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Energy management system application program interface (EMS-API) - Part 401: Profile framework



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English Version

Energy management system application program interface
(EMS-API) - Part 401: Profile framework
(IEC 61970-401:2022)

Interface de programmation d'application pour système de
gestion d'énergie (EMS-API) - Partie 401: Cadre de profils
(IEC 61970-401:2022)

Schnittstelle für Anwendungsprogramme für
Netzführungssysteme (EMS-API) - Teil 401: Rahmenwerk
für Profile
(IEC 61970-401:2022)

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Comité Européen de Normalisation Electrotechnique
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 57/2482/FDIS, future edition 1 of IEC 61970-401, 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 IEC 61970-401:2022.

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) 2023-04-04
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-07-04

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World Wide Web- Consortium (W3C)	OWL 2 Web Ontology Language Structural - Specification and Functional-Style Syntax (Second Edition), W3C Recommendation 11 December 2012, available at https://www.w3.org/TR/owl2-syntax/	-

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Energy management system application program interface (EMS-API) –
Part 401: Profile framework**

**Interface de programmation d'application pour système de gestion d'énergie
(EMS-API) –
Partie 401: Cadre de profils**



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Energy management system application program interface (EMS-API) –
Part 401: Profile framework**

**Interface de programmation d'application pour système de gestion d'énergie
(EMS-API) –
Partie 401: Cadre de profils**

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**ENERGY MANAGEMENT SYSTEM APPLICATION
PROGRAM INTERFACE (EMS-API) –****Part 401: Profile framework**

FOREWORD

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IEC 61970-401 has been prepared by IEC technical committee 57: Power systems management and associated information exchange. It is an International Standard.

This first edition cancels and replaces IEC TS IEC 61970-401 published in 2005. This edition constitutes a technical revision.

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

- a) The previous edition of IEC TS 61970-401:2005 provided an overview of the Component Interface Specifications (CIS) IEC 61970-402, IEC 61970-403, IEC 61970-404, IEC 61970-405, and IEC 61970-407. IEC 61970-402 to IEC 61970-407 are duplicates of existing OPC interfaces from OPC Foundation and the DAIS/HDA interfaces from OMG. Hence IEC 61970-402 to IEC 61970-407 have been withdrawn and IEC TS 61970-401:2005 no longer serves a purpose.

- b) IEC 61970-401 (this document) does not contain an overview of Component Interface Specifications (CIS) but instead a description of how to create profile specifications that describes dataset contents (or message contents). Hence it has been renamed "Profile framework". The profile specifications IEC 61970-450 (all parts) and IEC 61970-600 (all parts) describe dataset contents. The purpose of this document is to define the rules to be followed in the process of creating profile specifications.

The text of this International Standard is based on the following documents:

Draft	Report on voting
57/2482/FDIS	57/2494/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 61970 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

This document is one of the IEC 61970 series that defines message interfaces for network application data exchange.

The IEC 61970-300 series of documents specify a canonical Common Information Model (CIM) describing network application data. The CIM is an information model that represents all the major objects in an electric utility enterprise needed to describe data used by power network applications. The Canonical CIM provides the semantics for IEC 61970-450 (all parts) and IEC 61970-600 (all parts) profile specifications dedicated to specific data exchanges.

This document describes the framework in which profile specifications are created from the Canonical CIM. It describes the structure of profile documents and the rules for selection of information from the Canonical CIM to be included in profile specifications.

The reasons for creating this document are

- 1) The IEC 61970 profiles have for a long time been created using a profiling method not described by an IEC 61970 document.
- 2) The IEC 61970 profiling method has issues that need resolution. Issues and solutions are described in Annex A.

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

Part 401: Profile framework

1 Scope

This document describes how IEC 61970-450 (all parts), IEC 61970-600 (all parts) profile specifications are structured and created. Profile specifications describe a subset of the Canonical CIM dedicated to a specific data exchange. The Canonical CIM is described in IEC 61970-300 (all parts) as well as in IEC 61968-11.

Rules for creation or extension of Canonical CIM are outside the scope of this document.

This document specifies the structure of a profile specification and the rules for selecting subsets of information from the Canonical CIM. It standardizes the operations used to create the profile elements from the Canonical CIM. As Canonical CIM is described in UML the operations are described in terms of UML classes, attributes, and roles.

It is possible to map UML to RDFS or OWL, so any of the languages UML, RDFS or OWL can be used to describe the created profiles. Specification of languages (UML, RDFS or OWL) used to describe profiles as well as how profiles are presented and edited in user interfaces are outside the scope of this document. Languages used to describe profiles are specified in other specifications. Relevant specifications are referenced in Clause 2.

UML supports adding free text that describes further restrictions on UML constructs, e.g. classes, attribute values, association roles and cardinalities. Languages such as OCL and SHACL are dedicated to describing constraints. OCL is used to describe constraints for object data described in UML while SHACL is used to describe constraints on graph data described by RDFS or OWL. OCL is within the scope of this document, but SHACL is not.

This document supports profiles describing data exchanged as CIMXML datasets or messages. The exchange format within the scope is in accordance with IEC 61970-552 but other formats are possible.

Tool interoperability and serialisation formats are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the 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 61968-11, *Application integration at electric utilities – System interfaces for distribution management – Part 11: Common information model (CIM) extensions for distribution*

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

IEC 61970-300 (all parts), *Energy management system application program interface (EMS-API)*

IEC 61970-501:2006, *Energy management system application program interface (EMS-API) – Part 501: Common Information Model Resource Description Framework (CIM RDF) schema*¹

IEC 61970-552, *Energy management system application program interface (EMS-API) – Part 552: CIMXML Model exchange format*

OMG Unified Modeling Language®, OMG document number: formal/2015-03-01, available at <http://www.omg.org/spec/UML/2.5>

World Wide Web Consortium (W3C), RDF 1.1 Primer from 24 June 2014, available at <https://www.w3.org/TR/rdf11-primer/>

World Wide Web Consortium (W3C), RDF 1.1 Concepts and Abstract Syntax from 25 February 2014, available at <https://www.w3.org/TR/rdf11-concepts/>

World Wide Web Consortium (W3C), RDF 1.1 XML Syntax from 25 February 2014, available at <https://www.w3.org/TR/rdf-syntax-grammar/>

World Wide Web Consortium (W3C), RDF Schema 1.1 from 25 February 2014, available at <https://www.w3.org/TR/rdf-schema/>

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World Wide Web Consortium (W3C), OWL 2 Web Ontology Language Structural Specification and Functional-Style Syntax (Second Edition), W3C Recommendation 11 December 2012, available at <https://www.w3.org/TR/owl2-syntax/>

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC TS 61970-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

Canonical CIM

agreed semantic information model describing the power system domain; the information model aims at describing the power system domain in a normalized way without overlap

Note 1 to entry: The Canonical CIM is described in UML. UML can be serialized (saved as a document) in the standardized data format XMI for exchange between UML tools. Ecore is another serialization format with capability to describe UML.

¹ This specification is based on the W3C specification RDF Schema 1.0 from early 2000 which has since been revised multiple times.