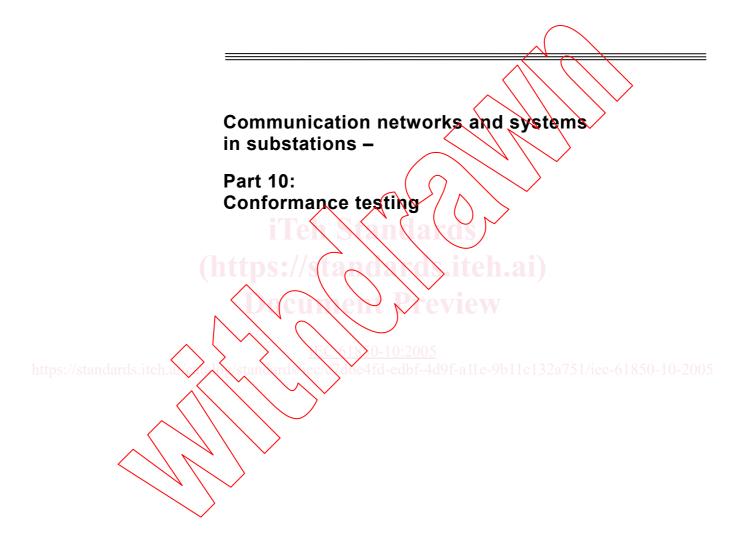
# INTERNATIONAL STANDARD

# IEC 61850-10

First edition 2005-05





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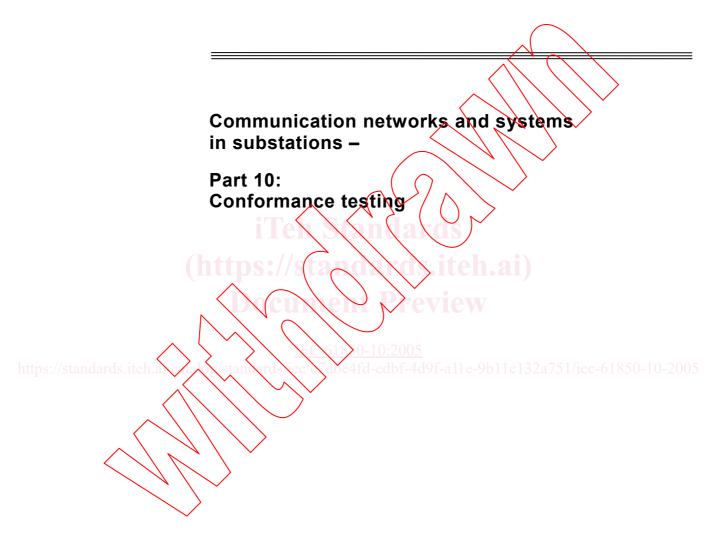
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## IEC 61850-10

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

## Part 10: Conformance testing

## **FOREWORD**

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International Standard IEC 61850-10 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

The text of this standard is based on the following documents:

FDIS	Report on voting
57/742/FDIS	57/749/RVD

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

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

IEC 61850 consists of the following parts, under the general title *Communication networks* and systems in substations:

- Part 1: Introduction and overview
- Part 2: Glossary
- Part 3: General requirements
- Part 4: System and project management
- Part 5: Communication requirements for functions and device models
- Part 6: Configuration description language for communication in electrical substations related to IEDs
- Part 7-1: Basic communication structure for substation and feeder equipment Principles and models
- Part 7-2: Basic communication structure for substation and feeder equipment Abstract communication service interface (ACSI)
- Part 7-3: Basic communication structure for substation and feeder equipment Common data classes
- Part 7-4: Basic communication structure for substation and feeder equipment Compatible logical node classes and data classes
- Part 8-1: Specific Communication Service Mapping (SCSM) Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
- Part 9-1: Specific Communication Service Mapping (SCSM) Sampled values over serial unidirectional multidrop point to point link
- Part 9-2: Specific Communication Service Mapping (SCSM) Sampled values over ISO/IEC 8802-3.
- Part 10: Conformance testing

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

A bilingual edition of this standard may be issued at a later date.

## INTRODUCTION

This part of IEC 61850 is part of a set of specifications which details a layered substation communication architecture.

This part of IEC 61850 defines:

- the methods and abstract test cases for conformance testing of devices used in substation automation systems, and
- the metrics to be measured within devices according to the requirements defined in IEC 61850-5.

The intended readers are test system developers.

NOTE 1 Tests regarding EMC requirements and environmental conditions are subject to EC 61850.3 and not included in this part of IEC 61850.

NOTE 2 It is recommended that IEC 61850-5 and IEC 61850-7-1 be read first in conjunction with IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4.

NOTE 3 Abbreviations used in IEC 61850-10 are listed in Clause 4 or may be found in other parts of IEC 61850 that are relevant for conformance testing.



# COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

## Part 10: Conformance testing

## 1 Scope

This part of IEC 61850 specifies standard techniques for testing of conformance of implementations, as well as specific measurement techniques to be applied when declaring performance parameters. The use of these techniques will enhance the ability of the system integrator to integrate IEDs easily, operate IEDs correctly, and support the applications as intended.

NOTE 1 The role of the test facilities for conformance testing and certifying the results are beyond the scope of this part of IEC 61850.

NOTE 2 The test approach and test system design to test a client device is likely to be different across the broad range of clients. There are many possibilities to test clients. The client tests are beyond the scope of this part of IEC 61850. It is intended to define client test requirements during the maintenance of this part.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61850-2, Communication networks and systems in substations - Part 2: Glossary

IEC 61850-4, Communication networks and systems in substations – Part 4: System and project management,

IEC 61850-5, Communication networks and systems in substations – Part 5: Communication requirements for functions and device models

IEC 61850-6. Communication networks and systems in substations – Part 6: Configuration description language for communication in electrical substations related to IEDs

IEC 61850-7-1, Communication networks and systems in substations – Part 7-1: Basic communication structure for substation and feeder equipment – Principles and models

IEC 61850-7-2, Communication networks and systems in substations — Part 7-2: Basic communication structure for substation and feeder equipment — Abstract communication service interface (ACSI)

IEC 61850-7-3, Communication networks and systems in substations – Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes

IEC 61850-7-4, Communication networks and systems in substations – Part 7-4: Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes

IEC 61850-8-1, Communication networks and systems in substations – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

IEC 61850-9-1, Communication networks and systems in substations – Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link

IEC 61850-9-2, Communication networks and systems in substations – Part 9-2: Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3

ISO/IEC 9646-1, Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts

ISO/IEC 9646-2, Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract test suite specification

ISO/IEC 9646-4, Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 4: Test realization

ISO/IEC 9646-5, Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 5: Requirements on test laboratories and clients for the conformance assessment process

ISO/IEC 9646-6, Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 6: Protocol profile test specification

## 3 Terms and definitions

For the purpose of this document, the terms and definitions provided in IEC 61850-2 as well as the following definitions apply.

# 3.1 Factory Acceptance Test

customer agreed functional tests of the specifically manufactured substation automation system or its parts using the parameter set for the planned application as specified in a specific customer specification. The FAT will be carried out in the factory of the manufacturer or other agreed-upon location by the use of process simulating test equipment.

## 3.2

## hold point

point, defined in the appropriate document beyond which an activity shall not proceed without the approval of the initiator of the conformance test. The test facility shall 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 proceeding of the activity.

## 3.3

## interoperability

ability of two or more IEDs from the same vendor (or different vendors) to exchange information and use that information for correct co-operation.

A set of values having defined correspondence with the quantities or values of another set.

## 3.4

## Model Implementation Conformance Statement

details the standard data object model elements supported by the system or device

## 3.5

## negative test

test to verify the correct response of a system or a device when subjected to:

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

## 3.6

## Protocol Implementation Conformance Statement

summary of the communication capabilities of the system or device to bettested

## 3.7

## Protocol Implementation eXtra Information for Testing PIXIT

the Protocol Implementation eXtra Information for Testing document contains system or device specific information regarding the communication capabilities of the system or device to be tested and which are outside the scope of the IEC 61850 series. The PIXIT is not subject to standardisation.

## 3.8

## routine test

performed by the manufacturer in order to ensure device operation and safety

## 3.9

## Site Acceptance Test

## SAT

verification of each data and control point and the correct functionality within the SAS and between the SAS and its operating environment at the whole installed plant by use of the final parameter set as specified in a specific customer specification. The SAT is the precondition for the SAS being put into operation.

## 3.10

## system related test

verification of correct behaviour of the IEDs and of the overall SAS under specific application conditions. The system related test is part of the final stage of the development of IEDs as belonging to a SAS-product family.

## 3.11

## test equipment

all tools and instruments which simulate and verify the input/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 serial links between the IEDs of the SAS on the other

## 3.12

## test facility

organisation able to provide appropriate test equipment and trained staff for conformance testing. The management of conformance tests and the resulting information should follow a quality system.

## 3.13

## type test

verification of correct behaviour of the IEDs of the SAS by use of the system tested software under the test conditions corresponding with the technical data

The type test marks the final stage of the hardware development and is the precondition for the start of the production. This test is carried out with IEDs, which have been manufactured through the normal production cycle.

## 3.14

RTU

SAS

Remote Terminal Unit

**Substation Automation System** 

## 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 provides 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.

## Abbreviated terms **ACSI Abstract Communication Service Interface ASDU** Application Service Data Unit **BRCB Buffered Report Control Block** CDC Common Data Class CT **Current Transducer** DTD **Document Type Definition** DUT **Device Under Test FAT** Factory Acceptance Test GΙ General Interrogation **GoCB** GOOSE Control Block **GOOSE** Generic Object Oriented Substation Events Generic Substation Event **GSE GSSE** Generic Substation Status Event **GsCB** GSSE Control Block НМІ Human Machine Interface ICD IED Capability Description Intelligent Electronic Device IED IΡ Internet Protocol LCB Log Control Block Logical Device LD LN Logical Node MC MultiCast **MCAA Multicast Application Association** MICS Model Implementation Conformance Statement MMS Manufacturing Message Specification (ISO 9506 series) **MSVCB** Multicast Sampled Value Control Block **PICS Protocol Implementation Conformance Statement PIXIT** Protocol Implementation eXtra Information for Testing