

Communication networks and systems in substation —

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

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National foreword

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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
(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.

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CENELEC

European Committee for Electrotechnical Standardization
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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.

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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.

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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

MU	Merging Unit
o	Optional support. The implementor may decide to implement the item
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
SCSM	Specific Communication Services Mapping
r	readable
RIF	Routing Information Field (ISO/IEC 8802-5)
SV	Sampled Value
TCI	Tag Control Information
TPID	Tag Protocol Identifier
USVCB	Unicast Sampled Value Control Block
VID	VLAN Identifier
VLAN	Virtual Local Area Network
VMD	Virtual Manufacturing Device
w	Writeable
x	Excluded: The implementor shall not implement this item
XML	Extensible Markup Language

5 Communication stack

5.1 Overview of the protocol usage

The OSI reference model (ISO/IEC 7498-1) defines a model based upon the concept of layering of communication functions. The model includes 7 layers and specifies the functional requirements for each layer to achieve a robust communication system. The model does not specify the protocols to be used to achieve the functionality, nor does it restrict the solution to a single set of protocols.

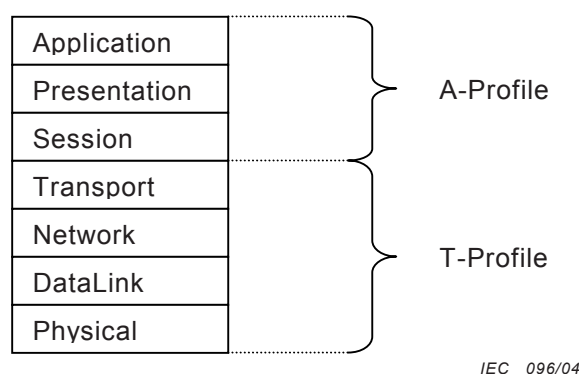


Figure 1 – OSI reference model and profiles

The use of ISO Application (A-Profile) and Transport (T-Profile) Profiles (see Figure 1) describes the various stack profiles. An ISO A-Profile is the set of specifications and agreements relating to the upper three (3) layers of the ISO OSI reference model (for example the application, presentation, and session layers). An ISO T-Profile is the set of specifications and agreements relating to the lower four (4) layers of the ISO OSI reference model (for example the transport, network, datalink and physical layers).