
Communication networks and systems in substations - Part 5: Communication requirements for functions and device models (IEC 61850- 5:2003)

Communication networks and systems in substations -- Part 5: Communication requirements for functions and device models

Kommunikationsnetze und -systeme in Stationen -- Teil 5:
Kommunikationsanforderungen für Funktionen und Gerätemodelle

Réseaux et systèmes de communication dans les postes -- Partie 5: Prescriptions relatives à la communication pour les fonctions et les modèles de dispositifs

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dans les postes
Partie 5 : Prescriptions relatives
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(CEI 61850-5:2003)

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SIST EN 61850-5:2004

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 57/641/FDIS, future edition 1 of IEC 61850-5, prepared by IEC TC 57, Power system control and associated communications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61850-5 on 2003-10-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-10-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annexes A to J are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61850-5:2003 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60044-8	- ¹⁾	Instrument transformers Part 8: Electronic current transformers	EN 60044-8	2002 ²⁾
IEC 60870-4	- ¹⁾	Telecontrol equipment and systems Part 4: Performance requirements	HD 546.4 S1	1992 ²⁾
IEC 61346	Series	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations	EN 61346	Series
IEC/TS 61850-2	- ¹⁾	Communication networks and systems in substations Part 2: Glossary	-	-
IEC 62053-22	- ¹⁾	Electricity metering equipment (a.c.) - Particular requirements Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)	EN 62053-22	2003 ²⁾
IEEE C37.2	1996	Electrical Power System Device Function Numbers and Contact Designations	-	-

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

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INTERNATIONAL STANDARD

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Communication requirements for functions and device models (standards.iteh.ai)

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS
IN SUBSTATIONS –Part 5: Communication requirements
for functions and device models

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, 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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International Standard IEC 61850-5 has been prepared by IEC technical committee 57: Power system control and associated communications.

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

FDIS	Report on voting
57/641/FDIS	57/649/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.

The content of this part of IEC 61850 is based on existing or emerging standards and applications. In particular the approach to formulate the requirements is based upon

CIGRE Technical Report, Ref. No. 180, *Communication requirements in terms of data flow within substations*. CE/SC 34 03, 2001, 112 pp. Ref. No. 180

K.P. Brand, *Communication requirements in terms of data flow within substations – Results of WG34.03 and standardization within IEC*, **Electra** 173, 77-85 (1997)

IEEE-SA TR 1550-2003: *IEEE-SA Technical Report on Utility Communications Architecture (UCA™), Version 2.0, Part 4: UCA Generic Object Models for Substation and Feeder Equipment (GOMSFE)*.

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*¹
- 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*²
- 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) and to ISO/IEC 8802-3*²
- 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*²
- Part 10: *Conformance testing*²

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

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

¹ To be published.

² Under consideration.

INTRODUCTION

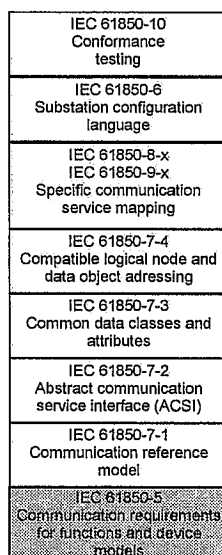
The IEC 61850 series is intended to provide interoperability between all devices in substations. Communication between these devices has to fulfil a lot of requirements imposed by all the functions to be performed in substations. Depending on the philosophy both of the vendor and of the user and on the state-of-the-art in technology, the allocation of functions to devices and control levels is not commonly fixed. This results in different requirements for the different communication interfaces within the substation. The IEC 61850 series shall support any allocation of functions.

The IEC 61850 series should have a long lifetime but be able to follow the fast changes in communication technology by both its technical approach and its document structure. Figure 1 shows the relationship of this part of the IEC 61850 series to subsequent parts of the IEC 61850 series. The IEC 61850 series has been organized so that changes to one part do not require a significant rewriting of another part, i.e. the parts are based on the communication requirements in this part of the IEC 61850 series; the derived modelling requirements in subsequent parts will not change the requirements of this part of the IEC 61850 series. The general parts, the requirement specification and the modelling parts are independent from any implementation. The implementation needed for the use of the IEC 61850 series is defined in some dedicated parts.

This part of the IEC 61850 series defines the communication requirements for functions and device models for substations.

The modelling of communication requires the definition of objects (for example, data objects, data sets, report control, log control) and services provided by objects (for example, get, set, report, create, delete). This is defined in IEC 61850-7-x with a clear interface to implementation. To use the benefits of communication technology, in the IEC 61850 series, no new OSI stacks are defined but a standardized mapping on existing stacks is given in IEC 61850-8-x and IEC 61850-9-x. A substation configuration language (IEC 61850-6) and a standardized conformance testing complement the IEC 61850 series. Figure 1 shows the general structure of the documents of the IEC 61850 series, as well as the relative position of IEC 61850-5 within this series.

NOTE To keep the layered approach of the IEC 61850 series which does not mix application and implementation requirements, terms such as client, server, data objects, etc. are normally not used in this part of the IEC 61850 series (requirements). In IEC 61850-7-x (modeling), IEC 61850-8-x and IEC 61850-9-x (specific communication service mapping) terms belonging to application requirements such as PICOMs are normally not used.



IEC 1993/03

Figure 1 – Relative position of this part of the IEC 61850 series

COMMUNICATION NETWORKS AND SYSTEMS IN SUBSTATIONS –

Part 5: Communication requirements for functions and device models

1 Scope

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

The specifications of this part refer to the communication requirements of the functions being performed in the substation automation system and to device models. All known functions and their communication requirements are identified.

The description of the functions is not used to standardize the functions, but to identify communication requirements between technical services and the substation, and communication requirements between Intelligent Electronic Devices within the substation. The basic goal is interoperability for all interactions.

Standardizing functions and their implementation is completely outside the scope of this part of IEC 61850. Therefore, a single philosophy for allocating functions to devices cannot be assumed in the IEC 61850 series. To support the resulting request for free allocation of functions, a proper breakdown of functions into parts relevant for communication is defined. The exchanged data and their required performance are defined. These definitions are supplemented by informative data flow calculations for typical substation configurations.

Intelligent electronic devices from substations such as protective devices are also found in other installations such as power plants. Using this part of IEC 61850 for such devices in these plants also would facilitate the system integration but this is beyond the scope of this part of IEC 61850.

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 60044-8, *Instrument transformers – Part 8: Electronic current transformers*

IEC 60870-4, *Telecontrol equipment and systems – Part 4: Performance requirements*

IEC 61346 (all parts), *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations*

IEC 61850-2, *Communication networks and system in substations – Part 2: Glossary*³

IEC 62053-22, *Electricity metering equipment (a.c.) – Particular Requirements – Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)*

³ To be published.