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2003-08

Communication networks and systems in substations –

Part 2: Glossary



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Commission Electrotechnique Internationale
International Electrotechnical Commission
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Withdrawn

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**COMMUNICATION NETWORKS AND SYSTEMS
IN SUBSTATIONS –****Part 2: Glossary****FOREWORD**

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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 control and associated communications.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
57/615/DTS	57/645/RVC

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 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 ¹
- 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/IEC 9506-1 and ISO/IEC 9506-2) over ISO/IEC 8802-3 ¹
- 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 ¹
- 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 either

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

¹ Under consideration.

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS -

Part 2: Glossary

1 Scope

This part of the IEC 61850 series applies to Substation Automation Systems (SAS). It defines the communication between intelligent electronic devices (IEDs) in the substation and the related system requirements.

This part of the IEC 61850 series contains the glossary of specific terminology and definitions used in the context of Substation Automation Systems within the various parts of the standard.

2 Terms and definitions

The following terms and definitions apply to all parts of the IEC 61850 series².

2.1

abstract communication service interface

virtual interface to an IED providing abstract information modelling methods for logical devices, logical nodes, data, and data attributes, and communication services for example connection, variable access, unsolicited data transfer, device control and file transfer services, independent of the actual communication stack and profiles used

[IEC 61850-1]

2.2

access point

communication access point to an IED. 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 only one, logical, access point

[IEC 61850-6]

2.3

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

[ISO/IEC 7498-1]

2.4

association

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

[IEC 61850-7-1]

² References to other standards given below certain definitions indicate that the term is either described or used in the cited standard. All references are listed in the bibliography.

2.5

attribute

named element of data and of a specific type

[IEC 61850-8-1]

2.6

bay

a substation consists of closely connected sub parts with some common functionality. Examples are the switchgear between an incoming or outgoing line, and the busbar, the bus coupler with its circuit breaker and related isolators and earthing switches, the transformer with its related switchgear between the two busbars representing the two voltage levels. The bay concept may be applied to 1½ breaker and ring bus substation arrangements by grouping the primary circuit breakers and associated equipment into a virtual bay. These bays comprise a power system subset to be protected, for example a transformer or a line end, and the control of its switchgear that has some common restrictions such as mutual interlocking or well-defined operation sequences. The identification of such subparts is important for maintenance purposes (what parts may be switched off at the same time with minimum impact on the rest of the substation) or for extension plans (what has to be added if a new line is to be linked in). These subparts are called 'bays' and may be managed by devices with the generic name 'bay controller' and have protection systems called 'bay protection'.

The concept of a bay is not commonly used in North America. The bay level represents an additional control level below the overall station level.

[IEC 61850-1]

2.7

bay level functions

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

[IEC 61850-5]

2.8

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.

[IEC 61850-7-2]

2.9

bus

communication system connection between IEDs with communication facilities

[IEC 61850-1]

2.10

class

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

[IEC 61850-7-1]

2.11**client**

entity that requests a service from a server, or which receives unsolicited data from a server

[IEC 61850-7-1]

2.12**communication connection**

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

[IEC 61850-10]

2.13**communication stack**

multi-layer stack. In the 7 layer OSI reference model for Open Systems Interconnection, each layer performs specific functions related to Open Systems Interconnection communication

[ISO/IEC 7498-1]

2.14**configuration (of a system or device)**

step in system design for example selecting functional units, assigning their locations and defining their interconnections

[IEV 351]

2.15**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 SAS product family. Additionally, the configuration list details the supported transmission protocols for communication with IEDs of other manufacturers

[IEC 61850-4]

2.16**conformance test**

check 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. The conformance test can 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

[IEC 61850-4]

2.17**connection**

association established between functional units for conveying information. A connection is established between two IEDs prior to any data exchange. A connection may be of short duration or long term

[IEC 61850-3]

2.18**connectivity node**

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

[IEC 61850-6]

2.19

Cyclic Redundancy Check

CRC

this 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

[IEC 61850-9-1]

2.20

data

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

[IEC 61850-8-1]

2.21

data attribute

defines the name (semantic), format, range of possible values, and representation of values while being communicated

[IEC 61850-7-2]

2.22

data class

class that aggregates data classes or data attributes. Specific data classes carry the semantic within a logical node

[IEC 61850-7-2]

2.23

data link layer

layer 2 of the OSI reference model for Open Systems Interconnection, responsible for the transmission of data over a physical medium. After establishment of a link, layer 2 performs data rate control, error detection, contention/collision detection, quality of service monitoring and error recovery

[ISO/IEC 7498-1]

2.24

data object

part of a logical node object representing specific information for example status or measurement. From an object-oriented point of view, a data object is an instance of a data class

[IEC 61850-1]

2.25

data set class

named list of ordered references to one or more Functionally Constrained Data (FCD) or Functionally Constrained Data Attributes (FCDA). Used to group commonly used data objects for easy retrieval

[IEC 61850-7-2]

2.26**device**

element or assembly of elements performing a required function

NOTE A device may form part of a larger device.

[IEV 151]

mechanism or piece of equipment designed to serve a purpose or perform a function for example, circuit breaker, relay or substation computer

[IEEE Std. 100–1996, IEEE dictionary of electrical and electronic terms]

in the context of a switchyard, a device is a physical plant item for example transformer or circuit breaker; in the context of substation automation a device is an IED

[IEC 61850-1]

2.27**diameter**

refers to a 1½ breaker arrangement and comprises the complete switchgear between the two busbars, i.e. the 2 lines and the 3 circuit breakers with all related isolators, earthing switches, CT's and VT's. It has some common functionality and relationship both for operation, maintenance and extensions

[IEC 61850-5]

2.28**distributed function**

when two, or more, logical nodes, that are located in different physical devices, together perform a function. 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

[IEC 61850-5]

2.29**distribution**

with reference to a power system, distribution refers to that part of the power system operating at voltages typically up to 69 kV

[IEC 61850-4]

2.30**electronic current transducer**

transducer in the primary plant measuring system current and providing low level analogue and/or digital data output(s)

2.31**electronic voltage transducer**

transducer in the primary plant measuring system voltage(s) and providing low level analogue and/or digital output(s)

2.32**engineering**

first phase of a project i.e. detail design

2.33

engineering tools

these support the creation and documentation of the conditions for adapting the SAS to the specific substation and customer requirements. The engineering tools are divided into project management, parameterization and documentation tools

[IEC 61850-4]

2.34

equipment

entity that performs an energy transport function for example transformer, circuit breaker, line. It may be stand alone or interfaced to an automation system via an integral device or associated external device

[IEC 61850-7-2]

2.35

expandability

criterion for the fast and efficient extension of an SAS (both hardware and software) by use of the engineering tools

[IEC 61850-4]

2.36

factory acceptance test

customer agreed functional tests of the specifically manufactured SAS installation or its parts, using the parameter set for the planned application. This test should be carried out in the factory of the system integrator by use of process simulating test equipment

[IEC 61850-4]

2.37

flexibility

criterion for the fast and efficient implementation of functional changes, including hardware adaptation, in an SAS by use of the engineering tools

[IEC 61850-4]

2.38

freeze

associated typically with measurands and counters. To freeze a value is to lock and hold the value at that instant

2.39

function(s)

task(s) performed by the substation automation system i.e. by application functions. Generally, functions exchange data with other functions. Details are dependant on the functions involved. Functions are performed by IEDs (physical devices). A function may be split into parts residing in different IEDs but communicating with each other (distributed function) and with parts of other functions. These communicating parts are called logical nodes.

In the context of this standard, the decomposition of functions or their granularity is ruled by the communication behaviour only. Therefore, all functions considered consist of logical nodes that exchange data. Functions without an explicit reference to logical nodes mean only that in the actual context, the logical node modelling of these functions is of no importance to the standard

[IEC 61850-1]

2.40**functional constraint**

property of a data-attribute that indicates the services for example read value, write value, substitute value, etc. that may be applied to that data attribute

[IEC 61850-7-2]

2.41**functionally constrained data**

reference to an ordered collection of data having the same functional constraint for example all MX (measurands)

[IEC 61850-7-2]

2.42**functionally constrained data attribute**

reference to a single data-attribute, of data, to which a specific functional constraint applies

[IEC 61850-7-2]

2.43**gateway**

network interconnection device that supports the full stack of the relevant protocol which it can convert to a non 7 layer protocol for asynchronous transmission over wide area networks

[IEC 61850-7-1]

2.44**generic object oriented substation event**

on the occurrence of any change of state, an IED will multicast a high speed, binary object, Generic Object Oriented Substation Event (GOOSE) report by exception, typically containing the double command state of each of its status inputs, starters, output elements and relays, actual and virtual

This report is re-issued sequentially, typically after the first report, again at intervals of 2, 4, 8...60000 ms. (The first repetition delay value is an open value it may be either shorter or longer).

A GOOSE report enables high speed trip signals to be issued with a high probability of delivery

[IEC 61850-5]

2.45**generic substation event model**

defines two classes of multicast/broadcast data i.e. GOOSE and GSSE, for the fast transfer of input and output data values between IEDs

2.46**generic substation state event**

similar to GOOSE but restricts the contained-data to data values of a number of double-command (bit pairs) status values, for example open, closed, in transition, or invalid states

[IEC 61850-7-2]

2.47

hold point

point, defined in the appropriate document, beyond which an activity must not proceed without the written approval of the initiator of the conformance test. The test facility must provide a written notice to the initiator at an agreed time prior to the hold point. The initiator, or his representative, is obligated to verify the hold point and approve the resumption of the testing

[IEC 61850-10]

2.48

hub

active network component. Each port of a hub links individual media segments together to create a larger network that operates as a single LAN. Collisions in the network are possible

[IEC 61850-3]

2.49

Human Machine Interface

HMI

display screen, either part of an IED or as a stand-alone device, presenting relevant data in a logical format, with which the user interacts. An HMI will typically present windows, icons, menus, pointers, and may include a keypad to enable user access and interaction

2.50

IED-parameter set

all the parameter values needed for the definition of the behaviour of the IED and its adaptation to the substation conditions. Where the IED has to operate autonomously, the IED-parameter-set can be generated without system parameters using an IED-specific parameterisation tool. Where the IED is a part of the SAS, the IED-parameter set may include system parameters, which must be co-ordinated by a general parameterisation tool at the SAS level

[IEC 61850-4]

2.51

implementation

development phase in which the hardware and software of a system become operational

[IEC 61850-7-1]

2.52

information

knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning

[IEV 101-12-01]

2.53

information model

knowledge concerning substation functions (devices) made visible and accessible through the means of the IEC 61850 series. The model describes in an abstract way a simplified representation of a real function or device

[IEC 61850-7-1]

2.54

initiator of conformance test

party initiating a conformance test that is to be performed by a test facility

[IEC 61850-10]

2.55**inspection**

activity such as measuring, examining, testing or gauging of one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformity is achieved for each characteristic

[IEC 61850-10]

2.56**instance**

entity that has a unique identity, with the attributes of a defined class, to which a set of services can be applied and which has a state that stores the effects of the services. 'Instance' is synonymous with 'object'

[IEC 61850-7-1]

2.57**instance name**

identifier associated with and designating an instance

[IEC 61850-7-1]

2.58**instantiation**

creation of an instance of a specified class

[IEC 61850-5]

2.59**Intelligent Electronic Device****IED**

any device incorporating one or more processors, with the capability to receive or send, data/control from, or to, an external source, for example electronic multi-function meters, digital relays, controllers

Device capable of executing the behaviour of one or more, specified logical nodes in a particular context and delimited by its interfaces

[IEC 61850-1]

2.60**interchangeability**

ability to replace a device supplied by one manufacturer with a device supplied by another manufacturer, without making changes to the other elements in the system

[IEC 61850-1]

2.61**interface**

shared boundary between two functional units, defined by functional characteristics for example common physical interconnection characteristics, signal characteristics or other characteristics as appropriate, and the provision of a declared collection of services

[IEC 61850-5]

2.62

interface related station level functions

functions representing the interface of the SAS local station-operator HMI to a remote control centre Tele-Control Interface (TCI) or to the remote engineering Tele-Monitoring Interface (TMI) for monitoring and maintenance purposes. These functions communicate via the logical interfaces 1 and 6 with the bay level and via logical interface 7 to technical services and via the remote control interface to the outside world. Logically, there is no difference if the HMI is local or remote. In the context of the substation, there exists at least a virtual interface for the SAS at the boundary of the substation. The same is true for both the TCI and TMI. These virtual interfaces may be realised in some implementations such as proxy servers

[IEC 61850-5]

2.63

internet protocol

TCP/IP standard internet protocol defines the datagram that provides the basis of connectionless packet delivery. It includes control and error message protocol providing the equivalent functions to network services, layer 3, of the OSI reference model for Open Systems Interconnection

[IEC 61850-3]

2.64

interoperability

ability of two or more IEDs from the same vendor, or different vendors, to exchange information and use that information for correct execution of specified functions

[IEC 61850-1]

2.65

life cycle

of an IED or system, covers all phases from the feasibility/concept phase through to the final decommissioning phase

[IEC 61850-10]

2.66

link layer

see data link layer

[IEC 61850-7-1]

2.67

local area network

communications network which typically covers the area within a building or small industrial complex. In the context of this standard, the area within the substation

[IEC 61850-9-1]

2.68

log

record (journal), of chronologically ordered data for example events with time tags and annotations

[IEC 61850-5]

2.69**logical connection**

communication link between logical nodes

[IEC 61850-5]

2.70**logical device class**

virtual device that exists to enable aggregation of related logical nodes and data set(s) for communication purposes. In addition, logical devices contain convenient lists of frequently accessed, or referred to, information for example data sets

[IEC 61850-7-2]

2.71**logical device object**

instance of the class of logical device

[IEC 61850-7-2]

2.72**logical node**

smallest part of a function that exchanges data. A logical node is an object defined by its data and methods

[IEC 61850-1]

2.73**logical node class**

aggregation of data, data sets, report controls, log controls, logs, GOOSE and GSSE controls and sampled measured values. Logical node classes represent typical functions of the substation system. IEC 61850-7-4 defines a list of compatible logical node classes for protection functions, supervisory control, metering, switchgear, power transformers, etc.

[IEC 61850-7-2]

2.74**logical node data**

information contained within a logical node. The term encompasses ACSI data, control blocks, etc.

[IEC 61850-8-1]

2.75**logical node object**

instance of a logical node class

[IEC 61850-7-2]

2.76**logical system**

union (via its logical nodes) of all communicating application functions performing some overall task for example 'management of a substation'. The boundary of a system is given by its logical or physical interfaces: examples are industrial systems, management systems, information systems, etc.

[IEC 61850-5]

2.77

manufacturer

producer of IEDs and/or supporting tools. A manufacturer may be able to deliver an SAS solely by use of his own IEDs and supporting tools (SAS product family)

[IEC 61850-4]

2.78

mapping

set of values having a defined correlation with the quantities, or values, of another set

[IEC 61850-1]

2.79

merging unit

physical unit performing the time coherent combination of the current and/or voltage data coming from the secondary converters. The merging unit can be part of one of the transducers in the field or may be a separate unit for example in the control room

[IEC 60044-8]

interface unit that accepts multiple analogue CT/VT and binary inputs and produces multiple time synchronised serial unidirectional multi-drop digital point to point outputs to provide data communication via the logical interfaces 4 and 5

[IEC 61850-9-1]

2.80

message

inherent attribute of a communication between IEDs, functions or instances, that conveys service specific data or commands, on receipt of which it is expected that action will be taken

[IEC 61850-3]

2.81

model

representation of some aspects of reality. The purpose of creating a model is to help understand, describe, or predict how things work in the real world by exploring a simplified representation of a particular entity or phenomenon

[IEC 61850-7-1]

2.82

model implementation conformance statement

details the standard data object models supported by the system or device

[IEC 61850-10]

2.83

multicast

uni-directional, connectionless communication between a server and a selected set of clients

[IEC 61850-6]

2.84

name plate

name for the set of data typically found on an item of a plant for example a power transformer, or an IED for example a protection relay, that uniquely describes that device's identity and attributes

[IEC 61850-7-2]

2.85**negative test**

test to verify the correct response of a device or a system to the following standards:

- IEC 61850 conformant information and services which are not implemented in the device or system under test.
- Non IEC 61850 conformant information and services sent to the device or system under test.

[IEC 61850-10]

2.86**network**

layer 3 of the OSI reference model for Open Systems Interconnection, provides functional and procedural means of connectionless or connection-mode transmission, also independence from routing and communications relaying considerations, enabling the transparent transfer of data between transport entities

[ISO/IEC 7498-1]

2.87**object****instance**

descriptor of an instance of a class of entity that is uniquely identifiable within the SAS domain, with defined boundaries and identity which encapsulates states and behaviour. States are represented by attributes, behaviour by services and state machines

[IEC 61850-1]

2.88**object attribute**

field or a category or value of data that, together with other attributes, specify the services or data values related to the function and performance of an object

[IEC 61850-6]

2.89**object name**

unique full reference identifier of a specific data object that is unique within the SAS domain, or within a specific domain.

It is constructed by concatenation, using dot '.' delimiters, to as many hierarchical levels as required, for example

'BasicDataClass.StructuredComponent.X.X.X.etc'

[IEC 61850-6]

2.90**open protocol**

protocol whose stack is either standardised or publicly available

[IEC 61850-1]

2.91**parameters**

variables which define the behaviour of functions of the SAS and its IEDs within a given range of values

[IEC 61850-4]

2.92

physical connection

communication link between physical devices

[IEC 61850-5]

2.93

physical device

equivalent to an intelligent electronic device as used in the context of this standard

[IEC 61850-1]

2.94

physical layer

layer 1 of the OSI reference model for Open Systems Interconnection provides the mechanical, electrical, functional and procedural means to activate, maintain and de-activate physical connections for bit transmission between data-link entities. Physical layer entities are interconnected by means of a physical medium

[ISO/IEC 7498-1]

2.95

physical node

point of connection on a physical device to a communication network. A physical node is a multi-functional unit providing both the communication server and the mapping to the real substation IED

[IEC 61850-1]

2.96

physical system

is composed of the IEDs and the interconnecting physical communication network (commonly fibre-optics). The boundary of a system is given by its logical or physical interfaces: examples are industrial systems, management systems, information systems, etc.

[IEC 61850-5]

2.97

piece of information for communication

exchanged data are called Piece of Information for COMMunication (PICOM) as adopted from the approach of the CIGRE working group 34.03. PICOM is a description of an information transfer on a given logical connection with given communication attributes between two logical nodes. It also contains the information to be transmitted and required attributes for example performance. It does not represent the actual structure or format of the data that is transmitted over the communication network

[IEC 61850-1]

2.98

point to point

one to one communication link between two nodes, used only for communication between those two nodes

[IEC 61850-9-1]

2.99**positive test**

test to ensure the correct implementation of the system capabilities as defined by the supplier. A positive test has a described and defined response

[IEC 61850-10]

2.100**presentation layer**

layer 6 of the OSI reference model for Open Systems Interconnection, provides an interface between the concrete local syntax used by the Application layer and the negotiated abstract and transfer syntaxes to be used for the transfer of data during a communication session between the two communicating application entities

[ISO/IEC 7498-1]

2.101**process level functions**

all functions interfacing to the process, i.e. binary and analogue input/output functions for example data acquisition (including sampling) and the issuing of commands. These functions communicate via the logical interfaces 4 and 5 to the bay level

[IEC 61850-5]

2.102**process related station level functions**

use data from more than one bay, or from the whole substation and act on the primary equipment of more than one bay, or on the primary equipment of the whole substation. Examples of such functions are: station wide interlocking, automatic sequencers, and busbar protection. These functions communicate mainly via the logical interface 8

[IEC 61850-5]

2.103**profile(s)**

defined format(s) used by a particular protocol to transmit data objects or commands, etc.

[IEC 61850-7-1]

2.104**protocol**

set of rules that determines the behaviour of functional units in achieving communication

[ISO/IEC 2382-9; IEC 61850-1]

2.105**protocol converter**

intelligent electronic device connected between two communication networks, that is capable of translating messages received in one protocol on one network to a second protocol for re-transmission on the other network and vice versa

2.106**protocol data unit**

encoded message containing the service parameters

2.107

protocol implementation conformance statement

summary of the capabilities of the system to be tested

[ISO/IEC 8823-2:1994]

Protocol Implementation Conformance Statements (PICS) contain information regarding the ACSI. This information could typically be optional parts, specific restrictions, or add-ons

[IEC 61850-7-2]

2.108

protocol implementation extra information for testing

document (PIXIT) containing system specific information regarding the capabilities of the system to be tested which are outside the scope of the IEC 61850 series. Provides information regarding the physical set-up that is not part of the ACSI. This could be information regarding the hardware, socket, and other information.

The PIXIT shall not be subjected to standardisation

[IEC 61850-10]

2.109

redundant redundancy

existence of more than one means for performing a required function in an item

[IEV 191]

refers to spare or duplicate functionality that allows a system to continue to operate without degradation of performance in the event of single failure for example a blown fuse

2.110

remote terminal unit

typically an outstation in a SCADA system, a Remote Terminal Unit (RTU) may act as an interface between the communication network and the substation equipment. The function of an RTU may reside in one IED or may be distributed

[IEC 61850-4]

2.111

report

agreed, or client defined, set of data compiled by an IED for transmission to a client at regular, or specified time intervals, or on demand. A report may also be generated as a result of one or more, trigger conditions that may be either pre-set or pre-defined by the client

[IEC 61850-6]

2.112

review

systematic examination, as defined in the appropriate document, of the quality document(s) for an activity. The test facility must provide the documentation to be reviewed to the initiator of the conformance test at an agreed time prior to the associated hold or witness point. How the review is conducted is subject to agreement

[IEC 61850-10]

2.113**SAS installation**

concrete instance of an SAS consisting of multiple, interoperable, IEDs from one, or more, manufacturers

[IEC 61850-4]

2.114**SAS parameter set**

all the parameters needed for the definition of the behaviour of the overall SAS and its adaptation to the substation conditions. The SAS parameter set includes the IED parameter sets of all participating IEDs

[IEC 61850-4]

2.115**SAS product family**

range of different IEDs from one manufacturer, with various functionalities and with the ability to perform substation automation system functions. The IEDs of a product family are unified in relation to the design, the operational handling, the mounting and wiring requirements and they use common or co-ordinated, supporting tools

[IEC 61850-4]

2.116**scalability**

criterion for a cost effective SAS taking into account the various functionalities, various IEDs, substation sizes and substation voltage ranges

[IEC 61850-4]

2.117**selector**

defines the references to a class instance for accessing the instance values

[IEC 61850-7-2]

2.118**self-description**

device contains information on its configuration. The representation of this information has to be standardised and has to be accessible via communication (in the context of this standard series)

[IEC 61850-1]

2.119**server**

on a communication network, a functional node that provides data to, or that allows access to its resources by, other functional nodes. A server may also be a logical subdivision, which has independent control of its operation, within the software algorithm (and/or possibly hardware) structure

[IEC 61850-6]

2.120**server class**

external visible behaviour of an IED or application process

[IEC 61850-7-2]

2.121

service

functional capability of a resource which can be modelled by a sequence of service primitives

2.122

service access point

represents a logical construct through which a peer selects a communication protocol or access to an application. The selection of the entire seven layers of a service access point represents a communication profile

[IEC 61850-8-1]

2.123

service primitive

abstract, implementation independent, representation of an interaction between the service user and the service provider

2.124

session

layer 5 of the OSI reference model for Open Systems Interconnection, manages the establishment and release, of session connections, also the synchronisation of data exchange between presentation entities

[ISO/IEC 7498]

2.125

SF₆

Sulphur HexaFluoride gas, used as an insulating medium in gas insulated circuit breakers and associated plant

[IEC 61850-3]

2.126

site acceptance test

verification of each data and control point and the correct functionality inside the SAS and between the SAS and its operating environment on the whole installed plant using the final parameter set. The site acceptance test is the pre-condition for the SAS being accepted and put into service

[IEC 61850-4]

2.127

specific communication service mapping

standardised procedure which provides the concrete mapping of ACSI services and objects onto a particular protocol stack/communication profile.

To reach interoperability, it is intended to have a minimum number of profiles and corresponding Specific Communication Service Mapping (SCSM). Special application sub-domains such as 'station bus' and 'process bus' may result in more than one mapping. However, for the specific protocol stack selected, only one single SCSM and one single profile should be specified.

A SCSM shall detail the instantiation of abstract services into protocol specific single service or sequence of services that achieve the service as specified in ACSI. Additionally, a SCSM shall detail the mapping of ACSI objects into objects supported by the application protocol.

SCSMs are specified in IEC 61850-8-x and IEC 61850-9-x

[IEC 61850-1]

2.128**state machine**

the functional behaviour of any IED, logical node or object, can be defined and delineated by means of a state machine. This describes, normally by means of a state diagram, the functionality, responses, actions and re-actions, as a series of discrete, linked states, together with the criteria governing the transition from one state to another specific state

[IEC 61850-7-2]

2.129**station level functions**

functions applying to the whole substation. There are two classes of station level functions i.e. process related station level functions and interface related station level functions

[IEC 61850-5]

2.130**subdevice**

part of a primary device, for example one phase of a three-phase device

[IEC 61850-6]

2.131**subnetwork**

communication system connection between IEDs which have serial communication facilities. All devices connected to a subnetwork can directly communicate to each other, without an intervening router. Routers or gateways can connect subnetworks

[IEC 61850-6]

2.132**subscribed data**

data that a client has requested to be supplied on a regular basis, or when trigger condition(s) are satisfied

2.133**substation automation system**

provides automation within a substation and includes the IEDs and communication network infrastructure

[IEC 61850-1]

2.134**substation master**

IED that functions either as a RTU or provides a centralised function for example time synchronising reference

[IEC 61850-3]

2.135**supporting tools**

support the user in the engineering, the operation and the management of the SAS and its IEDs. The supporting tools can perform the following tasks: engineering, project management, parameter change, diagnostics, testing, documentation, and other services.

Usually the supporting tools are part of the SAS and they run on an IED (for example PC)

[IEC 61850-4]

2.136 switch

active network component. Switches connect two or more sub networks, which themselves could be built of several segments connected by repeaters. Switches establish the borders for so called collision domains. Collisions cannot take place between networks divided by switches, data packets destined to a specific sub network do not appear on the other sub networks. To achieve this, switches must have knowledge of the hardware addresses of the connected stations. In cases where only one active network component is connected to a switch port, collisions on the network can be avoided

[IEC 61850-9-1]

2.137 system

The logical system is a union of all communicating application-functions performing some overall task like “management of a substation”, via logical nodes. The physical system is composed of all devices hosting these functions and the interconnecting physical communication network. The boundary of a system is given by its logical or physical interfaces. Within the scope of the IEC 61850 series, ‘system’ always refers to the Substation Automation System (SAS), unless otherwise noted

[IEC 61850-1]

2.138 system integrator

turnkey deliverer of SAS installations. The responsibility of system integration includes the engineering, the delivery and mounting of all participating IEDs, the factory and site acceptance tests and the trial operation. The quality assurance, maintenance and spares delivery obligations and the warranty, shall be agreed upon in the contract between the system integrator and the customer

[IEC 61850-4]

2.139 system life cycle

has two independent meanings and values:

- a) manufacturer's life cycle – the period from the start of production of a newly developed SAS product family to the discontinuation of support for that range of IEDs,
- b) customer's life cycle – the period from the commissioning of an SAS based mainly on this SAS product family to the decommissioning of the last installed SAS installation incorporating this product family

[IEC 61850-4]

2.140 system parameters

data that defines the co-operation of IEDs in the SAS. They are especially important in the definitions for configuration of the SAS, communication between IEDs, for marshalling of data between IEDs, for processing and visualisation of data from other IEDs for example at the station level, and for parameterisation

[IEC 61850-4]

2.141 system test

check of correct behaviour of the IEDs and of the overall SAS under various application conditions. The system test marks the final stage of the development of IEDs as part of a SAS product family

[IEC 61850-4]

2.142**telecommunication environment**

communication interfaces associated with telecommunications

[IEC 61850-4]

2.143**telecommunications Interface**

interface point to the telecommunication network link to the remote power system network control centre

[IEC 61850-3]

2.144**telemonitoring interface**

communications link to a monitoring engineer's workplace

[IEC 61850-5]

2.145**test equipment**

tools and instruments which simulate and verify the inputs/outputs of the operating environment of the SAS such as switchgear, transformers, network control centres or connected telecommunication units on the one side, and the communication channels between the IEDs of the SAS on the other

[IEC 61850-4]

2.146**test facility**

organisation which is able to provide appropriate test equipment and trained staff to perform conformance testing. The management of conformance tests and the resulting information should follow a quality system and a test facility should be certified in accordance with IEC 61850-10

[IEC 61850-10]

2.147**test item**

one single test step from the sequence of tests defined to verify conformance

[IEC 61850-10]

2.148**transient data**

pertaining to or designating a phenomenon or a quantity which varies between two consecutive states during a time interval short compared to the time-scale of interest

[IEV 161-02-01]

data objects with this designation only exist at the time they occur and must be logged to provide the evidence of their existence

[IEC 61850-7-4]

2.149**transmission**

refers to that part of the power system operating at voltages of typically 110 kV and above

[IEC 61850-4]

2.150

transport layer

layer 4 of the ISO OSI reference model for Open Systems Interconnection establishes the transport connection and addressing, controls and monitors the data rate flow and the release of the transport connection. Enables variable size data files to be seamlessly transported

[See ISO/IEC 7498-1 for details]

2.151

type test

verification of correct behaviour of the IEDs of the SAS by use of the system tested software under the environmental test conditions stated in the technical data. This test marks the final stage of IED hardware development and is the precondition for the start of full production. This test must be carried out with IEDs that have been manufactured through the normal production cycle

[IEC 61850-4]

2.152

unicast

point to point

communication between a server and a single client

[IEC 61850-6]

2.153

unified modelling language

standardised constructs and semantics for diagrams, including state machines, which are used to describe/specify the functionality of an IED, object model or a process

[IEC 61850-7-1]

2.154

unsolicited data or unsolicited message

data or message which is supplied to a client from a server without the client subscribing to that data or message, for example reset, abort, time. Does not require a connection to be established

[IEC 61850-7-2]

2.155

utility communications architecture

describes the concepts of standardised models for power system objects

[IEEE-SA TR 1550]

[IEC 61850-1]

2.156

witness point

point, defined in the appropriate document, at which an inspection will take place on an activity. The activity may proceed without the approval of the initiator of the conformance test. The test facility must provide a written notice to the initiator at an agreed time prior to the witness point. The initiator or his representative, has the right but is not obligated, to verify the witness point

[IEC 61850-10]

2.157**EXtensible Mark-up Language****XML**

high level language that can be used to construct plain-text file formats describing application-specific structured data. This enables data files to be generated and read by a computer, and which are also human legible.

XML is independent of platform for example hardware, software and application, and provides free-extensibility. XML file readers (browsers) are available that are non-proprietary

NOTE For further information see:

EXtensible Markup Language (XML) 1.0, W3C, available at <<http://www.w3.org/TR/1998/REC-xml-19980210>>

[IEC 61850-6]

IECNORM.COM : Click to view the full PDF of IEC TS 61850-2:2003

3 Abbreviations

This clause defines the abbreviations used within all parts of the IEC 61850 series.

A	Current in Amperes (Amps)	IEC 61850-7-4
a.c.	alternating current	IEC 61850-3
ACD	ACTivation information of Directional protection	IEC 61850-7-3
acs	Access	IEC 61850-7-4
ACSE	Application Common Service Element	IEC 61850-8-1
ACSI	Abstract Communication Service Interface	IEC 61850-1
ACT	Protection ACTivation information	IEC 61850-7-3
Acu	Acoustic	IEC 61850-7-4
Age	Ageing	IEC 61850-7-4
AIS	Air Insulated Switchgear	IEC 61850-1
Alm	Alarm	IEC 61850-7-4
ALPDU	Application Layer Protocol Data Unit	IEC 61850-9-1
Amp	Current – non phase related	IEC 61850-7-4
An	Analogue	IEC 61850-7-4
Ang	Angle	IEC 61850-7-4
A-Profile	Application Profile	IEC 61850-8-1
APCI	Application Protocol Control Information	IEC 61850-9-2
APDU	Application Protocol Data Unit	IEC 61850-9-2
API	Application Program Interface	IEC 61850-7-1
ASDU	Application Service Data Unit	IEC 61850-1
ASG	Analogue Setting	IEC 61850-7-3
ASN.1	Abstract Syntax Notation One	IEC 61850-7-1
AUI	Attachment Unit Interface, Transceiver, or connecting cable	IEC 61850-9-1
Auth	Authorisation	IEC 61850-7-4
Auto	Automatic	IEC 61850-7-4
Aux	Auxiliary	IEC 61850-7-4
Av	Average	IEC 61850-7-4
B	Bushing	IEC 61850-7-4
Bat	Battery	IEC 61850-7-4
Beh	Behaviour	IEC 61850-7-4
BER	Basic Encoding Rules ASN.1	IEC 61850-9-1
Bin	Binary	IEC 61850-7-4
Blk	Block, or Blocked	IEC 61850-7-4
Bnd	Band	IEC 61850-7-4
Bo	Bottom	IEC 61850-7-4

BR	Buffered Report (Functional Constraint)	IEC 61850-7-2
BRC	Buffered Report Control class	IEC 61850-7-2
BRCB	Buffered Report Control Block	IEC 61850-7-2
CAD	Computer Aided Design	IEC 61850-4
Cap	Capability	IEC 61850-7-4
Car	Carrier	IEC 61850-7-4
CB	Circuit Breaker	IEC 61850-1
CD ROM	Compact Disc Read Only Memory	IEC 61850-4
CDC	Common Data Class	IEC 61850-1
CDCAName	Common Data Class Attribute Name	IEC 61850-8-1
cdcNs	common data class Name space	IEC 61850-7-3
CDCNSpace	Common Data Class Name Space	IEC 61850-7-2
CE	Cooling Equipment	IEC 61850-7-4
Cf	Crest factor	IEC 61850-7-4
CF	ConFfiguration (Functional Constraint)	IEC 61850-7-2
Cfg	Configuration	IEC 61850-7-4
CFI	Canonical Format Identifier	IEC 61850-9-2
CG	Core Ground	IEC 61850-7-4
Ch	Channel	IEC 61850-7-4
Cha	Charger	IEC 61850-7-4
Chg	Change	IEC 61850-7-4
Chk	Check	IEC 61850-7-4
Chr	Characteristic	IEC 61850-7-4
CIM	Common Information Model of IEC 61970-301	IEC 61850-6
Cir	Circulating	IEC 61850-7-4
CL	Connectionless	IEC 61850-8-1
Clc	Calculate	IEC 61850-7-4
Client-CR	Client Conformance Requirement	IEC 61850-8-1
Clk	Clock or Clockwise	IEC 61850-7-2
Cls	Close	IEC 61850-7-4
Cnt	Counter	IEC 61850-7-4
CO	ContrOI (Functional Constraint)	IEC 61850-7-2
Col	Coil	IEC 61850-7-4
ConNode	Connectivity Node	IEC 61850-6
Cor	Correction	IEC 61850-7-4
CRC	Cyclic Redundancy Check	IEC 61850-2
Crd	Coordination	IEC 61850-7-4
Crv	Curve	IEC 61850-7-4
CSMA/CD	Carrier Sense Multiple Access/Collision Detection	IEC 61850-9-1

CT	Current Transformer/Transducer	IEC 61850-4
Ctl	Control	IEC 61850-7-4
Ctr	Centre	IEC 61850-7-4
Cyc	Cycle	IEC 61850-7-4
d.c.	direct current	IEC 61850-3
DA	Data Attribute	IEC 61850-7-2
DAT	Data Attribute Type	IEC 61850-7-2
dataNs	Data Name Space	IEC 61850-7-3
DataRef	Data Reference	IEC 61850-7-2
DataAttrRef	Data Attribute Reference	IEC 61850-7-2
DC	DesCription (functional constraint)	IEC 61850-7-2
dchg	Trigger option for data-change	IEC 61850-7-1
Dea	Dead	IEC 61850-7-4
Den	Density	IEC 61850-7-4
Det	Detected	IEC 61850-7-4
DEX	De-EXcitation	IEC 61850-7-4
DF	Data Frame	IEC 61850-9-1
Diag	Diagnostics	IEC 61850-7-4
Dif	Differential/Difference	IEC 61850-7-4
Dir	Directional	IEC 61850-7-4
DI	Delay	IEC 61850-7-4
Dlt	Delete	IEC 61850-7-4
Dmd	Demand	IEC 61850-7-4
Dn	Down	IEC 61850-7-4
DO	Data Object	IEC 61850-1
DORef	Data Object Reference	IEC 61850-6
DPC	Double Point Control	IEC 61850-7-2
DPS	Double Point Status information	IEC 61850-7-1
DPSCO	Double Point Controllable Status Output	IEC 61850-7-4
DQ0	Direct, Quadrature and Zero (0) axis quantities	IEC 61850-7-4
Drag	Drag Hand	IEC 61850-7-4
Drv	Drive	IEC 61850-7-4
DS	Data Set	IEC 61850-7-2
Dsch	Discharge	IEC 61850-7-4
DSG	Data Set Group	IEC 61850-9-1
DTD	Document Type Definition	IEC 61850-6
dupd	trigger option for data update	IEC 61850-7-2
Dur	Duration	IEC 61850-7-4
DUT	Device Under Test	IEC 61850-10

EC	Earth Coil	IEC 61850-7-4
ECT	Electronic Current Transformer or transducer	IEC 61850-9-1
EF	Earth Fault	IEC 61850-7-4
EMC	Electro Magnetic Compatibility	IEC 61850-1
EMI	Electro Magnetic Interference	IEC 61850-1
Ena	Enabled	IEC 61850-7-4
EPRI	Electric Power Research Institute	IEC 61850-1
Eq	Equalisation or Equal	IEC 61850-7-4
Ev	Evaluation	IEC 61850-7-4
EVT	Electronic Voltage Transformer or transducer	IEC 61850-9-1
Ex	Excitation	IEC 61850-7-4
EX	EXtended definition (Functional Constraint)	IEC 61850-7-2
Exc	Exceeded	IEC 61850-7-4
Excl	Exclusion	IEC 61850-7-4
F/S	Functional Standard	IEC 61850-8-1
FA	Fault Arc	IEC 61850-7-4
Fact	Factor	IEC 61850-7-4
FAT	Factory Acceptance Test	IEC 61850-4
FC	Functional Constraint	IEC 61850-7-1
FCD	Functionally Constrained Data	IEC 61850-7-2
FCDA	Functionally Constrained Data Attribute	IEC 61850-7-2
fchg	Trigger option for filtered-data change	IEC 61850-7-2
FD	Fault Distance	IEC 61850-7-4
Flt	Fault	IEC 61850-7-4
Flw	Flow	IEC 61850-7-4
FPF	Forward Power Flow	IEC 61850-7-2
Fu	Fuse	IEC 61850-7-4
Fwd	Forward	IEC 61850-7-4
Gen	General	IEC 61850-7-4
GI	General Interrogation	IEC 61850-7-2
GIS	Gas Insulated Switchgear	IEC 61850-1
Gn	Generator	IEC 61850-7-4
Gnd	Ground	IEC 61850-7-4
GO	GOose Control	IEC 61850-7-2
GoCB	Goose Control Block	IEC 61850-7-2
GOMSFE	Generic Object Models for Substation and Feeder Equipment	IEC 61850-1
GOOSE	Generic Object Oriented Substation Events	IEC 61850-5
GPS	Global Positioning System (time source)	IEC 61850-5

Gr	Group	IEC 61850-7-4
Grd	Guard	IEC 61850-7-4
Gri	Grid	IEC 61850-7-4
GS	GSSE Control (Functional Constraint)	IEC 61850-7-2
GsCB	GSSE Control Block	IEC 61850-7-2
GSE	Generic Substation Event	IEC 61850-7-2
GSEM	Generic Substation Event Model	IEC 61850-7-2
GSSE	Generic Substation Status Event	IEC 61850-7-2
H	Harmonics (phase related)	IEC 61850-7-4
H2	Hydrogen	IEC 61850-7-4
Ha	Harmonics (non phase related)	IEC 61850-7-4
Hi	High or Highest	IEC 61850-7-4
HMI	Human Machine Interface	IEC 61850-3
HP	Hot Point	IEC 61850-7-4
Hz	Hertz – frequency cycles/second	IEC 61850-7-4
I/O	Status Inputs/Output contacts, or channels	IEC 61850-5
ICD	IED Configuration Description	IEC 61850-10
IEC	International Electrotechnical Commission	IEC 61850-1
IED	Intelligent Electronic Device	IEC 61850-1
IEEE	Institute of Electrical and Electronic Engineers	IEC 61850-1
IETF	Internet Engineering Task Force	IEC 61850-8-1
IF	Interface (serial)	IEC 61850-5
Imb	Imbalance	IEC 61850-7-4
Imp	Impedance (non phase related)	IEC 61850-7-4
In	Input	IEC 61850-7-4
Ina	Inactivity	IEC 61850-7-4
INC	Integer status – Controllable	IEC 61850-7-3
Incr	Increment	IEC 61850-7-4
Ind	Indication	IEC 61850-7-4
Inh	Inhibit	IEC 61850-7-4
Ins	Insulation	IEC 61850-7-4
Int	Integer	IEC 61850-7-4
IntgPd	Integrity Period	IEC 61850-7-2
IP	Internet Protocol	IEC 61850-3
ISC	Integer Step Controlled position information	IEC 61850-7-3
ISCSO	Integer Status Controllable Status Output	IEC 61850-7-4
ISI	Integer Status Information	IEC 61850-7-3
ISO	International Standards Organisation	IEC 61850-1
IT	Current x Time product	IEC 61850-7-4

L	Lower	IEC 61850-7-4
LAN	Local Area Network	IEC 61850-5
LC	LOG CONTROL Class	IEC 61850-7-2
LCB	Log Control Block	IEC 61850-7-2
LD	Logical Device	IEC 61850-7-1
Ld	Lead	IEC 61850-7-4
LD0	Logical Device Zero (0)	IEC 61850-7-2
LDC	Line Drop Compensation	IEC 61850-7-4
LDCR	Line Drop Compensation Resistance	IEC 61850-7-4
LDCX	Line Drop Compensation Reactance (X)	IEC 61850-7-4
LDCZ	Line Drop Compensation Impedance (Z)	IEC 61850-7-4
IdNs	logical device Name space	IEC 61850-7-3
LED	Light Emitting Diode	IEC 61850-7-4
Len	Length	IEC 61850-7-4
Lev	Level	IEC 61850-7-4
Lg	Lag	IEC 61850-7-4
LG	LoGging (Functional Constraint)	IEC 61850-7-2
Lim	Limit	IEC 61850-7-4
Lin	Line	IEC 61850-7-4
Liv	Live	IEC 61850-7-4
LLC	Logical Link Control	IEC 61850-9-1
LLN0	Logical Node Zero (0)	IEC 61850-7-1
LN	Logical Node	IEC 61850-1
LN Name	Logical Node Name	IEC 61850-7-2
LNC	Logical Node Class	IEC 61850-7-2
LNData	Logical Node Data	IEC 61850-8-1
LNG	Logical Node Group	IEC 61850-7-4
InNs	logical node Name space	IEC 61850-7-3
Lo	Low	IEC 61850-7-4
LO	LockOut	IEC 61850-7-4
Loc	Local	IEC 61850-7-4
Lod	Load or Loading	IEC 61850-7-4
Lok	Locked	IEC 61850-7-4
Los	Loss	IEC 61850-7-4
LPHD	Logical Node PHysical Device	IEC 61850-7-1
LSAP	Link Service Access Point	IEC 61850-9-2
LSDU	Link layer Service Data Unit	IEC 61850-9-1
Lst	List	IEC 61850-7-4
LTC	Load Tap Changer	IEC 61850-7-4

m	Minutes	IEC 61850-7-4
M	Mandatory	IEC 61850-7-2
M/O	Data Object is Mandatory or Optional	IEC 61850-7-4
MAC	Media Access Control	IEC 61850-9-1
MAU	Medium Attachment Unit (Transceiver)	IEC 61850-9-1
Max	Maximum	IEC 61850-7-4
MCAA	MultiCast Application Association	IEC 61850-7-2
Mem	Memory	IEC 61850-7-4
MICS	Model Implementation Conformance Statement	IEC 61850-10
Min	Minimum	IEC 61850-7-4
MMS	Manufacturing Message Specification (ISO 9506)	IEC 61850-5
Mod	Mode	IEC 61850-7-4
Mot	Motor	IEC 61850-7-4
ms	Milliseconds	IEC 61850-7-4
MS	Multicast Sampled value control (Functional Constraint)	IEC 61850-7-2
Mst	Moisture	IEC 61850-7-4
MSVC	Multicast Sampled Value Control	IEC 61850-7-2
MSVCB	Multicast Sampled Value Control Block	IEC 61850-7-2
MT	Main Tank	IEC 61850-7-4
MTTF	Mean Time To Failure	IEC 61850-3
MTTR	Mean Time To Repair	IEC 61850-3
MU	Merging Unit	IEC 61850-9-1
MX	Measurand analogue value X (Functional Constraint)	IEC 61850-7-2
N	Neutral	IEC 61850-7-4
Nam	Name	IEC 61850-7-4
NCC	Network Control Centre	IEC 61850-5
Net	Net sum	IEC 61850-7-4
Ng	Negative	IEC 61850-7-4
Nom	Nominal, Normalising	IEC 61850-7-4
NPL	Name PLate	IEC 61850-7-2
Num	Number	IEC 61850-7-4
O	Optional	IEC 61850-7-2
Ofs	Offset	IEC 61850-7-4
Op	Operate/Operating	IEC 61850-7-4
Opn	Open	IEC 61850-7-4
OSI	Open Systems Interconnection	IEC 61850-1
Out	Output	IEC 61850-7-4
Ov	Over/Override/Overflow	IEC 61850-7-4