



# TECHNICAL SPECIFICATION



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**Communication networks and systems for power utility automation –  
Part 80-1: Guideline to exchanging information from a CDC-based data model  
using IEC 60870-5-101 or IEC 60870-5-104**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

#### Part 80-1: Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104

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- 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 61850-80-1, which is a technical specification, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.



This second edition cancels and replaces the first edition published in 2008. This edition constitutes a technical revision.

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

- a) IEC TS 61850-80-1:2008 is based on the definitions of IEC 61850 Edition 1. After the publication of IEC TS 61850-80-1:2008 the standard series IEC 61850 was updated to Edition 2 (almost all parts);
- b) In particular, IEC 61850-7-3:2010 introduces new Common Data Classes (CDCs) which are currently not mapped to IEC 60870-5-101 or IEC 60870-5-104 in IEC 61850-80-1:2008. Those new CDCs are: ENS, HST, VSS, ENC, BAC, ENG, ORG, TSG, CUG, VSG, CSG. IEC 61400-25-4, which is currently being updated, makes reference to IEC TS 61850-80-1:2008 and therefore needs to be updated according to the definitions of this second edition of IEC 61850. The following CDCs are missing in the IEC 61850-80-1:2008 and have therefore been added to this new edition for IEC 61400-25-4 Edition 2: ENS, ENC, ENG, ORG.

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

Enquiry draft	Report on voting
57/1649/DTS	57/1726/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.

A list of all parts of the IEC 61850 series, published under the general title *Communication networks and systems for power utility automation*, can be found on the IEC website.

The committee has decided that the contents of 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 edition of this document may be issued at a later date.

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## COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

### Part 80-1: Guideline to exchanging information from a CDC-based data model using IEC 60870-5-101 or IEC 60870-5-104

#### 1 Scope

This part of IEC 61850, which is a technical specification, gives a guideline on how to exchange information from a CDC-based data model (for example IEC 61850) using IEC 60870-5-101 or IEC 60870-5-104 between substation(s) and control center(s). Mostly guidelines for functions needed in a substation gateway device are given.

The goal of this technical specification is to describe standardized mapping of device-oriented data models (for example IEC 61850) with already defined attributes of CDCs and services (for example IEC 61850-7) onto the already defined ASDUs and services of IEC 60870-5-104 or IEC 60870-5-101. It is not the goal of this technical specification to add any extensions to published standards (for example IEC 61850 or IEC 60870-5-104 or IEC 60870-5-101).

After an introduction giving a basic description of the mapping, the mapping of the information model with associated data classes, and the mapping of services are described. Clause 9 shows how the mapped data and services according to the IEC 60870-5-104 and IEC 60870-5-101 protocol are marked (selected) in the interoperability sheet.

The scope of this technical specification is to achieve real-time exchange of process information required for operational purposes between a substation using a CDC-based data model (for example IEC 61850) and (a) control center(s) using a communication link over a wide area network (WAN) compliant to the definitions of IEC 60870-5-101 or IEC 60870-5-104. The amount of real-time information provided by the substation-gateway device can vary dependent on the operational needs. Actors could be regional and nationwide control centers that receive real-time information in order to monitor and control geographically widespread processes. The described mapping can be used for several fields of application of power utilities, such as substations, hydro and wind power plants, and decentralized energy resources DER. The mapping is based on the definitions of the IEC 61850 series and IEC 60870-5-104:2006/IEC 60870-5-101:2003. The scope of the mapped IEC 60870-5-104 and IEC 60870-5-101 subset is given in Clause 9.

This technical specification focuses mainly on defining rules and functions of a gateway device as a part of the substation. However, the rules and functions are also valid when an IED may optionally be connected directly to a WAN compliant with IEC 60870-5-101 or IEC 60870-5-104 and therefore, the mapping has to be done inside the IED.

To enable an automated database management approach, which aims to ensure consistency between the databases of substations and control centers, the SCD file (substation configuration description) can be extended with IEC 60870-5-101/IEC 60870-5-104 specific information to configure the 61850 to 101/104 gateway. How the SCD file can be extended is described in Annex A.

The extended substation configuration description (SCD+) is recommended to be used to configure any gateway in a vendor independent format.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60870-5-3, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 3: General structure of application data*

IEC 60870-5-4:1993, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 4: Definition and coding of application information elements*

IEC 60870-5-5:1995, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 5: Basic application functions*

IEC 60870-5-101, *Telecontrol equipment and systems – Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks*

IEC 60870-5-104:2006, *Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles*

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 61850-6, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs*

IEC 61850-7-2:2003, *Communication networks and systems in substations – Part 7-2: Basic information and communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)*

IEC 61850-7-2:2010, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)*

IEC 61850-7-3:2003, *Communication networks and systems in substations – Part 7-3: Basic communication structure – Common data classes*

IEC 61850-7-3:2010, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

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

IEEE 754:2008, *IEEE Standard for Binary Floating-Point Arithmetic*

RFC 2200, *Internet Official Protocol Standards, Request for Comments 2200 (June 1997)*