IEC TS 61850-2

Edition 2.0 2019-04

TECHNICAL SPECIFICATION

Communication networks and systems for power utility automation – Part 2: Glossary

IEC TS 61850-2:2019-04(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.200

ISBN 978-2-8322-6799-8

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 2: Glossary

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61850-2, which is a technical specification, has been prepared by IEC technical committee 57: Power system management and associated information exchange.

This second edition cancels and replaces the first edition, published in 2003. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

a) definition of new definitions used in the new edition of the IEC 61850 standard series (abstract data model for communication; application function; backward compatible; common data class; communication system; composition; configuration compatibility list; configured IED description CID; conformance; data object class; decomposition; documentation; domain; forward compatible; function-related naming; granularity; IED configuration tool; IED parameters; instantiated IED description IID; intelligent electronic device capability description ICD; language; local function; logical device; mandatory data attribute; mandatory data object; meta model; namespace; object reference; optional data attribute; optional data object; performance; power system; power utility automation system; PUAS installation; PUAS parameter set; PUAS product family; product-related naming; secondary system; semantic name; system configuration description SCD; system configuration language SCL; system configuration language implementation conformance statement SICS; system configuration language version; system master; system configuration tool SCT; system design specification; system extension description SED; system related test; system requirement specification; system specification description SSD; system specification tool; technical issued conformance test TICS; tool; virtualisation; extensible mark-up language schema XSD);

b) updating of existing definitions to the new domain power utility automation of the IEC 61850 standard series and to provide homogeneity (abstract communication service interface ACSI; bay; client; data; data attribute; data object; device; distributed function; engineering tools; expandability; factory acceptance test FAT; flexibility; function; gateway; generic object-oriented system event GOOSE; generic system event model; IED parameter set; information model; instance; intelligent electronic device IED; interchangeability; logical connection; logical node; logical system; manufacturer; merging unit; model implementation conformance statement MICS; physical connection; physical device; physical system; piece of information for communication PICOM; process level functions; process related station level functions; protocol; protocol implementation conformance statement PICS; protocol implementation extra information for testing PIXIT; redundancy; scalability; server; site acceptance test SAT; specific communication service mapping SCSM; station level functions; supporting tools; system; system integrator; system life cycle; system parameters; system test; test equipment; type test);

c) removal of deprecated definitions (logical device class; generic system state event; substation automation system);

d) provision of clarifications and corrections to the first edition of IEC 61850-2.

The text of this Technical Specification is based on the following documents:

Draft TS	Report on voting
57/1970/DTS	57/2024/RVDTS

Full information on the voting for the approval of this Technical Specification can be found in the report on voting indicated in the above table.

This document 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 for power utility automation*.

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 – Principles and models

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

Part 7-3: Basic communication structure – Common data classes

Part 7-4: Basic communication structure – Compatible logical node classes and data object classes

Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO/IEC 9506-1 and ISO/IEC 9506-2) over ISO/IEC 8802-3

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

Part 9-3: Precision time protocol profile for power utility automation

Part 10: Conformance testing

The committee has decided that the contents of this publication 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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 2: Glossary

1 Scope

This part of IEC 61850, which is a Technical Specification, applies to power utility automation systems (PUAS). It defines the communication between intelligent electronic devices (IEDs) in the power utility automation system and the related system requirements.

This document contains the glossary of specific terminology and definitions used in the context of Power Utility Automation Systems within the various parts of the standard.

This document is, by its nature, a living part since new definitions and abbreviations will be created continuously in the standard documents that are being written inside the IEC related to IEC 61850.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

The following terms and definitions apply to all parts of the IEC 61850 series.

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

3.1
abstract communication service interface
ACSI
virtual interface inside an IED between the data model (objects, services) and the mapping to the communication stack

3.2
abstract data model for communication
data standardized with their semantic meaning exchanged between the functions by the IEDs

Note 1 to entry: All application functions shall trust these data and perform their algorithm using this data. The formal description of the automation system by SCL is also based on this standardized data.

[SOURCE: IEC 61850-5:2013, 3.1.14]

3.3
access point
communication access point to an IED

Note 1 to entry: This may be a serial port, an Ethernet connection, or a client or server address dependent on the stack being used. Each access point of an IED to a communication bus is uniquely identified. Each server has at

least one logical access point, but the maximal number is not limited by the standard but only by the actual implementation.

3.4
application layer
layer 7 in the OSI reference model for Open Systems Interconnection comprising the interface between the OSI environment and the IED's or user's application

[SOURCE: ISO/IEC 7498-1:1994, 7.1]

3.5
application function
task, which is performed in or by power utility automation systems

Note 1 to entry: Generally, a function consists of subparts which may be distributed to different IEDs, which exchange data with each other. More precisely these sub-functions implemented in the IEDs exchange data. Also between different functions data are exchanged. The exchanged data exposed to the communication system shall be standardized based on the semantic content to be understandable by the receiving function. For this purpose the standard groups the exchanged data in objects called Logical Nodes which refer to the name of the allocated functions by their mnemonic name.

[SOURCE: IEC 61850-5:2013, 3.1.1]

3.6
association
conveyance path established between a client and a server for the exchange of messages

3.7
attribute
named element of data and of a specific type

[SOURCE: IEC 61850-8-1:2011, 3.11, modified (original term was "data attribute")]

3.8
backward compatible
property of a newer system or product that allows interoperability with a former version of such system or product

3.9
bay
subpart of a substation, having some common functionality, closely connected to the other subparts, and forming a substation

[SOURCE: IEC 61850-1:2013, 3.1.2]

3.10
bay level functions
functions that use mainly the data of one bay and act mainly on the primary equipment of that bay

Note 1 to entry: Bay level functions communicate via logical interface 3 within the bay level and via the logical interfaces 4 and 5 to the process level, i.e. with any kind of remote input/output or with intelligent sensors and actuators.

EXAMPLES Feeder or transformer, protection, control and interlocking.

[SOURCE: IEC 61850-5:2013, 3.5.3, modified (Note 1 to entry and examples added)]

3.11
broadcast
message placed onto a communication network intended to be read and acted on, as appropriate, by any IED. A broadcast message will typically contain the sender's address and a global recipient address

EXAMPLE: Time synchronising.

3.12
bus
communication system connection between IEDs with communication facilities

3.13
class
description of a set of objects that share the same attributes, services, relationships and semantics

[SOURCE: IEC 61850-7-3, 3.1]

3.14
client
entity that uses data from a server

3.15
common data class
template that groups all the possible data attributes that are parts of a data object class representing information related to status, measurements, control, settings

3.16
communication connection
connection which utilises the communication mapping function of one or more resources for the conveyance of information

3.17
communication functions
functions that use communication services to coordinate their actions

3.18
communication stack
multi-layer stack

Note 1 to entry: In the 7 layer OSI reference model for Open Systems Interconnection, each layer performs specific functions related to Open Systems Interconnection communication.

3.19
communication services
services implemented over a communication system

3.20
communication system
interconnected set of all communication links

Note 1 to entry: Depending on the size it is called either LAN (local area network) as used in substations or plants, or WAN (wide area network) as used globally in the power utility system.

[SOURCE: IEC 61850-5:2013, 3.1.10]

3.21
composition
process of building up devices using logical nodes

3.22
configuration (of a system or device)
step in system design for example selecting functional units, assigning their locations and defining their interconnections

3.23
configuration compatibility list
overview of all compatible hardware and software versions of components and IEDs, including the software versions of relevant supporting tools operating together in an UAS-product family

Note 1 to entry: The configuration compatibility list also contains the supported transmission protocols and protocol versions for communication with other IEDs.

[SOURCE: IEC 61850-4:2011, 3.12]

3.24
configuration list
overview of all compatible hardware and software versions of components and IEDs, including the software versions of relevant supporting tools, operating together in a PUAS product family

Note 1 to entry: Additionally, the configuration list details the supported transmission protocols for communication with IEDs of other manufacturers.

3.25
configured IED description CID
a file format in SCL language that describes the communication-related part of an instantiated IED within a project

Note 1 to entry: This is essentially an SCD file, possibly stripped down to what the concerned IED shall know,

Note 2 to entry: This term is used in IEC 61850-6.

3.26
conformance
accordance of the implementation of a product, process or service with all specified requirements or standards

Note 1 to entry: Additional features to those in the requirements / standards may be included,

Note 2 to entry: All features of the standard/specification are implemented and in accordance, but some additional features are not covered by the standard/specification,

[SOURCE: IEC 62361-103, 3.4]

3.27
conformance test
verification of data flow on communication channels in accordance with the standard conditions concerning access organization, formats and bit sequences, time synchronization, timing, signal form and level and reaction to errors

Note 1 to entry: The conformance test may be carried out and certified to the standard or to specifically described parts of the standard. The conformance test should be carried out by an ISO 9001 certified organisation or system integrator.

[SOURCE: IEC 61850-4:2011, 3.17]

3.28
connection
association established between functional units for conveying information

Note 1 to entry: A connection is established between two IEDs prior to any data exchange. A connection may be of short duration or long term.

3.29
connectivity node
identifiable, named, common connection point between terminals of primary devices whose only function is to connect them electrically with minimum resistance; for example a bus bar as a connectivity node connects bus bar disconnectors

Note 1 to entry: The connection to a device is done at a device terminal. A connectivity node can connect an arbitrary number of terminals (devices).

3.30
Cyclic Redundancy Check
CRC
check which is calculated and included in each frame transmitted by the sending device; the receiving device recalculates the CRC for that frame, as received, as a check for any transit damage in that frame

3.31
data
information represented in a manner suitable for automatic processing

[SOURCE: IEC 60050-701:1988, 701-01-11]

3.32
data object
meaningful, structured, information of applications, located in an IED, which can be read or written

[SOURCE: IEC 61850-8-1:2011, 3.12, modified ("automation device" replaced by "IED")]

3.33
data attribute
attribute name (semantic), format, range of possible values, and representation of values

3.34
data class
class that aggregates data classes or data attributes

Note 1 to entry: Specific data classes carry the semantic within a logical node.

3.35
data link layer
<IEC 61850-7-2> layer 2 of the OSI reference model for Open Systems Interconnection, responsible for the transmission of data over a physical medium

Note 1 to entry: After establishment of a link, layer 2 performs data rate control, error detection, contention/collision detection, quality of service monitoring and error recovery.

[SOURCE: ISO/IEC 7498-1, 7.6]

3.36
data object
instance of a data object class in a logical node instance whose values can be read or written

3.37
data object class
typed by a common data class, providing the semantic within a logical node class, representing meaningful, structured, information of applications

3.38
data set (dataset) class
named list of ordered references to one or more Functionally Constrained Data (FCD) or Functionally Constrained Data Attributes (FCDA)

Note 1 to entry: This is used to group commonly used data objects for easy retrieval.

3.39
decomposition
process of stripping application functions in smaller parts (such as logical nodes) to a reasonable or given granularity

3.40
device
<domain?> element or assembly of elements performing a required function

Note 1 to entry: A device may form part of a larger device.

[SOURCE: IEC 60050-151:2001, 151-11-20, modified ("material" deleted from beginning of definition)]

3.41
device
<domain?> mechanism or piece of equipment designed to serve a purpose or perform a function for example, circuit breaker, relay or substation computer

[SOURCE: IEEE 100:2000, device (10), The Authoritative Dictionary of IEEE Standards Terms]

3.42
device
<switchyard> physical plant item for example transformer or circuit breaker

3.43
device
<power utility automation system> IED which hosts application functions for operating the system

3.44
diameter
<1½ breaker arrangement>complete switchgear between the two busbars, i.e. the 2 lines and the 3 circuit breakers with all related isolators, earthing switches, CTs and VTs

Note 1 to entry: It has some common functionality and relationship both for operation, maintenance and extensions.

[SOURCE: IEC 61850-5:2013, 3.4.2]

3.45
distributed function
when two, or more, logical nodes, that are located in different IEDs, together represent a common application function

Note 1 to entry: Since all functions communicate in some way, the definition of a local or distributed function is not unique but depends on the definition of the functional steps to be performed until the function is completed. In the case of loss of one LN or one included communication link, the function may be blocked completely or show a graceful degradation, as applicable.

3.46
distribution
that part of the power system operating at voltages typically up to 69 kV