

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Standardized product ontology register and transfer by spreadsheets –  
Part 3: Interface for Common Information Model

(standards.iteh.ai)

Enregistrement d'ontologie de produits normalisés et transfert par tableurs –  
Partie 3: Interface pour un modèle d'information commun

<https://standards.iteh.ai/catalog/standards/sist/d151208-86d1-4097-9a1d-9ea683d3ccc7/iec-62656-3-2015>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2015 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

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

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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 It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

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

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

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

#### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

#### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

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

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

Plus de 60 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Standardized product ontology register and transfer by spreadsheets –  
Part 3: Interface for Common Information Model  
(standards.iteh.ai)

Enregistrement d'ontologie de produits normalisés et transfert par tableurs –  
Partie 3: Interface pour un modèle d'information commun

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 01.040.01; 01.110

ISBN 978-2-8322-2258-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	11
3.1 Terms and definitions.....	11
3.2 Abbreviations .....	13
4 Generic rules and principles for the design of CIM interface .....	13
4.1 Comparative analysis of the structures and functionalities of POM and CIM.....	13
4.2 CIM standard series.....	14
5 Rules of transformation from CIM to POM.....	15
5.1 General rules .....	15
5.2 CIM Class .....	16
5.2.1 General .....	16
5.2.2 Name.....	17
5.2.3 Description .....	17
5.2.4 Generalization-specialization .....	17
5.3 CIM class attributes .....	18
5.3.1 General .....	18
5.3.2 Name.....	18
5.3.3 Native attribute .....	18
5.3.4 Type.....	18
5.3.5 Description .....	18
5.4 CIM association .....	19
5.4.1 General .....	19
5.4.2 CIM association end structure.....	19
5.4.3 General transformation rule for association.....	20
5.4.4 General transformation rule for association end .....	20
5.5 CIM Enumeration class .....	24
5.5.1 General .....	24
5.5.2 Name.....	25
5.5.3 Description .....	25
5.6 CIM Enumeration Attribute .....	25
5.6.1 General .....	25
5.6.2 Name.....	25
5.6.3 Description .....	25
5.7 Data type .....	26
5.7.1 CIM basic datatype .....	26
5.7.2 CIM named data types .....	26
5.8 Package.....	28
5.8.1 General .....	28
5.8.2 POM relation object .....	30
5.8.3 CIM packages described in POM relation.....	31
6 CIM description in IEC 62656 format .....	33
6.1 General.....	33
6.2 Class .....	34

6.2.1	General .....	34
6.2.2	Code .....	34
6.2.3	Version number .....	34
6.2.4	Revision number.....	35
6.2.5	Date of original definition .....	35
6.2.6	Date of current version .....	35
6.2.7	Preferred name.....	35
6.2.8	Short name.....	36
6.2.9	Definition .....	36
6.2.10	Note .....	36
6.2.11	Superclass .....	36
6.2.12	Class type .....	37
6.2.13	Alternate ID .....	37
6.2.14	CIM package .....	37
6.2.15	Applicable properties .....	38
6.3	Property.....	38
6.3.1	General .....	38
6.3.2	Property data element type.....	38
6.3.3	Definition class .....	38
6.3.4	Data type.....	39
6.3.5	Applicable relations .....	39
6.3.6	Condition .....	39
6.3.7	Unit in text.....	39
6.3.8	Alternative units.....	40
6.4	Data type.....	40
6.4.1	General .....	40
6.4.2	Definition class .....	40
6.4.3	Unit in text.....	40
6.4.4	Alternative units.....	41
6.4.5	Data type.....	41
6.5	Enumeration .....	41
6.5.1	General .....	41
6.5.2	Definition class .....	41
6.5.3	Enumerated list of terms.....	41
6.5.4	Enumerate code list.....	42
6.6	Term meta-class .....	42
6.6.1	General .....	42
6.6.2	Preferred letter symbol in text.....	42
6.7	Relation .....	42
6.7.1	General .....	42
6.7.2	Relation type .....	43
6.7.3	Domain of the relation .....	43
6.7.4	Domain of the function.....	43
6.7.5	Codomain of the function .....	43
6.7.6	Domain element type .....	44
6.7.7	Role of the relation .....	44
7	XML schema for updated CIM instances in IEC CDD .....	44
7.1	General.....	44
7.2	Principles.....	45

8	Version control mechanism in POM for the parcellized CIM .....	46
	Annex A (normative) Mapping rules from CIM to POM – Mapping rules described in POM relation meta-class .....	47
	Annex B (normative) CIM in IEC 62656 format – Normative meta-properties of the CIM in IEC 62656 model .....	56
	Annex C (informative) XML Schema for parcellized CIM .....	63
C.1	XML schema for POM models .....	63
C.2	XML schema for a class .....	63
C.2.1	General .....	63
C.2.2	class.xsd .....	63
C.2.3	class1.xsd .....	64
C.2.4	class2.xsd .....	64
C.2.5	class3.xsd .....	64
C.2.6	class4.xsd .....	65
C.3	XML schema for a property .....	65
C.3.1	General .....	65
C.3.2	property.xsd .....	65
C.3.3	property1.xsd .....	66
C.3.4	property2.xsd .....	66
C.3.5	property3.xsd .....	67
C.3.6	property4.xsd .....	67
C.4	XML schema for a property derived from an association end .....	68
C.4.1	General .....	68
C.4.2	association.xsd .....	68
C.4.3	association1.xsd .....	68
C.4.4	association2.xsd .....	69
C.4.5	association3.xsd .....	70
C.4.6	association4.xsd .....	70
C.5	XML schema for a data type .....	70
C.5.1	General .....	70
C.5.2	datatype.xsd .....	71
C.5.3	datatype1.xsd .....	71
C.5.4	datatype2.xsd .....	71
C.5.5	datatype3.xsd .....	72
C.5.6	datatype4.xsd .....	72
C.6	XML schema for an enumeration and its enumerators .....	73
C.6.1	General .....	73
C.6.2	enum_term.xsd .....	73
C.6.3	enum_term1.xsd .....	73
C.6.4	enum_term2.xsd .....	74
C.6.5	enum_term3.xsd .....	74
C.6.6	enum_term4.xsd .....	75
C.7	XML schema for a CIM package .....	75
C.7.1	General .....	75
C.7.2	package.xsd example .....	75
C.7.3	package1.xsd example .....	76
C.7.4	package2.xsd example .....	76
C.7.5	package3.xsd example .....	76
C.7.6	package4.xsd example .....	77

Annex D (informative) XML examples for parcellized CIM .....	78
D.1 XML example for a CIM class with extended attributes .....	78
D.2 XML example for a property with extended attributes .....	78
D.3 XML example for a CIM association and aggregation with extended attributes .....	79
D.4 XML example for a CIM data type with extended attributes .....	81
D.5 XML example for a CIM enumeration and its enumerators with extended attributes .....	81
D.6 XML example for a CIM package with extended attributes.....	82
Annex E (informative) Property reference between CIM and IEC CDD – “Power transformer” definitions in both IEC CDD and CIM .....	84
Annex F (informative) Four Layer architecture of UML and POM – Four layer architecture of MOF (meta object facility).....	87
Annex G (informative) POM Relation usage in IEC 62656-3.....	88
G.1 General.....	88
G.2 Meta-model mapping rules between UML and POM(M2) .....	88
G.3 UML Association(M1).....	88
G.4 Model level relation definition(M1) .....	88
Annex H (informative) Parcellized CIM files access – URL for the parcellized CIM files .....	89
Bibliography.....	90
<b>iTeh STANDARD PREVIEW</b> (standards.iteh.ai)	
Figure 1 – CIM generalization example (from Figure 2 of IEC 61970-301:2013) .....	17
Figure 2 – Simple association example (from Figure 3 of IEC 61970-301:2013) .....	21
Figure 3 – Aggregation example (from Figure 4 of IEC 61970-301:2013) .....	21
Figure 4 – Property data element type definition .....	23
Figure 5 – CIM package example (from Figure 1 of IEC 61970-301:2013).....	30
Figure 6 – POM relation model explanation in UML.....	31
Figure 7 – Class instances of parcellized CIM.....	45
Figure 8 – Conceptual reference mechanism with ID in POM .....	46
Table 1 – Mapping of CIM objects and POM objects .....	15
Table 2 – Correspondence between a CIM class in UML and a POM class .....	17
Table 3 – Mapping of CIM class attribute and POM property.....	18
Table 4 – CIM association end structure .....	19
Table 5 –CIM associations defined as POM relations.....	20
Table 6 – Mapping of CIM association end and POM property .....	21
Table 7 – CIM association ends described as POM properties .....	22
Table 8 – Mapping of CIM enumeration and POM enumeration .....	25
Table 9 – Mapping of CIM enumeration attribute and POM term .....	25
Table 10 – Mapping of CIM basic data type and POM simple data type.....	26
Table 11 – Mapping of CIM data type and a named data type in POM.....	27
Table 12 – Mapping of CIM package and POM relation.....	29
Table 13 – CIM package described as POM relation .....	32
Table A.1 – Mapping rule from CIM class to POM class .....	48
Table A.2 – Mapping rule from CIM class attribute to POM property.....	49
Table A.3 – Mapping rule from CIM association to POM relation .....	50

Table A.4 – Mapping rule from CIM association end to POM property ..... 51

Table A.5 – Mapping rule between CIM enumeration and POM enumeration..... 52

Table A.6 – Mapping rule between CIM enumeration attribute and POM term ..... 52

Table A.7 – Mapping rule between CIM data type and POM data type ..... 53

Table A.8 – Mapping rule between CIM Package and POM relation ..... 54

Table A.9 – Mapping rule from POM property to CIM aggregation/association/class attribute ..... 55

Table B.1 – Meta-properties for class meta-class ..... 57

Table B.2 – Meta-properties for property meta-class ..... 58

Table B.3 – Meta-properties for datatype meta-class ..... 59

Table B.4 – Meta-properties for enumeration meta-class ..... 60

Table B.5 – Meta-properties for term meta-class ..... 61

Table B.6 – Meta-properties for relation meta-class ..... 62

Table C.1 – POM models and XML schemas..... 63

Table E.1 – Native properties of Power transformer class in the IEC CDD ..... 85

Table E.2 – Native properties of Power transformer class in IEC 61970-301:2013 ..... 86

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[IEC 62656-3:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015>



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

—————

**STANDARDIZED PRODUCT ONTOLOGY REGISTER  
AND TRANSFER BY SPREADSHEETS –**
**Part 3: Interface for Common Information Model**
**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.  
<https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015>
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 62656-3 has been prepared by subcommittee 3D, Product properties and classes and their identification, of IEC technical committee 3: Information structures, documentation and graphical symbols.

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

FDIS	Report on voting
3D/234/FDIS	3D/245/RVD

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.

A list of all parts in the IEC 62656 series, published under the general title *Standardized product ontology register and transfer by spreadsheets*, 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

- 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.**

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC 62656-3:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015>

## INTRODUCTION

The IEC 62656 series, *Standardized product ontology register and transfer by spreadsheets* is a series of International standards that collectively define the methods for transferring and registering the ontologies of various products and services to and from the ontology registries and applications based on IEC 61360 / ISO13584 common data dictionary model. The IEC common data dictionary, or IEC CDD for short, is one of such registries maintained online as an IEC 61360-4 International Standard based on IEC database procedure stipulated in ISO/IEC Directives Supplement – Procedures specific to IEC. The IEC CDD is a cross-domain data dictionary covering all electro-technical products and services, maintained and updated through a database administered by IEC Central Office.

The common information model originally defined in IEC 61968 and IEC 61970 series of standards, often called by its short name “CIM” provides a standard way to represent all the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. This model includes public classes and attributes for these objects, as well as the relationships between them. It is known as an information model for energy management system (EMS) of power grids and currently is recognized as a standard ontology model for smart grids. An ontology specification conformant to the CIM data model is available in UML format according to IEC 61970-301, and in RDF format according to IEC 61970-501.

The IEC 62656 series consists of the following parts, under the general title *Standardized product ontology transfer and register by spreadsheets*:

- Part 1: Logical structure for data parcels;
- Part 2: Application guide for use with the IEC common data dictionary (CDD);
- Part 3: Interface for common information model.

[IEC 62656-3:2015](https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015)

<https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015>

# STANDARDIZED PRODUCT ONTOLOGY REGISTER AND TRANSFER BY SPREADSHEETS –

## Part 3: Interface for Common Information Model

### 1 Scope

This part of IEC 62656 specifies an interface between IEC 62656 series and meta-model for CIM originally defined in IEC 61968 and IEC 61970 series of standards. The current CIM includes IEC 62325 series and the interface specified in this part of IEC 62656 also applies to the model defined in IEC 62325-301:2014. More specifically, this standard defines a formal mapping between the IEC 62656 and meta-model for CIM in order to import the CIM ontology into the IEC CDD, and to ensure the interoperability of ontologies of two standards, or even among a wider spectrum of standards. For the basis of the mapping from CIM to the data model defined in IEC 62656-1, the UML representation of CIM is referenced.

As a result of the interface specification available from this part of IEC 62656, the smart grid ontology defined in CIM becomes accessible and interoperable in the midst of ontology pieces originating in other ontology standards, encompassing material, environmental, and mechanical, and logistic domains of information. In addition, the specification may also cover the lifecycle of products.

This part of IEC 62656 also defines methods for transforming the IEC CDD content into the format defined in IEC 61968 and IEC 61970 series. However, this standard does not intend any standardization of the elements defined in IEC CDD as part of the CIM ontology, for all the definitions of IEC CDD are already part of an acknowledged horizontal International Standard known as IEC 61360-4-DB. Rather it makes the pieces of information stored in IEC CDD available for further standardization or customization in power electric domains or more specific user communities as a basic resource, in particular for the purpose of extending the CIM series of standards.

The data model of this part is based on IEC 62656-1 which specifies the logical structure for a data parcel, or just simply “parcel,” that is a short name for the medium of registering or transferring of product ontology. Such a parcel may be typically implemented in a leaf of a spreadsheet. The data model built on a set of parcels is called “parcellized ontology model”, which is often abbreviated as “POM” in the remainder of this document.

This part of IEC 62656 specifies:

- the mapping rules and principles for importing CIM UML objects into POM;
- the syntactic and semantic requirements on the parcellized CIM objects;
- the piecewise version control mechanism in POM for the parcellized CIM objects.

The following items are outside the scope of this part of IEC 62656:

- definition of the interface between CIM UML and CIM RDF;
- specification of syntactic and semantic requirements on CIM UML;
- specification of syntactic and semantic requirements on CIM RDF.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For

undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62656-1:2014, *Standardized product ontology register and transfer by spreadsheets – Part 1: Logical structure for data parcels*

IEC 61360-1:2009, *Standard data elements types with associated classification scheme for electric components – Part 1: Definitions – Principles and methods*

IEC 61360-4, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types, component classes and terms*, available from <<http://std.iec.ch/iec61360>>

IEC 61968-1:2003, *System interfaces for distribution management – Part 1: Interface architecture and general requirements*

IEC 61968-11:2010, *System interfaces for distribution management – Part 11: Common information model (CIM) extensions for distribution*

IEC 61970-1:2005, *Energy management system application program interface (EMS-API) – Part 1: Guidelines and general requirements*

IEC 61970-2:2004, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

IEC 61970-301:2013, *Energy management system application program interface (EMS-API) – Part 301: Common Information Model(CIM) base*

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

IEC 62325-301:2014, *Framework for energy market communications – Part 301: Common information model (CIM) extensions for markets*

ISO 639-1:2002, *Codes for the representation of names of languages – Part 1: Alpha-2 code*

ISO 8601:2004, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO/IEC Directives Supplement:2013, *Procedures specific to IEC*

### **3 Terms, definitions and abbreviations**

#### **3.1 Terms and definitions**

For the purpose of this document, the terms and definitions given in IEC 61970-2 and IEC 62656-1, as well as the following apply.

##### **3.1.1 attribute**

- a) attribute defined in IEC 62656-1, equivalent to a meta-property
- b) attribute of class used in IEC 61970-301 corresponding to a property in POM
- c) attribute of enumeration used in IEC 61970-301 corresponding to a term in POM

Note 1 to entry: In case of b), it is more specifically called as “CIM attribute” or “CIM class attribute” in this standard

**3.1.2****aggregationKind**

kind of the UML association comprising normal association, aggregation and composition.

Note 1 to entry: Possible value of aggregationKind is “none” for normal association, “shared” for aggregation and “composition” for a composition, the same as ISO/IEC 19505-2:2012 definitions.

**3.1.3****CIM multiplicity at the source**

multiplicity of the instances of the class located at the source side of the two classes connected by an association

**3.1.4****CIM basic data type**

basic data type defined in the CIM comprising String, Boolean, Float and Integer

Note 1 to entry: In CIM edition, there are other basic data types available for use

**3.1.5****CIM object**

class, attribute, package, or relationship defined in series of IEC 61970, IEC 61968 and IEC 62325 series to represent power system resources

**3.1.6****CIM package**

general-purpose means of grouping related model elements of CIM

Note 1 to entry: CIM Package is a synonymous name assigned to the Segment(MDC\_P211) attribute of IEC 62656-1:2014

[IEC 62656-3:2015](https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015)

**3.1.7****CIM UML ID**

ID of each CIM object, assigned by a UML tool by which the object is designed

<https://standards.iteh.ai/catalog/standards/sist/dfd51208-88d1-4697-9a1d-9ea683d3ccc7/iec-62656-3-2015>

**3.1.8****INVERSIBLE\_P\_DET****INVERSIBLE\_PROPERTY**

kind of property data element type that can depend on the same type of property

Note 1 to entry: A UML association with unspecified navigability is defined with INVERSIBLE\_P\_DET because the navigability may be assigned in the future

**3.1.9****navigability**

state of accessibility of the instances of a class at one end of an association from the instances of the class at the other end of the association.

Note 1 to entry: In this standard, the navigability of bidirectional, unidirectional and unspecified is distinguished.

**3.1.10****parcellized CIM**

collection of CIM objects translated into and represented by a set of spreadsheets conformant to the POM objects defined in IEC 62656-1, with an extended list of attributes added in this part of the standard

**3.1.11****POM object**

set of objects defined by a meta-class of IEC 62656-1:2014 and used in this part of IEC 62656.

EXAMPLE Class, property, datatype, enumeration, unit, term and relation.

### 3.1.12 property

- a) instance of property meta-class, or the meta-class per se as schema; defined in IEC 62656-1
- b) property defined in IEC 61970-2 that represents a specific aspect, characteristic, attribute or relation used to describe a network resource

Note 1 to entry: To clearly distinguish between these two cases, in case of a), it is called “POM property” or “property in POM”. In case of b), it is called “CIM property” in this part of IEC 62656; whenever necessary.

## 3.2 Abbreviations

For the purposes of this standing document, the following abbreviations apply.

CIM	common information model
IEC CDD	IEC common data dictionary
POM	parcellized ontology model
RDF	resource description framework
RDFS	resource description framework schema
UML	unified modeling language
XML	extensible markup language

## 4 Generic rules and principles for the design of CIM interface

### 4.1 Comparative analysis of the structures and functionalities of POM and CIM

The current CIM is modelled with the UML which is widely accepted among IT engineers for designing concepts of products and services. Thus UML is used as a convenient design tool to model the CIM. However, from the users' perspective, the current CIM modelled in UML is totally devoid of mechanism to locally update or extend the entities of the model on an entity-by-entity basis, while the POM is adequately equipped to record the history of changes in a continuous manner. In other words, the current CIM standard is designed to update the model as a whole in a file at once. However, this poses a significant obstacle to the maintenance of the model as an ontology in a database and to the updates of the elements of the database on an individual basis. Since every update shall entail a holistic change of the model, and such a change will disrupt the operation of the objects already installed and used in various applications and systems.

To address this concern, an advanced framework for ontology maintenance and change management for the elements of the ontology in a database form is required, which shall be equipped with;

- a) ontology evolution management
- b) ontology extension mechanism
- c) hierarchy management for both the specialisation (is-a) and composition (has-a).

The above three requirements are fully met by POM, while the CIM in UML or in RDF is designed for other requirements and objectives.

Moreover, by scope, the CIM concentrates on information exchange among electric-power related systems and products, thus the information covered by IEC 61968, IEC 61970 and IEC 62325 series is not complete for describing the whole range and life-cycle of the products and services used in the power grids: Namely, manufacturing, installation, maintenance, transport, and disposal related characteristics of the products and services are not covered. Although some parts of IEC 61968 and IEC 62325 series are intended to relate pieces of information of different domains, they do not and cannot standardize the entire domains of electro-technical ontology, simply because such is not within the scope of one domain TC/SC.