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2003-11

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

Part 2: Glossary



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**APPLICATION INTEGRATION AT ELECTRIC UTILITIES –
SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –****Part 2: Glossary****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 61968-2, which is a technical specification, has been prepared by IEC technical committee 57: Power system control and associated communications.

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

Enquiry draft	Report on voting
57/547/CDV	57/633/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 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: Glossary

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 2004. 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- withdrawn;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.

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.

The series of standards will be using a lot of definitions, terms and abbreviations from the area of distribution management as well as from the area of Information and Communication Technology. This glossary part defines the terms and abbreviations as they are used in the context of this series of standards.

The contents of this part 2 contains the following clauses:

Table 1 – Document overview for IEC 61968-2

Clause	Title	Purpose
1	Scope	The scope, purpose, aim, and organization of IEC 61968 are described.
2	Terms and definitions	Definition of terms that are specific to this series of standards or may have different interpretations when not defined explicitly.
3	Glossary of abbreviations	Definitions of abbreviations that are specific to this series of standards.

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

Part 2: Glossary

1 Scope

This glossary, accompanying the IEC 61968 series, is the second part in the series that, taken as a whole, define interfaces for the major elements of an interface architecture for Distribution Management Systems (DMS). This part of IEC 61968, referred to as Part 2, identifies and explains terms and abbreviations used in the remaining parts of IEC 61968.

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.

2 Terms and definitions

For the purposes of the IEC 61968 series, the following terms and definitions apply.

2.1

abstract component

smallest logical block of software considered in the IEC 61968 interface reference model. Abstract components have interfaces that will be defined in future parts 3 to 10 of the IEC 61968 series. It is expected that different vendors will supply physical Application Components that support the interfaces for one or more abstract components

2.2

adapter

layer of software that connects one component, for example an application, to another component, for example an interface implementation or a middleware implementation

NOTE Same as object adapter.

2.3

address/network connection

linkage of customer to premise to electrical feeder

2.4

application component

block of software with specific functions and interfaces. A distribution management system is considered to be a set of one or more applications. Each application consists of one or more application components

2.5

attribute

identifiable association between an object and a value. An attribute is a property of an object

2.6

audit trail

information saved in a sequential form so that an event can be traced back to its origin

2.7**automated mapping/geofacilities**

geospatial management system utilizing computer graphics technology to enter, store, and update graphic and non-graphic information. Automated mapping reduces the cost and effort in map creation and maintenance and facility record keeping. An automated mapping/geospatial system processes geographic depictions and related non-graphic data elements for each entity stored in a digital database. The graphic representations are referenced using a coordinate system that relates to locations on the surface of the earth. Information in the database can be queried and displayed based upon either the graphic or non-graphic attributes of the entities. The system provides the utility a single, continuous electronic map of the service territory

2.8**automatic generation control**

controls generation such that average hourly generation control follows predispach schedule. Generation levels may be changed based on improving economic operation, emergency conditions, or other improved conditions

2.9**billing system**

electronic billing, customer account inquiries

2.10**breaker control**

operator or manual opening or closing of a circuit breaker to isolate a fault or change the network configuration

2.11**broker**

middleware component that provides a means for communication between distributed application components

2.12**busbar voltage control**

regulates the voltage on the distribution substation busbar by controlling transformer load tap changing. Includes control of either single or paralleled substation transformers

2.13**business functions**

functions that form part of a business process. The functions may be performed manually and/or by one or more software applications

2.14**cartographic map**

map, which displays planimetric and/or topographic information and which, may be used as a base for a thematic layer. Features, which may be included on a base map, are roads, rivers, major structures (buildings), contours, etc. Feature presentation will, however, be map scale dependent. A cartographic feature is a term applied to the natural or cultural objects shown on a map or chart

2.15**circuit**

normal or actual configuration of a specific distribution circuit originating at a substation and extending to either normally open switches of other distribution circuits or simply terminating at different end points

NOTE Same as feeder.

2.16

class

definition of the attribute and methods for a type of object (see object)

2.17

clearance

special authority given a person or persons working on de-energized cables, wires or equipment

NOTE Also known as safety permit.

2.18

client

requester of either or both services or resources, i.e. the code or process that invokes an operation on an object

2.19

cold load pickup

restores service to a distribution feeder or feeders after a prolonged outage (minutes or more) without causing feeder and substation protective relays to operate due to high inrush currents.

2.20

common facilities

sets of programs and documents used by applications through a common interface

2.21

communication services

to connect multiple components, an integration system must reconcile network and protocol differences transparently to the components. The IEC specifies therefore a basic set of appropriate communication services

2.22

component

set of services with a well-defined interface. A component can be as large as a complete (legacy) application which implements multiple services or as small as a tiny widget which implements only one service. Components are independent software entities, which encapsulate (private) data the component needs to know to perform its business function. For example, it can perform any function that is required for distribution management. Typical categories of functions are showed in the interface reference model

2.23

component adapter

piece of software that has the role of making non compliant components compliant with the IEC 61968 series. As such, the component adapter only goes as far as necessary to make the component conformant to one or more specific IEC interface specifications. A component adapter is a type of wrapper

2.24

configuration data exchange

inter-substation computer communications to transfer control/monitoring (SCADA) of devices to an adjacent substation due to reconfiguration or outage

2.25

connectivity model

complete description of the electrical connections between lines, cables, switches, isolators and other network components

2.26**contingency analysis**

study of the effect of unexpected failure or outage of a system component. In distribution systems it generally involves the study of how to restore power to customers when the normal supply path is unavailable.

Also an operating application which computes the potential effect of contingencies involving the loss of generation and transmission facilities. A specific set of predefined contingencies is analyzed on a cyclic basis. It simulates a contingency and calculates the changes in busbar voltages and power flows resulting from the contingency. The base conditions for this calculation are the Busbar voltages or power flows obtained from the load flow program

2.27**CORBA compliance**

the minimum required for a CORBA compliant system is adherence to the specifications in the CORBA core and one mapping. Interoperability and inter-working are separate compliance points

2.28**crew dispatch schedule**

dynamically created schedule in which the work order for a specific crew is described. The schedule is based on the planned work or unplanned service interruptions in the infrastructure known at the moment the schedule was created

2.29**crew management**

tracking of crew details schedules, crewmembers and all general activities related to outage and general operational investigations.

2.30**crew scheduling**

dispatch of service people for customer service calls and distribution construction, and the recording and monitoring of time spent on each call

2.31**crew tracking reports**

dynamic information about the location, and progress of field crews in dealing with the work assigned to the current control

2.32**current control**

manages circulating current in a parallel transformer configuration at the distribution substation. Reduces substation transformer load losses and minimizes transformer overloads by balancing loading between transformers in the same or adjacent distribution substations

2.33**customer**

resident who is supplied with power and is calling in because he/she has no power

2.34**customer outage analysis**

up-to-date information on the number of customers affected by a specific network incident

2.35**data type**

categorization of values operation arguments, typically covering both behavior and representation (i.e., the traditional non-OO programming language notion of type)

2.36

data model

data model is a collection of descriptions of data structures and their contained fields, together with the operations or functions that manipulate them

2.37

data warehouse

repository of data

2.38

database management/security

provides the required maintenance of data elements and controls the data requirements of other subsystems. Security management encompasses access control authorization facilities and partitioning the network. Security management may also include support for encryption and maintenance of security logs

2.39

deferred synchronous request

request where the client does not wait for completion of the request, but does intend to accept results later. Contrast with synchronous request and one-way request

2.40

demand-side management

functions that enable the utility to manage the demand curve in an emergency or planned mode and to determine the customer load curve. Demand-side management functions include load control and load survey.

2.41

department

business function, for example handling outages, repairs on meters and repairs on the distribution network, or customer care

2.42

device operation history

data concerning the operation of electrical devices, often used in condition-based maintenance schemes

2.43

dispatcher

person responsible for the controls at the master station

2.44

Distributed COM DCOM

object protocol that enables ActiveX components to communicate directly with each other across a network including Internet and Intranet. DCOM is language neutral, so any language that produces ActiveX components can also produce DCOM applications

DCOM is based on the most widely-used component technology today. DCOM is simply "COM with a longer wire" a low level extension of the component object model, the core object technology within Microsoft

2.45

distributed load control

distributed control is performed with both utility commands from a remote location like direct load control and a local controller that responds to local conditions. The utility has the ability to activate the control action, but the customer retains the option to override or modify the utility direct load control command

2.46**distribution automation**

those actions to carry out automation of the distribution networks to enable automatic or remote operation. It may include retrofitting switchgear with actuators/motors and the installation of RTU's. The action to restore supply post-fault may be initiated manually via a SCADA System, or automatically by IED's, RTU's, FPI's or EFI's

2.47**Distribution Management System****DMS**

integration of business processes, hardware, software, and telecommunications equipment that provide effective tools to manage the operational business processes related to network management, outage management, power quality and other supporting operational practices.

2.48**domain**

another word for scope. The distribution management domain covers the business functions, software systems, physical equipment and staff concerned with the distribution of electrical power to consumers.

The term utility domain is used to describe the software systems, equipment, staff and consumers of a single utility organization, which could be a company or a department. It is expected that within each utility domain, the systems, equipment, staff and consumers can be uniquely identified. When information is exchanged between two utility domains, then identifiers may need extending with the identity of the utility organization in order to guarantee global uniqueness

2.49**economic dispatch**

the economic dispatch function is closely coupled with the automatic generation control function. It allocates generation among committed units in the real-time mode to minimize total operating cost. In the study mode, economic dispatch works with unit commitment to allocate generation among unit schedules over a period of seven days.

2.50**electronic billing**

process which uses computers and data communications, as opposed to regular mail service, to inform customers about their electric power consumption and to request payment

2.51**electronic billing**

transmission of an electronic customer usage bill on a periodic basis (typically monthly) to customers

2.52**emergency response**

off-site facility that has direct dial lines into regulatory agencies and the press for use in a nuclear emergency

2.53**energy accounting**

accounting of energy sales and purchases to and from other utilities. The data collection function of energy accounting tracks the actual amount of power exchanged with other utilities. The account reconciliation function of energy accounting reports inadvertent data by comparing data from the interchange planning function (planned power exchange) with the data from the data collection function of energy accounting (actual power exchanged). The energy accounting function also includes billing cogenerators and other utilities for power sold

2.54

Energy Management System EMS

distributed processing system that includes hardware and software for power utility management

2.55

equipment characteristics

data concerning the nature and operational parameters of physical devices designed to perform particular functions. Characteristics can be viewed as a relationship between two or more variable quantities which describes the performance of a device under given condition

2.56

equipment operation statistics

data such as the duration of time, the number of times, or other parameters that indicate how a physical device has performed its function over a period of time

2.57

fault

unplanned power interruption

2.58

fault analysis

review of fault records, sequence of events records, and other documentation produced upon a fault to determine the cause of the fault, its total impact, steps taken by the system to recover from the fault, and the possible avoidance of a future occurrence. This data includes pre-fault information as well as post fault information for a specified period

2.59

fault isolation

process of isolating the segment of faulted transmission or distribution network

2.60

fault locations estimates

estimate based on the obtained information about the fault, for example Ohms from a distance relay, which is used to calculate the estimated location of the fault.

2.61

fault restoration

process of restoring the faulted segment of transmission or distribution network

2.62

feeder

normal or actual configuration of a specific distribution circuit originating at a substation and extending to either normally open switches of other distribution circuits or simply terminating at different end points. Same as circuit

2.63

fuse

protective device designed to open when current thresholds (excessive amperes) are exceeded

2.64

implementation

portion of a code composition that is executed, i.e. a definition that provides the information needed to create an object and allow the object to participate in providing an appropriate set of services. An implementation typically includes a description of the data structure used to represent the core state associated with an object, as well as definitions of the methods that

access that data structure. It will also typically include information about the intended interface of the object

2.65**incident simulation**

recreating an incident on the network for analysis and also for training

2.66**instance**

object is an instance of an interface if it provides the operations, signatures and semantics specified by that interface. An object is an instance of an implementation if its behavior is provided by that implementation

2.67**inter application**

between two or more applications

2.68**Interactive Voice Response****IVR**

interactive voice response systems permit customer telephone inquiries to be processed without the need for human intervention through the use of automated query/response scripts. Human intervention can often be requested if needed. These systems are often used for trouble reporting

2.69**interface**

complete protocol used by a class for all of its messaging, i.e. a listing of the operations and attributes that an object provides. This includes the signatures of the operations, and the types of the attributes. An interface definition ideally includes the semantics as well. An object satisfies an interface if it can be specified as the target object in each potential request described by the interface.

2.70**interface adapters**

standards software interface that facilitates a software module to communicate and share of information with other software modules.

2.71**interface profile**

description of the set of interfaces for an abstract component using a specified type of middleware

2.72**Interface Reference Model****IRM**

architecture model of business functions, abstract components and middleware

2.73**interoperability**

two applications are interoperable when able to exchange information needed to properly perform their respective functions. This is normally achieved by using only published standard Application Program Interface (API) definitions that specify compatible data definitions and exchange methods

2.74**intra application**

within the same application

2.75

inventory

list of articles, typically giving the code number, quantity, and value of each.

2.76

issue

item Issue refers to the physical movement of an item from a stocking location. An issue can result from the fulfillment of a sales order, or from a manufacturing production order, or from a work order

[Open Applications Group (see bibliography)]

2.77

load control

explicit action taken to reduce the load at a given point in time. The action may involve: voltage reduction, switching off selected customer devices or totally interrupting supply to some customers, encouraging customers to modify their normal consumption pattern, etc

2.78

load forecast

forecast of the expected load at a specific time and day-of-week for each feeder in the network

2.79

load forecasting

the load forecasting function predicts the hourly system load. The load forecasting function maintains a real-time forecast and a study forecast. The real-time forecast is based on actual historical load and weather data and generates a load forecast for the current hour. The study forecast uses a completely independent set of historical and predicted data that the operator may use to set up and evaluate hypothetical situations up to seven days in the future

2.80

load shedding

emergency disconnection of customer loads to preserve the power network operation. This removes overloads and arrests consequent frequency decline without disrupting the utility transmission grid.

2.81

Low Voltage

LV

portion of the electrical distribution network which is below a specified voltage

2.82

maintenance

work involving inspection, cleaning, adjustment, or other service of equipment to enable it to perform better or to extend its service life. Generally, although not always, equipment must be taken out of service while it is undergoing maintenance

2.83

maintenance scheduling

planning the specific times when a set of maintenance activities should be performed taking into account a variety of constraining factors such as the impact of removing the equipment from service, availability and workload of maintenance crews, etc

2.84

message

specification of the conveyance of information from one instance to another, with the expectation that activity will ensue. A message may specify the raising of a signal or the call of an operation

2.85**message brokers**

message broker enables objects to transparently make and receive requests and responses in a distributed environment

2.86**Message Queue Middleware
MQM**

provides reliable, asynchronous and loosely coupled communication services. MQM represents the realization by major software vendors of the need for ubiquitous message queue-based communication services

2.87**metadata**

data that describes data. Data dictionaries and repositories are examples of metadata. The term may also refer to any file or database that holds information about another database's structure, attributes, processing or changes.

2.88**meter records**

history of the meter usage readings on a periodic basis. Meter records will also include customers who used the power at the meter location

2.89**metering and load management**

remote meter-reading, time-of-use management, service connect/disconnect

2.90**method**

single request or message made available by a server, i.e. an implementation of an operation. Code that may be executed to perform a requested service. Methods associated with an object may be structured into one or more programs

2.91**middleware**

middleware is a term used to describe the software needed to support interactions between clients and servers. Middleware aims to make a heterogeneous, distributed environment appear as a single "virtual machine" that provides access to all resources and business components on the network, hiding the complexity of the necessary communication protocols and services. Examples of middleware categories include: message brokers, message oriented middleware, transactional middleware, database middleware, and many others.

2.92**middleware adapter**

piece of software that has the role to make non-IEC compliant Middleware Services compliant with the IEC 61968 interface specifications

2.93**middleware services**

middleware services are required to provide a set of APIs so that the previous layers in the IEC 61968 service profile among others can locate transparently across the network, can interact with other applications or services, are independent from communication profile services, are reliable and available, etc.

2.94**network**

distribution network (not the transport or transmission network)

2.95

network calculation

suite of applications software used to analyze the capacity, efficiency and reliability of the power network

2.96

network state supervision

monitoring and supervision of feeder networks

2.97

object

instance of a class, supporting encapsulation, inheritance and polymorphism, i.e. a combination of state and a set of methods that explicitly embodies an abstraction characterized by the behavior of relevant requests. An object is an instance of an implementation and an interface. An object models a real-world entity, and it is implemented as a computational entity that encapsulates state and operations (internally implemented as data and methods) and responds to request or services

2.98

object adapter

ORB component, which provides object reference, activation, and state related services to an object implementation. There may be different adapters provided for different kinds of implementations

2.99

object creation

event that causes the existence of an object that is distinct from any other object

2.100

Object Request Broker ORB

provides the means by which clients make and receive requests and responses, for example a CORBA implementation like Orbix or Visibroker or DCOM implemented in Windows NT

2.101

operation

alternative term for a method or service performed by a software application (computing). Operations do not normally include equipment installation or removal (electrical)

NOTE This is the alternative term for method (computing).

2.102

Optimal Power Flow OPF

optimal solution of power flow calculations in a transmission or a distribution network

2.103

ORB core

ORB component which moves a request from a client to the appropriate adapter for the target object

2.104

outage

description of a no power situation. This may include the fault of the outage situation if it is known

2.105**outage analysis**

uses information from distribution automation, the energy management system, and the customer information system regarding trouble calls, blackouts, and circuit outages to analyze service outages and assist in the power restoration process

2.106**Outage Management System****OMS**

all related business processes and supporting technologies related to interruption of electric power supply to customers. These generally include trouble call handling, customer notification, probable device prediction, dispatching workflows for outages and general electric service problems, network management, crew management and reliability reporting

2.107**outage report**

progress report on restoration of supplies following a fault. Outage reports indicate whether each outage is a chargeable outage to the utility and must be reported in reliability statistics

2.108**outage schedules**

data, which defines the time, duration and extent of, planned outages

2.109**outage report**

report with outage data

2.110**peer**

used in the context of inter-process communication to describe another process with similar capabilities of making and servicing requests

2.111**performance monitoring**

implements data acquisition processes to obtain performance data by using specialized performance testing equipment. Documents performance-monitoring results

2.112**planning**

determines the regulating and support conditions of voltage control devices and the necessary magnitude, sign, and location of reactive power injection into an electric network to maintain desired system voltage profile; minimize system loss; maintain system stability while maximizing power transfer; reduce generation production costs; and unload transmission system equipment through reduction of reactive flows

2.113**power flow**

power flow function allows dispatchers to study control actions upon the power system. The power flow function operates in two modes. Dispatcher power flow allows the operator to determine the effects of control actions (breaker switching, tap changing, and interchange adjustments) on the system. In optimal power flow, the control actions are automatically predetermined within the limitations of the power system.

2.114**process**

a program is an inanimate entity; only when a processor "breathes life" into it does it become the "active" entity we call process. This process is an individually controllable computation entity, which may go through a series of discrete process states for example ready state, running state, blocked state, etc.

2.115

purchase order

document authorizing the purchase of goods or services from a specific vendor. The purchase order includes the terms of the purchase, delivery requirements, identification of goods or services ordered, as well as their quantities and prices
[Open Applications Group (see bibliography)]

2.116

quality index analysis

report on the overall performance of the utility in the supply of power to its customers

2.117

receivable

transaction representing an invoice, credit memo or debit memo to a customer. A receivable is an open (unpaid) item in the accounts receivable ledger
[Open Applications Group (see bibliography)]

2.118

release/clearance remote switch command scheduling

preparation and execution of switching plans for remote switch operations and management of necessary safety documentation

2.119

request

client issues a request to cause a service to be performed. A request consists of an operation (i.e. the name of a method) and zero or more parameters.

2.120

results

information returned to the client, which may include values as well as status information indicating that exceptional conditions were raised in attempting to perform the requested service

2.121

security

physical security systems that restrict access to specific areas of a facility via card readers or video cameras

2.122

server

entity providing a service or resources, i.e. a process implementing one or more operations on one or more objects.

2.123

server object

object providing response to a request for a service. A given object may be a client for some requests and a server for other requests

2.124

short circuit analysis

application program used for analysis of transmission or distribution network

2.125

state

time-varying properties of an object that affect that object's behavior