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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

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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

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61850-9-2 edition 2.1 contains the second edition (2011-09) [documents 57/1133/FDIS and 57/1161/RVD] and its amendment 1 (2020-02) [documents 57/2112/FDIS and 57/2135/RVD].

International Standard IEC 61850-9-2 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

Compared to the second edition, this first revision of the second edition:

a) updates the normative references
b) adds a synchronization clause (Clause 9); adds references to IEC 61588:2009 and IEC/IEEE 61850-9-3 for SV synchronization;
c) modifies physical layer specification in T-Profile;
d) modifies MSVCB components (Table 9 and Table 10);
e) deprecates usage of USVCB;
f) modifies encoding for the transmission of the sampled value buffer (Table 14);
g) adds Table 20;
h) adds Table 21;
i) adds Annex C related to possible backward compatibility issues between revisions of this standard;
j) provides clarifications and corrections to the second edition of IEC 61850-9-2, based on the tissues = { 1349, 1272, 1055, 944, 863 }.

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 the base publication and its amendment will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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 all electronic sensors related to process measurements of the T logical node group having a digital sampled value output stream such as current and voltage transformers, merging units, or devices acting as T group publishers as well as subscribing intelligent electronic devices, for example protection units, bay controllers and meters.

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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems*

IEC TS 61850-2, *Communication networks and systems in substations – 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 61850-7-2, *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 61850-8-1, *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/IEEE 61850-9-3, *Communication networks and systems for power utility automation – Part 9-3: Precision Time Protocol profile for power utility automation*

IEC TR 61850-90-4, *Communication networks and systems for power utility automation – Part 90-4: Network engineering guidelines*

IEC 62351-6[1], *Power systems management and associated information exchange – Data and communications security – Part 6: Security for IEC 61850*

IEC 62439-3:2016, *Industrial communication networks – High availability automation networks – Part 3: Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR)*

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/IEEE 8802-3, *Standard for Ethernet*

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 4217:2015, *Code for the representation of currencies*

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*

[1] Under preparation. Stage at the time of publication: IEC/PRVC 62351-6:2020.

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, *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*

RFC 2460, *Internet Protocol, Version 6 (IPv6) Specification, IETF,* available at http://www.ietf.org

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC/TS 61850-2 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Abbreviated terms

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
DF	data frame
DO	data object
F/S	functional standard