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BS EN 61970-301:2017



BSI Standards Publication

Energy management system application program interface (EMS-API)

Part 301: Common information model (CIM) base

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This British Standard is the UK implementation of EN 61970-301:2017. It is identical to IEC 61970-301:2016. It supersedes BS EN 61970-301:2014 which is withdrawn.

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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Published by BSI Standards Limited 2017

ISBN 978 0 580 91020 3

ICS 33.200

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 April 2017.

Amendments/corrigenda issued since publication

Date	Text affected
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EUROPÄISCHE NORM

March 2017

ICS 33.200

Supersedes EN 61970-301:2014

English Version

Energy management system application program interface
(EMS-API) - Part 301: Common information model (CIM) base
(IEC 61970-301:2016)

Interface de programmation d'application pour système de
gestion d'énergie (EMS-API) - Partie 301: Base de modèle
d'information commun (CIM)
(IEC 61970-301:2016)

Schnittstelle für Anwendungsprogramme für
Netzführungssysteme (EMS-API) - Teil 301: Allgemeines
Informationsmodell (CIM), Basismodell
(IEC 61970-301:2016)

This European Standard was approved by CENELEC on 2017-01-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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The text of document 57/1779/FDIS, future edition 6 of IEC 61970-301, 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 61970-301:2017.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-10-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-01-20

This document supersedes EN 61970-301:2014.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61850-7-3	NOTE	Harmonized as EN 61850-7-3.
IEC 61968-11:2013	NOTE	Harmonized as EN 61968-11:2013 (not modified).
IEC 61970-501	NOTE	Harmonized as EN 61970-501.
IEC 62325 Series	NOTE	Harmonized as EN 62325 Series.

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(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 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050	Series	International electrotechnical vocabulary (IEV)	-	-
IEC 61850	Series	Communication networks and systems for power utility automation	EN 61850	Series
IEC 61850-7-4	2010	Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes	EN 61850-7-4	2010
IEC 61968	Series	Application integration at electric utilities - System interfaces for distribution management	EN 61968	Series
IEC/TS 61970-2	-	Energy management system application program interface (EMS-API) - Part 2: Glossary	CLC/TS 61970-2	-
UML 2.0 - Object Management group	-	Object Management Group: UML 2.0 Specification	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 301: Common information model (CIM) base

FOREWORD

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International Standard IEC 61970-301 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This sixth edition cancels and replaces the fifth edition, published in 2013. This sixth edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) new model for grounding including Petersen coils;
- b) models for HVDC;
- c) addition of Static Var Compensation models;
- d) phase shift transformer updates - the section has been added;
- e) short circuit calculations based on IEC 60909;
- f) addition of non-linear shunt compensator;

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- g) addition of model for steady state calculation inputs, Steady State Hypothesis;
- h) addition of base frequency model;
- i) corrections of several smaller issues, e.g. issues found at ENTSO-E interoperability tests;
- j) UML clean up;
- k) new model for PowerElectronicUnits and their connection to the AC network added;
- l) new section on relation between TapChanger.ItcFlag and TapChanger.TapChangerControl;
- m) Annex A with custom extensions added.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/1779/FDIS	57/1788/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61970 series, under the general title: *Energy management system application program interface (EMS-API)*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

This document is one of the IEC 61970 series which defines an application program interface (API) for an energy management system (EMS). IEC 61970 was originally based upon the work of the EPRI Control Center API (CCAPI) research project (RP-3654-1). The principle objectives of the EPRI CCAPI project were to:

- reduce the cost and time needed to add new applications to an EMS;
- protect the investment of existing applications or systems that are working effectively with an EMS.

The principal objective of the IEC 61970 series is to produce standards which facilitate 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 systems (DMS). This is accomplished by defining application program interfaces to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The Common Information Model (CIM) specifies the semantics for this API. The Component Interface Specifications (CIS), which are contained in other parts of the IEC 61970 series, specify the content of the messages exchanged.

The CIM is an abstract model that represents all the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. This model includes public classes and attributes for these objects, as well as the relationships between them.

This document defines the CIM Base set of packages which provide a logical view of the functional aspects of an Energy Management System including Supervisory Control and Data Acquisition (SCADA). Other functional areas are standardized in separate IEC documents that augment and reference this document. For example, IEC 61968-11 addresses distribution models and references this document. While there are multiple IEC standards dealing with different parts of the CIM, there is a single, unified information model comprising the CIM behind all these individual standards documents.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning a computer-based implementation of an object-oriented power system model in a relational database. As such, it does not conflict with the development of any logical power system model including the Common Information Model (CIM), where implementation of the model is not defined.

The IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

ICL
Wenlock Way
West Gorton
Manchester
M12 5DR
United Kingdom

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ISO (www.iso.org/patents) and IEC (http://www.iec.ch/tctools/patent_decl.htm) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

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

Part 301: Common information model (CIM) base

1 Scope

The common information model (CIM) is an abstract model that represents all the major objects in an electric utility enterprise typically involved in utility operations. 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 network applications developed independently by different vendors, between entire systems running network applications developed independently, or between a system running network applications and other systems concerned with different aspects of power system operations, such as generation or distribution management. SCADA is modeled to the extent necessary to support power system simulation and inter-control centre communication. The CIM facilitates integration by defining a common language (i.e. semantics) based on the CIM to enable these applications or systems to access public data and exchange information independent of how such information is represented internally.

The object classes represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This document should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

Due to the size of the complete CIM, the object classes contained in the CIM are grouped into a number of logical Packages, each of which represents a certain part of the overall power system being modeled. Collections of these Packages are progressed as separate International Standards. This document specifies a Base set of packages which provide a logical view of the functional aspects of Energy Management System (EMS) information within the electric utility enterprise that is shared between all applications. Other standards specify more specific parts of the model that are needed by only certain applications. Subclause 4.3 of this document provides the current grouping of packages into standards documents.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at www.electropedia.org)

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61968 (all parts), *Application integration at electric utilities – System interfaces for distribution management*