

BS EN 61970-552:2014



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Energy Management System Application Program Interface (EMS-API)

Part 552: CIMXML Model
Exchange Format

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National foreword

This British Standard is the UK implementation of EN 61970-552:2014. It is identical to IEC 61970-552:2013.

The UK participation in its preparation was entrusted to Technical Committee PEL/57, Power systems management and associated information exchange.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Energy Management System Application Program Interface (EMS-API) - Part 552: CIMXML Model Exchange Format (IEC 61970-552:2013)

Interface de programmation d'application
pour système de gestion d'énergie (EMS-
API) -
Partie 552: Format d'échange de modèle
CIMXML
(CEI 61970-552:2013)

Schnittstelle für Anwendungsprogramme
für Netzführungssysteme (EMS-API) -
Teil 552: CIM-XML-Modell
Austauschformat
(IEC 61970-552:2013)

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Foreword

The text of document 57/1386/FDIS, future edition 1 of IEC 61970-552, prepared by IEC/TC 57, "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61970-552:2014.

The following dates are fixed:

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-12-03

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The text of the International Standard IEC 61970-552:2013 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 61968-11	-	Application integration at electric utilities - System interfaces for distribution management - Part 11: Common information model (CIM) extensions for distribution	EN 61968-11	-
IEC/TS 61970-2	-	Energy management system application program interface (EMS-API) - Part 2: Glossary	CLC/TS 61970-2	-
IEC 61970-301	-	Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base	EN 61970-301	-
IEC 61970-501	-	Energy management system application program interface (EMS-API) - Part 501: Common Information Model Resource Description Framework (CIM RDF) schema	EN 61970-501	-
W3C	-	Document Object Model (DOM)	-	-
W3C	-	RDF/XML Syntax Specification	-	-
W3C	-	Extensible Markup Language (XML) 1.0	-	-
W3C	-	XSL Transformations (XSLT)	-	-

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INTRODUCTION

This International standard is part of the IEC 61970 series that define an Application Program Interface (API) for an Energy Management System (EMS).

IEC 61970-301 specifies a Common Information Model (CIM): a logical view of the physical aspects of an electric utility operations. The CIM is described using the Unified Modelling Language (UML), a language used to specify, visualize, and document systems in an object-oriented manner. UML is an analysis and design language; it is not a programming language. In order for software programs to use the CIM, it must be transformed into a schema form that supports a programmable interface.

IEC 61970-501 describes the translation of the CIM in UML form into a machine readable format as expressed in the Extensible Markup Language (XML) representation of that schema using the Resource Description Framework (RDF) Schema specification language.

IEC 61970-552 specifies how the CIM RDF schema specified in IEC 61970-501 is used to exchange power system models using XML (referred to as CIMXML) defined in the 61970-45x series of profile standards, such as the CIM Transmission Network Model Exchange Profile described in IEC 61970-452.

ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

Part 552: CIMXML Model exchange format

1 Scope

This International Standard specifies a Component Interface Specification (CIS) for Energy Management Systems Application Program Interfaces. This part specifies the format and rules for exchanging modelling information based upon the CIM. It uses the CIM RDF Schema presented in IEC 61970-501 as the meta-model framework for constructing XML documents of power system modelling information. The style of these documents is called CIMXML format.

Model exchange by file transfer serves many useful purposes. Profile documents such as IEC 61970-452 and other profiles in the 61970-45x series of standards explain the requirements and use cases that set the context for this work. Though the format can be used for general CIM-based information exchange, specific profiles (or subsets) of the CIM are identified in order to address particular exchange requirements. The initial requirement driving the solidification of this specification is the exchange of transmission network modelling information for power system security coordination.

This standard supports a mechanism for software from independent suppliers to produce and consume CIM described modelling information based on a common format. The proposed solution:

- is both machine readable and human readable, although primarily intended for programmatic access,
- can be accessed using any tool that supports the Document Object Model (DOM) and other standard XML application program interfaces,
- is self-describing,
- takes advantage of current World Wide Web Consortium (W3C) recommendations.

This document is the Level 2 Component Interface Specification document that describes in narrative terms (with text and examples based on the CIM) the detailed definition of the CIMXML format.

2 Normative references

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

IEC 60050 series, *International Electrotechnical Vocabulary*

IEC 61968-11, *Application integration at electric utilities – System interfaces for distribution management – Part 11: Common information model (CIM) extensions for distribution*

IEC/TS 61970-2, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

IEC 61970-301, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*

IEC 61970-501, *Energy management system application program interface (EMS-API) – Part 501: Common Information Model Resource Description Framework (CIM RDF) schema*

W3C: RDF/XML Syntax Specification

W3C: Extensible Markup Language (XML) 1.0

W3C: XSL Transformations (XSLT)

W3C: Document Object Model (DOM)

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions contained in IEC 60050 (for general glossary) and IEC 61970-2 (for EMS-API glossary definitions), as well as the following apply.

3.1

Application Program Interface

API

set of public functions provided by an executable application component for use by other executable application components

3.2

Common Information Model

CIM

abstract model that represents all the major objects in an electric utility enterprise typically contained in an EMS information model

Note 1 to entry: By providing a standard way of representing power system resources as object classes and attributes, along with their relationships, the CIM facilitates the integration of EMS applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management.

3.3

CIMXML

serialisation format for exchange of XML data as defined in this document

3.4

Document Object Model

DOM

platform- and language-neutral interface defined by the World Wide Web Consortium (W3C) that allows programs and scripts to dynamically access and exchange the content, structure and style of documents

3.5

Document Type Definition

DTD

standard for describing the vocabulary and syntax associated with an XML document

Note 1 to entry: XML Schema and RDF are other forms that can be used.

3.6

Energy Management System

EMS

computer system comprising a software platform providing basic support services and a set of applications providing the functionality needed for the effective operation of electrical

generation and transmission facilities so as to assure adequate security of energy supply at minimum cost

3.7

Hypertext Markup Language

HTML

mark-up language used to format and present information on the Web

3.8

model

collection of data describing objects or entities real or computed

Note 1 to entry: In the context of CIM the semantics of the data is defined by profiles; refer to 3.9.

Note 2 to entry: In power system analysis, a model is a set of static data describing the power system. Examples of Models include the Static Network Model, the Topology Solution, and the Network Solution produced by a power flow or state estimator application.

3.9

profile

schema that defines the structure and semantics of a model that may be exchanged

Note 1 to entry: A Profile is a restricted subset of the more general CIM.

3.10

profile document

collection of profiles intended to be used together for a particular business purpose

3.11

Resource Description Framework

RDF

language recommended by the W3C for expressing metadata that machines can process simply

Note 1 to entry: RDF uses XML as its encoding syntax.

3.12

RDF Schema

schema specification language expressed using RDF to describe resources and their properties, including how resources are related to other resources, which is used to specify an application-specific schema

3.13

Real-World Object

objects that belong to the real world problem domain as distinguished from interface objects and controller objects within the implementation

Note 1 to entry: The real-world objects for the EMS domain are defined as classes in IEC 61970-301 Common Information Model.

Note 2 to entry: Classes and objects model what is in a power system that needs to be represented in a common way to EMS applications. A class is a description of an object found in the real world, such as a PowerTransformer, GeneratingUnit, or Load that needs to be represented as part of the overall power system model in an EMS. Other types of objects include things such as schedules and measurements that EMS applications also need to process, analyze, and store. Such objects need a common representation to achieve the purposes of the EMS-API standard for plug-compatibility and interoperability. A particular object in a power system with a unique identity is modeled as an instance of the class to which it belongs.

3.14

Standard Generalized Markup Language SGML

international standard for the definition of device-independent, system-independent methods of representing texts in electronic form

Note 1 to entry: HTML and XML are derived from SGML.

3.15

Unified Modeling Language UML

object-oriented modeling language and methodology for specifying, visualizing, constructing, and documenting the artifacts of a system-intensive process

3.16

Uniform Resource Identifier URI

Web standard syntax and semantic for identifying (referencing) resources (things, such as files, documents, images).

3.17

eXtensible Markup Language XML

subset of Standard Generalized Markup Language (SGML), ISO 8879, for putting structured data in a text file

Note 1 to entry: This is an endorsed recommendation from the W3C. It is license-free, platform-independent and well-supported by many readily available software tools.

3.18

eXtensible Stylesheet Language XSL

language for expressing stylesheets for XML documents

4 Model exchange header

4.1 General

Model exchange typically involves the exchange of a collection of documents, each of which contains instance data (referred to as a model) and a header. The structure and semantics of each model are described by a profile, which is not included in the exchanged data. The overall exchange is governed by a collection of profiles in a Profile Document.

A header describes the content of the model contained in a document e.g. the date the model was created, description etc. The header may also identify other models and their relationship to the present model. Such information is important when the models are part of a work flow where, for example, the models have relations to each other, e.g. a model succeeds and/or depends on another.

Subclauses 4.2 to 4.4 define the model with header data and work flow it is designed to support.

4.2 CIMXML documents and headers

A CIMXML document is described by a single header. Multiple headers in a CIMXML document are not allowed. Hence instance data in a CIMXML document adhere to a single profile.