

INTERNATIONAL STANDARD

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**Communication networks and systems for power utility automation –
Part 9-2: Specific communication service mapping (SCSM) – Sampled values
over ISO/IEC 8802-3**

**Réseaux et systèmes de communication pour l'automatisation des systèmes
électriques –
Partie 9-2: Mise en correspondance des services de communication spécifiques
(SCSM) – Valeurs échantillonnées sur ISO/CEI 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
5.2.1 Client/server services	11
5.2.2 A-Profile	12
5.2.3 TCP/IP T-Profile	13
5.3 SV service and communication profile	13
5.3.1 SV mapping overview	13
5.3.2 A-Profile	14
5.3.3 T-Profile	14
5.4 Restrictions	17
6 Mapping of IEC 61850-7-2 and IEC 61850-7-3 data attributes	17
7 Mapping of IEC 61850-7-2 classes and services	17
7.1 Classes of SV data sets	17
7.2 Definition of SV data sets	17
8 Mapping of the model for the transmission of sampled values	18
8.1 Overview	18
8.2 Mapping of the multicast sampled value control block class and services	18
8.2.1 Multicast sampled value control block definition	18
8.2.2 MSV Services.....	19
8.3 Mapping of the unicast sampled value control block class and services	20
8.3.1 Unicast sampled value control block definition.....	20
8.3.2 USV Services	21
8.4 Mapping of the update of the sampled value buffer.....	21
8.5 Additional definitions for the transmission of sampled values.....	21
8.5.1 Application layer functionality	21
8.5.2 Presentation layer functionality.....	22
8.6 Definitions for basic data types – Presentation layer functionality	24
9 Conformance.....	24
9.1 Notation.....	24
9.2 PICS	24
9.2.1 Profile conformance.....	24
9.2.2 SV Services	25
10 Substation configuration language (SCL).....	25
11 SCSM specific address element definitions	26
Annex A (informative) ISO/IEC 8802-3 frame format and ASN.1 basic encoding rules.....	27
Annex B (informative) Multicast address selection	32

Figure 1 – OSI reference model and profiles.....	11
Figure 2 – Structure of the tag header	15
Figure 3 – Reserved 1	16
Figure 4 – Concatenation of several ASDU's into one frame	22
Figure A.1 – ISO/IEC 8802-3 frame format – No link redundancy	27
Figure A.2 – ISO/IEC 8802-3 frame format – Link redundancy: HSR	28
Figure A.3 – ISO/IEC 8802-3 frame format – Link redundancy: PRP	29
Figure A.4 – Basic encoding rules format	30
Figure A.5 – Format of the tag octets	30
Figure A.6 – Example for an ASN.1 coded APDU frame structure	31
Table 1 – Service requiring client/server communication profile	12
Table 2 – Service and protocols for client/server communication A-Profile	12
Table 3 – Service and protocols for peer TCP/IP T-Profile	13
Table 4 – Service requiring SV communication profile	13
Table 5 – Service and protocols for SV communication A-Profile	14
Table 6 – SV T-Profile	14
Table 7 – Default Virtual LAN IDs and priorities.....	15
Table 8 – Assigned Ethertype values	16
Table 9 – MMS TypeDescription definition for MSVCB MMS structure.....	18
Table 10 – DstAddress structure	19
Table 11 – Mapping of multicast sampled value services	19
Table 12 – MMS TypeDescription definition for USVCB MMS structure	20
Table 13 – Mapping of unicast sampled value services	21
Table 14 – Encoding for the transmission of the sampled value buffer	22
Table 15 – Encoding for the basic data types.....	24
Table 16 – PICS for A-Profile support.....	25
Table 17 – PICS for T-Profile support.....	25
Table 18 – SV conformance statement.....	25
Table 19 – Definitions for SV SCL.....	26
Table B.1 – Recommended multicast addressing example.....	32

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 9-2: Specific communication service mapping (SCSM) – Sampled values over ISO/IEC 8802-3

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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
57/1133/FDIS	57/1161/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 second edition cancels and replaces the first edition published in 2004 and constitutes a technical revision.

Main changes with respect to the first edition are:

- addition of an optional Link redundancy layer (Tables 3 to 6);
- redefinition of “reserved” fields in link layer (5.3.3.4);
- evolution of USVCB and MSVCB components (Tables 9, 10, 12);
- evolution of encoding for the transmission of the sampled value buffer (Table 14).

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61850 series, under the general title: *Communication networks and systems for power utility automation*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date 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.

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 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, or sensors.

Process bus communication structures can be arranged in different ways as described in IEC/TR 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 is 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 61850-8-1 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 IEC 61850.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

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 series on the real elements of the stack being used, and
- the implementation specification of functionality, which 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* (withdrawn)

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* (withdrawn)

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* (withdrawn)

IEC/TR 61850-1, *Communication networks and systems for power utility automation – Part 1: Introduction and overview*

IEC/TS 61850-2, *Communication networks and systems for power utility automation – Part 2: Glossary*

IEC 61850-6, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs*

IEC 61850-7-1, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Part 7-1: Principles and models*

IEC 61850-7-2, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-4, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61850-8-1, *Communication networks and systems for power utility automation – 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/TS 62351-6, *Power systems management and associated information exchange – Data and communications security – Part 6: Security for IEC 61850*

IEC 62439-3:2010, *Industrial communication networks – High availability automation networks – Part 3: Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR) Amendment 1*¹

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

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

ISO/IEC 8327-1:1996, *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 8802-3:2000, *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 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN. 1): Specification of basic notation*

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*

¹ To be published.

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> [cited on 2011-03-18]

RFC 792, *Internet Control Message Protocol*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

RFC 793, *Transmission Control Procedure*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

RFC 826, *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> [cited on 2011-03-18]

RFC 894, *A Standard for the Transmission of IP Datagrams over Ethernet Networks*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

RFC 919, *Broadcasting Internet Datagrams*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

RFC 1006 *ISO transport services on top of TCP: Version 3*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

RFC 1112, *Host Extensions for IP multicasting*; IETF, available at <http://www.ietf.org> [cited on 2011-03-18]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC/TS 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