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TECHNICAL REPORT



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	9
4 Abbreviated terms	9
5 Use cases	10
5.1 General.....	10
5.2 Distance line protection with permissive overreach tele-protection scheme	10
5.3 Distance line protection with blocking tele-protection scheme.....	13
5.4 Directional comparison protection.....	15
5.5 Transfer/Direct tripping.....	18
5.6 Interlocking	20
5.7 Multi-phase auto-reclosing application for parallel line systems	22
5.8 Current differential line protection	24
5.9 Phase comparison protection	28
5.10 Other applications	31
5.10.1 General	31
5.10.2 Fault locator system (2, 3 terminals).....	31
5.10.3 System integrity protection schemes (SIPS)	33
5.10.4 Real time predictive generator shedding	36
5.10.5 Out-of-step detection	39
5.10.6 Synchrophasors.....	41
5.10.7 Remedial action schemes (RAS)	41
6 Communication requirements for substation-to-substation communication.....	41
6.1 General issues	41
6.1.1 Introduction	41
6.1.2 Logical allocation of functions and interfaces (5.2 in IEC 61850-5)	41
6.1.3 The role of interfaces.....	43
6.1.4 Response behaviour requirements.....	43
6.2 Functions based on substation-substation communication	43
6.2.1 Protection functions.....	43
6.2.2 Control functions	44
6.3 Message performance requirements.....	44
6.3.1 Transfer time definition (13.4 in IEC 61850-5)	44
6.4 The introduction and use of message performance classes	47
6.4.1 General	47
6.4.2 Control and protection	47
6.4.3 Metering and power quality.....	49
6.5 General requirements for data integrity	51
6.6 Requirements for teleprotection – Reliability (security and dependability).....	51
6.6.1 General	51
6.6.2 Security requirements for protection schemes according to CIGRE and IEC	51
6.6.3 Dependability requirements for protection schemes according to CIGRE and IEC	52

7	Considerations on security and dependability issues when using Ethernet networks.....	52
7.1	General.....	52
7.2	Security of traffic.....	52
7.3	Dependability of traffic.....	53
7.4	Avoiding GOOSE packets flooding the WAN.....	53
7.5	Summary on recommendations for using Ethernet for communication between substations.....	54
7.5.1	General.....	54
7.5.2	Example of packet delays.....	54
7.6	Useful features of some Ethernet telecommunications networks.....	55
8	Communication aspects.....	55
8.1	Services.....	55
8.2	Communication architecture.....	55
8.2.1	Preliminary notes and definitions.....	55
8.2.2	Tunnelling.....	56
8.2.3	Gateway.....	57
9	Modelling.....	58
9.1	General architecture.....	58
9.2	Communication interface ITPC.....	59
9.3	Communication-aided protection schemes and direct tripping.....	61
9.3.1	Proposed model.....	61
9.3.2	LN PSCH.....	62
9.4	Differential protection schemes.....	62
9.4.1	Proposed model.....	62
9.4.2	LN RMXU.....	65
9.4.3	SV format.....	65
10	Configuration aspects.....	66
10.1	General.....	66
10.2	Direct communication link.....	66
10.2.1	General.....	66
10.2.2	SCL enhancements.....	71
10.2.3	SCL example.....	71
10.3	Tele-protection equipment between substations.....	77
	Bibliography.....	79
	Figure 1 – Distance line protection with permissive overreach tele-protection scheme.....	10
	Figure 2 – Distance line protection with blocking tele-protection scheme.....	13
	Figure 3 – Directional comparison with permissive scheme.....	16
	Figure 4 – Transfer/Direct tripping.....	18
	Figure 5 – Interlocking – Interoperation.....	20
	Figure 6 – Auto-reclosing.....	22
	Figure 7 – Current differential line protection.....	25
	Figure 8 – Phase comparison protection.....	28
	Figure 9 – Principle to detect internal fault by phase comparison.....	28
	Figure 10 – Fault locator system (2, 3 terminals).....	31
	Figure 11 – Example of a system integrity protection scheme.....	33
	Figure 12 – Real time predictive type generator shedding system.....	36

Figure 13 – Out-of-step detection.....	39
Figure 14 – Logical interfaces between substation A and substation B.....	42
Figure 15 – Transfer time for binary and other signals over a serial connection	45
Figure 16 – Transfer time for binary signal with conventional output and input relays.....	45
Figure 17 – Definition of transfer time t for binary signals in case of line protection.....	46
Figure 18 – Definition of transfer time t over serial link in case of line protection.....	46
Figure 19 – Basic SS-to-SS communication structure	56
Figure 20 – SS-to-SS communication via tunnel	57
Figure 21 – SS-to-SS communication via proxy gateway.....	58
Figure 22 – Allocation of the LN ITPC representing the communication channel and the LNs providing the data to be exchanged between substations.....	59
Figure 23 – Protection application example for permissive underreach distance teleprotection scheme and appropriate logical node modelling	61
Figure 24 – Communication system based on current system	63
Figure 25 – Communication system based on future system	63
Figure 26 – Proposed 2-terminal current differential feeder protection relay model	64
Figure 27 – Proposed 3-terminal current differential feeder protection relay model	64
Figure 28 – SCD files and SED region for SS-to-SS communication	67
Figure 29 – Enhanced engineering process	68
Figure 30 – IED states when exchanging SED files	70
Figure 31 – Proxy gateway method (AA1F3, AA2F3 are Proxy gateways)	78
Table 1 – Grouping of protection and control interfaces	42
Table 2 – Protection functions using substation-substation communication	43
Table 3 – Control functions using substation-substation communication	44
Table 4 – Change of transfer time and synchronisation method	50
Table 5 – Performance classes for time tagging of events.....	50
Table 6 – Time performance classes for instrument transformer synchronisation	50
Table 7 – The bit error rate as indication for communication quality	51
Table 8 – Logical node ITPC.....	60
Table 9 – Logical node PSCH.....	62
Table 10 – Logical node RMXU.....	65
Table 11 – Sampled value (SV) format definition.....	66
Table 12 – IED engineering control types.....	69

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**COMMUNICATION NETWORKS AND SYSTEMS
FOR POWER UTILITY AUTOMATION –****Part 90-1: Use of IEC 61850 for the communication
between substations**

FOREWORD

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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 61850-90-2¹⁾. 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 61850-90-3¹⁾.

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), *Communication 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, *Communication 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 8802-3²⁾*

IEC 61850-9-2,____ *Communication networks and systems in substations – Part 9-2: Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3²⁾*

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