

# INTERNATIONAL STANDARD

Energy management system application program interface (EMS-API) –  
Part 453: CIM based graphics exchange



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2008 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00



IEC 61970-453

Edition 1.0 2008-06

# INTERNATIONAL STANDARD

Energy management system application program interface (EMS-API) –  
Part 453: CIM based graphics exchange

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

ICS 33.200

ISBN 2-8318-9843-9

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 General use cases for graphic exchange .....	7
5 CIM based graphics exchange format.....	8
5.1 General.....	8
5.2 Relationship of CIM based graphics exchange to CIM XML domain data exchange .....	9
5.3 Presentation logic.....	10
5.4 User interaction logic.....	11
5.5 Complex objects .....	11
5.6 Layers .....	11
5.7 Graphics objects data model .....	11
5.8 Identification of graphics objects .....	12
5.9 Metadata model.....	13
5.9.1 Class diagram .....	13
5.9.2 Cge:Metadata attributes .....	14
Bibliography.....	16
Figure 1 – System overview .....	8
Figure 2 – Graphics and domain data exchange using IEC 61970 exchange formats .....	10
Figure 3 – Graphics object data model.....	12
Figure 4 – Metadata model and references to IEC 61970-301 classes .....	13
Figure 5 – Attributes of cge:Metadata .....	14
Table 1 – Graphics object summary .....	12
Table 2 – Use of metadata reference elements .....	14
Table 3 – Use of metadata reference attributes.....	14

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

## Part 453: CIM based graphics exchange

### 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61970-453 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

CDV	Report on voting
57/874/CDV	57/932/RVC

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.

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.

A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

This standard is one of the IEC 61970 series that define an application program interface (API) for an Energy Management System (EMS).

The Part 3 series of IEC 61970 specify a Common Information Model (CIM): a logical view of the physical aspects of EMS information. The Part 3 series includes Part 301: Common Information Model (CIM) Base.

This standard is one of the IEC 61970, Part 4 series that define utility control center component interface specifications (CIS). Part 4 specifies the functional requirements for interfaces that a component (or application) shall implement to exchange information with other components (or applications) and/or to access publicly available data in a standard way. The component interfaces describe the specific message contents and services that can be used by applications for this purpose. The implementation of these messages in a particular technology is described in Part 5 of this series of standards.

Energy Management Systems display CIM data mostly in tabular lists and graphic schematic displays. The graphics schematic definitions may be included in the CIM, as defined by the location package IEC 61968, Part 11, or they may be stored in various proprietary formats.

Part 453 specifies guidelines for the exchange of graphic schematic definitions. Part 553-4 defines the SVG format for exchanging graphic schematic definitions.

preview generated by EVS

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

## Part 453: CIM based graphics exchange

### 1 Scope

This part of IEC 61970 is a member of the Part 450 to 499 series that, taken as a whole, defines, at an abstract level, the content and exchange mechanisms used for data transmitted between control center components.

Included in this part of IEC 61970 are the general use cases for exchange of graphic schematic display definitions, and guidelines for linking the schematic definitions with CIM data. Guidelines for management of schematic definitions through multiple revisions are also included.

### 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 61970 (all parts), *Energy management system application program interface (EMS-API)*

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

IEC 61970-402, *Energy management system application program interface (EMS-API) – Part 402: Common services*

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

### 3 Terms and definitions

The following terms and definitions as well as the entries in the international electrotechnical vocabulary, IEC 60050, apply.

#### 3.1

##### **domain object**

an instance of a class that models a Real-World Object with a unique identity

NOTE A domain object inherits from a CIM IdentifiedObject. A domain object is normally not a graphics object.

#### 3.2

##### **graphics display**

electronic equivalent of a seamless paper plan

NOTE The graphics display is an identified container for the graphics objects. Examples of graphics displays include substation diagrams, transportation or distribution network orthogonal schematics, or pseudo-geographical schematics. A graphics display has a well-defined coordinate space.