

**Communication networks and systems
in substations - Part 9-2: Specific
Communication Service Mapping
(SCSM) - Sampled values over ISO/IEC
8802-3**

Communication networks and systems in
substations - Part 9-2: Specific Communication
Service Mapping (SCSM) - Sampled values over
ISO/IEC 8802-3

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 61850-9-2:2004 sisaldab Euroopa standardi EN 61850-9-2:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.07.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 61850-9-2:2004 consists of the English text of the European standard EN 61850-9-2:2004.</p> <p>This document is endorsed on 22.07.2004 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: Defines the Specific Communication Service Mapping for the transmission of sampled values according to the abstract specification in IEC 61850-7-2. The mapping is that of the abstract model on a mixed stack using direct access to an ISO/IEC 8802-3 link for the transmission of the samples in combination with IEC 61850-8-1.</p>	<p>Scope: Defines the Specific Communication Service Mapping for the transmission of sampled values according to the abstract specification in IEC 61850-7-2. The mapping is that of the abstract model on a mixed stack using direct access to an ISO/IEC 8802-3 link for the transmission of the samples in combination with IEC 61850-8-1.</p>
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ICS 33.200

Võtmesõnad:

Communication networks and systems in substations
Part 9-2: Specific Communication Service Mapping (SCSM) –
Sampled values over ISO/IEC 8802-3
(IEC 61850-9-2:2004)

Réseaux et systèmes de communication
dans les postes
Partie 9-1: Implémentation spécifique
des services de communication (SCSM) -
Valeurs numérisées sur l'ISO 8802-3
(CEI 61850-9-2:2004)

Kommunikationsnetze und
-systeme in Stationen
Teil 9-2: Spezifische Abbildung von
Kommunikationsdiensten (SCSM) -
Abgetastete Werte über ISO/IEC 8802-3
(IEC 61850-9-2:2004)

This European Standard was approved by CENELEC on 2004-04-01. 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.

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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 57/690/FDIS, future edition 1 of IEC 61850-9-2, 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 61850-9-2 on 2004-04-01.

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) 2005-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2007-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61850-9-2:2004 was approved by CENELEC as a European Standard without any modification.

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60874-10-1	- ¹⁾	Connectors for optical fibres and cables Part 10-1: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1	-	-
IEC 60874-10-2	- ¹⁾	Part 10-2: Detail specification for fibre optic connector type BFOC/2,5 terminated to single-mode fibre type B1	-	-
IEC 60874-10-3	- ¹⁾	Part 10-3: Detail specification for fibre optic adaptor type BFOC/2,5 for single and multimode fibre	-	-
IEC 61850-7-1	- ¹⁾	Communication networks and systems in substations Part 7-1: Basic communication structure for substation and feeder equipment - Principles and models	EN 61850-7-1	2003 ²⁾
IEC 61850-7-2	- ¹⁾	Part 7-2: Basic communication structure for substation and feeder equipment - Abstract communication service interface (ACSI)	EN 61850-7-2	2003 ²⁾
IEC 61850-7-3	- ¹⁾	Part 7-3: Basic communication structure for substation and feeder equipment - Common data classes	EN 61850-7-3	2003 ²⁾
IEC 61850-7-4	- ¹⁾	Part 7-4: Basic communication structure for substation and feeder equipment - Compatible logical node classes and data classes	EN 61850-7-4	2003 ²⁾
IEC 61850-8-1	- ¹⁾	Part 8-1: Specific communication service mapping (SCSM) - Mapping to MMS (ISO/IEC 9506 Part 1 and Part 2) over ISO 8802-3	EN 61850-8-1	- ³⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ In preparation.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61850-9-1	- ¹⁾	Part 9-1: Specific Communication Service Mapping (SCSM) - Sampled values over serial unidirectional multidrop point to point link	EN 61850-9-1	2003 ²⁾
ISO/IEC 7498-1	1994	Information technology - Open systems interconnection - Basic reference model Part 1: The basic model	EN ISO/IEC 7498-1	1995
ISO/IEC 8326	1996	Information technology - Open systems Interconnection - Session service definition	-	-
ISO/IEC 8327-1	1997	Information technology - Open Systems Interconnection - Connection-oriented Session protocol: Protocol specification	-	-
ISO/IEC 8649	1996	Information technology - Open systems interconnection - Service definition for the Association Control Service Element (ACSE)	-	-
ISO/IEC/TR2 8650-1	1996	Information technology - Open systems interconnection - Connection-oriented protocol for the association control service element: Protocol specification	-	-
ISO/IEC 8802-3	2001	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-
ISO/IEC 8822	1994	Information technology - Open Systems Interconnection - Presentation service definition	-	-
ISO/IEC 8823-1	1994	Information technology - Open Systems Interconnexion - Connection-oriented presentation protocol: Protocol specification	-	-
ISO/IEC 8824-1	2000	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
A1	2000		-	-
A2	2000		-	-
ISO/IEC 8825-1	2000	Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 9506-1	2003	Industrial automation systems - Manufacturing Message Specification Part 1: Service definition	-	-
ISO 9506-2	2003	Part 2: Protocol specification	-	-
IEEE 754	1985	Standard for Binary Floating-Point Arithmetic	-	-
IEEE 802.1Q	1998	IEEE Standards for local and metropolitan area networks: Virtual bridged local area networks	-	-
RFC 791	1981	Internet Protocol	-	-
RFC 792		Internet Control Message Protocol	-	-
RFC 793	1981	Transmission Control Protocol (TCP), Internet Activities Board recommended standard	-	-
RFC 826	1982	Address Resolution Protocol (ARP), Internet Activities Board elective standard	-	-
RFC 894	1984	Internet Protocol on Ethernet Networks, Internet Activities Board elective standard	-	-
RFC 919	1984	Broadcasting Internet Datagrams	-	-
RFC 1006	1989	ISO transport services on top of TCP: Version 3	-	-
RFC 1112	1989	Host Extensions for IP Multicasting	-	-

INTERNATIONAL STANDARD

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**Part 9-2:
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Reference number
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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.

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INTERNATIONAL STANDARD

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Communication networks and systems in substations –

Part 9-2: Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	9
4 Abbreviations.....	9
5 Communication stack.....	10
5.1 Overview of the protocol usage	10
5.2 Client/server services and communication profiles	11
5.3 SV service and communication profile	13
5.4 Restrictions	15
6 Mapping of IEC 61850-7-2 and IEC 61850-7-3 Data Attributes.....	16
7 Mapping of IEC 61850-7-2 classes and services	16
7.1 Classes of SV data sets	16
7.2 Definition of SV data sets	16
8 Mapping of the model for the transmission of sampled values	16
8.1 Overview	16
8.2 Mapping of the multicast sampled value control block class and services	16
8.3 Mapping of the unicast sampled value control block class and services	17
8.4 Mapping of the update of the sampled value buffer.....	19
8.5 Additional definitions for the transmission of sampled values.....	19
8.6 Definitions for basic data types	21
9 Conformance	21
9.1 Notation.....	21
9.2 PICS	21
10 Substation Configuration language (SCL).....	23
Annex A (informative) ISO/IEC 8802-3 frame format and ASN.1 basic encoding rules.....	24
Annex B (informative) Process bus architectures	27
Annex C (informative) Multicast address selection	28
Figure 1 – OSI reference model and profiles.....	10
Figure 2 – Structure of the tag header	14
Figure 3 – Concatenation of several ASDU's into one frame	19
Figure A. 1 – ISO/IEC 8802-3 frame format	24
Figure A.2 – Basic encoding rules format	25
Figure A.3 – Format of the tag octets	25
Figure A.4 – Example for an ASN.1 coded APDU frame structure	26
Figure B.1 – Alternative process bus architectures	27

Table 1 – Service requiring client/server communication profile	11
Table 2 – Service and protocols for client/server communication A-Profile	12
Table 3 – Service and Protocols for Peer TCP/IP T-Profile.....	12
Table 4 – Service requiring SV communication profile	13
Table 5 – Service and protocols for SV communication A-Profile	13
Table 6 – SV T-Profile	13
Table 7 – Default Virtual LAN IDs and priorities	14
Table 8 – Assigned Ethertype values	15
Table 9 – MMS TypeDescription definition for MSVCB MMS structure.....	17
Table 10 – Mapping of multicast sampled value services	17
Table 11 – MMS TypeDescription definition for USVCB MMS Structure.....	18
Table 12 – Mapping of unicast sampled value services	18
Table 13 – Encoding for the transmission of the sampled value buffer	20
Table 14 – Encoding for the basic data types.....	21
Table 15 – PICS for A-Profile support.....	22
Table 16 – PICS for T-Profile support.....	22
Table 17 – SV conformance statement.....	22
Table 18 – Definitions for SV SCL.....	23

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –**Part 9-2: Specific Communication Service Mapping (SCSM) –
Sampled values over ISO/IEC 8802-3**

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.
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International Standard IEC 61850-9-2 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

FDIS	Report on voting
57/690/FDIS	57/709/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 61850 consists of the following parts, under the general title *Communication networks and systems in substations*:

- Part 1: Introduction and overview
- Part 2: Glossary
- Part 3: General requirements
- Part 4: System and project management
- Part 5: Communication requirements for functions and device models
- Part 6: Configuration description language for communication in electrical substations related to IEDs
- Part 7-1: Basic communication structure for substation and feeder equipment – Principles and models
- Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)
- Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes
- Part 7-4: Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes
- Part 8-1: Specific Communication Service Mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
- Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link
- Part 9-2: Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3
- Part 10: Conformance testing ¹

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.

A bilingual version of this document may be issued at a later date.

¹ Under consideration.

INTRODUCTION

This part of IEC 61850 defines the SCSM for sampled values over ISO/IEC 8802-3. The intent of this SCSM definition is to supplement IEC 61850-9-1 to include the complete mapping of the sampled value model.

This part of IEC 61850 applies to electronic current and voltage transformers (ECT and EVT having a digital output), merging units, and intelligent electronic devices for example protection units, bay controllers and meters.

Process bus communication structures can be arranged in different ways as described in Annex B and IEC 61850-1. In addition to the transmission of sampled value data sets, which are directly connected to ISO/IEC 8802-3, a selection of IEC 61850-8-1 services are necessary to support the access to the SV control block. References to the relevant IEC 61850-8-1 services are provided in this SCSM. For less complex devices (for example merging units) the sampled value control block can be pre-configured, in which case there is no need to implement IEC 61850-8-1 services based on the MMS-Stack.

This document defines the mapping of sampled value class model (IEC 61850-7-2) to ISO/IEC 8802-3. This SCSM, in combination with IEC 61850-7 and IEC 61850-6, allows interoperability between devices from different manufacturers.

This standard does not specify individual implementations or products, nor does it constrain the implementation of entities and interfaces within a computer system. This standard specifies the externally visible functionality of implementations together with conformance requirements for such functionalities.

Reading Guide

- This document is an extended mapping specification of IEC 61850-9-1 and IEC 61850-8-1 to cover sampled value transmission over ISO/IEC 8802-3.
- This document can best be understood if the reader is thoroughly familiar with IEC 61850-7-1, IEC 61850-7-2, IEC 61850-7-3 and IEC 61850-7-4.
- The ACSI services defined in IEC 61850-7-2 are not explained in this part of the standard.

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 9-2: Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3

1 Scope

This part of IEC 61850 defines the Specific Communication Service Mapping (SCSM) for the transmission of sampled values according to the abstract specification in IEC 61850-7-2. The mapping is that of the abstract model on a mixed stack using direct access to an ISO/IEC 8802-3 link for the transmission of the samples in combination with IEC 61850-8-1.

Each SCSM consists of three parts:

- a specification of the communication stack being used,
- the mapping of the abstract specifications of IEC 61850-7 on the real elements of the stack being used, and
- the implementation specification of functionality, that is not covered by the stack being used.

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 60874-10-1, *Connectors for optical fibres and cables – Part 10-1: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1*

IEC 60874-10-2, *Connectors for optical fibres and cables – Part 10-2: Detail specification for fibre optic connector type BFOC/2,5 terminated to single-mode fibre type B1*

IEC 60874-10-3, *Connectors for optical fibres and cables – Part 10-3: Detail specification for fibre optic adaptor type BFOC/2,5 for single and multimode fibre*

IEC 61850-7-1, *Communication networks and systems in substations – Part 7-1: Basic communication structure for substation and feeder equipment – Part 7-1: Principles and models*

IEC 61850-7-2, *Communication networks and systems in substations – Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)*

IEC 61850-7-3, *Communication networks and systems in substations – Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes*

IEC 61850-7-4, *Communication networks and systems in substations – Part 7-4: Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes*

IEC 61850-8-1, *Communication networks and systems in substations – Part 8-1: Specific Communication Service Mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*

IEC 61850-9-1, *Communication networks and systems in substations – Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link*

ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 8326:1996, *Information processing systems – Open Systems Interconnection – Session service definition*

ISO/IEC 8327-1:1997, *Information technology – Open Systems Interconnection – Connection-oriented session protocols: Protocol specification*

ISO/IEC 8649:1996, *Information technology – Open Systems Interconnection – Service definition for the Associated Control Service Element*

ISO/IEC 8650-1:1996, *Information technology – Open Systems Interconnection – Connection-oriented protocol for the Association Control Service Element: Protocol specification*

ISO/IEC 8802-3:2001, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition*

ISO/IEC 8823-1:1994, *Information technology – Open Systems Interconnection – Connection-oriented presentation protocol: Protocol specification*

ISO/IEC 8824-1:1999, *Information technology – Abstract Syntax Notation One (ASN. 1): Specification of basic notation*
Amendment 1 (2000)
Amendment 2 (2000)

ISO/IEC 8825-1, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO 9506-1:2003, *Industrial automation systems – Manufacturing Message Specification – Part 1: Service definition*

ISO 9506-2:2003, *Industrial automation systems – Manufacturing Message Specification – Part 2: Protocol specification*

IEEE 754:1985, *IEEE Standard for Binary Floating-Point Arithmetic*

IEEE 802.1Q:1998, *IEEE Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks*

RFC 791, *Internet Protocol*; IETF, available at <<http://www.ietf.org>>

RFC 792, *Internet Control Message Protocol*; IETF, available at <<http://www.ietf.org>>

RFC 793, *Transmission Control Procedure*; IETF, available at <<http://www.ietf.org>>

RFC 826, *An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware*; IETF, available at <<http://www.ietf.org>>

RFC 894, *A Standard for the Transmission of IP datagrams over Ethernet Networks*; IETF, available at <<http://www.ietf.org>>

RFC 919, *Broadcasting Internet Datagrams*; IETF, available at <<http://www.ietf.org>>

RFC 1006 *ISO transport services on top of TCP: Version 3*; IETF, available at <<http://www.ietf.org>>

RFC 1112, *Host Extensions for IP Multicasting*; IETF, available at <<http://www.ietf.org>>

3 Terms and definitions

For the purposes of this document, the definitions given in IEC 61850-2 apply.

4 Abbreviations

ACSI	Abstract Communication Service Interface
ASDU	Application Service Data Unit
ASN.1	Abstract Syntax Notation number One
APCI	Application Protocol Control Information
APDU	Application Protocol Data Unit
APPID	Application Identifier
AUI	Attachment Unit Interface
BER	ASN.1 Basic Encoding Rules
BS	Bitstring
c	Conditional support. The item shall be implemented if the stated condition exists
CFI	Canonical Format Identifier
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
DF	Data Frame
DO	Data Object
ECT	Electronic Current Transformer
EVT	Electronic Voltage Transformer
F/S	Functional Standard
GOOSE	Generic Object Oriented Substation Event
GSSE	Generic Substation Status Event
i	Out-of-scope: The implementation of the item is not within the scope of this standard
ICD	IED Configuration Description
IED	Intelligent Electronic Device
LSDU	Link Layer Service Data Unit
m	Mandatory support. The item shall be implemented.
MAC	Media Access Control
MAU	Medium Attachment Unit
MMS	Manufacturing Message Specification (ISO 9506)
MSVCB	Multicast Sampled Value Control Block