IEC/TR 61850-90-1

Edition 1.0 2010-03

TECHNICAL REPORT

colour inside

Communication networks and systems for power utility automation – Part 90-1: Use of IEC 61850 for the communication between substations

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.200

ISBN 978-2-88910-580-9

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-1: Use of IEC 61850 for the communication between substations

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, Publicly Available Specifications (PAS) 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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 61850-90-1, which is a technical report, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

Enquiry draft	Report on voting
57/992/DTR	57/1021/RVC

Full information on the voting for the approval of this technical report 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, 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 amendment and the base publication will remain unchanged until the stability 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 version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

When IEC 61850 was prepared, it was intended for use in information exchange between devices of a substation automation system. In the mean time, the concepts are now used as well in other application domains of the power utility system. Therefore, IEC 61850 is on the way to becoming the foundation for a globally standardized utility communication network.

With existing and new applications in the field of power system operation and protection, the requirement to exchange standardized information directly between substations is increasing. IEC 61850 shall be the basis for this information exchange.

IEC 61850 provides the basic features to be used for that information exchange, however, some extensions to IEC 61850 may be required. This technical report provides a comprehensive overview of the different aspects that need to be considered when using IEC 61850 for information exchange between substations. Areas that require extension of specific parts of the existing IEC 61850 standard will later be incorporated in future editions of the affected part of IEC 61850.

A similar report discussing the use of IEC 61850 for communication between substations and control centres is under preparation as IEC 61850-90-2[1)]. Further, a similar report discussing the use of IEC 61850 for wide-area RAS (remedial action schemes) is being contemplated; this will likely be IEC 61850-90-3[1)].

The scope of IEC 61850 is no longer limited to substations. This is reflected in the changed title of the series. New domain specific parts have been added to the series. Working Group 10 of Technical Committee 57 is currently preparing the second edition of the basic parts of IEC 61850.

---

1) Under consideration.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 90-1: Use of IEC 61850 for the communication between substations

1 Scope

This part of IEC 61850 provides a comprehensive overview on the different aspects that need to be considered while using IEC 61850 for information exchange between substations. In particular, this technical report

- defines use cases that require an information exchange between substations;
- describes the communication requirements;
- gives guidelines for the communication services and communication architecture to be used;
- defines data as a prerequisite for interoperable applications;
- does not define implementations which guarantee interoperability between different IEDs;
- describes the usage and enhancements of the configuration language SCL.

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 (all parts), *Instrument transformers*

IEC 60834-1:1999, *Teleprotection equipment of power systems – Performance and testing – Part 1: Command systems*

IEC 60834-2:1993, *Performance and testing of teleprotection equipment of power systems – Part 2: Analogue comparison systems*

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

IEC/TS 61850-2, *Communication networks and systems in substations – Part 2: Glossary*

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

IEC 61850-3, *Communication networks and systems in substations – Part 3: General requirements*

IEC 61850-5:2003, *Communication networks and systems in substations – Part 5: Communication requirements for functions and device models*

IEC 61850-6:2009, *Communication networks and systems for power utility automation – Part 6: Configuration description language for communication in electrical substations related to IEDs*

IEC 61850-7-2:2010, C*ommunication networks and systems for power utility automation – Part 7-2: Basic communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-4:2010, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object 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*[2)]

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*[2)]

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)*

IEC/TS 62351-6, *Power systems management and associated information exchange – Data and communication security – Part 6: Security for IEC 61850*

IEC 62439, *High availability automation networks*

ANSI/IEEE 1588, *Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems / revision of ANSI/IEEE 1588-2002 / Approved 2008-09-10*

IEEE 802.1Q, *Local and metropolitan area networks – Virtual bridged local area networks*

---

2) To be published