Application integration at electric utilities - System interfaces for distribution management - Part 13: CIM RDF Model exchange format for distribution

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61968-13:2008 sisaldab Euroopa standardi EN 61968-13:2008 ingliskeelset teksti.	This Estonian standard EVS-EN 61968-13:2008 consists of the English text of the European standard EN 61968-13:2008.
Standard on kinnitatud Eesti Standardikeskuse 24.11.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 24.11.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on .	Date of Availability of the European standard text .
Standard on kättesaadav Eesti standardiorganisatsioonist.	The standard is available from Estonian standardisation organisation.

ICS 33.200

Võtmesõnad:

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61968-13

October 2008

ICS 33.200

English version

Application integration at electric utilities - System interfaces for distribution management - Part 13: CIM RDF Model exchange format for distribution

(IEC 61968-13:2008)

Intégration d'applications pour les services électriques - Système d'interfaces pour la gestion de la distribution - Partie 13: Format d'échange du modèle CIM RDF pour la distribution (CEI 61968-13:2008)

Integration von Anwendungen in Anlagen der Elektrizitätsversorgung - Systemschnittstellen für Netzführung - Teil 13: RDF-Austauschformat des CIM-Models für Verteilnetze (IEC 61968-13:2008)

This European Standard was approved by CENELEC on 2008-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 61968-13:2008 E

Foreword

The text of document 57/930/FDIS, future edition 1 of IEC 61968-13, prepared by IEC TC 57, Power systems management and associated information exchange, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61968-13 on 2008-09-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-06-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-09-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61968-13:2008 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 61968-1	-[7)]	Application integration at electric utilities - System interfaces for distribution management - Part 1: Interface architecture and general requirements	EN 61968-1	2004[8)]
IEC 61968-3	-[7)]	Application integration at electric utilities - System interfaces for distribution management - Part 3: Interface for network operations	EN 61968-3	2004[8)]
IEC 61968-4	-[7)]	Application integration at electric utilities - System interfaces for distribution management - Part 4: Interfaces for records and asset management	EN 61968-4	2007[8)]
IEC 61970-301	-[7)]	Energy management system application program interface (EMS-API) - Part 301: Common Information Model (CIM) base	EN 61970-301	2004[8)]
IEC 61970-501	-[7)]	Energy management system application program interface (EMS-API) - Part 501: Common Information Model Resource Description Framework (CIM RDF) schema	EN 61970-501	2006[8)]

[7)] Undated reference.

[8)] Valid edition at date of issue.

CONTENTS

INTRODUCTION

The IEC 61968 series of standards is intended to facilitate inter-application integration as opposed to intra-application integration. Intra-application integration is aimed at programs in the same application system, usually communicating with each other using middleware that is embedded in their underlying runtime environment, and tends to be optimized for close, real-time, synchronous connections and interactive request/reply or conversation communication models. IEC 61968, by contrast, is intended to support the inter-application integration of a utility enterprise that needs to connect disparate applications that are already built or new (legacy or purchased applications), each supported by dissimilar runtime environments. Therefore, these interface standards are relevant to loosely coupled applications with more heterogeneity in languages, operating systems, protocols and management tools. This series of standards is intended to support applications that need to exchange data every few seconds, minutes, or hours rather than waiting for a nightly batch run. This series of standards, which are intended to be implemented with middleware services that exchange messages among applications, will complement, not replace utility data warehouses, database gateways, and operational stores.

As used in IEC 61968, a DMS consists of various distributed application components for the utility to manage electrical distribution networks. These capabilities include monitoring and control of equipment for power delivery, management processes to ensure system reliability, voltage management, demand-side management, outage management, work management, automated mapping and facilities management. Standards interfaces are defined for each class of applications identified in the Interface Reference Model (IRM), which is described in IEC 61968-1.

APPLICATION INTEGRATION AT ELECTRIC UTILITIES – SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –

Part 13: CIM RDF Model exchange format for distribution

1 Scope

This part of IEC 61968 specifies the format and rules for exchanging modeling information based upon the CIM (Common Information Model) and related to distribution network data.

The intention of this part of IEC 61968 is to allow the exchange of instance data in bulk. Thus, the imported network model data should be sufficient to allow performing network connectivity analysis, including network tracing, outage analysis, load flow calculations, etc. This part could be used for synchronizing geographical information system databases with remote control system databases.

This part is closely linked to IEC 61970-452 Energy Management System Application Program Interface (EMS-API) CIM Network applications model exchange specification. Thus, this document has been written in order to reduce its maintenance. It describes only differences with IEC 61970-452. Nevertheless, as IEC 61970-452 is a future international standard, this part still has duplicate information with IEC 61970-452, in order to be more understandable.

It uses the CIM RDF[1)] Schema presented in IEC 61970-501 as the meta-model framework for constructing XML[2)] documents containing power system modeling information. The syntax of these documents is called CIM XML format. Model exchange by file transfer serves many useful purposes, specially when some applications need to have the complete network model defined. Though the format can be used for general CIM-based information exchange, in this part of IEC 61968, specific profiles (or subsets) of the CIM are identified in order to address particular exchange requirements.

Given the CIM RDF Schema described in IEC 61970-501, a DMS power system model can be converted for export as an XML document, see Figure 1. This document is referred to as a CIM XML document. All of the tags (resource descriptions) used in the CIM XML document are supplied by the CIM RDF schema. The resulting CIM XML model exchange document can be parsed and the information imported into a foreign system. This part of IEC 61968 is aligned to CIM Model version 11, CPSM 3.0 profile.

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1) RDF: Resource Description Framework.

2) XML: eXtensible Markup Language.

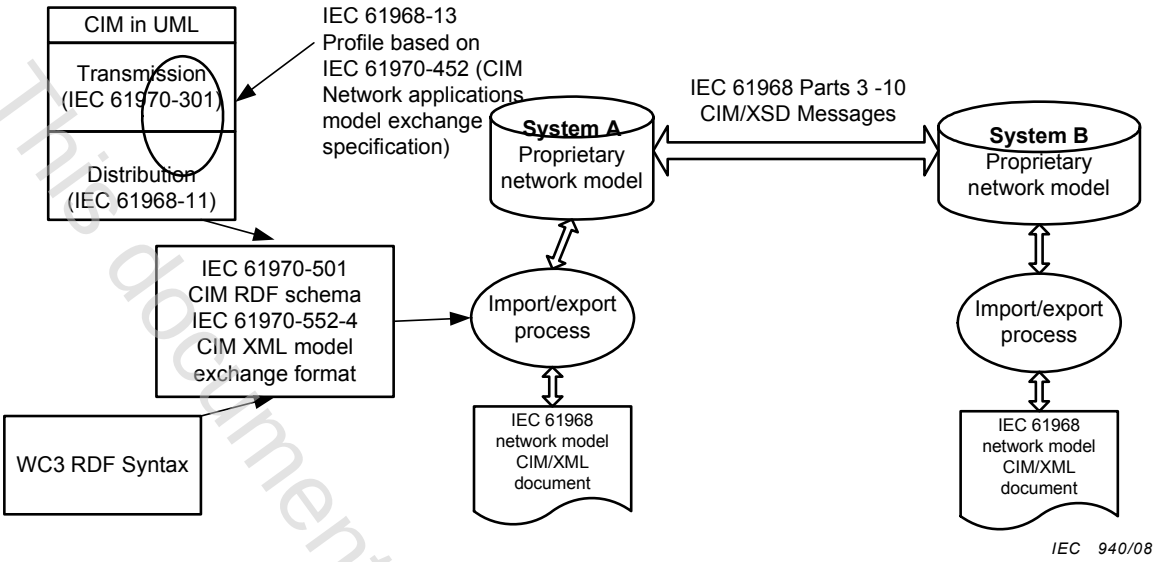

Figure 1 – XML-based DMS network data configuration

Similar to using any programming language, implementers have many choices when creating a CIM XML document. The RDF syntax itself can be used in several ways to achieve the same basic result. The way one approaches the CIM RDF Schema can yield various forms when producing a CIM XML document. The following clauses discuss the style guidelines for producing a CIM XML document. Such guideline rules are important to communicate and follow when producing these documents because they simplify and facilitate the software written to unambiguously interpret the model information.

Some comparisons have been made between CIM RDF and CIM XSD. Annexes A, B, C and D are extracted from articles and documents discussing CIM RDF and CIM XSD. A distribution management system can use only a CIM XSD message types architecture, but CIM RDF has three advantages:

- A UML model is a graph model and RDF helps to describe the graph model. XSD describes a hierarchical model which suits the message type approach.
- RDF is more readable and understandable by people working in the electrotechnical field.
- It is a basic requirement to build ontologies.

If required, tools would ensure the compatibility between CIM-RDF and, for instance, IEC 61968-4 and IEC 61968-3 message types concerning distribution network model representation.

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 61968-1, *Application integration at electric utilities – System interfaces for distribution management – Part 1: Interface architecture and general requirements*

IEC 61968-3, *Application integration at electric utilities – System interfaces for distribution management – Part 3: Interface for network operations*

IEC 61968-4, *Application integration at electric utilities – System interfaces for distribution management – Part 4: Interfaces for records and asset management*

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

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

3 Future standards documents related to this part

The following documents are taken into account even if they have not been published as FDIS yet.

Extensions to CIM for Distribution: IEC 61968-11.

This document is used during interoperability tests: IEC 61970-452.

IEC 61970-552-4, *EMS-API – Part 552-4: CIM XML Model Exchange Format.*

4 CIM RDF describing distribution networks

In this part of the IEC 61968 standard, the object is to describe a CIM RDF model for the Distribution networks. It has the same objective as the NERC Common Power System Model (CPSM) Profile that has been agreed to at the Transmission level (reference: http://www.w3.org/TR/2004/REC-rdf-primer-20040210 subclause 6.5, and IEC 61970-452). At the distribution level, several kinds of application exist such as Network Operation, Asset Management, Customer Information, Network Planning, Work Management, etc. Efforts on standardization of these applications are conducted at the IEC through the Technical Committee 57. For more information, refer to http://www.cimuser.org web site.

Electric utilities use power system models for a number of different purposes. For example, power system simulations are developed for planning and security analysis. An operational power system model may consist of thousands of classes of information. In addition to using these models in-house, applications inside an individual utility need to exchange system modelling information, both for planning and operational purposes (e.g. coordinating transmission and distribution networks and ensuring reliable operations). However, individual utilities use different software packages for these purposes. As a result, the system models are stored in different formats, making exchange among these models difficult. The exchange of model data is difficult and requires specific interface development for data exchange between each pair of applications. Consequently, the individual utilities recognize the need to agree on common definitions of the power system entities and relationships to facilitate the future data exchange requirements.

The CIM defines most of objects inside an electric utility as classes and attributes, as well as the relationships among them. The CIM uses these object classes, their attributes and relationships to support the integration of independently developed applications among vendor specific DMS applications. CIM represents a canonical data model to support data exchange between each part of a DMS system such as asset management, distribution planning, etc.

Based on the NERC CPSM Profile for the transmission network, this part of IEC 61968 proposes a CIM-RDF profile for modelling Distribution networks. This part of IEC 61968 defines a CDPSM profile (Common Distribution Power System Model). IEC 61968-13 will mention the differences between this part of IEC 61968 and CPSM profile when they occur.

The data intended for initial configuration of distribution network applications includes the applications such as distribution load flow calculation, dynamic network coloring, stability studies due to the impact of Distributed Energy Resources on Distribution Networks,