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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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INTERNATIONAL ELECTROTECHNICAL COMMISSION
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FOREWORD

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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• withdrawn;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.

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[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