IEC 61850-7-2

Edition 2.1 2020-02

CONSOLIDATED VERSION

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.200

ISBN 978-2-8322-7859-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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DISCLAIMER
This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 61850-7-2 bears the edition number 2.1. It consists of the second edition (2010-08) [documents 57/1065/FDIS and 57/1083/RVD] and its amendment 1 (2020-02) [documents 57/2100/FDIS and 57/2131/RVD]. The technical content is identical to the base edition and its amendment.

International Standard IEC 61850-7-2 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

This edition includes the following significant technical changes with respect to the previous edition:

a) class diagrams have been updated;

b) data types have been gathered in one document and harmonized with IEC 61850-6:2007B;

c) errors and typos have been corrected;

d) CDCs for service tracking have been moved to IEC 61850-7-3:2007B to gather all CDCs in one document;

e) several terms have been harmonized with those in the other parts;

f) definition and explanation of values for each attribute were moved into the class definition tables;

g) definition and explanation of values for each service parameter were move to service parameter definition tables;

h) harmonization of the namingscheme for Enumeration and CodedEnum types to <EnumTitle>Kind resp. <CodedEnumTitle>Kind – fully backward compatible as the value of the literal have not changed;

i) deprecation of the USVCB model.

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

– provides clarifications and corrections to the second edition of IEC 61850-7-2, based on the tissues = { 728, 730, 778, 780, 783, 786, 813, 820, 850, 852, 858, 860, 861, 869, 875, 876, 943, 970, 1038, 1050, 1061, 1062, 1071, 1091, 1092, 1116, 1122, 1127, 1145, 1154, 1194, 1202, 1232, 1242, 1252, 1276, 1283, 1307, 1308, 1319, 1338, 1341, 1356, 1377, 1386, 1428, 1432, 1433, 1435, 1439, 1455, 1569, 1589, 1622, 1630, 1650, 1652 }.

Content in some parts of Clause 6, some UML diagrams, as well as Annex B are automatically generated from the UML model.

Contrary to usual IEC practice, for ease of use in this case, all tables and figures (including those which have been added since Edition 2) have been numbered consecutively in the amendment and the consolidated version.

This IEC standard includes Code Components i.e. components that are intended to be directly processed by a computer. Such content is any text found between the markers <CODE BEGINS> and <CODE ENDS>, or otherwise is clearly labeled in this standard as a Code Component.

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

In this document, the following print types are used:

– **bold** is used to highlight defined terms,

– **Tahoma bold** is used where the difference between a capital i (I) and a small L (l) is important to see.

– Table numbering with additional characters 'N' (e.g. Table 16N) are tables following the Ed 2.1 numbering.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document is part of a set of definitions which details a layered utility communication architecture. This architecture has been chosen to provide abstract definitions of classes and services such that the definitions are independent of specific protocol stacks, implementations, and operating systems.

The IEC 61850 series is intended to provide interoperability between a variety of devices. Communication between these devices is achieved by the definition of a hierarchical class model (for example, logical device, logical node, data, data set, report control, or log) and services provided by these classes (for example, get, set, report, define, delete) in IEC 61850-7-x.

This document defines the abstract communication service interface (ACSI) for use in the utility application domain, which requires real-time cooperation of intelligent electronic devices. The ACSI has been defined so as to be independent of the underlying communication systems. Specific communication service mappings[1] (SCSM) are specified in IEC 61850-8-x and IEC 61850-9-x.

This document defines the abstract communication service interface in terms of

– a hierarchical class model of all information that can be accessed via a communication network,

– services that operate on these classes, and

– parameters associated with each service.

The ACSI description technique abstracts away from all the different approaches to implement the cooperation of the various devices.

This document does not provide comprehensive tutorial material. It is recommended that IEC 61850-5 and IEC 61850-7-1 be read first in conjunction with IEC 61850-7-2 and IEC 61850-7-3.

NOTE 1 Refer to International Electrotechnical Vocabulary, IEC 60050, for general glossary definitions.

NOTE 2 Abstraction in ACSI has two meanings. First, only those aspects of a real device (for example, a breaker) or a real function that are visible and accessible over a communication network are modelled. This abstraction leads to the hierarchical class models and their behaviour defined in IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4. Second, the ACSI abstracts from the aspect of concrete definitions on how the devices exchange information; only a conceptual cooperation is defined. The concrete information exchange is defined in the SCSMs.

NOTE 3 Examples use names of classes (for example XCBR for a class of a logical node) defined in IEC 61850-7-4 and IEC 61850-7-3. The normative names are defined in IEC 61850-7-4 and IEC 61850-7-3 only.

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1 The ACSI is independent of the specific mapping. Mappings to standard application layers or middle ware technologies are possible.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)

1 Scope

1.1 General

This document applies to the ACSI communication for utility automation. The ACSI provides the following abstract communication service interfaces.

a) Abstract interface describing communications between a client and a remote server for
   – real-time data access and retrieval,
   – device control,
   – event reporting and logging,
   – setting group control,
   – self-description of devices (device data dictionary),
   – data typing and discovery of data types, and
   – file transfer.
b) Abstract interface for fast and reliable system-wide event distribution between an application in one device and many remote applications in different devices (publisher/subscriber) and for transmission of sampled measured values (publisher/subscriber).

1.2 Namespace name and version

This new clause is mandatory for any IEC 61850 namespace (as defined by the part 7-1 of IEC 61850 Edition 2).

The parameters which identify this new release of this namespace are:

- Namespace version: 2007
- Namespace revision: B
- Namespace name: “IEC 61850-7-2:2007B”
- Namespace release: 3
- Namespace release date: 2019-10-02

The table below provides an overview of all published versions of this namespace.

Edition	Publication date	Webstore	Namespace
Edition 1.0	2003-05	IEC 61850-7-2:2003	IEC 61850-7-2:2003
Edition 2.0	2010-10	IEC 61850-7-2:2010	IEC 61850-7-2:2007
Amendment 1 of Edition 2.0	2020-02	IEC 61850-7-2:2010/AMD1:2020	IEC 61850-7-2:2007B
Edition 2.1	2020-02	IEC 61850-7-2:2010+AMD1:2020 CSV	IEC 61850-7-2:2007B

1.3 Code Component distribution

The Code Component will be available in light and full version:

– Full version will contain definition of the whole Basic Types defined in this standard with the documentation associated and access will be restricted to purchaser of this part
– Light version will not contain the documentation but will contain the whole definition of the Basic Types as per full version, and this light version will be freely accessible on the IEC website for download, but the usage remains under the licensing conditions.

The link for downloading the light version of this code component is:

http://www.iec.ch/public/TC57/supportdocuments/IEC_61850-7-2.NSD.2007B3.light.zip

The Code Components for IEC 61850 data models (like basic types, presence conditions, … definition in this IEC standard) are available as the file format NSD defined by standard IEC 61850-7-7.

The Code Component(s) included in this IEC standard are potentially subject to maintenance works and user shall select the latest release in the repository located at:

http://www.iec.ch/TC57/supportdocuments

The latest version/release of the document will be found by selecting the file IEC_61850-7-2.NSD.{VersionStateInfo}.light.zip with the filed VersionStateInfo of the highest value.

Each Code Component is a ZIP package containing the electronic representation of the Code Component itself, with a file describing the content of the package (IECManifest.xml).

The IECManifest contains different sections giving information on:

– The copyright notice
– The identification of the code component
– The publication related to the code component
– The list of the electronic files which compose the code component
– An optional list of history files to track changes during the evolution process of the code component

The life cycle of a code component is not restricted to the life cycle of the related publication. The publication life cycle goes through two stages, Version (corresponding to an edition) and Revision (corresponding to an amendment). A third publication stage (Release) allows publication of Code Component without need to publish an amendment.

This is useful when InterOp Tissues need to be fixed. Then a new release of the Code Component will be released, which supersedes the previous release, and distributed through the IEC TC57 web site.

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

IEC 61850-5, *Communication networks and systems for power utility automation - Part 5: Communication requirements for functions and device models*

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 61850-7-1:2020, *Communication networks and systems for power utility automation - Part 7-1: Basic communication structure - Principles and models*

IEC 61850-7-3:2020, *Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes*

IEC 61850-7-4:2020, *Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes*

ISO 4217, *Codes for the representation of currencies and funds*

IEEE 754, *Standard for Floating-Point Arithmetic*