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# TECHNICAL SPECIFICATION



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**Energy management system application program interface (EMS-API) –  
Part 555: CIM based efficient model exchange format (CIM/E)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

#### Part 555: CIM based efficient model exchange format (CIM/E)

#### FOREWORD

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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 TS 61970-555, which is a technical specification, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

Enquiry draft	Report on voting
57/1730/DTS	57/1769/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 document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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 publication may be issued at a later date.

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## INTRODUCTION

This part of IEC 61970, which is a technical specification, describes 'CIM-E', an alternative to IEC 61970-552 (CIM/XML) for serializing CIM data exchanges, which is in use in China. It is a general method of serialization that could be used with any defined exchange, but it was developed specifically as an alternative to IEC 61970-552 for exchanging power system network models and solutions, which are defined in IEC 61970-452 and IEC 61970-456. Following is an explanation as to why the IEC has formally documented this method in addition to IEC 61970-552.

When the IEC first developed its standard for exchanging power system models, the primary model exchange specification, IEC 61970-452, described exchange of a complete model. The companion standard, IEC 61970-552, specified how to serialize model data for exchange, and also described how to serialize 'incremental updates' of a model in which only changed parts are exchanged. This latter feature was included because complete models could be very large and require significant processing time, but in most real business situations, model transfers are updates of previous exchanges in which only small parts of the models have changed. Unfortunately, while the IEC understood the potential value of incremental processing, no 'use cases' were produced to document the situations in which full or incremental processing would be recommended.

At the time that the IEC was producing these documents, China was following the development of CIM standards and planning to use them. The situations in which they wanted to use CIM model exchange demanded high performance. The solution they chose was CIM-E, a more compact version of serialization than CIM/XML, which their applications could process quickly.

As time passed, the IEC expanded its set of exchanges to include solved cases and continued to envision incremental updates as the approach for optimizing performance. China began to participate actively in WG 13 meetings, and also continued to enhance the CIM-E serialization method, which is a national standard now in China.

In 2011, China proposed that IEC adopt CIM-E as a standard. The IEC concluded that a CIM-E specification was appropriate. China represents a significant part of the world's electricity infrastructure. It is using CIM. The IEC therefore felt that an IEC specification for CIM-E would be useful, provided that it simply presented a specification for meeting a requirement for CIM-E exchange and did not endorse CIM-E as the recommended method for achieving high performance.

The IEC 61970 series defines an Application Program Interface (API) for an Energy Management System (EMS).

IEC 61970-301 specifies a Common Information Model (CIM): a logical view of the physical aspects of electric utility operations. The CIM is described using the Unified Modeling Language (UML), a language used to specify, visualize, and document systems in an object-oriented manner. UML is an analysis and design language; it is not a programming language. For software programs to use the CIM it needs to be transformed into a schema form that supports a programmable interface.

This part of IEC 61970 describes the translation of the CIM in UML form into a machine readable format as expressed in CIM based Efficient Model Exchange Format(CIM/E) representation of that schema using the CIM/E Schema.

This part of IEC 61970 specifies how the CIM/E schema is used to support power system models or particular application data models exchange requirements, especially for real-time or online applications. Similar to CIM/XML, CIM/E is an efficient serialization format to describe CIM objects. The power system model described by CIM/E or by CIM/XML can be converted bi-directionally with consistent result.

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

### **Part 555: CIM based efficient model exchange format (CIM/E)**

#### **1 Scope**

This part of IEC 61970, which is a technical specification, specifies a Component Interface Specification (CIS) for Energy Management Systems Application Program Interfaces. This part specifies the format and rules for exchanging modelling information based upon the CIM. It uses the CIM/E Schema as the meta-model framework for constructing CIM/E documents of power system modelling information. The style of these documents is called CIM/E format. CIM/E is suitable for use in online model exchange of power system applications.

#### **2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes 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 61970-452, *Energy management system application program interface (EMS-API) – Part 452: CIM model exchange specification*