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IEC
TS 61970-2

First edition
2004-07

Energy management system application program interface (EMS-API) –

Part 2:
Glossary

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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

Part 2: Glossary

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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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61970-2, which is a technical specification, has been prepared by IEC Technical Committee 57: Power systems management and associated information exchange.

The specific standards documents for which this glossary applies are listed in IEC 61970-1[1].

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
57/666/CDV	57/725/RVC

Full information on the voting for the approval of this technical specification 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.

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[1]

Part 2:   Glossary

Part 301:   Common Information Model (CIM) Base

Part 302:   Common information model (CIM) financial, energy scheduling and reservations[1]

Part 401:   Component Interface Specification (CIS) framework

Part 402:   Component Interface Specification (CIS) – Common services[1]

Part 403:   Component Interface Specification (CIS) – Generic data access [1]

Part 404:   Component Interface Specification (CIS) – High speed data access[2]

Part 405:   Component Interface Specification (CIS) – Generic eventing and subscription[2]

Part 407:   Component Interface Specification (CIS) – Time series data access[2]

Part 453:   Exchange of graphics schematics definitions (common graphics exchange)[2]

Part 501:   Common Information Model (CIM) XML codification for programmable reference and model data exchange[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

• transformed into an International standard,

• reconfirmed,

• withdrawn,

• replaced by a revised edition, or

• amended.

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

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[1] Under consideration.

[2] Under consideration.

INTRODUCTION

This Technical specification 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 principle objectives of the EPRI CCAPI project are to:

– reduce the cost and time needed to add new applications to an EMS;

– protect the investment in existing applications that are working effectively in an EMS.

The principal task of the CCAPI project is to develop a set of guidelines, or specifications, to enable the creation of "plug-in" applications[3] in the control center environment.

This part of the IEC 61970 series provides a glossary of terms and abbreviations that are specific to the IEC 61970 series or may require interpretation as to how they were used in it.

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[3] A plug-in application is defined to be a piece of software that may be installed on a system with minimal effort and no modification of source code; i. e., the way software packages are installed on a desktop computer. The CCAPI Project goal is to at least approach that ideal by reducing the often significant efforts currently required to install third-party applications in an EMS.

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

Part 2: Glossary

1 Scope

This Technical specification provides a glossary for the volume of work produced as part of the IEC 61970 series of documents. Terms and abbreviations that are either specific to the series, or that require explanation because of the way that they are used in it, are supplied.

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 61970-1, *Energy Management System Application Program Interface (EMS-API) – Part 1: Guidelines and general requirements*

3 Terms and definitions

For the purposes of this Technical specification, the terms and definitions given below apply.

3.1
aggregation
special case of association

3.2
application
piece of software that comprises one or more components that perform some business function in a given domain. The important aspect is the functionality performed and not the packaging of the software. An example would be a word processor. It has a fairly well understood functionality but the components that are actually installed can look very different depending on the vendor.

3.3
application context
collection of applications working together as an organizational unit to accomplish some high-level objective

3.4
Application Program Interface
API
set of public functions provided by an executable application component for use by other executable application components

3.5
association
connection between classes that can be assigned a role

3.6
cardinality from
multiplicity from the class that is being described, '0' is an optional association and 'n' means that an unspecified number of associations are allowed

3.7
cardinality to
multiplicity and cardinality of the class on the other side of the association

3.8
Common Information Model
CIM
abstract model that represents all of the major objects in an electric utility enterprise that are typically contained in an Energy Management System (EMS) information model. 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's developed independently or between an EMS and other systems concerned with different aspects of power operations, such as generation or distribution management.

3.9
CIM context
run-time environment within which all application instances operate to achieve a common objective

3.10
class
description of an object found in the real world that needs to be represented as part of the overall power system model or a set of resources to which a given set of properties apply

3.11
communication profiles
particular protocols and protocol services that are to be used for information exchange between separate server platforms in a component execution system

3.12
component
reusable software building block: a pre-built piece of encapsulated application code that can be combined with other components and with handwritten code to rapidly produce a custom application. In order to qualify as a component, the application code must provide a standard interface that enables other parts of the application to invoke its functions and to access and manipulate the data within the component. For compiled languages, a component is usually a file of executable code (*.exe or *.dll) or resource files containing data used by this or other applications. The component model defines the structure of the interface.

3.13
component adapter
piece of software that sits between the application (or component) and the component container and integration infrastructure and which provides the fundamental component support services

3.14
component container
components execute within a container. The container provides a context for one or more components and provides management and control services for the components. It also provides an operating system process or thread in which to execute the component.

3.15
component execution system
term encompassing the entire reference model from the container layer down including the component container, middleware services and communication profiles. It includes other normal platform supplied services as well, including the operating system, persistent storage, etc.

NOTE   Also known as container systems.

3.16
component model
basic architecture of a component specifying the structure of its interfaces and the mechanisms by which it interacts with its container and with other components

3.17
container
container provides a context for one or more components and provides management and control services for the components

3.18
container systems
see component execution systems

3.19
Directed Label Graph
DLG
graphical data structure consisting of vertices connected by arcs in which each arc has a direction (from one vertex to another) and is identified by a label.

3.20
document
large, rich data structure, such as an XML document, used in a form of information exchange between computer systems. This exchange is more likely to involve individual, atomic information transfers where all information on how to handle the information and/or action requested in the transfer is self-contained rather than acquired in multi-step transactions where the handling of the information transfer may be contingent upon previous information transfers or events.

3.21
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

3.22
Document Type Definition
DTD
standard for describing the vocabulary and syntax associated with an XML document

3.23
element
container enclosed between start and stop tags

3.24
energy management system
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

3.25
event
unit of information exchange that is issued asynchronously by its source

3.26
extensible markup language
XML
subset of the Standard Generalized Markup Language (SGML), ISO 8879, for putting structured data in a text file

3.27
extensible style sheet language
XSL
language for expressing style sheets for XML documents

3.28
generalization
relationship between a more general and a more specific class where the more specific class contains additional information

3.29
HyperText Markup Language
HTML
markup language used to format and present information on the web

3.30
independent system operator
ISO
in the restructured electric energy environment, the organization charged with operating the transmission grid in a safe and secure manner

3.31
legacy application
application performing some business function that may have been purchased or developed prior to establishing a component model for integration purposes

3.32
legacy wrapper
mechanism that converts a legacy application input/output into one or more component interfaces so that the legacy application can participate in information exchange in component-based system architecture

3.33
middleware
diverse group of software products that function as an integration, conversion or translation layer. Middleware provides generic interfaces for events, messaging, data access, transactions, etc.

3.34
multiplicity constraints
documents the CIM values for allowed cardinality for a role name in an association

3.35
name
token beginning with a letter or one of a few punctuation characters and continuing with letters, digits, hyphens, underscores, colons or full stops together known as name characters

3.36
namespaces
a way to tie a specific use of a word in context to the dictionary (schema) where the intended definition is to be found

3.37
North American Electric Reliability Council
NERC
electric utility sponsored organization formed to promote the reliability of the electric supply in North America

3.38
object linking and embedding
OLE
Microsoft display technology

3.39
OLE for process control
OPC
industry standard managed by the OPC Foundation

3.40
package
general-purpose means of grouping related model elements

3.41
plug-in application
piece of software that may be installed on a system with minimal effort and no modification of source code

3.42
property
specific aspect, characteristic, attribute or relation used to describe a resource

3.43
proxy server
enables multiple, independently developed servers to be combined within one context

3.44
Real World Objects
RWO
belong to the real world problem domain as distinguished from interface objects and controller objects within the implementation

3.45
reference model
abstract architecture that provides a visualization of the problem space being addressed, provides a language for describing and discussing solutions, defines terminology and provides other similar aids toward achieving a mutual understanding of the problem being solved with the EMS-API standards.

3.46
resource
anything with a distinct identity including, but not limited to, utility assets such as switches, pumps and generators. Anything that can be referenced by a Uniform Resource Identifier (URI). A resource is a unique instance of an entity object that exists within two or more applications and can be referred to within an information exchange. The internal representation of a resource does not necessarily match the entity object definition within a component interface. However, the data published through a component interface will match a subset of the entity definition.

3.47
Resource Description Framework
RDF
language recommended by the World-Wide Web Consortium (W3C) for expressing metadata that machines can process simply

3.48
Resource Description Framework (RDF) schema
schema specification language expressed using Resource Description Framework (RDF) to describe resources and their properties.

3.49
Regional Transmission Organization
RTO
in the restructured electric energy environment, the regional organization charged with operating the transmission grid in a safe and secure manner and promoting the open exchange of electricity in the marketplace

3.50
Standard Generalized Markup Language
SGML
international standard for the definition of device independent, system independent methods of representing text in electronic form

3.51
ulonglong
64-bit unsigned integer

3.52
Unified Modeling Language
UML
modeling language and methodology for specifying, visualizing, constructing and documenting the artifacts of a system intensive process

3.53
Uniform Resource Identifier
URI
web standard syntax and semantic for identifying (referencing) resources

4   Glossary of abbreviations

For the purposes of this International Standard, the abbreviations given below apply.

AC	Alternating Current
ACE	Area Control Error
ACID	Atomicity, Consistency, Isolation, Durability
ACSI	Abstract Communication Service Interface

AE	Alarms and Events
AGC	Automatic Generation Control
alloc	Allocated
Amp	Ampere
API	Application Program Interface
ASCII	American Standard Code for Information Interchange
ASP	Application Service Provider
ATC	Available Transmission Capacity
auto	Automatic
aux	Auxiliary
AVR or aVR	Automatic Voltage Regulation

b	Susceptance
Bmag	Magnetizing branch susceptance
BPA	Bonneville Power Administration
Btu	British thermal unit
BWR	Boiling Water Reactor
B2B	Business-to-Business

C	Celsius
CAES	Compressed Air Energy Storage
CCAPI	Control Center Application Program Interface
CD	Compact Disc
CDA	Common Data Access
CG	Control Gain
CGI	Common Graphic Interface
ch	Charging
CIM	Common Information Model
CIS	Common Interface Specification
Cntrl	Control
COM	Common Object Model
Cond	Conducting
CORBA	Common Object Request Broker Architecture
CPSM	Common Power System Model
CS	Common Services
CT	Current Transformer or Combustion Turbine
CTS	Component Transaction Server

D	Delta
DA	Data Access
DAF	Data Access Facility
DAIS	Data Acquisition from Industrial Systems
DBMS	Database Management System
DC	Direct Current
DCOM	Distributed Common Object Modeling

dd	Day
DG	Derivative Gain
Diff	Differential
Disch	Discharge
disp	Dispatch
DLF	Dispatcher Power Flow
DLG	Directed Label Graph
.dll	Dynamically Linked Load Modules
DMS	Distribution Management System
DOM	Document Object Model
DTC	Distributed Transaction Coordinator
DTD	Document Type Definition
DTF	Domain Task Force
E	Efficiency
EB	Error Bias
EDC	Economic Dispatch Control
Eff	Efficiency
EJB	Enterprise Java Beans
EMS	Energy Management System
EPRI	Electric Power Research Institute
Eq	Equipment
ER	Error Rate
ERP	Enterprise Resource Planning
.exe	Executables
exp	Exponent
f or F	Frequency
F	Fahrenheit
FB	Feedback
FG	Feedback Gain
freq	Frequency
Fri	Friday
FTP	File Transfer Protocol
G	Conductance
GA	Gain Adjuster
GDA	Generic Data Access
gen	Generator
GES	Generic Eventing and Subscription
GID	Generic Interface Definition
G mag	Magnetizing branch conductance
gMR	Geometric Mean Radius
GUI	Graphic User Interface
GUID	Globally Unique Identifier

H	Head
HDAIS	Historical Data Access from Industrial Systems
hh	Hour
hi	High
HIS	Historical Information System
HMI	Human Machine Interface
HP	High Pressure
hr	Hour
HSDA	High Speed Data Access
HT	Heat Transfer
html	Hyper-text Mark-up Language
http	Hyper-text Transport Protocol
Hz	Hertz or Frequency
I	Current
IC	Integral Constant
ICCP	Inter-Control Center Protocol
ID	Identification
IDL	Interface Definition Language
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IEM	Information Exchange Model
IETF	Internet Engineering Task Force
IG	Integral Gain
Ign	Ignition
IHR	Incremental Heat Rate
IIOP	Internet Inter-ORB Protocol
int	Integer
in2	Square Inch
IP	Intermediate Pressure
ISO	International Standards Organization or Independent System Operator
IT	Information Technology
I/O	Input/Output
JMS	Java Messaging Service
J2EE	Java 2 Enterprise Edition
K	Constant
kg	Kilogram
klb	Kilopounds
kV or KV	Kilovolt
kvarh	Kilovolt ampere reactive hour
kW	Kilowatt
kWh	Kilowatt-hour

LAN	Local Area Network
lbf	Pound-Force
LE	Less than or equal to
LFC	Load Frequency Control
LP	Low Pressure
LT	Less Than
LTC	Load Tap Changer
m	Metre
mag	Magnetizing
mm	Minutes or Month
Max or max	Maximum
MBtu	Millions of British Thermal Units
MDA	Model Driven Architecture
.mdl	Minimum Description Length
Meas	Measurement
Mgt	Management
MIDL	Microsoft Interface Definition Language
Min or min	Minimum or Minutes
Mm3	Millions of Cubic Metres
Mon	Monday
MPL	Motor Position Limit
MRN	Must Run
MSMQ	Microsoft Message Queue
Mult	Multiplier
MVA	Megavoltampere
MVAR, MVAr or MVar	Megavoltampere Reactive
MW or mW	Megawatt
MWEB	Megawatt Error Bias
MWh	Megawatt-hour
m3	Cubic Metre
NERC	North American Electric Reliability Council
nom	Nominal
OAMAS	Open Application Middleware API Specification
OASIS	Open Access Same Time Information System
ODBC	Open Database Connectivity
OLE	Object Linking and Embedding
OMG	Object Management Group
Op	Operating
OPC	OLE for Process Control
Oper Cnt	Operation Count
OPF	Optimal Power Flow

ORB	Object Request Broker
OTS	Operator Training Simulator
OVR	Over Voltage Relay

p	Real Power
P	Phase or Pulse or Real Power
PC	Proportional Constant or Personal Computer
Pct	Per Cent
PD	Pressure Drop
PEB	Pressure Error Bias
PED	Pressure Error Deadband
pf	Power Factor
PF	Participation Factor
PG	Proportional Gain
phi	Angle
PIM	Platform Independent Model
PLC	Programmable Logic Controller
Pos	Switch Position
Pres	Pressure
PSR	Power System Resource
PT	Potential Transformer or Voltage Transformer
PU	Per Unit
PWR	Pressurized Water Reactor
Pwr Fact	Power factor
P/S	Publish/Subscribe

Q or q	Discharge or Reactive Power
QOS	Quality of Service

r	Resistance
RDBMS	Relational Database Management System
RDF	Resource Description Framework
REG	Regulation
Req	Request
Res	Reserve
rf	Re-circulation and Core Flow Coefficient
RFP	Request for Proposal
RMI	Remote Method Invocation
rms and RMS	Root Mean Square
RMU	Ring-Main-Unit
ROC	Rate of Change
RP	Research Project
RTO	Regional Transmission Operator
RTU	Remote Terminal Unit
RWO	Real World Objects

S	Setpoint or Apparent Power
SA	Security Analysis
Sat	Saturday
SCADA	Supervisory Control and Data Acquisition
SCD	Speed Changer Droop
Sched	Schedule
SE	Simple Eventing
sec	Second
SF6	Sulfur Hexaflouride
SGML	Standard Generalized Markup Language
SiRPAC	Simple RDF Parser and Compiler
SOAP	Simple Object Access Protocol
SO2	Sulfur Dioxide
SP	Set Point
SQL	Structured Query Language
ss	Seconds
stby	Standby
Subtrans	Sub-Transient
Sun	Sunday
SVC	Static Var Compensator
Sync	Synchronous
TapPos	Tap Position
TASE	Telecontrol Application Service Element
TC	Technical Committee or Time Constant
tcul	Tap Changer Under Load
TCP/IP	Transport Control Protocol/Internet Protocol
Temp	Temperature
Thu	Thursday
TotAng	Angle
TotPF	Average Power Factor
TotVA	Total Apparent Power
TotVAh	Total Apparent Energy
TotVAr	Total Reactive Power
TotVArh	Total Reactive Energy
TotW	Total Real Power
TotWh	Total Real Energy
TP	Transaction Processor
Trans	Transient
transf	Transformer
TSDA	Time Series Data Access
Tue	Tuesday
U	Unsigned

UDDI	Universal Description and Discovery Information
UML	Unified Modeling Language
UMS	Utility Management System
UNIX	Universal Interactive Executive
uoc	Unit of Currency
URI	Uniform Resource Identifier
URL	Universal Resource Locator
URN	Universal Resource Name
UTC	Universal Time Code

V	Voltage
VAR or Var	Volt-ampere reactive
VoltAmp	Apparent Power
VoltAmpR	Reactive Power
Vs	Versus
VT	Value type or Voltage Transformer

WAN	Wide Area Network
Wed	Wednesday
WG	Working Group
WSDL	Web Service Description Language
W3C	World Wide Web Consortium

x	Reactance
Xd	Direct axis synchronous reactance
XMI	Extensible Mark-Up Language Metadata Interchange
XML	Extensible Mark-up Language
Xq	Quadrature axis synchronous reactance
XSL	Extensible Style Sheet Language
XSLT	Extensible Style Sheet Language Template
X'd	Direct axis transient reactance
X''d	Direct axis sub-transient reactance
X'q	Quadrature axis transient reactance
X''q	Quadrature axis sub-transient reactance

| Y | Wye (Transformer) |
| yyyy | Year |

| Z | Zig-Zag (Transformer) |

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A Prioritaire

RÉPONSE PAYÉE

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....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply)*. I am the/a:

purchasing agent ❏
librarian ❏
researcher ❏
design engineer ❏
safety engineer ❏
testing engineer ❏
marketing specialist ❏
other...

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❏
consultant ❏
government ❏
test/certification facility ❏
public utility ❏
education ❏
military ❏
other...

Q4 This standard will be used for: *(tick all that apply)*

general reference ❏
product research ❏
product design/development ❏
specifications ❏
tenders ❏
quality assessment ❏
certification ❏
technical documentation ❏
thesis ❏
manufacturing ❏
other...

Q5 This standard meets my needs: *(tick one)*

not at all ❏
nearly ❏
fairly well ❏
exactly ❏

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❏
standard is incomplete ❏
standard is too academic ❏
standard is too superficial ❏
title is misleading ❏
I made the wrong choice ❏
other ....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness...
quality of writing....................................
technical contents..................................
logic of arrangement of contents ....
tables, charts, graphs, figures...............
other ....

Q8 I read/use the: *(tick one)*

French text only ❏
English text only ❏
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