can be shown to lead to the same results.
[2] The XML schemas and examples that accompany this standard are available at the locations defined in Clause 6.

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particular UUT. This information includes information regarding the tested UUT, the test equipment, and the test program set (TPS).

1.2 Application of this document's annexes

This document includes three annexes.

Annex A, Annex B, and Annex C are informative, thus they are provided strictly as information, for users, implementers, and maintainers of this document.

1.3 Scope

This standard defines an exchange format, utilizing XML, for identifying all of the hardware, software, and documentation that is needed to test and diagnose a UUT on an ATS.

1.4 Application

This standard provides for the identification of all necessary assets required to test a particular UUT. Assets consist of, but are not limited to, test stations, instrumentation, interface cables, interface devices, ancillary equipment, test station software, test program software, and test program documentation. This collection of assets is the test configuration for that particular UUT.

Identifying a test configuration provides for the generation of a single "document" (also sometimes referred to as an "index card") in which every asset that is required to be in place prior to testing the UUT is recorded. This document is readable by both humans and machines; humans may use the document to identify and assemble the necessary assets, whereas the machine may use the document to verify that the necessary assets are in place.

The information contained in the XML documents conforming to this standard will be useful to the following:

a) TPS developers

b) TPS maintainers

c) Automatic test equipment (ATE) system developers

d) ATE system maintainers

e) Developers of ATML-based tools and systems

f) UUT developers and maintainers

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1.5.1 General

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All simple types, complex types, attribute groups, and elements will be listed. Explanatory information will be provided along with examples if additional clarification is needed. The explanatory information will include information on the intended use of the elements and/or attributes where the name of the entity does not clearly indicate its intended use. Only attributes that extend the source type will be listed for elements derived from another source type (e.g., an abstract type). Details regarding the base type will be listed along with the base type.

When referring an attribute of an XML element, the convention of [*element]@[attribute*] will be used. In cases where an attribute name is referred to with no associated element, the attribute name will be enclosed in single quotes. Element and type names will always be set in italics when appearing in text.

This standard uses the vocabulary and definitions of relevant IEEE standards. In case of conflict of definitions, except for those portions quoted from standards, the following precedence shall be observed: 1) Clause 3 and 2) The *IEEE Standards Dictionary Online* [B8].

1.5.2 Precedence

The *TestConfiguration* schema (TestConfiguration.xsd) element, child element, and annotation information shall take precedence over the descriptive information contained in Clause 4.

1.5.3 Word usage

In accordance with *the IEEE Standards Style Manual* [B9], the word *shall* is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*). The use of the word *must* is used only to describe unavoidable situations. The use of the word *will* is only used in statements of fact.

The word *should* is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability (*can* equals *is able to*).

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IEEE Std 1671™-2010, IEEE Standard for Automatic Test Equipment Markup Language (ATML) for Exchanging Automatic Test Equipment and Test Information via XML.[4,5]

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* [B8][6] should be consulted for terms not defined in this clause. In the event a term is explicitly redefined, or defined in more detail, in an ATML component standard, the component standards definition shall be normative for that ATML component standard.

automatic test equipment (ATE): An integrated assembly of stimulus, measurement, and switching components under computer-control that is capable of processing software routines designed specifically to test a particular item or group of items. ATE software includes operating system software, test executive software, and instrument control software.[7]

automatic test system (ATS): A fully-integrated, computer-controlled suite of electronic test equipment hardware, software, documentation, and ancillary items designed to verify the functionality of unit under test (UUT) assemblies at any level of maintenance. An ATS combines the following three elements: ATE, TPS, and the test environment.[7]

child or "dot" standard: An IEEE standard that is identified by a number (e.g., 1671), a dot, then a number. (e.g. dot 1 refers to 1671.1; dot 2 refers to 1671.2, etc.)

digital rights management: Access control technologies that may be utilized to impose limitations on the usage of digital content material that were not foreseen by the content provider. Within the context of automatic test markup language (ATML), the digital content materials are the associated XML schemas and the content provider is IEEE.

eXtensible Markup Language (XML) style sheet: A description of how an XML document is to be presented on a computer screen or in print.

system identifier: A reference intended to identify an element of an automatic test system (ATS) (e.g., the system identifier DMM identifies a digital multi-meter in an ATS)

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[7] Adapted from DoD ATS Selection Process Guide. This document is available at :http://www.acq.osd.mil/ats/

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test executive: A software application which controls the execution environment of unit under test (UUT) programs. Typical functions include (but are not limited to), the verification of hardware/software availability, interpretation and execution of operators commands, the initialization and control of tests, providing common subprograms for test software usage, providing debug and simulation capabilities, the logging of test data, and the allocation of virtual resources.

test program set (TPS): automatic test equipment (ATE), interface hardware, test program software, documentation, and other ancillary equipment that connects the unit under test (UUT) to the ATE. The TPS software performs fault isolation and diagnostics, and can certify a UUT as ready for issue. Ancillary hardware consists of probes, holding fixtures and peculiar instrumentation.[7]

3.2 Acronyms and abbreviations

AHAF	air hose attachment fixture
ARB	arbitrary waveform generator
ATE	automatic test equipment
ATML	Automatic Test Markup Language
ATS	automatic test system
CA	cable
CFA	cognizant field activity
CHG #	change number
CSET	cable set
DCPS	direct current power supply
DMM	digital multi-meter
ETE	end to end
FSCM	federal supply code for manufacturers
FST	fleet support team
GPO	Government Printing Office
HA	hose assembly
HF	holding fixture
ID	interface device
ITP	internal test program
ITP/SW	internal test program software
MCCD	master configuration control document

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MIM	maintenance instruction manual
MTPSI	master test program set index
NAMP	Naval Aviation Maintenance Program
NOMEN	nomenclature
ODSK	optical disk
OFP	operational flight program
OFP/SW	operational flight program software
OS	operating system
OTPH	operational test program hardware
OTPI	operational test program instruction
OTPM	operational test program media
PG	page
PIN	product identification number
PLT	pallet
P/N	part number
PNL	panel
POC	point of contact
PROG	program
REFDES	reference designator
RFI	ready for issue
R/T	run-time
SCC20	Standards Coordinating Committee 20
SE	support equipment
SW NO	software number
T/E	test executive
TEC	type equipment code
TECPUB	technical publication
TF	test fixture

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