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Electricity metering - Data exchange for meter reading, tariff and load control - Part 62: Interface classes

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Title : IEC 62056-62: Electricity metering – data exchange for meter reading, tariff and load control – Part 62: Interface classes

Note d'introduction

Introductory note

ATTENTION Parallel IEC CDV/CENELEC Enquiry)	ATTENTION CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)

FORM CDV (IEC)
2002-08-09

CONTENTS

List of Figures

List of Tables

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICITY METERING – DATA EXCHANGE FOR METER READING, TARIFF AND LOAD CONTROL –

Part 62: Interface classes

FOREWORD

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The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of a maintenance service concerning the stack of protocols on which the present standard IEC 62056-62 is based.

The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

The provider of the maintenance service has assured the IEC that he is willing to provide services under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the provider of the maintenance service is registered with the IEC. Information (see also chapter 4.6.2 and Annex E) may be obtained from:

DLMS[1] User Association
Geneva / Switzerland
www.dlms.ch

International Standard IEC 62056-62 Ed. 2 has been prepared by IEC technical committee 13: Equipment for electrical energy measurement and load control.

[1] Device Language Message Specification.

Main changes in this edition 2 are the following:

- the list of common data types has been amended, some new types have been added;
- new HLS mechanisms have been added;
- instance specific data types have been replaced with well defined set of applicable data types;
- new units have been added;
- new interface classes "Register table" and "Status mapping" have been added;
- a new version of the "IEC local port setup", "Modem configuration", "Auto connect" and "HDLC setup" interface classes have been added;
- new interface classes for setting up a TCP/IP based communication profile have been added. References to related RFC-s and Internet Standards, as well as related definitions have been added.

For easier tracking of the changes, new text is highlighted by yellow.

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

FDIS	Report on voting
13/XXXX/FDIS	13/XXXX/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.

Annexes A, B, C and D form an integral part of this standard.

Annex E is for information only.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date [2)] 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

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

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2) The National Committees are requested to note that for this publication the maintenance result date is 2010.

INTRODUCTION

Driven by the need of the utilities to optimise their business processes, the meter becomes more and more part of an integrated metering and billing system. Whereas in the past the commercial value of a meter was mainly generated by its data acquisition and processing capabilities, nowadays the critical issues are system integration and interoperability.

The Companion Specification for Energy Metering (COSEM) addresses these challenges by looking at the meter as an integrated part of a commercial process, which starts with the measurement of the delivered product (energy) and ends with the revenue collection.

The meter is specified by its “behaviour” as seen from the utility's business processes. The formal specification of the behaviour is based on object modelling techniques (interface classes and objects). The specification of these objects forms a major part of COSEM.

The COSEM server model (see 4.5) represents only the externally visible elements of the meter. The client applications that support the business processes of the utilities, customers and meter manufacturers make use of this server model. The meter offers means to retrieve its structural model (the list of objects visible through the interface), and provides access to the attributes and specific methods of these objects.

The set of different interface classes form a standardized library from which the manufacturer can assemble (model) its individual products. The elements are designed so that with them the entire range of products (from residential to commercial and industrial applications) can be covered. The choice of the subset of interface classes used to build a meter, their instantiation, and their implementation are part of the product design and therefore left to the manufacturer. The concept of the standardized metering interface class library provides the different users and manufacturers with a maximum of diversity without having to sacrifice interoperability.

ELECTRICITY METERING – DATA EXCHANGE FOR METER READING, TARIFF AND LOAD CONTROL –

Part 62: Interface classes

1 Scope

This part of IEC 62056 specifies a model of a meter as it is seen through its communication interface(s). Generic building blocks are defined using object-oriented methods, in the form of interface classes to model meters from simple up to very complex functionality.

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 60050-300:2001, *International Electrotechnical Vocabulary – Electrical and electronic measurements and measuring instruments – Chapter 311: General terms relating to measurements – Chapter 312: General terms relating to electrical measurements – Chapter 313: Types of electrical measuring instruments – Chapter 314: Specific terms according to the type of instrument*

IEC 60559:1989, *Binary floating-point arithmetic for microprocessor systems*

IEC 61334-4-41:1996, *Distribution automation using distribution line carrier systems – Part 4: Data communication protocols – Section 41: Application protocols – Distribution line message specification*

IEC 62051:1999, *Electricity metering – Glossary of terms*

IEC 62051-1:2004, *Electricity metering – Glossary of terms – Part 1: Terms related to data exchange with metering equipment using DLMS/COSEM*

IEC 62056-21:2002, *Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange*

IEC 62056-31:1999, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 31: Using local area networks on twisted pair with carrier signalling*

IEC 62056-46:2001, *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC-protocol*

IEC 62056-46 Amd. 1:200X [3], *Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC-protocol*

IEC 62056-47:200X [2], *Electricity metering – Data exchange for meter reading, tariff and load control – Part 47: COSEM transport layers for IP networks*

IEC 62056-53 Ed.2:200X [2], *Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM Application layer*

[3] To be published

IEC 62056-61 Ed.2:200X [2], *Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: OBIS Object identification system*

ANSI C12.19:1997 / IEEE 1377:1997, *Utility Industry End Device Data Tables*

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

STD 0005: *Internet Protocol – (Also: RFC0791, RFC0792, RFC0919, RFC0922, RFC0950, RFC1112)*
Author: J. Postel
Date: September 1981

STD 0006: *User Datagram Protocol (Also RFC 0768)*
Author: J. Postel
Date: 28 August 1980

STD 0007: *Transmission Control Protocol (Also RFC 0793)*
Author: J. Postel
September 1981

STD0010: *Simple Mail Transfer Protocol*
Author: J. Postel
Date: August 1982

STD 0051*: The Point-to-Point Protocol (PPP) - Also: RFC1661, RFC1662*
Authors: W. Simpson, Ed.
Date: July 1994

See also Bibliography for other related Internet RFC-s.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purpose of this part of IEC 62056, the terms and definitions given in IEC 60050-300, IEC 62051, and IEC 62051-1 apply.

3.2 Abbreviations

AARE	Application Association Response
AARQ	Application Association ReQuest
ACSE	Application Control Service Element
APDU	Application Protocol Data Unit
ASE	Application Service Element
A-XDR	Adapted eXtended Data Representation
CHAP	Challenge Handshake Authentication Protocol
COSEM	Companion Specification for Energy Metering
CtoS	Client to Server Challenge
DHCP	Dynamic Host Control Protocol
DLMS	Distribution Line Message Specification also: Device Language Message Specification
DNS	Domain Name Server

EAP	Extensible Authentication Protocol
GMT	Greenwich Mean Time
GPS	Global Positioning System
HLS	High Level Security
IANA	Internet Assigned Numbers Authority
IC	Interface Class
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
LCP	Link Control Protocol
LLS	Low Level Security
LN	Logical Name
LSB	Least Significant Bit
m	Mandatory
MD5	Message Digest Algorithm 5
MSB	Most Significant Bit
o	Optional
OBIS	OBject Identification System
PAP	Password Authentication Protocol
PDU	Protocol Data Unit
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
ROHC	Robust Header Compression
SAP	Service Access Point
SHA-1	Secure Hash Algorithm
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
SN	Short Name
StoC	Server to Client Challenge

4 Basic principles

4.1 General

This subclause describes the basic principles on which the COSEM interface classes are built. It also gives a short overview on how interface objects (instantiations of the interface classes) are used for communication purposes. Data collection systems and metering equipment from different vendors, following these specifications can exchange data in an interoperable way.

Object modelling: for specification purposes this standard uses the technique of object modelling. An object is a collection of attributes and methods.

The information of an object is organized in attributes. They represent the characteristics of an object by means of attribute values. The value of an attribute may affect the behaviour of an object. The first attribute in any object is the “logical_name”. It is one part of the identification of the object.

An object offers a number of methods to either examine or modify the values of the attributes. Objects that share common characteristics are generalized as an interface class with a class_id. Within a specific class, the common characteristics (attributes and methods) are described once for all objects. Instantiations of an interface class are called COSEM objects.

Manufacturers may add proprietary methods or attributes to any object, using negative numbers.

Figure 1 illustrates these terms by means of an example:

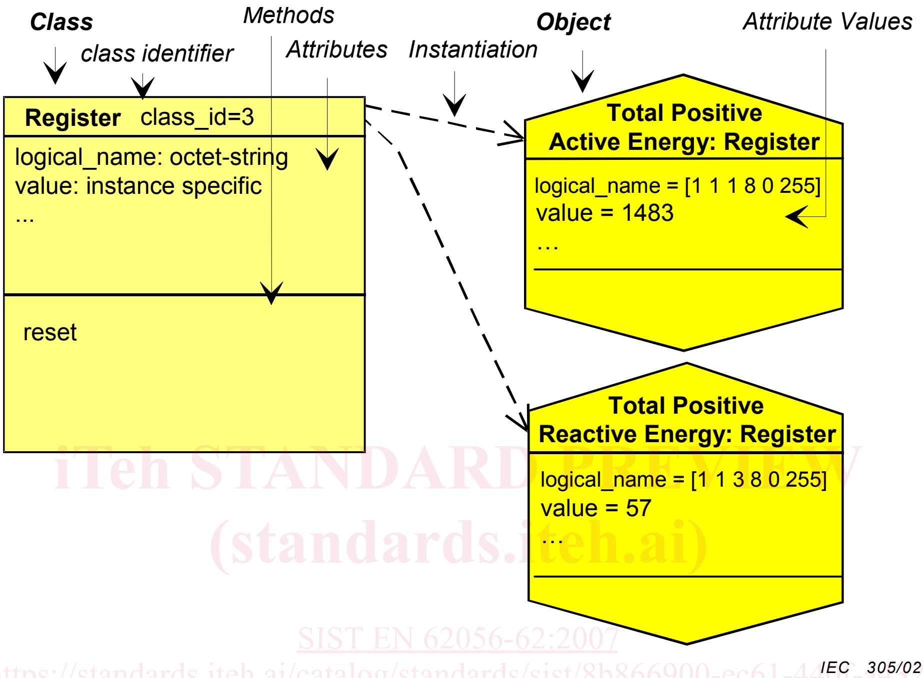

Figure 1 – An interface class and its instances

The interface class "Register" is formed by combining the features necessary to model the behaviour of a generic register (containing measured or static information) as seen from the client (central unit, hand held terminal). The contents of the register are identified by the attribute "logical_name". The logical_name contains an OBIS identifier (see IEC 62056-61). The actual (dynamic) content of the register is carried by its "value" attribute.

Defining a specific meter means defining several specific registers. In the example of Figure 1, the meter contains two registers; i.e. two specific COSEM objects of the class "Register" are instantiated. This means that specific values are assigned to the different attributes. Through the instantiation one COSEM object becomes a "total, positive, active energy register" whereas the other becomes a "total, positive, reactive energy register".

REMARK The COSEM objects (instances of interface classes) represent the behaviour of the meter as seen from the "outside". Therefore, modifying the value of an attribute must always be initiated from the outside (e.g. resetting the value of a register). Internally initiated changes of the attributes are not described in this model (e.g. updating the value of a register).

4.2 Class description notation

This subclause describes the notation used to define the interface classes.

A short text describes the functionality and application of the class. A table gives an overview of the class including the class name, the attributes, and the methods (class description template).

Class name		**Cardinality**	**class_id, version**		
Attribute(s)		***Data type***	***Min.***	***Max.***	***Def.***
1. logical_name	(static)	octet-string			
2. …	(…)	…			
3. …	(…)	…			
Specific method(s) (if required)		***m/o***			
1. …		…			
2. …		…			

Each attribute and method must be described in detail.

Class name	Describes the class (e.g. “Register”, “Clock”, “Profile generic”,...)
Cardinality	Specifies the number of instances of the class within a logical device (see 4.5). *value* — The class shall be instantiated exactly “value” times. *min...max.* — The class shall be instantiated at least “min.” times and at most “max.” times. If min. is zero (0) then the class is optional, otherwise (min. > 0) "min." instantiations of the class are mandatory.
class_id	Identification code of the class (range 0 to 65 535). The class_id of each object is retrieved together with the logical name by reading the object_list attribute of an “Association LN” / ”Association SN” object. The class_id's from 0 to 8 191 are reserved to be specified by the DLMS UA. Class_id's from 8 192 to 32 767 are reserved for manufacturer specific interface classes. Class_id's from 32 768 to 65 535 are reserved for user group specific interface classes. DLMS UA reserves the right to assign ranges to individual manufacturers or user groups.
Version	Identification code of the version of the class. The version of each object is retrieved together with the logical name and the class_id by reading the object_list attribute of an “Association LN” / ”Association SN” object. **Within one logical device, all instances of a certain class must be of the same version.**
Attribute(s)	Specifies the attribute(s) that belong to the class. (*dyn.*) — Classifies an attribute that carries a process value, which is updated by the meter itself. *(static)* — Classifies an attribute, which is not updated by the meter itself (e.g. configuration data).
logical_name	octet-string — The logical name is always the first attribute of a class. It identifies the instantiation (COSEM object) of this class. The value of the logical_name conforms to OBIS (see IEC 62056-61).
Data type	Defines the data type of an attribute (see 4.3).
Min.	Specifies if the attribute has a minimum value. *x* — The attribute has a minimum value. *<empty>* — The attribute has no minimum value.
Max.	Defines if the attribute has a maximum value. *x* — The attribute has a maximum value. *<empty>* — The attribute has no maximum value.