

CONSOLIDATED VERSION



**Communication networks and systems for power utility automation –
Part 6: Configuration description language for communication in power utility
automation systems related to IEDs**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Part 6: Configuration description language for communication in power utility
automation systems related to IEDs**

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CONTENTS

FOREWORD.....	7
INTRODUCTION.....	12
1 Scope.....	13
1.1 General.....	13
1.2 Namespace name and version	13
1.3 Code Component distribution	14
2 Normative references	15
3 Terms and definitions	16
4 Abbreviations	17
5 Intended engineering process with SCL	18
5.1 General.....	18
5.2 Scope of SCL.....	18
5.3 Use of SCL in the engineering process	19
5.4 IED modifications.....	22
5.5 Data exchange between projects	23
6 The SCL object model	26
6.1 General.....	26
6.2 The process model	29
6.3 The product (IED) model.....	30
6.4 The communication system model	31
6.5 Modelling of redundancy	32
6.6 Data flow modelling	33
7 SCL description file types	33
8 SCL language.....	35
8.1 Specification method.....	35
8.2 Language versions and compatibility.....	38
8.2.1 MustUnderstand files.....	39
8.2.2 SCL name space and versions.....	40
8.2.3 Incompatibilities to earlier versions	41
8.3 SCL language extensions	41
8.3.1 General	41
8.3.2 Data model extensions	42
8.3.3 Additional semantics to existing syntax elements.....	42
8.3.4 Data type constraints.....	42
8.3.5 XML name spaces	42
8.3.6 Private data.....	43
8.3.7 Another XML syntax	44
8.3.8 Summary: Standard conformance for extension handling.....	44
8.3.9 Extension example	44
8.4 General structure	44
8.5 Object and signal designation	45
8.5.1 General	45
8.5.2 Object designations in an object hierarchy.....	45
8.5.3 Signal identifications to be used in the communication system.....	46
8.5.4 Signal identifications usable by applications	48

8.5.5	Naming example	49
9	The SCL syntax elements	49
9.1	Header	49
9.2	Process description	52
9.2.1	General	52
9.2.2	Voltage level	57
9.2.3	Bay level	58
9.2.4	Power equipment	59
9.2.5	SubEquipment level	66
9.2.6	Process function logical nodes	67
9.2.7	Non power equipment	68
9.2.8	Substation section example	69
9.3	IED description	71
9.3.1	General	71
9.3.2	The IED, Services and Access Point	75
9.3.3	The IED server	87
9.3.4	The logical device	88
9.3.5	LN0 and other Logical Nodes	89
9.3.6	Data object (DOI) definition	91
9.3.7	Data set definition	94
9.3.8	Report control block	96
9.3.9	Log control block	99
9.3.10	GSE control block	100
9.3.11	Sampled value control block	102
9.3.12	Setting control block	104
9.3.13	Binding to external signals	105
9.3.14	Associations	109
9.4	Communication system description	110
9.4.1	General	110
9.4.2	Subnetwork definition	111
9.4.3	Address definition	113
9.4.4	GSE address definition	114
9.4.5	SMV address definition	115
9.4.6	Physical connection parameters	115
9.4.7	Communication section example	116
9.5	Data type templates	117
9.5.1	General	117
9.5.2	LNNodeType definitions	119
9.5.3	DO type definition	120
9.5.4	Data attribute (DA) definition	122
9.5.5	Data attribute structure type	126
9.5.6	Enumeration types	128
9.5.7	Data type template examples	129
10	Tool and project engineering rights	129
10.1	IED configurator	129
10.2	System configurator	130
10.3	Right transfer between projects	130
Annex A (normative)	SCL syntax: XML schema definition	133

Annex B (informative) SCL enumerations according to IEC 61850-7-3 and IEC 61850-7-4.....	185
Annex C (informative) Syntax extension examples.....	186
C.1 Extension syntax for drawing layout coordinates.....	186
Annex D (informative) Example.....	188
D.1 Example specification.....	188
D.1.1 General.....	188
D.1.2 Substation configuration.....	188
D.1.3 Communication system configuration.....	189
D.1.4 Transformer IED.....	189
D.2 Example SCL file contents.....	190
Annex E (informative) SCL syntax: General XML schema definition.....	203
E.1 General.....	203
E.2 Base types.....	203
E.3 Substation syntax.....	218
E.4 Data type templates.....	218
E.5 IED capabilities and structure.....	219
E.6 Communication subnetworks.....	232
E.7 Main SCL.....	232
Annex F (informative) XML schema definition of SCL variants.....	234
Annex G (normative) SCL Implementation Conformance Statement (SICS).....	240
Annex H (informative) ExtRef use cases.....	245
Annex I (normative) SCL – mixed version projects.....	249
I.1 General.....	249
I.2 Downgrading rules.....	252
I.2.1 Data Model related downgrading rules.....	252
I.2.2 SCL IED and Substation Model related compatibility rules.....	256
I.2.3 Generic rules.....	259
I.3 Upgrading rules.....	259
I.3.1 Data Model Structure related upgrading rules.....	259
I.3.2 SCL Element related upgrading rules.....	261
I.4 Mixed version projects involving Ed2, Ed2.1 devices / SCTs.....	262
I.4.1 General.....	262
I.4.2 Downgrading rules.....	265
I.4.3 Upgrading rules.....	267
Bibliography.....	269
Figure 1 Reference model for information flow in the configuration process.....	20
Figure 2 IED type description to System Configurator.....	21
Figure 3 – IED instance description to System Configurator.....	22
Figure 4 – Modification process.....	23
Figure 5 – Engineering right handling in projects.....	25
Figure 6 – SCL substation object model.....	27
Figure 7 – SA System Configuration example.....	29
Figure 8 – ICD files describing implementable IED types of a general IED class.....	35
Figure 9 – UML diagram overview of SCL schema.....	37
Figure 10 – Elements of the signal identification as defined in IEC 61850-7-2.....	46

Figure 11 – Elements of the signal name using product naming	47
Figure 12 – Possible elements of the signal name using functional naming	48
Figure 13 – Names within different structures of the object model	49
Figure 14 – UML diagram of Header section	50
Figure 15 – UML diagram of Substation section	53
Figure 16 – UML diagrams for equipment type inheritance and relations	60
Figure 17 – Substation section example	70
Figure 18 – IED structure and access points	72
Figure 19 – UML description of IED-related schema part – Base	73
Figure 20 – UML description of IED-related schema part for Control blocks	74
Figure 21 – UML description of IED-related schema part – LN definition	75
Figure 22 – UML diagram overview of the Communication section	111
Figure 23 – UML overview of DataTypeTemplate section	118
Figure 24 – UML diagram of Process and Line elements	56
Figure C.1 – Coordinate example	186
Figure D.1 – T1-1 Substation configuration	188
Figure D.2 – T1-1 Communication configuration	189
Figure D.3 – T1-1 Transformer bay	190
Figure I.1 – Edition 1-Edition 2 – Area of compatibility	249
Figure I.2 – Edition 1-Edition 2 Mixed engineering with different SCL versions	250
Figure I.3 – Edition 1-Edition 2 Mixed engineering with different SCL versions with one SCT managing data flow restriction	251
Figure I.4 – Edition 1-Edition 2 Mixed engineering with same SCL version – restricted to (Ed1∩Ed2)UEd2	252
Figure I.5 – Workflow with SED 2007B4 imports SCD 2007B4 following mustUnderstand/mayIgnore rules	263
Figure I.6 – Workflow with ICT A imports SCD 2007B4 following the mustUnderstand rules	264
Figure I.7 – Workflow with ICT A exports SCD 2007B following the downgrading rules	265
Table 1 – The files composing the XML schema definition for SCL	37
Table 2 – Attributes of the Private element	43
Table 3 – Attributes of the Header element	51
Table 4 – Attributes of the History item (Hitem) element	52
Table 5 – Primary apparatus device type codes	64
Table 6 – Attributes of the Terminal element	66
Table 7 – Attributes of the SubEquipment element	67
Table 8 – Attributes of the LNode element	68
Table 9 – General Equipment codes from IEC 61850-7-4	69
Table 10 – Attributes of the IED element	76
Table 11 – List of service capabilities and setting elements and attributes	78
Table 12 – Attributes of the Access point element	84
Table 13 – Attributes of the IED server element	88
Table 14 – Attributes of the Authentication element	88

Table 15 – Attributes of the LDevice element.....	89
Table 16 – Attributes of the LN0 element.....	90
Table 17 – Attributes of the LN element.....	91
Table 18 – Attributes of the DOI element.....	92
Table 19 – Attributes of the DAI element.....	93
Table 20 – Attributes of the SDI element.....	93
Table 21 – Attributes of the DataSet element.....	94
Table 22 – Attributes of the FCDA element.....	95
Table 23 – Attributes of the report control block element.....	96
Table 24 – Attributes of the RptEnabled element.....	97
Table 25 – Attributes of the ClientLN element.....	98
Table 26 – Attributes of the log control block element.....	100
Table 27 – Attributes of the GSE control block element.....	101
Table 28 – Attributes of the IEDName element.....	102
Table 29 – Attributes of the sampled value control block element.....	103
Table 30 – Attributes of the Smv Options element.....	104
Table 31 – Deprecated Smv options.....	104
Table 32 – Attributes of the setting control block element.....	105
Table 33 – Attributes of the Input/ExtRef element.....	107
Table 34 – Attributes of the association element.....	110
Table 35 – Attributes of the Subnetwork element.....	112
Table 36 – Attributes of the ConnectedAP element.....	113
Table 37 – Attributes of the GSE element.....	114
Table 38 – Attributes of the SMV element.....	115
Table 39 – PhysConn P-Type definition.....	116
Table 40 – Template definition element.....	119
Table 41 – Attributes of the LN doType element.....	120
Table 42 – Attributes of the DO element.....	120
Table 43 – Attributes of the DOType element.....	121
Table 44 – Attributes of the SDO element.....	121
Table 45 – Data type mapping.....	122
Table 46 – Attribute value kind (Valkind) meaning.....	123
Table 47 – Attributes of the DA element.....	124
Table 48 – Attributes of the BDA element.....	127
Table 49 – Attributes of the EnumType element.....	128
Table 50 – Usage of Service element at IED level and Server / ServerAt level.....	85
Table 51 – Usage of ExtRef attributes in different use cases.....	108
Table 52 – Allowed SCT engineering actions.....	132
Table G.1 – IED configurator conformance statement.....	240
Table G.2 – System configurator conformance statement.....	242

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 6: Configuration description language for communication in power utility automation systems related to IEDs

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**This Consolidated version of IEC 61850-6 bears the edition number 2.1. It consists of
the second edition (2009-12) [documents 57/1025/FDIS and 57/1041/RVD] and its
amendment 1 (2018-06) [documents 57/1918/FDIS and 57/1940/RVD]. The technical
content is identical to the base edition and its amendment.**

International Standard IEC 61850-6 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This second edition constitutes a technical revision.

The main changes with respect to the previous edition are as follows:

- functional extensions added based on changes in other Parts, especially Parts 7-2 and 7-3;
- functional extensions concerning the engineering process, especially for configuration data exchange between system configuration tools, added;
- provision of clarifications and corrections. Issues that require clarification are published in a database available at <http://tissue.iec61850.com>. Arising incompatibilities are listed in 8.2.3.

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

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

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The Code Component(s) included in this IEC standard are a set of .xsd. This Code Component is published through the IEC WebSite; for details see 1.3 of the present IEC standard.

This consolidated edition brings two distinct sets of changes:

- 1) Resolved Interop Issues (covered by the table below) which have already followed the technical issues (Tissues) process as described in IEC 61850-1 and have reached the green "status".
- 2) Resolved Editorial Tissues which may have lead to interoperability issues.

The resolutions of these issues which lead to these changes are described in greater detail in the Tissue database hosted at <http://tissue.iec61850.com>.

The only new features compared to the original IEC 61850-6:2009 are the inclusion of the Process and Line elements supporting other application areas than substations, and necessary enhancements to fully support the amended communication related parts. Apart from this, this consolidated edition strictly respects the scope of the original edition.

Technical issues summary

N°, Subject, Cat, Clause and Paragraph are as they appear on the Tissue database hosted at <http://tissue.iec61850.com> where all technical issues have been stored from the origin of IEC 61850.

“Subject” defines very briefly the topic under focus.

“Cat” defines whether this has been considered as an Interoperability Issue (IntOp2) or just a need for amending IEC 61850-6:2009.

The Tissues which have been considered are:

N°	Subject	Cat	Clause	Paragraph
658	Tracking related features	IntOp2	Annex A	
660	XML encoding header repeat	Ed2	Annex A.4	
663	FCDA element cannot be a "functionally constrained logical node"	IntOp2	9.3.7	Table 22
668	Modeling of autotransformer	IntOp2	9.2.4	
678, 699	DO type description table	Ed2		Table 43
687	ResvTms attribute at the SGCB	Ed2	9.3.12	
719	ConfDataSet maxAttributes defineds FCDA elements in data set	IntOp2	9.3.2	Table 11
721	Log element name	IntOp2	9.3.5	
731	SCL example inconsistent	Ed2	9.3.4§	
752	Input section naming	Ed2	9.3.13	
768	bType VisString65 is missing	IntOp2	Annex A	
779	Relative object references	IntOp2	9.5.4.1	
787	SICS I45 inconsistency	Ed2	Annex G	
788	SICS S56 from optional to mandatory	IntOp2	Annex G	
789 (822)	ConfLdName for services applies to client and server	IntOp2	9.3.2	Table 11
804	valKind and IED versus system configurator	IntOp2	9.5.4.1	
806	Max length of log name incosnsten to part 7-2	Ed2	Annex A	SCL_BaseSimpleTypes
807	Indicate if 'owner' is present in RCB	Ed2	9.3.2	Table 11
823	valKind for structured data attributes	IntOp2	9.5.4.1	
824	Short addresses at structured data attributes	IntOp2	9.3.6, 9.5.4.1	
825	Floating point values	IntOp2	9.5.4.1	Table 45
845	SGCB ResvTms	IntOp2	9.3.2	Table 11
853	SBO and ProtNs	IntOp2	9.5.5	
855	recursive SubFunction	Ed2	9.2.7	
856	Voltage level frequency and phases	Ed2	9.2.2	
857	Function/SubFunction for primary equipment	Ed2	9.2.4	
873	Examples for "curvpts"	Ed2	9.3.6	end of paragraph
886	Missing 8-1 P-Types	Ed2	Annex A	

N°	Subject	Cat	Clause	Paragraph
901	tServices at Ap and at IED	Ed2	9.3.2	below Table 12
936	SupSubscription parameter usage is difficult	IntOp2	9.3.2	Table 11
948	Enumeration (string) value format	IntOp2	9.5.6	
949	type of LN inst is ambiguous	Ed2	9.3.5	Table 17
1118	RptEnabled definition	Ed2	9.3.8	
1147	Filehandling service capability	Ed2	9.3.2	Table 11
1195	Typographical error	Ed2	9.3.2	
1208	IP V6 address format	IntOp2	A.5	
1284	SCSM mapping may require a communication section in an ICD file	Ed2	7	
1298	How to differentiate preconfigured Report data sets from those generated by the system tool	Ed2	9.3.2	Table 11
1304	Error in SCL object model	Ed2		Figure 6
1318	SSD will not validate against XSD	Ed2	9.2.6	Note 2
1327	SICS: import of SCD by IED tool	Ed2	Annex G	Table G.1
1328	Limitation of the size of identifiers	Ed2	9.5.2, 9.5.3, 9.5.6	
1354	Changes to SICS	Ed2	Annex G	Tables G.1, G.2
1359	Replace "c37_238" with "61850-9-3"	Ed2	9.3.2	
1365	Need to tighten up the XSD in regards to IED name usage	IntOp2	9.2.6	3
1395	Client LN attributes	IntOp2	9.3.8	
1396	The use and configuration flow of LGOS and LSVS is Unclear	Ed2	9.3.2	Table 11
1397	Subscription limitation visible in IxD file	Ed2	Annex G	
1398	originalScIVersion management in SCT	Ed2	9.3.2	
1402	Extref during engineering	Ed2	9.3.13, Annex H(new)	
1415	SICS-S110 IID import mandatory	Ed2	Annex G	Table G.2
1419	Support of IdName on other IEDs	Ed2	Annex G	Table G.1
1434	Add capability to change nofASDU is missing	Ed2	9.3.2	Table 11
1444	Need to support fixed and SCT controlled data sets	Ed2		
1445	ConfReportControl and a fixed reportSettings	Ed2	9.3.2	
1447	Restriction on EnumTypes in SCL	Ed2		
1448	Not possible to determine the restriction on number of BRCBs if rptMod=both	Ed2		
1450	originalScIXxx computation rules	IntOp2	9.3.2	
1457	Multiple DOI nodes with the same name	Ed2		
1458	New ExtRef attributes for later binding	Ed2		

The committee has decided that the contents of the base publication and its amendment 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 IEC 61850 specifies a description language for the configuration of power utility IEDs. This language is called System Configuration description Language (SCL). It is used to describe IED configurations and communication systems according to IEC 61850-5 and IEC 61850-7-x. It allows the formal description of the relations between the utility automation system and the process (substation, switch yard). At the application level, the switch yard topology itself and the relation of the switch yard structure to the SAS functions (logical nodes) configured on the IEDs can be described.

While this part describes the language to describe the configuration of IEC 61850 systems, other parts of the standard describe how to configure the system and possible restrictions. Therefore implementations claiming conformance to this standard shall take into account constraints from the other normative references. Some references to the other parts have been included for the purpose of clarification but these references are not all inclusive.

NOTE The process description, which is in this standard restricted to switch yards and general process functions, will be enhanced by appropriate add-ons for wind mills, hydro plants and distributed energy resources (DER).

SCL allows the description of an IED configuration to be passed to a communication and application system engineering tool, and to pass back the whole system configuration description to the IED configuration tool in a compatible way. Its main purpose is to allow the interoperable exchange of communication system configuration data between an IED configuration tool and a system configuration tool from different manufacturers.

IEC 61850-8-x and IEC 61850-9-x, which concern the mapping of IEC 61850-7-x to specific communication stacks, may extend these definitions according to their need with additional parts, or simply by restrictions on the way the values of objects have to be used.

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 6: Configuration description language for communication in power utility automation systems related to IEDs

1 Scope

1.1 General

This part of IEC 61850 specifies a file format for describing communication-related IED (Intelligent Electronic Device) configurations and IED parameters, communication system configurations, switch yard (function) structures, and the relations between them. The main purpose of this format is to exchange IED capability descriptions, and SA system descriptions between IED engineering tools and the system engineering tool(s) of different manufacturers in a compatible way.

The defined language is called System Configuration description Language (SCL). The IED and communication system model in SCL is according to IEC 61850-5 and IEC 61850-7-x. SCSM specific extensions or usage rules may be required in the appropriate parts.

The configuration language is based on the Extensible Markup Language (XML) version 1.0 (see XML references in Clause 2).

This standard does not specify individual implementations or products using the language, nor does it constrain the implementation of entities and interfaces within a computer system. This part of the standard does not specify the download format of configuration data to an IED, although it could be used for part of the configuration data.

1.2 Namespace name and version

This new section is mandatory for any IEC 61850 namespace (as defined by IEC 61850-7-1:2011).

The parameters which are identifying this new release of the SCL namespace `xmlns:scl="http://www.iec.ch/61850/2003/SCL"` are:

- Namespace Version: 2007
- Namespace Revision: B
- Namespace Release: 4
- Namespace release date: 2018/01/22

The table below provides an overview of all published versions of this namespace.

Edition	Publication date	Webstore	Namespace
Edition 1.0	2004-03	IEC 61850-6:2004	IEC 61850-6:2003
Edition 2.0	2009-12	IEC 61850-6:2009	IEC 61850-6:2007B
Amendment 1 of Edition 2.0	2018	IEC 61850-6:2009/AMD1:2018	IEC 61850-6:2007B4
Edition 2.1	2018	IEC 61850-6:2009+AMD1:2018 CSV	IEC 61850-6:2007B4