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**Energy management system application program interface (EMS-API) - Part 301:  
Common Information Model (CIM) Base (IEC 61970-301:2003)**

Energy management system application program interface (EMS-API) -- Part 301:  
Common Information Model (CIM) base

Anwendungsprogramm-Schnittstelle für Netzführungssysteme (EMS-API) -- Teil 301:  
Allgemeines Informationsmodell (CIM), Basismodell

Système de gestion d'énergie - Interface de programmation d'application (EMS-API) --  
Partie 301: Base de Modèle d'Information Commun (CIM)

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**Ta slovenski standard je istoveten z: EN 61970-301:2004**

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35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

**SIST EN 61970-301:2004****en**

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EUROPEAN STANDARD

**EN 61970-301**

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Part 301: Common Information Model (CIM) Base  
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Système de gestion d'énergie –  
Interface de programmation d'application  
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Commun (CIM)  
(CEI 61970-301:2003)

Anwendungsprogramm-Schnittstelle für  
Netzführungssysteme (EMS-API)  
Teil 301: Allgemeines Informationsmodell  
(CIM), Basismodell  
(IEC 61970-301:2003)

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of document 57/656/FDIS, future edition 1 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 was approved by CENELEC as EN 61970-301 on 2004-02-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-02-01

The International Electrotechnical Commission (IEC) and CENELEC draw 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.

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Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 61970-301:2003 was approved by CENELEC as a European Standard without any modification.

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## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

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 61850	Series	Communication networks and systems in substations	EN 61850	Series
ISO 8601	1988	Data elements and interchange formats - Information interchange - Representation of dates and times	EN 28601	1992

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**Interface de programmation d'application  
pour système de gestion d'énergie (EMS-API) –**

**Partie 301:  
Base de modèle d'information commun (CIM)**

**iTeh STANDARD PREVIEW**

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**Part 301:  
Common Information Model (CIM) base**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENERGY MANAGEMENT SYSTEM APPLICATION  
PROGRAM INTERFACE (EMS-API) –****Part 301: Common Information Model (CIM) base**

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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 bilingual version (2005-03) replaces the English version.

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

FDIS	Report on voting
57/656/FDIS	57/682/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.

The French version of this standard has not been voted upon.

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

IEC 61970 consists of the following parts, under the general title *Energy management system application program interface (EMS-API)*:

Part 1: Guidelines and general requirements

Part 2: Glossary

Part 301: Common Information Model (CIM) base

Part 401: Component interface specification framework

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

## INTRODUCTION

This standard is part of the IEC 61970 series, which defines an Application Program Interface (API) for an Energy Management System (EMS). This standard is based upon the work of the EPRI Control Center API (CCAPI) research project (RP-3654-1). The principal objectives of the EPRI CCAPI project are 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 task of the CCAPI project is to produce requirements and draft text for standards to 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) specify the content of the messages exchanged.

This part of IEC 61970-301 defines the CIM Base set of packages which provide a logical view of the physical aspects of Energy Management System information. Future IEC 61970-302 defines the financial and energy scheduling logical view. Future IEC 61970-303 defines the SCADA logical view. 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.

The objects 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 standard 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.

## 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 Energy Management System (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. This is accomplished by defining a common language (i.e., semantics and syntax) based on the CIM to enable these applications or systems to access public data and exchange information independently 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 standard 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 part of IEC 61970 specifies a base set of packages which provide a logical view of the physical 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 4.2 below provides the current grouping of packages into standards documents.

#### 2 Normative references

The following referenced documents are indispensable for the application 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 61850 (all parts), *Communication networks and systems in substations*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

#### 3 Terms and definitions

For the purposes of this part of IEC 61970, the terms and definitions given in IEC 60050, Annex A of this document and the following apply.

### 3.1

#### **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

### 3.2

#### **Application Program Interface API**

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

## 4 CIM specification

### 4.1 CIM modeling notation

The CIM is defined using object-oriented modeling techniques. Specifically, the CIM specification uses the Unified Modeling Language (UML) notation, which defines the CIM as a group of packages.

Each package in the CIM contains one or more class diagrams showing graphically all the classes in that package and their relationships. Each class is then defined in text in terms of its attributes and relationships to other classes.

The UML notation is described in Object Management Group (OMG) documents and several published textbooks.

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### 4.2 CIM packages

The CIM is partitioned into a set of packages. A package is a general purpose means of grouping related model elements. There is no specific semantic meaning. The packages have been chosen to make the model easier to design, understand and review. The common information model consists of the complete set of packages. Entities may have associations that cross many package boundaries. Each application will use information represented in several packages.

The comprehensive CIM is partitioned into the following packages for convenience, where packages are grouped to be handled as a single standard document as shown:

IEC 61970-301

- Core
- Domain
- Generation
- Generation Dynamics
- LoadModel
- Meas
- Outage
- Production
- Protection
- Topology
- Wires

## Future IEC 61970-302

- Energy Scheduling
- Financial
- Reservation

## Future IEC 61970-303

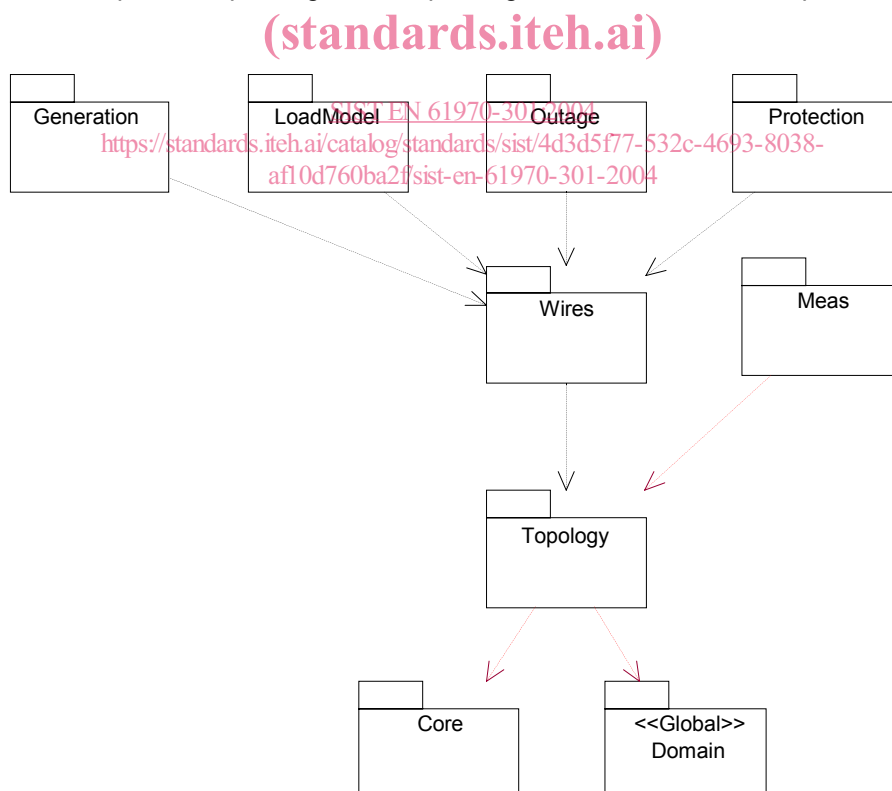
- SCADA

## IEC 61968

- Assets
- Consumer
- Core2
- Distribution
- Documentation

Note that the package boundaries do not imply application boundaries. An application may use CIM entities from several packages.

Figure 1 shows the packages defined for IEC 61970-301 CIM Base and their dependency relationships. The dashed line indicates a dependency relationship, with the arrowhead pointing from the dependent package to the package on which it has a dependency.



IEC 2608/03

**Figure 1 – CIM Part 301 Package Diagram**

The following Subclauses summarize the contents of each CIM package. Annex A contains the specification for each of the CIM packages.