ICS 33.200 SLOVENSKÁ TECHNICKÁ NORMA Február 2015

| STN | **Rozhranie aplikačného programu pre systémy riadenia elektrickej energie (EMS-API). Časť 301: Základ všeobecného informačného modelu (CIM).** | **STN EN 61970-301**<br><br>33 4621 |
|---|---|---|

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/15

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 61970-301

October 2013

ICS 33.200

Supersedes EN 61970-301:2011

English version

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

(IEC 61970-301:2013)

Interface de programmation d'application pour système de gestion d'énergie (EMS-API) -
Part 301: Base de modèle d'information commun (CIM)
(CEI 61970-301:2013)

Schnittstelle für Anwendungsprogramme für Netzführungssysteme (EMS-API) -
Teil 301: Allgemeines Informationsmodell (CIM), Basismodell
(IEC 61970-301:2013)



CENELEC

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**



Ref. No. EN 61970-301:2013 E

## Foreword

The text of document 57/1331/FDIS, future edition 4 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 61970-301:2013.

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) | 2014-04-04 |
| • latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2016-06-27 |

This document supersedes EN 61970-301:2011.

EN 61970-301:2013 includes the following significant technical changes with respect to EN 61970-301:2011:

• extensions have been added to support UCTE exchange;

• several classes have been moved from EN 61970 to the Assets package in EN 61968;

• the transformer regulation model has been modified and expanded to support phase shifting transformer models needed by ENTSO-E;

• zero and negative sequence impedance terms have been added where missing;

• new StateVariables package has been added to support exchange of network model solutions from power flow, state estimation, etc.;

• additional classes that have been added included:

– PhaseTapChanger

– RatioTapChanger

– ImpedanceVariationCurve

– RatioVariationCurve

– TapSchedule

– SwitchSchedule

– PhaseVariationCurve

– EquivalentInjection added to the Equivalents package

– WindGeneratingUnit and NuclearGeneratingUnit added as subtypes of GeneratingUnit

• classes that were removed included:

– Company

– HeatExchanger

– MeasurementType class removed and replaced with attribute Measurement.measurementType.

– Datatypes ShortLength and LongLength were removed and replaced with Length.

– Load, CustomerLoad, and InductionMotorLoad.

– Subtytpes of ConformLoad and NonConFormLoad

- various editorial changes to cleanup the UML model.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

## Endorsement notice

The text of the International Standard IEC 61970-301:2013 was approved by CENELEC as a European Standard without any modification.

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

| | | |
|---|---|---|
| IEC 61850 series | NOTE | Harmonised in EN 61850 series. |
| IEC 61850-7-3 | NOTE | Harmonised as EN 61850-7-3. |
| IEC 61968 series | NOTE | Harmonised in EN 61968 series. |
| IEC 61968-11:2010 | NOTE | Harmonised as EN 61968-11:2010 (not modified). |
| IEC 61970-501 | NOTE | Harmonised as EN 61970-501. |

# 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.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 61850-7-4 | - | 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 | - |
| IEC/TS 61970-2 | - | Energy management system application program interface (EMS-API) - Part 2: Glossary | CLC/TS 61970-2 | - |
| ISO 8601 | - | Data elements and interchange formats - Information interchange - Representation of dates and times | - | - |

IEC 61970-301

Edition 5.0 2013-12

# INTERNATIONAL STANDARD

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

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

IEC 61970-301:2013

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The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

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IEC 61970-301

Edition 5.0 2013-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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

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

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COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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# CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

## Part 301: Common information model (CIM) base

## FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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

This fifth edition cancels and replaces the fourth edition, published in 2013-05. This fifth edition constitutes a technical revision.

Major changes from the fourth edition include the following.

- transformer models have been modified to be consistent for use by distribution and transmission purposes. Additionally the tap changer model was updated to more clearly reflect the intended usage without relying upon rules for which attributes are appropriate in which situations;
- a more general and clear naming approach was added and several ambiguous attributes related to naming were dropped. The approach allows for users to define new name domains and to give them their own unique description;
- phase component wires models have been enhanced to describe internal phase specific attributes and connections;

- addition of diagram layout models to facilitate the exchange of diagram layout information;
- addition of new data types for Decimal, and clean up of date and time types;
- addition of new Compound data types to the Domain package.

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

| FDIS | Report on voting |
|---|---|
| 57/1395/FDIS | 57/1417/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 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.

**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.**

# INTRODUCTION

This standard is one of the IEC 61970 series which define an application program interface (API) for an energy management system (EMS). This standard was originally based upon the work of the EPRI Control Center API (CCAPI) research project (RP-3654-1). The principal 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 of standards 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 standards, 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.

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.

This standard, IEC 61970-301, defines the CIM base set of packages which provide a logical view of the functional aspects of an energy management system including SCADA. Other functional areas are standardized in separate IEC documents that augment and reference this base CIM standard. For example, IEC 61968-11 addresses distribution models and references this base CIM standard. 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:

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United Kingdom (U.K.)

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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.

# 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. SCADA is modeled to the extent necessary to support power system simulation and inter-control center 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 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 particular International Standard 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 4.2 below provides the current grouping of packages into standards documents.

## 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 (all parts), *International Electrotechnical Vocabulary (IEV)* http://www.electropedia.org

IEC 60870-6 (all parts), *Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations*

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

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

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*

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

IEC 62325 (all parts), *Framework for energy market communications*

Object Management Group: UML 2.0 Specification – http://www.omg.org