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

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

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN 61850-9-1:2003 sisaldab Euroopa standardi EN 61850-9-1:2003 ingliskeelset teksti. Käesolev dokument on jõustatud 09.09.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN 61850-9-1:2003 consists of the English text of the European standard EN 61850-9-1:2003. This document is endorsed on 09.09.2003 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: Lays down the specific communication service mappings for the communication between bay and process level; specifies a mapping on a serial unidirectional multidrop point to point link in accordance with IEC 60044-8. Applies to the communication between merging units of electronic current or voltage-transformers and bay devices such as protection relays	**Scope:** Lays down the specific communication service mappings for the communication between bay and process level; specifies a mapping on a serial unidirectional multidrop point to point link in accordance with IEC 60044-8. Applies to the communication between merging units of electronic current or voltage-transformers and bay devices such as protection relays

ICS 33.200

Võtmesõnad: buildings, electrical enginee, electrical equ, electrical protection equipment, electronic equipment, energy supply systems (buildings), links, mapping, power supplies, signal transmission, specification (approval), specifications, substation, telecommunications

EUROPEAN STANDARD **EN 61850-9-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM June 2003

ICS 33.200

English version

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

(IEC 61850-9-1:2003)

Réseaux et systèmes de communication dans les postes
Partie 9-1: Implémentation spécifique des services de communication - Transmission de valeurs numérisées par une liaison série unidirectionnelle point à point multi brins
(CEI 61850-9-1:2003)

Kommunikationsnetze und -systeme in Stationen
Teil 9-1: Spezifische Abbildung von Kommunikationsdiensten (SCSM) - Abgetastete Werte über serielle Simplex-Mehrfach-Punkt-zu-Punkt-Verbindung
(IEC 61850-9-1:2003)

This European Standard was approved by CENELEC on 2003-05-01. 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, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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

Ref. No. EN 61850-9-1:2003 E

Foreword

The text of document 57/619/FDIS, future edition 1 of IEC 61850-9-1, 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 61850-9-1 on 2003-05-01.

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) 2004-02-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-05-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A and ZA are normative and annexes B, C and D are informative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61850-9-1:2003 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 60044-7	- [1)]	Instrument transformers Part 7: Electronic voltage transformers	EN 60044-7	2000 [2)]
IEC 60044-8	- [1)]	Part 8: Electronic current transformers	EN 60044-8	2002 [2)]
IEC 60874-10-1	1997	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 61850-7-2	- [1)]	Communication networks and systems in substations 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)]
ISO/IEC 8802-3	- [1)]	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 8825-1	- [1)]	Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)	-	-

1) Undated reference.

2) Valid edition at date of issue.

Publication	Year	Title	EN/HD	Year
IEEE 802.1Q	1998	IEEE Standards for local and metropolitan area networks: Virtual bridged local area networks	-	-
IEEE 802.3	- [1)]	Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-

INTERNATIONAL STANDARD

IEC 61850-9-1

First edition
2003-05

Communication networks and systems in substations –

Part 9-1:
Specific Communication Service Mapping (SCSM) –
Sampled values over serial unidirectional multidrop point to point link

Reference number
IEC 61850-9-1:2003(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 (http://www.iec.ch/searchpub/cur_fut.htm) 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 (http://www.iec.ch/online_news/justpub/jp_entry.htm) is also available by email. Please contact the Customer Service Centre (see below) for further information.

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INTERNATIONAL STANDARD

IEC 61850-9-1

First edition
2003-05

Communication networks and systems in substations –

Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organisation for standardisation comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardisation in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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 organisations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organisation for Standardisation (ISO) in accordance with conditions determined by agreement between the two organisations.
2) The formal decisions or agreements of the 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 National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61850-9-1 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
57/619/FDIS	57/636/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 [1]

Part 3: General requirements

Part 4: System and project management

Part 5: Communication requirements for functions and devices models [2]

Part 6: Configuration description language for communication in electrical substations related to IEDs [1]

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/IEC 9506-1 and ISO/IEC 9506-2) and to ISO/IEC 8802-3 [1]

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 [1]

Part 10: Conformance testing [1]

The relationship between IEC 60044-8 and this standard is as follows:

IEC 60044-8 defines a merging unit as interface to electronic current and voltage transformers. Data objects provided by that merging unit are specified in IEC 60044-8. This standard specifies a serial communication interface between the merging unit and equipment using the digital output of the merging unit like protection or metering equipment. For the specification of that serial interface, a subset of the abstract communication services defined in IEC 61850-7-2 are mapped on an ISO/IEC 8802-3 based communication link.

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 standard may be issued at a later date.

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1 Under consideration.

2 To be published.

INTRODUCTION

This part of IEC 61850 applies to electronic current and voltage transformers (ECT and EVT) with a digital output via a merging unit, for use with electronic measuring instruments and electronic protective devices.

The transformer technology can be based on optical arrangements equipped with electronic components, on air core coils (with or without a built-in integrator) or, on iron core coils with integrated burden and used as a current to voltage converter, alone or equipped with electronic components.

For digital output, this standard takes into account a point to point connection from the merging unit to electronic measuring instruments and electronic devices.

This mapping 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.

Reading Guide

- The point to point transformer interface as defined here is based on the concepts described in IEC 60044-8. This standard extends this concept and proposes an alternative link layer to provide a solution for transmitting sampled measured values via Ethernet based interfaces. For the definition and measurement of the accuracy, synchronisation methods, data rates etc. of the transformers, refer to IEC 60044-8.

- This document can best be understood if the reader is thoroughly familiar with Parts 7-1, 7-2, 7-3 and 7-4 of this Standard.

- No explanations to the ACSI services are given in this part of the standard. For detailed information about the use of the ACSI services, refer to IEC 61850-7-2.

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link

1 Scope

This part of IEC 61850 specifies the specific communication service mappings for the communication between bay and process level and it specifies a mapping on a serial unidirectional multidrop point to point link in accordance with IEC 60044-8. This part of IEC 61850 specifies a mapping of the abstract service for the transmission of sampled values (as defined in IEC 61850-7-2) on a serial unidirectional multidrop point to point link in accordance with IEC 60044-8. It applies to the communication between merging units of electronic current (ECT) or voltage-transformers (EVT) and bay devices such as protection relays. If higher requirements on sampling rate, further sampled measured value data sets in addition to the universal data set, inter-bay communication and synchronisation apply, these will be covered by IEC 61850-9-2[3]. Figure 1 shows the schematics of this interface.

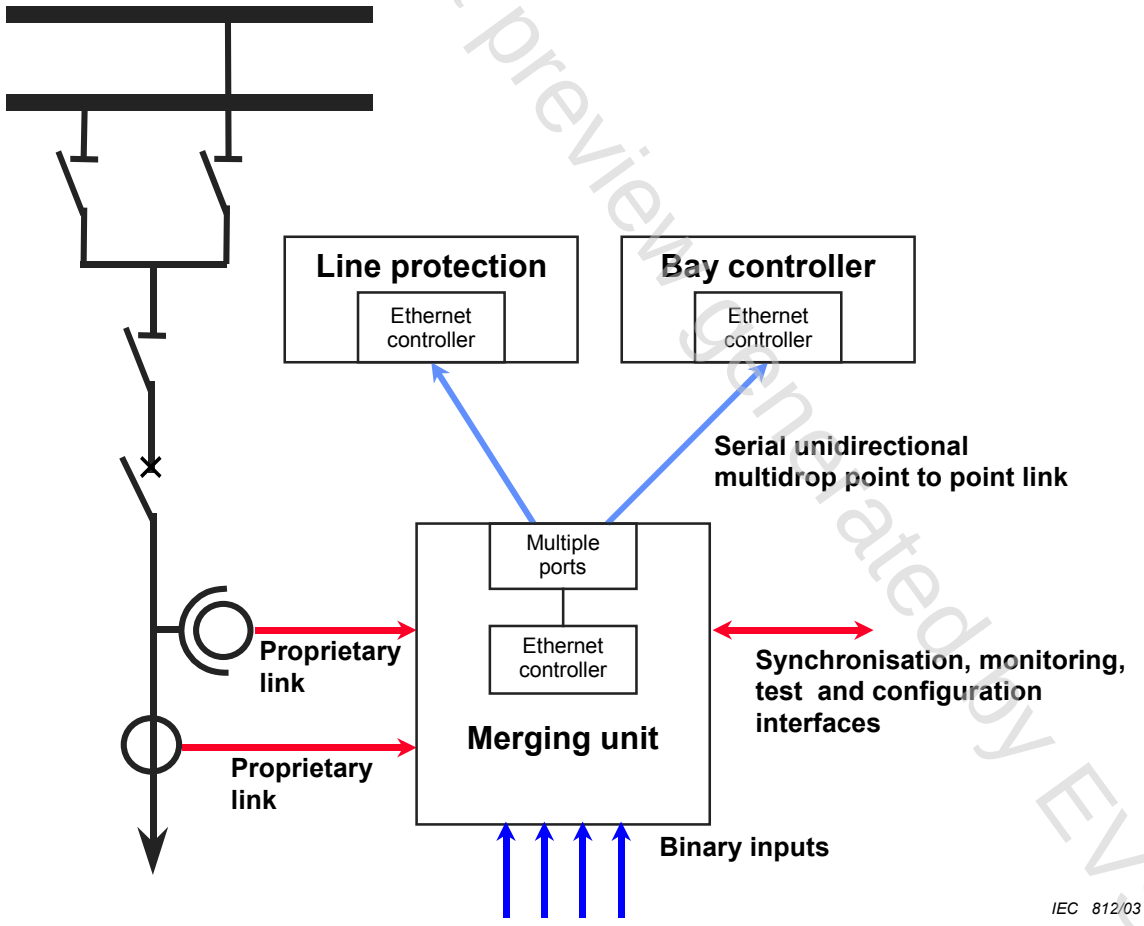

Figure 1 – Example for the use of the serial unidirectional multidrop point to point link

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3 Under consideration.

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 60044-7: *Instrument Transformers – Part 7: Electronic voltage transformers*

IEC 60044-8: *Instrument Transformers – Part 8: Electronic current transformers*

IEC 60874-10-1:1997, *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 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*

ISO/IEC 8802-3: *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 8825-1: *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

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

IEEE 802.3: *Information Technology – Telecommunication and Information Exchange Between Systems – LAN/MAN – Specific Requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*

3 Terms and definitions

For the purpose of this part of IEC 61850, the definitions of IEC 61850-2[4], IEC 60044-7 and IEC 60044-8 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
AUI	Attachment Unit Interface
BER	ASN.1 Basic Encoding Rules
CFI	Canonical format identifier

4 Under consideration.