

Protection and Control Relay

611 series

Protocol Implementation Conformance Statement for the IEC 61850 interface in 611 series



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1 About this document

1.1 Read it first!

Before attempting any operation with IED from 611 series, read carefully the IED documentation first.

This document is addressed to anyone who needs to interact with 611 series and its IEC 61850 features in more detail.

1.2 Document information

Revision History

Revision	Date	Note
A	15 Sep 2011	611 series v1.0
B	11 Sep 2015	611 series v2.0

Applicability

This This manual is applicable to all 611 series Protection and Control IED versions mentioned in document Revision History above or newer versions if document update is not required.

2 Safety Information

There are safety warnings and notes in the following text. They are in a different format to distinguish them from normal text.

Safety warning

The safety warnings should always be observed. Non-observance can result in death, personal injury or substantial damages to property. Guarantee claims might not be accepted when safety warnings are not respected. They look like below:



Do not make any changes to the 611 series configuration unless you are familiar with the 611 series and its configuration tool. This might result in disoperation and loss of warranty.

Note

A note contains additional information worth noting in the specific context, and looks like below:



The selection of this control mode requires caution, because operations are allowed both from the HMI and remotely.

3 Abbreviations, Definitions and Conventions

3.1 Abbreviations

HMI	Human Machine Interface
LCD	Liquid Crystal Display
SLD	Single Line Diagram
LED	Light Emitting Diode
GPS	Global Positioning System
SCADA	Supervision, Control and Data Acquisition
CT	Current Transformer
VT	Voltage Transformer
SI	Sensor Input
Y	Yes
N	No

3.2 Definitions

Operational State:	the unit is active and it is protecting and controlling the switch-gear.
Stand-alone:	the unit is not connected to a Scada system.
M/m:	mandatory support. The item shall be implemented.
C/c:	conditional support. The item shall be implemented if the stated condition exists.
O/o:	optional support. The implementation may decide to implement the item.
x:	excluded: The implementation shall not implement this item.
i:	out-of-scope: The implementation of the item is not within the scope of this product.
F/S:	Functional Standard. Should be applied.
Base:	Shall be applied in any application claiming conformance to this standard.

4 Reference Documents

Ref	Document id	Rev	Document title
[1]	61850-8-1 First edition 2004-05		Communication networks and systems in substations - Part 8-1: Specific communication service mapping (SCSM) – Map-pings to MMS (ISO/IEC 9506 Part 1 and Part 2) and to ISO/IEC 8802-3
[2]	61850-10 First edition 2005-05		Communication networks and systems in substations – part 10: Conformance testing
[3]	61850-7-2 First edition 2003-05		Communication networks and systems in substations – Part 7-2: Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)
[4]	61850-6 First edition 2004-03		Communication networks and systems in substations - Part 6: Configuration description language for communication in electrical substations related to IEDs
[5]	61850-7-3 First edition 2003-05		Communication networks and systems in substations – Part 7-3: Basic communication structure for substation and feeder equipment – Common data classes
[6]	61850-7-4 First Edition 2003-05		Communication networks and systems in substations – Part 7-4

5 Introduction

This document defines the compliance to IEC 61850 in terms of service, modeling and engineering interfaces. Also, exceptions and local adaptations are described.

The conformance statements and documents are referred as PICS (Protocol Implementation Conformance Statement), MICS (Model Implementation Conformance Statement) and local adaptations to be published are described in PIXIT (Protocol Implementation eXtra Information for Testing). ACSI conformance statement describes the abstract services interfaces, which are normally mapped to certain SCSM and therefore indirectly stated in PICS.

The purpose of the information in this document is to give a user, to a system integrator a detailed explanation of IEC 61850 capabilities of a product.

5.1 Scope of this statement

The scope of this document is one product/software module. This is identified as follows:

Product family / name:

Product designation: 611 series

Product version: See Document Revision History

Role(s) in two-party association (TP, c/s): Server

Role(s) in multicast association (MC, GOOSE, GSSE): GOOSE

Notes, exceptions: MMS conformance statement is not filled

6 ACSI conformance statement

6.1 General

These tables are according to 7-2. [3]

6.2 ACSI basic conformance statement

Table 6-1– Basic conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
Client-Server roles				
B11	Server side (of TWO-PARTY-APPLICATION-ASSOCIATION)	—	Y	
B12	Client side of (TWO-PARTY-APPLICATION-ASSOCIATION)	N	—	
SCSMs supported				
B21	SCSM: IEC 61850-8-1 used		Y	
B22	SCSM: IEC 61850-9-1 used		N	
B23	SCSM: IEC 61850-9-2 used		N	
B24	SCSM: other			
Generic substation event model (GSE)				
B31	Publisher side	—	Y	
B32	Subscriber side	Y	—	
Transmission of sampled value model (SVC)				
B41	Publisher side	—	—	
B42	Subscriber side	—	—	

6.3 ACSI models conformance statement

Table 6-2– ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
If Server side (B1) supported				
M1	Logical device	N	Y	
M2	Logical node	N	Y	
M3	Data	N	Y	
M4	Data set	N	Y	
M5	Substitution	N	N	
M6	Setting group control	N	Y	
	Reporting			
M7	Buffered report control	N	Y	
M7-1	Sequence-number	N	Y	
M7-2	report-time-stamp	N	Y	
M7-3	reason-for-inclusion	N	Y	
M7-4	data-set-name	N	Y	
M7-5	data-reference	N	Y	
M7-6	buffer-overflow	N	Y	
M7-7	EntryID	N	Y	
M7-8	BufTim	N	Y	
M7-9	IntgPd	N	Y	
M7-10	GI	N	Y	
M7-11	conf-revision	N	Y	
M8	Unbuffered report control	N	Y	
M8-1	sequence-number	N	Y	
M8-2	report-time-stamp	N	Y	
M8-3	reason-for-inclusion	N	Y	
M8-4	data-set-name	N	Y	
M8-5	data-reference	N	Y	
M8-6	BufTim	N	Y	
M8-7	IntgPd	N	Y	
M8-8	GI	N	Y	
M8-9	conf-revision	N	Y	
	Logging	N	N	
M9	Log control	N	N	
M9-1	IntgPd			
M10	Log	N	N	
M11	Control	N	Y	
If GSE (B31/32) is supported				
M12	GOOSE	N	Y	
M13	GSSE	N	N	
If SVC (41/42) is supported				

		Client/ Subscriber	Server/ Publisher	Value/Comments
M14	Multicast SVC	N	N	
M15	Unicast SVC	N	N	
M16	Time	N	Y	Time source with required accuracy is available
M17	File Transfer	N	Y	

6.4 ACSI service conformance statement

The ACSI service conformance statement shall be as defined in Table 2-3 (depending on the statements in Table 2-2).

Table 6-3 – ACSI service Conformance statement

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
Server					
S1	GetServerDirectory	TP		Y	

Application association					
S2	Associate		N	Y	
S3	Abort		N	Y	
S4	Release		N	Y	

Logical device					
S5	GetLogicalDeviceDirectory	TP	N	Y	

Logical node					
S6	GetLogicalNodeDirectory	TP	N	Y	
S7	GetAllDataValues	TP	N	Y	

Data					
S8	GetDataValues	TP	N	Y	
S9	SetDataValues	TP	N	Y	
S10	GetDataDirectory	TP	N	Y	
S11	GetDataDefinition	TP	N	Y	

Data set					
S12	GetDataSetValues	TP	N	Y	
S13	SetDataSetValues	TP	N	N	
S14	CreateDataSet	TP	N	N	
S15	DeleteDataSet	TP	N	N	
S16	GetDataSetDirectory	TP	N	Y	

Substitution					
S17	SetDataValues	TP	N	N	

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
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Setting group control

S18	SelectActiveSG	TP	N	Y	
S19	SelectEditSG	TP	N	Y	
S20	SetSGValues	TP	N	Y	
S21	ConfirmEditSGValues	TP	N	Y	
S22	GetSGValues	TP	N	Y	
S23	GetSGCBValues	TP	N	Y	

Reporting

Buffered report control block (BRCB)

S24	Report	TP	N	Y	
S24-1	data-change (dchg)		N	Y	
S24-2	quality-change (qchg)		N	Y	
S24-3	data-update (dupd)		N	N	
S25	GetBRCBValues	TP	N	Y	
S26	SetBRCBValues	TP	N	Y	

Unbuffered report control block (URCB)

S27	Report	TP	N	Y	
S27-1	data-change (dchg)		N	Y	
S27-2	quality-change (qchg)		N	Y	
S27-3	data-update (dupd)		N	N	
S28	GetURCBValues	TP	N	Y	
S29	SetURCBValues	TP	N	Y	

Logging

Log control block

S30	GetLCBValues	TP	N	N	
S31	SetLCBValues	TP	N	N	

Log

S32	QueryLogByTime	TP	N	N	
S33	QueryLogAfter	TP	N	N	
S34	GetLogStatusValues	TP	N	N	

Generic substation event model (GSE)

GOOSE-CONTROL-BLOCK

S35	SendGOOSEMessage	MC	N	Y	
S36	GetReference	TP	N	N	
S37	GetGOOSEElementNumber	TP	N	N	
S38	GetGoCBValues	TP	N	Y	
S39	SetGoCBValues	TP	N	Y	

GSSE-CONTROL-BLOCK

S40	SendGSSEMessage	MC	N	N	
S41	GetGsReference	TP	N	N	
S42	GetGSSEElementNumber	TP	N	N	
S43	GetGsCBValues	TP	N	N	
S44	SetGsCBValues	TP	N	N	

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
Transmission of sampled value model (SVC)					
Multicast SVC					
S45	SendMSVMessage	MC	N	N	
S46	GetMSVCBValues	TP	N	N	
S47	SetMSVCBValues	TP	N	N	
Unicast SVC					
S48	SendUSVMessage	TP	N	N	
S49	GetUSVCBValues	TP	N	N	
S50	SetUSVCBValues	TP	N	N	

Control					
S51	Select		N	N	
S52	SelectWithValue	TP	N	Y	
S53	Cancel	TP	N	Y	
S54	Operate	TP	N	Y	
S55	CommandTermination	TP	N	Y	
S56	TimeActivatedOperate	TP	N	N	

File transfer					
S57	GetFile	TP	N	Y	
S58	SetFile	TP	N	N	
S59	DeleteFile	TP	N	Y	
S60	GetFileAttributeValues	TP	N	Y	

Time					
T1	Time resolution of internal clock			2^{-10} (1ms)	nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			T1	T0 (10ms) T1 (1ms) T2 (100μs) T3 (25μs) T4 (4μs) T5 (1μs)
T3	supported TimeStamp resolution	-		2^{-10} (1ms)	nearest negative power of 2 in seconds according to IEC61850-7-2, paragraph 5.5.3.7.3.3

7 SCL conformance statement

Defines several degrees of conformance for which implementations may declare support of the substation configuration language. [1]

Table 7-1 – SCL conformance degrees

	SCL Conformance	Client-CR			Server-CR		
		Base	F/S	Value/Range	Base	F/S	Value/Range
SCL.1	SCL File for Implementation Available (offline)				m	m	<i>Supported, SCL file export from tool</i>
SCL.2	SCL File available from implementation online	O	o		o	o	<i>Not Supported,</i>
SCL.3	SCL implementation reconfiguration supported online	O	o		o	o	<i>Not Supported</i>

8 PICS – Protocol conformance statement

8.1 Profile conformance

Table 8-1 and Table 8-2 define the basic conformance statement.

Table 8-1 – PICS for A-Profile support

		Client		Server		Value/Comment
		F/S		F/S		
A1	Client/Server A-Profile	c1		c1		<i>Supported</i>
A2	GOOSE/GSE Management A-Profile	c2		c2		<i>Not supported</i>
A3	GSSE A-Profile	c3		c3		<i>Not supported</i>
A4	TimeSync A-Profile	c4		c4		<i>Supported</i>
c1 – shall be 'm' if support for any service specified for Client/S are declared within the ACSI basic conformance statement. c2 – shall be 'm' if support for any service specified for GOOSE/GSE Management are declared within the ACSI basic conformance statement. c3 – shall be 'm' if support for any service specified for GSSE A-Profile are declared within the ACSI basic conformance statement c4 – support for at least one other A-Profile shall be declared (e.g. in A1-A3) in order to claim conformance to IEC 61850-8-1.						

Table 8-2 – PICS for T-Profile support

		Client		Server		Value/Comment
		F/S		F/S		
T1	TCP/IP T-Profile	c1		c1		<i>Supported</i>
T2	OSI T-Profile	c2		c2		<i>Not supported</i>
T3	GOOSE/GSE T-Profile	c3		c3		<i>Supported</i>
T4	GSSE T-Profile	c4		c4		<i>Not supported</i>
T5	TimeSync T-Profile	o		o		<i>Supported</i>
c1 – shall be 'm' if support for A1 is declared. Otherwise, shall be "i" c2 – shall be "o" if support for A1 is declared. Otherwise, shall be "i". c3 – shall be 'm' if support for A2 is declared. Otherwise, shall be "i". c4 – shall be 'm' if support for A3 is declared. Otherwise, shall be "i".						

8.2 MMS Conformance

MMS conformance guaranteed by MMS stack vendor, ie. Sisco Inc..

All needed services supporting the ACSI services stated to be supported in paragraph 2. are supported by the MMS stack used.

9 PIXIT

In this chapter, the essentials for device communication configuration and integration are described. PIXIT is given as a separate document.

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ABB Oy

Distribution Automation

P.O. Box 699

FI-65101 Vaasa

FINLAND

Tel. +358 10 22 11

Fax. +358 10 224 1094

www.abb.com/substationautomation