

Communication networks and systems in substations —

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

The European Standard EN 61850-9-1:2003 has the status of a
British Standard

ICS 33.200

National foreword

This British Standard is the official English language version of EN 61850-9-1:2003. It is identical with IEC 61850-9-1:2003.

The UK participation in its preparation was entrusted to Technical Committee PEL/57, Power systems control, which has the responsibility to:

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**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)

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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 57/619/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.

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- 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with the EN have to be withdrawn (dow) 2006-05-01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.

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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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

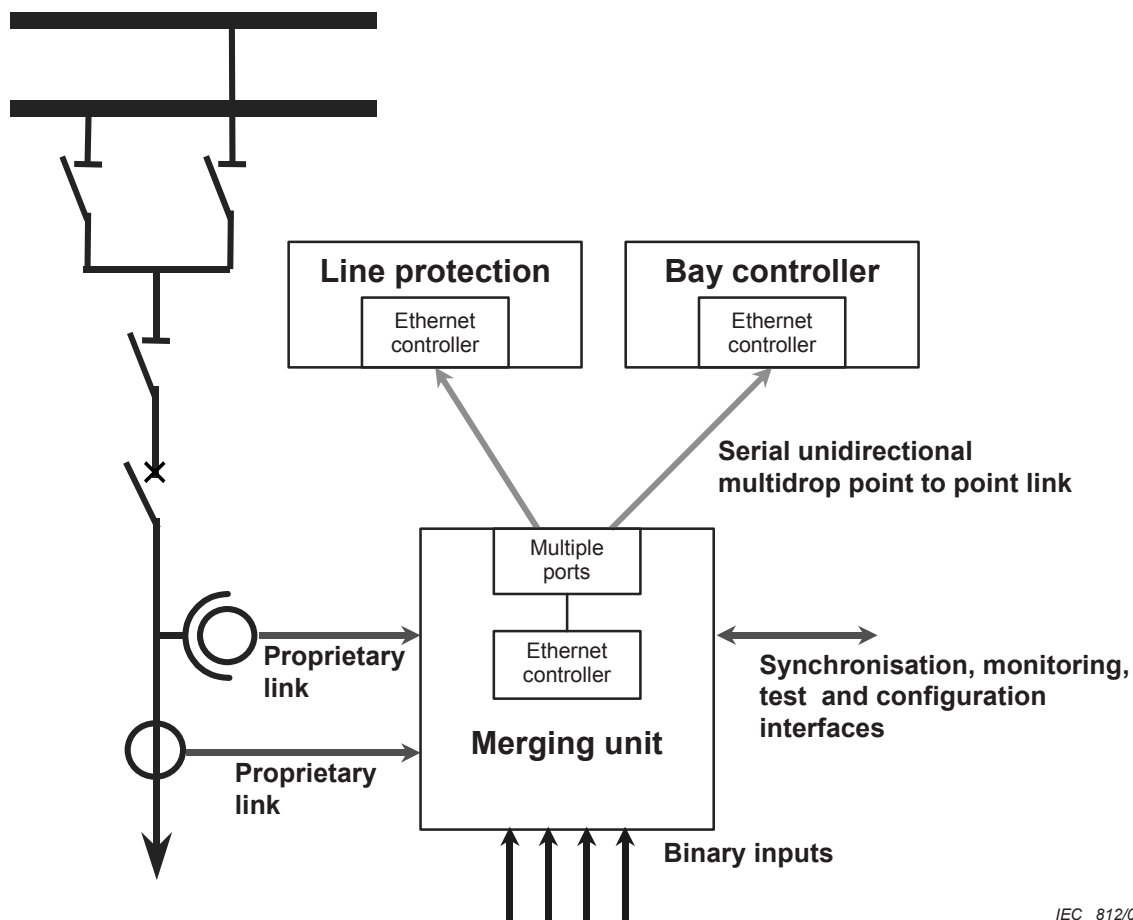
- The point to point transformer interface as defined here is based on the concepts described in IEC 60044-8. This standard extends this concept and proposes an alternative link layer to provide a solution for transmitting sampled measured values via Ethernet based interfaces. For the definition and 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 61850-9-2¹. Figure 1 shows the schematics of this interface.



IEC 812/03

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

¹ 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 61850-22, 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

² Under consideration.

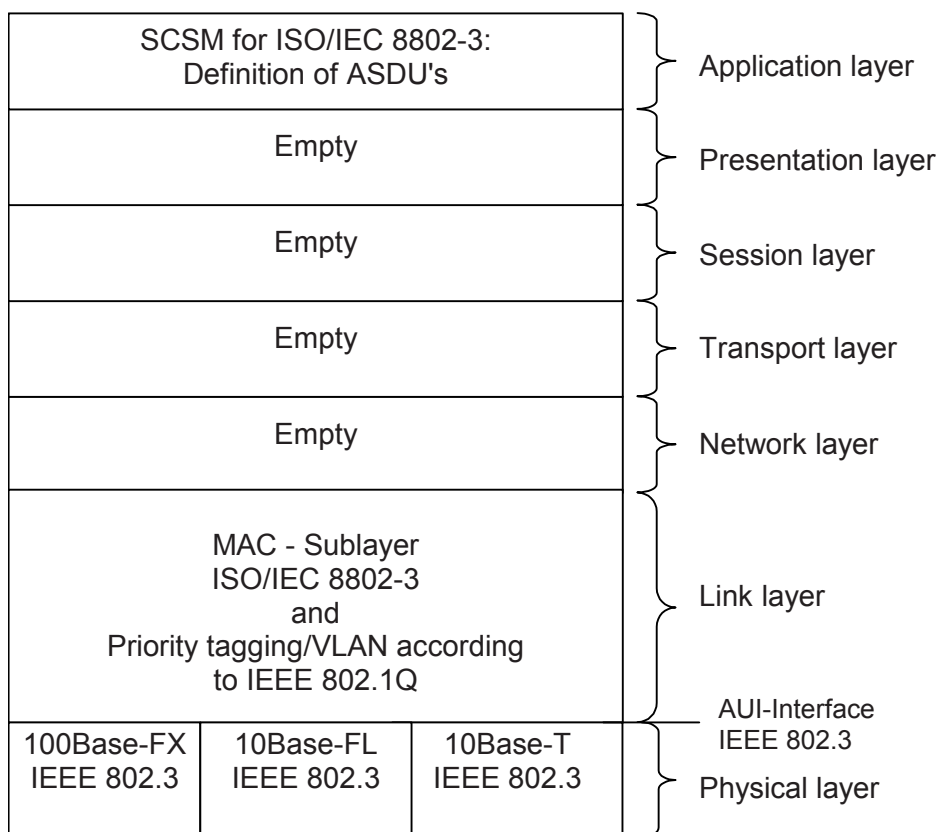
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
DF	Data Frame
DO	Data Object
DSG	Data Set Group
ECT	Electronic Current Transformers
EVT	Electronic Voltage Transformers
LSDU	Link Layer Service Data Unit
MAC	Media Access Control
MSVCB	Multicast Sampled Value Control Block
MU	Merging Unit
PDU	Protocol Data Unit
SBO	Select Before Operate
SC	Secondary Converter
SCSM	Specific Communication Services Mapping
SIG	Status Indication Group
SAV	Sampled Analogue Value
TCI	Tag Control Information
TPID	Tag Protocol Identifier
VID	VLAN Identifier
VLAN	Virtual Local Area Network

5 Principle of mapping to the serial unidirectional multidrop point to point link

This Clause gives an overview of the mapping to the serial unidirectional multidrop point to point link. It defines the communication stack and data unit structures for the application layer. Restrictions to the application that are a consequence of this mapping are defined as well.

5.1 Communication stack

Figure 2 gives an overview of the communication stack. The link layer is in conformity with ISO/IEC 8802-3. This standard is usually referred to as Ethernet. In the following, the term Ethernet will be used instead of ISO/IEC 8802-3 (CSMA/CD).



IEC 813/03

Figure 2 – Communication stack

The relevant device standards will specify whether 100Base-FX, 10Base-FL or 10Base-T is used, depending on the application.

5.1.1 Physical layer

5.1.1.1 Specifications for the Medium Attachment Unit (MAU)

The connection of the merging unit to the secondary equipment can be an optical fibre transmission system. By taking into account and solving the EMC requirements, a copper based transmission system is an option.

5.1.1.2 Fibre optic transmission system

The preferred version of the fibre optic transmission system is IEEE 802.3 100Base-FX. The 10Base-FL system could be used also for sampling rates below $48 \times f_r$ (a selection guide is given in Annex B). This interface shall be used for applications where this media interface is already used for other communication links. It is recommended to use the BFOC connectors (IEC 60874-10-1). Two fibres are always necessary for the optical fibre transmission system in order to support the link supervision.

5.1.1.3 Twisted-pair transmission system

The twisted-pair medium according to IEEE 802.3 10Base-T could be used as an option, if appropriate electromagnetic shield measures are considered.