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Standards

Irish Standard
I.S. EN 61850-7-1:2011

Communication networks and systems
for power utility automation -- Part 7-1:
Basic communication structure -
Principles and models (IEC 61850-7
-1:2011 (EQV))

I.S. EN 61850-7-1:2011

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English version

**Communication networks and systems for power utility automation -
Part 7-1: Basic communication structure -
Principles and models
(IEC 61850-7-1:2011)**

Réseaux et systèmes de communication
pour l'automatisation des systèmes
électriques -
Partie 7-1: Structure de communication de
base -
Principes et modèles
(CEI 61850-7-1:2011)

Kommunikationsnetze und -systeme für
die Automatisierung in der elektrischen
Energieversorgung -
Teil 7-1: Grundlegende
Kommunikationsstruktur -
Grundsätze und Modelle
(IEC 61850-7-1:2011)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Foreword

The text of document 57/1121/FDIS, future edition 2 of IEC 61850-7-1, prepared by IEC TC 57, Power systems management and associated information exchange, was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61850-7-1:2011.

This document supersedes EN 61850-7-1:2003.

Compared to EN 61850-7-1:2003, EN 61850-7-1:2011 introduces:

- the model for statistical and historical statistical data,
- the concepts of proxies, gateways, LD hierarchy and LN inputs,
- the model for time synchronisation,
- the concepts behind different testing facilities,
- the extended logging function.

EN 61850-7-1:2011 also clarifies the following points:

- the use of numbers for data extension,
- the use of name spaces,
- the mode and behaviour of a logical node,
- the use of range and deadbanded values,
- the access to control actions and others.

The following dates are fixed:

- | | | |
|--|-------|------------|
| – latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-05-19 |
| – latest date by which the national standards conflicting with the document have to be withdrawn | (dow) | 2014-08-19 |

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Endorsement notice

The text of the International Standard IEC 61850-7-1:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- | | | |
|------------------|------|---|
| IEC 61346-1 | NOTE | Harmonized as EN 61346-1. |
| IEC 61346-2 | NOTE | Harmonized as EN 61346-2. |
| IEC 61400 series | NOTE | Harmonized in EN 61400 series (not modified). |
-

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

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/TS 61850-2	-	Communication networks and systems in substations - Part 2: Glossary	-	-
IEC 61850-3	-	Communication networks and systems in substations - Part 3: General requirements	EN 61850-3	-
IEC 61850-4	-	Communication networks and systems for power utility automation - Part 4: System and project management	EN 61850-4	-
IEC 61850-5	-	Communication networks and systems in substations - Part 5: Communication requirements for functions and device models	EN 61850-5	-
IEC 61850-6	-	Communication networks and systems for power utility automation - Part 6: Configuration description language for communication in electrical substations related to IEDs	EN 61850-6	-
IEC 61850-7-2	-	Communication networks and systems for power utility automation - Part 7-2: Basic information and communication structure - Abstract communication service interface (ACSI)	EN 61850-7-2	-
IEC 61850-7-3	-	Communication networks and systems for power utility automation - Part 7-3: Basic communication structure - Common data classes	EN 61850-7-3	-
IEC 61850-7-4	-	Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes	EN 61850-7-4	-
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	EN 61850-8-1	-

I.S. EN 61850-7-1:2011

- 4 -

EN 61850-7-1:2011

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	EN 61850-9-2	-
IEC 61850-10	-	Communication networks and systems in substations - Part 10: Conformance testing	EN 61850-10	-
ISO/IEC 8802-3	-	Information technology - Telecommunications - and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications		-
ISO/IEC 8825	Series	Information technology - ASN.1 encoding rules		-
ISO 9506-1	-	Industrial automation systems - Manufacturing - Message Specification - Part 1: Service definition		-
ISO 9506-2	-	Industrial automation systems - Manufacturing - Message Specification - Part 2: Protocol specification		-

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	12
3 Terms and definitions	13
4 Abbreviated terms	13
5 Overview of the IEC 61850 series concepts.....	14
5.1 Objective.....	14
5.2 Topology and communication functions of substation automation systems	16
5.3 The information models of substation automation systems	16
5.4 Applications modelled by logical nodes defined in IEC 61850-7-4.....	18
5.5 The semantic is attached to data	21
5.6 The services to exchange information	23
5.7 Services mapped to concrete communication protocols	24
5.8 The configuration of the automation system	25
5.9 Summary.....	26
6 Modelling approach of the IEC 61850 series.....	27
6.1 Decomposition of application functions and information.....	27
6.2 Creating information models by stepwise composition	28
6.3 Example of an IED composition	31
6.4 Information exchange models.....	31
6.4.1 General	31
6.4.2 Output model.....	33
6.4.3 Input model	36
6.4.4 Model for statistical and historical statistical data	46
6.4.5 Model for system functions	50
7 Application view	52
7.1 General.....	52
7.2 First modelling step – Logical nodes and data	53
7.3 Mode and behaviour of a logical node	57
7.4 Use of measurement ranges and alarms for supervision functions.....	57
7.5 Data used for limiting the access to control actions	58
7.6 Data used for blocking functions described by logical nodes	58
7.7 Data used for logical node inputs/outputs blocking (operational blocking).....	58
7.7.1 General	58
7.7.2 Blocking incoming commands.....	59
7.7.3 Blocking process outputs.....	59
7.7.4 Blocking oscillating inputs.....	60
7.8 Data used for testing	60
7.8.1 General	60
7.8.2 Multicast signals used for simulation	60
7.8.3 Input signals used for testing.....	61
7.8.4 Test mode	62
7.9 Logical node used for extended logging functions	62
8 Device view.....	63
8.1 General.....	63

8.2	Second modelling step – logical device model.....	64
8.2.1	The logical device concept	64
8.2.2	The device nameplate	65
8.2.3	Gateways and proxies	66
8.2.4	Logical devices for monitoring external device health	67
8.2.5	Logical devices management hierarchy	68
9	Communication view.....	70
9.1	General.....	70
9.2	The service models of the IEC 61850 series.....	70
9.3	The virtualisation.....	72
9.4	Basic information exchange mechanisms	73
9.5	The client-server building blocks	75
9.5.1	Server	75
9.5.2	Client-server roles	76
9.6	Logical nodes communicate with logical nodes.....	77
9.7	Interfaces inside and between devices	78
10	Where physical devices, application models and communication meet	79
11	Relationships between IEC 61850-7-2, IEC 61850-7-3 and IEC 61850-7-4	80
11.1	Refinements of class definitions	80
11.2	Example 1 – Logical node and data class	81
11.3	Example 2 – Relationship of IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4... ..	85
12	Formal specification method	86
12.1	Notation of ACSI classes	86
12.2	Class modelling.....	87
12.2.1	Overview	87
12.2.2	Common data class	88
12.2.3	Logical node class	91
12.3	Service tables	92
12.4	Referencing instances	93
13	Name spaces	96
13.1	General.....	96
13.2	Name spaces defined in the IEC 61850-7-x series.....	97
13.3	Specification of name spaces	101
13.3.1	General	101
13.3.2	Specification.....	101
13.4	Attributes for references to name spaces	102
13.4.1	General	102
13.4.2	Attribute for logical device name space (ldNs)	103
13.4.3	Attribute for logical node name space (lnNs).....	103
13.4.4	Attribute for data name space (dataNs)	104
13.4.5	Attribute for common data class name space (cdcNs).....	104
14	Common rules for new version of classes and for extension of classes.....	104
14.1	General.....	104
14.2	Basic rules	104
14.3	Rules for LN classes	105
14.3.1	Use of standardized LN classes.....	105
14.3.2	Extensions to standardized LN classes made by third parties	106
14.3.3	New LN classes.....	106

14.3.4	New versions of standardized LN classes made by name space owners	107
14.4	Rules for common data classes and control block classes	107
14.4.1	New common data classes and control block classes	107
14.4.2	New versions of standardized common data classes	107
14.4.3	New versions of control block classes.....	107
14.5	Multiple instances of LN classes for dedicated and complex functions.....	108
14.5.1	Example for time overcurrent.....	108
14.5.2	Example for PDIS	108
14.5.3	Example for power transformer.....	108
14.5.4	Example for auxiliary network	108
14.6	Specialisation of data by use of number extensions.....	109
14.7	Examples for new LNs.....	109
14.8	Example for new Data	109
Annex A	(informative) Overview of logical nodes and data	110
Annex B	(informative) Allocation of data to logical nodes	113
Annex C	(informative) Use of the substation configuration language (SCL)	116
Annex D	(informative) Applying the LN concept to options for future extensions	118
Annex E	(informative) Relation between logical nodes and PICOMs	123
Annex F	(informative) Mapping the ACSI to real communication systems.....	124
	Bibliography.....	132
	Figure 1 – Relations between modelling and mapping parts of the IEC 61850 series	14
	Figure 2 – Sample substation automation topology	16
	Figure 3 – Modelling approach (conceptual).....	17
	Figure 4 – Logical node information categories	20
	Figure 5 – Build-up of devices (principle)	20
	Figure 6 – Position information depicted as a tree (conceptual)	21
	Figure 7 – Service excerpt	23
	Figure 8 – Example of communication mapping	25
	Figure 9 – Summary	26
	Figure 10 – Decomposition and composition process (conceptual).....	27
	Figure 11 – XCBR1 information depicted as a tree.....	30
	Figure 12 – Example of IED composition.....	31
	Figure 13 – Output and input model (principle)	32
	Figure 14 – Output model (step 1) (conceptual)	33
	Figure 15 – Output model (step 2) (conceptual)	34
	Figure 16 – GSE output model (conceptual).....	34
	Figure 17 – Setting data (conceptual)	35
	Figure 18 – Input model for analogue values (step 1) (conceptual)	37
	Figure 19 – Range and deadbanded value (conceptual).....	38
	Figure 20 – Input model for analogue values (step 2) (conceptual)	39
	Figure 21 – Reporting and logging model (conceptual).....	40
	Figure 22 – Data set members and reporting	41
	Figure 23 – Buffered report control block (conceptual).....	42

Figure 24 – Buffer time	43
Figure 25 – Data set members and inclusion-bitstring	44
Figure 26 – Log control block (conceptual).....	44
Figure 27 – Peer-to-peer data value publishing model (conceptual)	45
Figure 28 – Conceptual model of statistical and historical statistical data (1)	47
Figure 29 – Conceptual model of statistical and historical statistical data (2)	49
Figure 30 – Concept of the service tracking model – Example: control service tracking.....	51
Figure 31 – Real world devices	52
Figure 32 – Logical nodes and data (IEC 61850-7-2)	53
Figure 33 – Simple example of modelling.....	55
Figure 34 – Basic building blocks.....	55
Figure 35 – Logical nodes and PICOM.....	56
Figure 36 – Logical nodes connected (outside view in IEC 61850-7-x series).....	56
Figure 37 – Mode and behaviour data (IEC 61850-7-4).....	57
Figure 38 – Data used for limiting the access to control actions (IEC 61850-7-4)	58
Figure 39 – Data used for logical node inputs/outputs blocking (IEC 61850-7-4)	59
Figure 40 – Data used for receiving simulation signals.....	60
Figure 41 – Example of input signals used for testing	61
Figure 42 – Test mode example.....	62
Figure 43 – Logical node used for extended logging functions (GLOG)	63
Figure 44 – Logical device building block.....	64
Figure 45 – Logical devices and LLN0/LPHD	65
Figure 46 – The common data class DPL.....	66
Figure 47 – Logical devices in proxies or gateways.....	67
Figure 48 – Logical devices for monitoring external device health	68
Figure 49 – Logical devices management hierarchy	69
Figure 50 – ACSI communication methods.....	71
Figure 51 – Virtualisation	73
Figure 52 – Virtualisation and usage	73
Figure 53 – Information flow and modelling	74
Figure 54 – Application of the GSE model.....	74
Figure 55 – Server building blocks	75
Figure 56 – Interaction between application process and application layer (client/server)	76
Figure 57 – Example for a service.....	76
Figure 58 – Client/server and logical nodes	77
Figure 59 – Client and server roles	77
Figure 60 – Logical nodes communicate with logical nodes.....	78
Figure 61 – Interfaces inside and between devices	79
Figure 62 – Component hierarchy of different views (excerpt).....	80
Figure 63 – Refinement of the DATA class.....	81
Figure 64 – Instances of a DATA class (conceptual)	84
Figure 65 – Relation between parts of the IEC 61850 series	85

Figure 66 – Abstract data model example for IEC 61850-7-x.....	87
Figure 67 – Relation of TrgOp and Reporting.....	90
Figure 68 – Sequence diagram	92
Figure 69 – References	93
Figure 70 – Use of FCD and FCDA	94
Figure 71 – Object names and object reference	95
Figure 72 – Definition of names and semantics	96
Figure 73 – One name with two meanings.....	97
Figure 74 – Name space as class repository.....	98
Figure 75 – All instances derived from classes in a single name space.....	99
Figure 76 – Instances derived from multiple name spaces	100
Figure 77 – Inherited name spaces	100
Figure 78 – Basic extension rules diagram.....	105
Figure B.1 – Example for control and protection LNs combined in one physical device	113
Figure B.2 – Merging unit and sampled value exchange (topology).....	114
Figure B.3 – Merging unit and sampled value exchange (data)	114
Figure C.1 – Application of SCL for LNs (conceptual)	116
Figure C.2 – Application of SCL for data (conceptual).....	117
Figure D.1 – Seamless communication (simplified)	118
Figure D.2 – Example for new logical nodes	119
Figure D.3 – Example for control center view and mapping to substation view	121
Figure E.1 – Exchanged data between subfunctions (logical nodes)	123
Figure E.2 – Relationship between PICOMS and client/server model.....	123
Figure F.1 – ACSI mapping to an application layer.....	124
Figure F.2 – ACSI mappings (conceptual).....	125
Figure F.3 – ACSI mapping to communication stacks/profiles	126
Figure F.4 – Mapping to MMS (conceptual).....	126
Figure F.5 – Mapping approach	127
Figure F.6 – Mapping detail of mapping to a MMS named variable.....	128
Figure F.7 – Example of MMS named variable (process values)	128
Figure F.8 – Use of MMS named variables and named variable list.....	129
Figure F.9 – MMS information report message.....	130
Figure F.10 – Mapping example.....	131
Table 1 – LN groups	18
Table 2 – Logical node class XCBR (conceptual).....	29
Table 3 – Excerpt of integer status setting	36
Table 4 – Comparison of the data access methods	41
Table 5 – ACSI models and services.....	71
Table 6 – Logical node circuit breaker	82
Table 7 – Controllable double point (DPC).....	83
Table 8 – ACSI class definition	86
Table 9 – Single point status common data class (SPS).....	88

Table 10 – Quality components attribute definition	89
Table 11 – Basic status information template (excerpt)	89
Table 12 – Trigger option	90
Table 13 – GenLogicalNodeClass definition	91
Table 14 – Excerpt of logical node name plate common data class (LPL)	103
Table 15 – Excerpt of common data class	103
Table A.1 – Excerpt of data classes for measurands	111
Table A.2 – List of common data classes (excerpt)	112

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**COMMUNICATION NETWORKS AND
SYSTEMS FOR POWER UTILITY AUTOMATION –**
**Part 7-1: Basic communication structure –
Principles and models**

FOREWORD

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International Standard IEC 61850-7-1 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

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

FDIS	Report on voting
57/1121/FDIS	57/1145/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 second edition cancels and replaces the first edition published in 2003. This second edition constitutes a technical revision.

Compared to the first edition, this second edition introduces:

- the model for statistical and historical statistical data,
- the concepts of proxies, gateways, LD hierarchy and LN inputs,
- the model for time synchronisation,
- the concepts behind different testing facilities,
- the extended logging function.

It also clarifies the following points:

- the use of numbers for data extension,
- the use of name spaces,
- the mode and behaviour of a logical node,
- the use of range and deadbanded values,
- the access to control actions and others.

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 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.

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

This part of the IEC 61850 series provides an overview of the architecture for communication and interactions between systems for power utility automation such as protection devices, breakers, transformers, substation hosts etc.

This document is part of a set of specifications which details a layered communication architecture for power utility automation. This architecture has been chosen to provide abstract definitions of classes (representing hierarchical information models) and services such that the specifications are independent of specific protocol stacks, implementations, and operating systems.

The goal of the IEC 61850 series is to provide interoperability between the IEDs from different suppliers or, more precisely, between functions to be performed by systems for power utility automation but residing in equipment (physical devices) from different suppliers. Interoperable functions may be those functions that represent interfaces to the process (for example, circuit breakers) or substation automation functions such as protection functions. This part of the IEC 61850 series uses simple examples of functions to describe the concepts and methods applied in the IEC 61850 series.

This part of the IEC 61850 series describes the relationships between other parts of the IEC 61850 series. Finally this part defines how interoperability is reached.

NOTE Interchangeability is the ability to replace a device from the same vendor, or from different vendors, utilising the same communication interface and as a minimum, providing the same functionality, with no impact on the rest of the system. If differences in functionality are accepted, the exchange may also require some changes somewhere else in the system. Interchangeability implies a standardisation of functions and, in a strong sense, of devices which are outside the scope of this standard. Interchangeability is outside the scope, but it will be supported following this standard for interoperability.

This part of the IEC 61850 series is intended for all stakeholders of standardised communication and standardised systems in the utility industry. It provides an overview of and an introduction to IEC 61850-7-4, IEC 61850-7-3, IEC 61850-7-2, IEC 61850-6, and IEC 61850-8-1.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 7-1: Basic communication structure – Principles and models

1 Scope

This part of the IEC 61850 series introduces the modelling methods, communication principles, and information models that are used in the various parts of the IEC 61850-7-x series. The purpose of this part of the IEC 61850 series is to provide – from a conceptual point of view – assistance to understand the basic modelling concepts and description methods for:

- substation-specific information models for power utility automation systems,
- device functions used for power utility automation purposes, and
- communication systems to provide interoperability within power utility facilities.

Furthermore, this part of the IEC 61850 series provides explanations and provides detailed requirements relating to the relation between IEC 61850-7-4, IEC 61850-7-3, IEC 61850-7-2 and IEC 61850-5. This part explains how the abstract services and models of the IEC 61850-7-x series are mapped to concrete communication protocols as defined in IEC 61850-8-1.

The concepts and models provided in this part of the IEC 61850 series may also be applied to describe information models and functions for:

- hydroelectric power plants,
- substation to substation information exchange,
- information exchange for distributed automation,
- substation to control centre information exchange,
- information exchange for metering,
- condition monitoring and diagnosis, and
- information exchange with engineering systems for device configuration.

NOTE 1 This part of IEC 61850 uses examples and excerpts from other parts of the IEC 61850 series. These excerpts are used to explain concepts and methods. These examples and excerpts are informative in this part of IEC 61850.

NOTE 2 Examples in this part use names of classes (e.g. XCBR for a class of a logical node) defined in IEC 61850-7-4, IEC 61850-7-3, and service names defined in IEC 61850-7-2. The normative names are defined in IEC 61850-7-4, IEC 61850-7-3, and IEC 61850-7-2 only.

NOTE 3 This part of IEC 61850 does not provide a comprehensive tutorial. It is recommended that this part be read first – in conjunction with IEC 61850-7-4, IEC 61850-7-3, and IEC 61850-7-2. In addition, it is recommended that IEC 61850-1 and IEC 61850-5 also be read.

NOTE 4 This part of IEC 61850 does not discuss implementation issues.

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