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Edition 1.0 2015-10

TECHNICAL REPORT

colour inside

Application integration at electric utilities – System interfaces for distribution management –
Part 900: Guidance for implementation of IEC 61968-9



IEC TR 61968-900:2015-10(en)



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Part 900: Guidance for implementation of IEC 61968-9

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

Part 900: Guidance for implementation of IEC 61968-9

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

Enquiry draft	Report on voting
57/1579/DTR	57/1616/RVC

Full information on the voting for the approval of this technical report 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 61968 series, published under the general title *Application integration at electric utilities – System interfaces for distribution management*, can be found on the IEC website.

The present technical report refers to some ambiguities occurring essentially in IEC 61968-9 and IEC 61968-100 (labelled here as “Warnings”). These issues are being addressed in Working Group 14 of IEC technical committee 57 and will be resolved in the forthcoming new editions of IEC 61968-9 and IEC 61968-100.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

General

This technical report is intended to help users to interpret IEC 61968-9:2013.

IEC 61968-9 provides a uniform means for performing meter read and control operations over a distributed network.

The most recent version of IEC 61968-9 was published in 2013 and is the second edition. This technical report therefore concentrates on this edition.

Although this technical report concentrates on IEC 61968-9, a portion of this depends on another standard, IEC 61968-100:2013.

The purpose of IEC 61968-9 is to allow heterogeneous components, possibly produced by different vendors, to interoperate with one another. Such components typically include a customer information system (CIS), an outage management system (OMS), a meter data management system (MDMS) and a head-end system (HES).

The messages that are exchanged between the various components are XML documents. IEC 61968-9 defines how these messages are expressed according to the semantics of the operations supported by this standard.

For example, a MDMS might instruct a HES to read the forward bulk energy usage from a set of meters and return the corresponding values back to the MDMS. Alternatively, the HES might be instructed to perform some control operations on a meter – for instance, disconnect the power, reset the readings of that meter and then reestablish the power again. In both cases, IEC 61968-9 defines the precise way in which the appropriate request and response messages are formulated.

While IEC 61968-9 defines the various data items from which the request and response messages are constructed, it is less prescriptive about the corresponding message flows – that is, how a complete message exchange looks. This document provides examples of typical message exchange patterns.

In other words, IEC 61968-9 is informative rather than normative (mandatory) when it comes to describing use cases and message patterns.

IEC 61968-9 does not prescribe the means by which such messages are transmitted from component to component. However, it may be assumed that components communicate with one another either by means of web services (SOAP messages) or over a message bus such as JMS or equivalent.

IEC 61968-9 XML schema definition files

IEC 61968-9 defines many different types of XML message according to the kind of data that are to be transmitted. These message types are referred to as profiles. For example, one such profile corresponds to a meter read request message and another to the corresponding response message.

Annexes H and I of IEC 61968-9:2013 contain listings of various XML schema definition (XSD) files, one for each profile supported by the standard. These constrain the formats of the various allowable XML messages and can be used both to generate sent messages as well as to validate received messages. XSD validation is often a first step in ensuring that received messages are at least syntactically correct, although it does not guarantee that the information in the various fields is always appropriate with regard to the application.

A paper or PDF listing is not a particularly practical way of accessing these XSD documents. However, they are also available in electronic form from the UCAIUG website[1].

Such XSD files may be conveniently examined using a graphical editor such as XML Spy which is a commercial product from Altova GmbH[2]. Open-source tools such as Eclipse[3] offer similar functionality.

Conventions used in this technical report

The examples used in this technical report generally refer to MDMS and HES systems. These names are used for illustrative purposes only. Other system names such as CIS and MDMS or client and server could just as equally well have been chosen.

XML fragments and examples, the names of files and other literal text are shown in a `fixed-width font`.

XML schemas are depicted using screen shots taken from XML Spy. The solid lines represent mandatory elements and the dotted lines represent optional elements. Please see the XML Spy documentation[4] for explanations of the other symbols used.



A sign like this denotes a warning. There are a few areas where special care needs to be taken with IEC 61968-9.

How this technical report is organized

- Clause 3 of this technical report describes the basics of IEC 61968-100 as they relate to IEC 61968-9.
- Clause 4 describes more details concerning IEC 61968-100, especially as to what these have to do with formulating request and response messages and how notifications of errors are communicated. This clause also describes how the standard IEC 61968-9 set of messages may be augmented by implementation-specific messages.
- Clause 5 describes how meters and other objects are named in the IEC 61968-9 world.
- Clauses 6 and 7 respectively describe how meter read operations and meter control operations are carried out.
- Clause 8 shows how a MDMS or HES may be configured with provisioning information.
- Clause 9 discusses some of the less frequently used message exchange patterns, specifically how to schedule actions for execution at some future time and how to cancel them should the need arise.

---

1 http://iectc57.ucaiug.org/WG14/Part9/Shared%20Documents/Part%209%202Ed/IEC-Part9-Profiles-2nd-Edition%20FDIS.zip

2 http://www.altova.com – XML Spy is the trade name of a product supplied by Altova GmbH. This information is given for the convenience of users of this document and does not constitute an endorsement by the IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

3 http://www.eclipse.org – Eclipse is the trade name of a product supplied by the Eclipse Foundation. This information is given for the convenience of users of this document and does not constitute an endorsement by the IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

4 http://www.altova.com/documents/XMLSpyTutorial.pdf

- Clause 10 provides some details concerning transmitting IEC 61968-9 messages over SOAP (web services) or JMS transports.
- Clause 11 is a detailed reference of the various fields that are used within IEC 61968-9 messages.

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

Part 900: Guidance for implementation of IEC 61968-9

1 Scope

This part of IEC 61968-9, which is a technical report, is a reference document and, as such, is not always suitable for someone new to the world of meter reading and control. In particular, it assumes significant domain knowledge.

This technical report is a companion document to the official standard. It is written from the viewpoint of a software developer or systems integrator who is tasked with implementing IEC 61968-9. It is not intended as a complete description of this standard. For full details, please refer to IEC 61968-9.

To get the most from this technical report, the user should have a good understanding of XML technologies, in particular of XML schema definitions and of web services.

This technical report contains informative recommendations which may be used to guide implementations of IEC 61968-9 and IEC 61968-100. It does not attempt to be exhaustive. In particular, it focuses on the most common IEC 61968-9 interfaces and assumes the user is using web services or JMS as the underlying transport mechanism. If the user is using other systems or the transport services are something other than web services or JMS, the recommendations in this technical report may be less relevant but perhaps still useful.

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 61968-9:2013, *Application integration at electric utilities – System interfaces for distribution management – Part 9: Interfaces for meter reading and control*

IEC 61968-100:2013, *Application integration at electric utilities – System interfaces for distribution management – Part 100: Implementation profiles*

3 IEC 61968-100 basics

3.1 General

The IEC 61968-100 standard is shared across the other IEC 61968 standards, not just IEC 61968-9. In broad terms, whereas IEC 61968-9 is concerned with the *contents* of the various messages, IEC 61968-100 is more concerned with the *construction* of the messages and the *transport* of messages between systems.

An important part of IEC 61968-100 is the `Message.xsd` schema definition file[5]. This describes a message header which forms part of every IEC 61968-9 message. This is

[5] http://iectc57.ucaiug.org/WG14/part100/Shared%20Documents/Common%20Message/Message.xsd

described in further detail in Subclause 3.4. The `Message.xsd` file also describes the entire message envelope – in other words, the overall format of an IEC 61968-9 message including header and other message parts.

IEC 61968-100 also comprises a “generic WSDL” file[6] which further defines how messages are formulated and exchanged when using web services as the transport mechanism. This is described in detail in Subclause 10.2.2.

Before continuing, it should be emphasized that this technical report describes IEC 61968-100 as it specifically relates to IEC 61968-9. In general, however, the principles described here are also applicable to other parts of the IEC 61968 series, especially Parts 3 to 8.

3.2 IEC 61968-100 message exchange patterns

IEC 61968-9 does not completely specify the message exchange patterns – that is, how a set of messages together form a conversation in which one system requests data from another and these are then returned. Such message exchange patterns instead fall under the remit of IEC 61968-100.

A detailed discussion of all the possible message exchange patterns is beyond the scope of this technical report. However, with regard to implementation of IEC 61968-9, there are two broad kinds of message exchange into which all use cases fall.

- **Request and response messages**. This is the classic request-response paradigm. For example, a MDMS system may make an on-demand meter read request to a HES. When the HES has obtained the necessary data, it returns these back to the MDMS along with some indication of success or otherwise of the overall request. Other examples might be for a request to be made to the HES to disconnect the power to a customer or for the meter to be reset to an initial state (if the customer has just moved into a new apartment, say). In these latter examples, the response reflects the success or failure of the request.

  The IEC 61968 series of standards are flexible in defining how a complete conversation may be carried out. For instance, a single request for some meter data may result in several corresponding response messages being generated. This may happen, say, if the meter read requests are for future data. It may also occur if the amount of data being requested is too large to fit into a single response, in which case a series of response messages would be returned that represent the complete meter data delivered in chunks.

- **Unsolicited event messages**. These are made when one entity sends data to another without an initial request having been made. For example, a HES might notify a MDMS when a meter is disconnected. Alternatively, the HES may be configured to read a set of meters at certain times and to report their values without an explicit request message being sent.

  In another example, a typical conversation may begin with a request for an action to take place followed by the corresponding response which in essence says nothing more than “this request appears to be acceptable”. Finally, only when the applications carries out the action at some later time is an unsolicited event message sent to the original requestor to confirm whether the action has succeeded or not.

3.3 IEC 61968-100 message types

3.3.1 General

IEC 61968-100 defines four kinds of message: request messages, response messages, event messages and fault messages. In IEC parlance these message kinds are termed stereotypes.

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6 http://iectc57.ucaiug.org/WG14/part100/Shared%20Documents/IEC%2061968-100%202nd%20Edition/Generic%20WSDL%20-%202nd%20Edition/IEC61968-100-Generic.wsdl

- **Request messages** are used for sending queries or commands. For example, a request message might be sent from a MDMS to a HES to instruct the latter to obtain a set of meter readings according to meter identification and other criteria.
- **Response messages** are used for returning the corresponding data or status information. Once it has acquired the required data, for example, the HES sends these back to the MDMS in one or more response messages.

  Response messages are also used to indicate whether a given request succeeded or whether there were any failures in carrying it out.

  Response messages may also be used for sending simple acknowledgements in the context of web services as described in Subclause 10.2.2.
- **Event messages** are used for sending unsolicited data – that is, asynchronous data or status information. For instance, such messages may be sent to notify a MDMS or other entity of an asynchronous event such as a power outage to a meter.

  As noted above, event messages may also be used to send meter readings according to a pre-configured schedule. For example, a HES might maintain its own schedule of meter interrogations and push these data to a MDMS at regular intervals throughout the day.

  An event message that results from a previous request is termed a *consequential event message*.
- **Fault messages** are used for sending notifications of errors that are so severe that the receiving system can perform no meaningful processing. These typically occur within the context of requests made over web services – for instance, as a result of detection of a SOAP fault. More general error notifications – requests that are incomplete or reference non-existent meters and such like – are instead made in a response message. This document does not address fault messages any further.

Any IEC 61968-9 message, whether it is a request message, response message or event message, is composed as an XML document. These different message types are distinguished by the top-level element in the XML document. This must always be one of `<RequestMessage>`, `<ResponseMessage>` or `<EventMessage>` accordingly.

3.3.2 Request messages

Request messages are structured as illustrated in Figure 1. This is an example of a simple message that is sent from a MDMS to a HES to request a meter read.