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Energy management system application program interface (EMS-API) – Part 600-1: Common Grid Model Exchange Standard (CGMES) – Structure and rules

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FOREWORD

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International Standard IEC 61970-600-1 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This first edition cancels and replaces IEC TS 61970-600-1 published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TS 61970-600-1:2017:

- Terms and definitions were updated.
- The "Type" column in all tables was deleted to increase readability of the document as all the rules are considered required, hence categorisation is not necessary.
- Requirement HGEN4 was added to define additional rules to the file header compared to IEC 61970-552:2016.

- Annex B on “Summary of specific rules for naming conventions” is deleted as the information was either integrated in the UML or considered outdated.
- Annex D referring to the PST modelling is deleted as it will be fully integrated in IEC 61970-301:2020+AMD1[1].
- Annex E “Implementation guide” is deleted as all rules and implementation guidance is or will be integrated in either Clause 5 of this document or IEC 61970-301:2020 (and its future Amendment 1) or IEC 61970-452 or IEC 61970-456 as referenced by this document. Note that former Subclause E.11.2 on ConformLoadGroup and NonConformLoadGroup was implemented differently due to another issue, please refer to IEC 61970-600-2:2020.
- Rules GENC17, GENC18, GENC19, EQ__4, EQ__5, SV__4, BPPL12, BPPL13, MVAL5, EXCH9, TP__4 and MARP12 were added.
- Rules GENC3, GENC6, PROF2, PROF4, PROF5, PROF8, PROF9, EXCH5, EXCH6, EXCH7, MAS_4, MAS_6, MAS_9, MAS_10, MAS_11, MAS_13, EQ__1, HREF2, HREF3, HREF5, MVAL3, TPBD1, TPBD2, BPPL10, NAMC12 and NAMC13 are deleted as they are considered not relevant due to other changes.
- The following rules were modified: GENC1, GENC2, GENC4, GENC5, GENC7, GENC8, GENC9, GENC10, GENC16, EQBD2, BPPL11, EXCH2, EXCH3, EXCH8, FBOD3, FBOD5, PROF10, PROF11, MAS_1, MAS_8, HGEN3, HREF1,EEXT1, EQ__2, TP__1, TP__2, TP__3, MARP10, MARP11, NAMC1, NAMC4, NAMC11, NAMC14, BPPL1, BPPL2 and BPPL3.
- Explicit equipment boundary profile definition (EQBD) has been deprecated (refer to Subclause 4.6.5 of IEC 61970-301:2020 and future Amendment 1 for details on deprecations) in this edition in favour of using its full profile counterpart (EQ) for exchange of boundary datasets. The topology boundary profile (TPBD) is not included in the CGMES as TP is considered output and therefore it is no need to exchange Topology information part of the boundary model authority set.
- Annex F has been deleted.

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

FDIS	Report on voting
57/2366/FDIS	57/2382/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.

[1] An amendment to IEC 61970-301:2020 is currently under consideration.

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

- 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

The purpose of this document is to define the Common Grid Model Exchange Standard (CGMES) based on Common Information Model (CIM) standards defined in IEC 61970-series, IEC 61968-series and IEC 62325-series and to address requirements defined by the European legislation. However, the document is not limited to the European legislation requirements and business processes, it is created to support data exchange between applications that support power system model management and analysis. The data exchange can be between internal applications or between applications at System Operators (SO) and Reginal Coordination Centre (RCC). This covers DSO-DSO, DSO-TSO, TSO-TSO, TSO-RCC/ISO/RTO and RCC-RCC interfaces, but not limited to these.

The CGMES is created to address the information exchange requirements provided in Common Grid Model methodologies (CGMm) in accordance with the legal requirements stated in various European network codes guidelines. The CGMES applies to applications dealing with power system data management, as well as applications supporting the following analyses:

- power flow and contingency analyses,
- short circuit calculations,
- market information and transparency,
- capacity calculation for capacity allocation and congestion management, and
- dynamic security assessment.

The conformity of applications used for system operation and system development data exchanges with the CGMES is crucial for the needed interoperability of these applications. This document provides the grouping of all principle requirements for the CGMES Conformity Assessment Framework and the guiding principles for assessing applications' CGMES conformity. The description of the CGMES Conformity Assessment Process is currently not part of the IEC 61970-600-series, but it is planned to be included as an international standard in order to validate that the CGMES is correctly implemented by suppliers of the applications used by system operators (ISO/TSO/DSO etc) and for Regional Coordination Centres (RCCs).

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

Part 600-1: Common Grid Model Exchange Standard (CGMES) – Structure and rules

1 Scope

This part of IEC 61970, which covers the definition of Common Grid Model Exchange Standard (CGMES), defines the main rules and application's requirements to meet business requirements for assembled and merged model to fit relevant business services. This document does not define the business requirements, business processes nor how applications are implemented. This document defines how relevant Common Information Model (CIM) standards work together so that specific business requirements can be resolved.

It also includes extensions to the Common Information Model (CIM). The current extensions are defined in IEC 61970-301:2020 and will be covered in its future Amendment 1, but additional extensions can be defined in other standards in the IEC 61970-600-series. The extensions can be used to define additional profiles or to expand IEC 61970-450-series or IEC 61968-13 profiles. However, primary CGMES includes additional constraints on existing profiles and validation of assembled and merged models that is based on existing profiles. This can be done by making optional attributes and associations mandatory (required).

In addition, this document includes the specification of the serialisation that must be supported by referring to an existing standard defined in IEC 61970-550-series, e.g., IEC 61970-552, and making relevant constraints related to it.

The goal is to achieve interoperability between applications using CGMES in a high-performance environment with combined minimum effort so that relevant business processes are satisfied.

An overview of IEC 61970-600 series is provided in the following table, which also presents identified needs that are not yet addressed.

Part	Description	Scope
61970-600-1	Structure and rules. This part defines the structure of the series of standard and the rules that needs to be applied on the assembled and merged models that are defined by the different profile standards.	In the scope
61970-600-2	Exchange profiles specification. This part defines the IEC 61970-450-series and IEC 61968-13 related profiles that are included in CGMES. It includes the references to published standards and additional constraints defined to the relevant standard. If the relevant edition of a standard is not published, it also includes the profile definition and the standard's constraints.	In the scope
to be defined (TBD)	Information extension. This part defines additional information model that is not included in the relevant edition of IEC 61970-301, IEC 61970-302 or IEC 61968-11 that is needed to meet business requirement.	Identified as a need and not yet addressed neither in this document nor in IEC 61970-600 series
to be defined (TBD)	Extended exchange profiles specification. This part defines additional profiles that is not included in IEC 61970-450-series and IEC 61968-13 that is needed to meet business requirement.	
to be defined (TBD)	Conformity Assessment Scheme (CAS). This part defines the Conformity Assessment Scheme (CAS) including test use cases and references to test configurations to evaluate if an application tool conforms to the CGMES.	

Clause 4, Data exchange context, describes the context the CGMES is developed to support.

Clause 5, Specifications and functionalities, defines the rules that shall be applied for validating a model part, an assembled and a merged model. When the rule is defined in the relevant profile it will include a refence to the rule.

Clause 6, CGMES governance, defines the governance of CGMES and the version strategy.

Annex A is left blank.

Annex B (normative), File header guidelines, explains the usage of the file header that is defined in IEC 61970-552.

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 61970-552:2016, *Energy management system application program interface (EMS-API) – Part 552: CIMXML Model exchange format*

IEC 61970-301:2020, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*

IEC 61970-302:2018, *Energy management system application program interface (EMS-API) – Part 302: Common information model (CIM) dynamics*