

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61968-1:2004 sisaldab Euroopa standardi EN 61968-1:2004 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 22.07.2004 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 13.01.2004.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 61968-1:2004 consists of the English text of the European standard EN 61968-1:2004.

This standard is ratified with the order of Estonian Centre for Standardisation dated 22.07.2004 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 13.01.2004.

The standard is available from Estonian standardisation organisation.

ICS 33.200

Võtmesõnad:

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

**Application integration at electric utilities –
System interfaces for distribution management
Part 1: Interface architecture and general requirements
(IEC 61968-1:2003)**

Intégration d'applications pour les services
électriques –
Systèmes d'interface pour la gestion
de la distribution
Partie 1 : Architecture des interfaces
et spécifications générales
(CEI 61968-1:2003)

Integration von Anwendungen in Anlagen
der Elektrizitätsversorgung -
Systemschnittstellen für Netzführung
Teil 1: Schnittstellenarchitektur
und allgemeine Anforderungen
(IEC 61968-1:2003)

This European Standard was approved by CENELEC on 2003-12-01. 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, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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

Foreword

The text of document 57/650/FDIS, future edition 1 of IEC 61968-1, prepared by IEC TC 57, Power system control and associated communications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61968-1 on 2003-12-01.

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) 2004-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-12-01

Endorsement notice

The text of the International Standard IEC 61968-1:2003 was approved by CENELEC as a European Standard without any modification.

This document is a preview generated by EVS

INTERNATIONAL STANDARD

IEC
61968-1

First edition
2003-10

Application integration at electric utilities – System interfaces for distribution management –

Part 1: Interface architecture and general requirements



Reference number
IEC 61968-1:2003(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)
- **Catalogue of IEC publications**
The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.
- **IEC Just Published**
This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.
- **Customer Service Centre**
If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre.

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC
61968-1

First edition
2003-10

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

© IEC 2003 — Copyright - all rights reserved

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 the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

XB

For price, see current catalogue

CONTENTS

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 General	7
2.1 Overview of the IEC 61968 series	7
2.2 An example using the IEC 61968 series	8
2.3 Overview of IEC 61968-1	9
3 Interface reference model	10
3.1 Domain	10
3.2 Business functions	10
3.3 Interface reference model	11
4 Interface architecture	17
4.1 General	17
4.2 Requirements analysis methodology	18
5 Interface profile	18
5.1 Components	18
5.2 Component adapters	19
5.3 Interface specification	20
5.4 Middleware adapter	21
5.5 Middleware services	22
5.6 Communication services	23
5.7 Platform environment	23
6 Information exchange model	23
6.1 General requirements	23
6.2 IEM management related services	24
7 Component reporting and error handling	25
7.1 General	25
7.2 Error message handling	25
8 Security and authentication	26
8.1 General	26
8.2 Security threats	26
8.3 Security functions	27
8.4 Management of integrity and security	28
8.5 Security agent	28
9 Maintenance aspects	29
Annex A (informative) Distribution management domain	30
Annex B (informative) IEC 61968 series development process	33
Annex C (informative) Inter-application integration performance considerations	58
Annex D (informative) Views of data in a conventional electric utility	60
Annex E (informative) Business functions	63

Figure 1 – Distribution management system with IEC 61968 compliant interface architecture	6
Figure 2 – Example utility implementation of the IEC 61968 series	9
Figure 3 – Typical applications mapped to interface reference model	11
Figure 4 – Overview of the interface profile and corresponding subclause numbers	18
Figure A.1 – Hierarchy of complexity in a system environment	30
Figure A.2 – General utility structure	31
Figure B.1 – Process 1A: IEC Technical Committee 57 Working Group 14 process for developing future parts of the IEC 61968 series	34
Figure B.2 – Process 1B: (Continuation) IEC Technical Committee 57 Working Group 14 process for developing future parts of the IEC 61968 series	35
Figure B.3 – Process 2A: Typical business subfunctions of DMS and external systems	36
Figure B.4 – Process 2B (continuation) an overview of an utility's application of the IEC 61968 standard	37
Figure B.5 – Typical components of major DMS business functions – Part 1	39
Figure B.6 – Typical components of major DMS business functions – Part 2	40
Figure B.7 – Integration scenario example (from: data acquisition for external EMS)	47
Figure B.8 – Message data model example (from use case 46: data acquisition for external EMS)	55
Figure B.9 – CIM top level package	56
Figure D.1 – Database views depend on the time and user	61
Figure E.1 – Map of typical utility systems to the business functions of the IRM	63
Table 1 – Document overview for IEC 61968-1	9
Table 2 – Interface reference model	12
Table A.1 – Examples of data exchange in a company environment	31
Table A.2 – Data categories	32
Table B.1 – Use case template	42
Table B.2 – Example steps in a Use Case (From: Data Acquisition for External EMS)	45
Table B.3 – Information model (from: data acquisition for external EMS)	48
Table B.4 – Commonly used verbs	50
Table B.5 – OAG verbs	53
Table C.1 – Typical load scenario	58
Table C.2 – Example of typical transaction volume for DMS	59
Table E.1 – Typical information exchanged among business functions of the IRM	64

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: Interface architecture and general requirements

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.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 61968-1 has been prepared by IEC technical committee 57: Power system control and associated communications.

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

FDIS	Report on voting
57/650/FDIS	57/668/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.

IEC 61968 consists of the following parts under the general title *Application integration at electric utilities – System interfaces for distribution management*:

Part 1: Interface architecture and general requirements

Part 2: Glossary¹

Part 3: Interface standard for network operations¹

Part 4: Interface standard for records and asset management¹

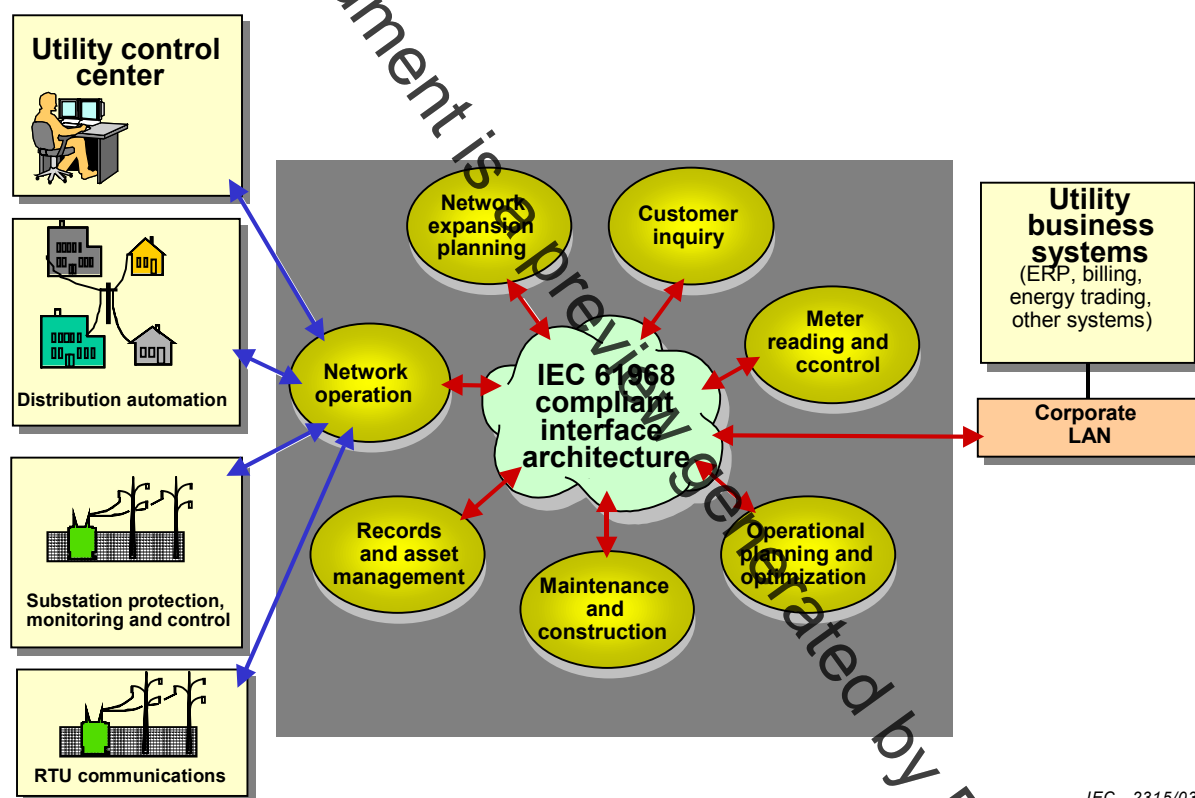
The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

¹ Under consideration.

INTRODUCTION

The IEC 61968 series is intended to facilitate inter-application integration, as opposed to intra-application integration, of the various distributed software application systems supporting the management of utility electrical distribution networks. 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, IEC 61968 is relevant to loosely coupled applications with more heterogeneity in languages, operating systems, protocols and management tools. IEC 61968 is intended to support applications that need to exchange data on an event driven basis. IEC 61968 is intended to be implemented with middleware services that broker messages among applications, and will complement, but not replace utility data warehouses, database gateways, and operational stores.



IEC 2315/03

Figure 1 – Distribution management system with IEC 61968 compliant interface architecture

Figure 1 clarifies the scope of IEC 61968-1 graphically in terms of business functions and shows a Distribution Management System with IEC 61968 compliant interface architecture.

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

Part 1: Interface architecture and general requirements

1 Scope

This part of IEC 61968 is the first in a series that, taken as a whole, defines interfaces for the major elements of an interface architecture for Distribution Management Systems (DMS). This part of IEC 61968 identifies and establishes requirements for standard interfaces based on an Interface Reference Model (IRM). Subsequent parts of this standard are based on each interface identified in the IRM. This set of standards is limited to the definition of interfaces and is implementation independent. They provide for interoperability among different computer systems, platforms, and languages. Methods and technologies used to implement functionality conforming to these interfaces are considered outside of the scope of these standards; only the interface itself is specified in the IEC 61968 series.

As used in the IEC 61968 series, 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. The IRM is specified in Clause 4.

2 General

2.1 Overview of the IEC 61968 series

As used in IEC 61968, a DMS (Distribution Management System) 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 to be defined for each class of applications identified in the Interface Reference Model (IRM), which is described in Clause 4.

IEC 61968 recommends that system interfaces of a compliant utility inter-application infrastructure be defined using Unified Modelling Language (UML).

The eXtensible Markup Language (XML) is a data format for structured document interchange particularly on the Internet. One of its primary uses is information exchange between different and potentially incompatible computer systems. XML is thus well-suited to the domain of system interfaces for distribution management.

Where applicable, future parts of the IEC 61968 series will define the information required for 'message payloads'. Message Payloads will be formatted using XML with the intent that these payloads can be loaded on to messages of various messaging transports, for example OAG, SOAP (Simple Object Access Protocol), etc. The XML encoding rules will be covered in a future part of the IEC 61968 series.

Communication between application components of the IRM requires compatibility on two levels:

- Message formats and protocols.
- Message contents must be mutually understood, including application-level issues of message layout and semantics.