

SIEMENS

Preface

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SICAM Q100

Applications

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IEC 61850

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PIXIT, PICS, TICS

V1.00

Manual

E50417-G1040-C522-A1

Preface

Purpose of this manual

In this manual you will find the specification of the applications of the IEC 61850 interface.

Target audience

This manual is intended mainly for all persons who configure, parameterize and operate a SICAM Q100 device.

Scope of validity

This manual is valid for SICAM Q100 devices running Edition 2 mode of IEC 61850.

Standards

This manual has been created according to the ISO 9001 quality standards.

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1 Applications

Contents

This chapter specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SICAM Q100.

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1.1 General

This manual specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SICAM Q100.

It is based on the service subset definition given in the protocol implementation conformance (PICS), which is specified within the user manual SICAM Q100 IEC 61850.

The following applicable ACSI service models are supported and specified:

- Association model
- Server model
- Data set model
- Reporting model
- Control model
- Time and time synchronization model
- File transfer model

Together with the PICS the PIXIT forms the basis for a conformance test according to IEC 61850-10.

1.2 Association model

ID	Ed	Description	Value / Clarification
As2	1,2	TCP_KEEPALIVE value. The recommended range is 1..20s	10 seconds
As3	1,2	Lost connection detection time	30 seconds
As5	1,2	What association parameters are necessary for successful association?	Transport selector Y Session selector Y Presentation selector Y AP Title N AE Qualifier N
As6	1,2	If association parameters are necessary for association, describe the correct values	Transport selector 0001 Session selector 0001 Presentation selector 00000001 AP Title Any AE Qualifier Any
As7	1,2	What is the maximum and minimum MMS PDU size?	Max MMS PDU size 20000 Min MMS PDU size 8192
As8	1,2	What is the maximum start up time after a power supply interrupt?	45 seconds

1.3 Server model

ID	Ed	Description	Value / Clarification
Sr1	1,2	Which analogue value (MX) quality bits are supported (can be set by server)?	Validity: Good Y Invalid Y Reserved N Questionable N Overflow Y OutofRange N BadReference Y Failure Y OldData N Inconsistent N Inaccurate N Source: Process Y Substituted N Test N OperatorBlocked N
Sr2	1,2	Which status value (ST) quality bits are supported (can be set by server)?	Validity: Good Y Invalid Y Reserved N Questionable N BadReference Y Oscillatory N Failure Y OldData N Inconsistent N Inaccurate N Source: Process Y Substituted N Test N OperatorBlocked N

1.4 Data set model

No additional information. See Services section in SCL files.

1.5 Substitution model

Substitution model is not supported by the device.

1.6 Setting group control model

Setting Group control model is not supported by the device.

1.7 Reporting model

ID	Ed	Description	Value / Clarification
Rp3	1,2	Can the server send segmented reports?	Y
Rp4	1,2	Mechanism on second internal data change notification of the same analogue data value within buffer period (Compare IEC 61850-7-2 §14.2.2.9)	Send report immediately
Rp7	1,2	What is the buffer size for each BRCB or how many reports can be buffered?	No fixed size, depends on total number of BRCBs
Rp10	1,2	What is the scan cycle for binary events? Is this fixed, configurable?	200 ms if measurement inputs are used to generate binary events. 2 ms if binary inputs are used to generate binary events. Fixed
Rp12	2	After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart?	Restored from original configuration (ConfRev is fix)

1.8 Logging model

Logging model is not supported by the device.

1.9 GOOSE publish model

GOOSE publish model is not supported by the device.

1.10 GOOSE subscribe model

GOOSE subscribe model is not supported by the device.

1.11 GOOSE performance

GOOSE performance is not supported by the device.

1.12 Control model

ID	Ed	Description	Value / Clarification
Ct2	1,2	Is the control model fixed, configurable and/or dynamic?	Fixed
Ct9	1,2	Which additional cause diagnosis are supported?	Unknown N Not-supported N Blocked-by-switching-hierarchy N Select-failed N Invalid-position N Position-reached N Parameter-change-in-execution N Step-limit N Blocked-by-Mode N Blocked-by-process N Blocked-by-interlocking N Blocked-by-synchrocheck N Command-already-in-execution N Blocked-by-health N 1-of-n-control N Abortion-by-cancel N Time-limit-over N Abortion-by-trip N Object-not-selected N Edition 2 specific values: Object-already-selected N No-access-authority N Ended-with-overshoot N Abortion-due-to-deviation N Abortion-by-communication-loss N Blocked-by-command N None N Inconsistent-parameters N Locked-by-other-client N
Ct10	1,2	How to force a "test-not-ok" respond with SelectWithValue request?	SelectWithValue is not supported
Ct11	1,2	How to force a "test-not-ok" respond with Select request?	Select is not supported
Ct12	1,2	How to force a "test-not-ok" respond with Operate request?	DOns: Test and logical node Beh do not match (test mode is not supported) SBOs: N/A DOes: N/A SBOes: N/A

ID	Ed	Description	Value / Clarification
Ct13	1,2	Which origin categories are supported / accepted?	bay-control Y station-control Y remote-control Y automatic-bay Y automatic-station Y automatic-remote Y maintenance Y process Y
Ct14	1,2	What happens if the orCat value is not supported or invalid?	DOns: oper.Resp-, object-access-unsupported (9) SBOs: N/A DOes: N/A SBOes: N/A
Ct15	1,2	Does the IED accept a SelectWithValue / Operate with the same control value as the current status value? Is this behaviour configurable?	DOns: Y SBOs: N DOes: N SBOes: N N
Ct18	1,2	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	N/A
Ct20	1,2	Does the IED support local / remote operation?	N
Ct21	1,2	Does the IED send an InformationReport with LastApplError as part of the Operate response- for control with normal security?	SBOs: N/A DOns: N
Ct22	2	How to force a "parameter-change-in-execution"?	SBOs: N/A SBOes: N/A

1.13 Time and time synchronization model

ID	Ed	Description	Value / Clarification
Tm1	1,2	What time quality bits are supported (may be set by the IED)?	LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized Y
Tm2	1,2	Describe the behaviour when the time server(s) ceases to respond What is the time server lost detection time?	On one time server: Time quality is set to ClockNotSynchronized and ClockFailure. On all time servers: Time quality is set to ClockNotSynchronized and ClockFailure. Configurable from 2 – 120 minutes (default 10 minutes)
Tm3	1,2	How long does it take to take over the new time from time server?	Max. 60 seconds
Tm4	1,2	When is the time quality bit “ClockFailure” set?	At faulty internal clock or failure of the synchronization source (SNTP, field bus) or RTC failure
Tm5	1,2	When is the time quality bit “ClockNotSynchronized” set?	When connection to all time servers is lost (see PIXIT-Tm2)
Tm8	1,2	Which attributes of the SNTP response packet are validated?	Leap indicator not equal to 3 Y Mode is equal to SERVER N OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp N RX/TX timestamp fields are checked for reasonableness Y SNTP version 3 and/or 4 N other (describe) N
Tm9	1,2	Do the COMTRADE files have local time or UTC time and is this configurable?	Local Configurable N

1.14 File transfer model

ID	Ed	Description	Value / Clarification
Ft2	1,2	Directory names are separated from the file name by	"\"
Ft4	1,2	Are directory/file name case sensitive?	Case sensitive
Ft5	1,2	Maximum file size for SetFile	SetFile is not supported
Ft8	1,2	Is it allowed that 2 clients get a file at the same time?	same file N different files N
Ft9	1,2	Which files can be deleted?	Deleting files is not supported

1.15 Service tracking model

Service tracking model is not supported by the device.

1.16 TICS – Technical Issues Implementation Conformance Statement for Edition 2

Edition 2 TISSUES have already been implemented in the device Object Model and are active within the name space of IEC 61850-7-4:2007.

Part	TISSUE No.	Link	Description	Impact of Interoper.
Part 6	949	http://tissue.iec61850.com/tissue.msp?issueid=949	type of LN inst is ambiguous	x
	823	http://tissue.iec61850.com/tissue.msp?issueid=823	ValKind for structured data attributes	
	779	http://tissue.iec61850.com/tissue.msp?issueid=779	object references	x
	719	http://tissue.iec61850.com/tissue.msp?issueid=719	ConfDataSet - maxAttributes definition is confusing	x
Part 7-2	1116	http://tissue.iec61850.com/tissue.msp?issueid=1116	CONTROL service(s) parameter 'origin' misspelled	x
	728	http://tissue.iec61850.com/tissue.msp?issueid=728	BRCB: could PurgeBuf be set when RptEna=TRUE?	
Part 7-3	1079	http://tissue.iec61850.com/tissue.msp?issueid=1079	q and t semantic syntax errors	x
	968	http://tissue.iec61850.com/tissue.msp?issueid=968	BCR value range	
	887	http://tissue.iec61850.com/tissue.msp?issueid=887	Data semantics for q and t	x
Part 7-4	952	http://tissue.iec61850.com/tissue.msp?issueid=952	QVVR clarification and new DO	x
	877	http://tissue.iec61850.com/tissue.msp?issueid=877	QVUB -settings should be optional	x
	686	http://tissue.iec61850.com/tissue.msp?issueid=686	New annex H - enums types in XML	x
	671	http://tissue.iec61850.com/tissue.msp?issueid=671	mistake in definition of Mod & Beh	x

2 IEC 61850 Conformance Statements

Contents

This chapter describes conformity with IEC 61850. It does not describe the entire standard but only parts in which there is a choice in the services.

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2.1 Definition of the Communication Services acc. to Standard (PICS)

The tables in the section below appear in the same sequence as in standard IEC 61850, Part 8-1, Section 24.

The tables refer to Part 7 of the standard and the corresponding information must be contained in the PICS.

This section describes the conformance statements. The standard groups them together under the term Protocol Implementation Conformance Statement (PICS).

Mandatory services

Please note that a number of services are prescribed and must be implemented to comply with the standard. Only the optional services and protocols are listed here because they constitute freedom of implementation. None of the mandatory services is explicitly explained here. Please refer to the standard IEC 61850, Part 8-1.

The description below refers to implementation in the SICAM Q100 device.

The tables give the names stated in the standard.

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 6185-8-1 used	N	Y	
B22	SCSM: IEC 6185-9-1 used	N	N	
B23	SCSM: IEC 6185-9-2 used	N	N	
B24	SCSM: other	N/A	N/A	
Generic substation event model (GSE)				
B31	Publisher side	—	N	
B32	Subscriber side	N	—	
Transmission of sampled value model (SVC)				
B41	Publisher side	—	N	
B42	Subscriber side	N	—	
Y = supported N or empty = not supported				

ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
If Server or Client side (B11/12) 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	N	
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	BufTm	N	Y	
M7-9	IntgPd	N	Y	
M7-10	GI	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	BufTm	N	Y	
M8-7	IntgPd	N	Y	
M8-8	GI	N	Y	
Logging				
M9	Log control	N	N	
M9-1	IntgPd	N	N	
M10	Log	N	N	
M11	Control	N	N	
If GSE (B31/32) is supported				
M12	GOOSE	N	N	
M13	GSSE	N	N	
If SVC (41/42) is supported				
M14	Multicast SVC	N	N	
M15	Unicast SVC	N	N	
If Server or Client side (B11/12) supported				
M16	Time	Y	N	

2.1 Definition of the Communication Services acc. to Standard (PICS)

		Client/ Subscriber	Server/ Publisher	Value/Comments
M17	File Transfer	N	Y	
Y = supported N or empty = not supported				

ACSI service conformance statement

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

Setting group control					
S18	SelectActiveSG	TP	N	N	
S19	SelectEditSG	TP	N	N	
S20	SetSGValues	TP	N	N	
S21	ConfirmEditSGValues	TP	N	N	
S22	GetSGValues	TP	N	N	
S23	GetSGCBValues	TP	N	N	

	Services	AA:TP/MC	Client (C)	Server (S)	Comments
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	N	
S36	GetGoReference	TP	N	N	
S37	GetGOOSEElementNumber	TP	N	N	
S38	GetGoCBValues	TP	N	N	
S39	SetGoCBValues	TP	N	N	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC	N	N	
S41	GetGsReference	TP	N	N	
S42	GetGSSEDataOffset	TP	N	N	
S43	GetGsCBValues	TP	N	N	
S44	SetGsCBValues	TP	N	N	
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					

2.1 Definition of the Communication Services acc. to Standard (PICS)

	Services	AA:TP/MC	Client (C)	Server (S)	Comments
S48	SendUSVMessage	TP	N	N	
S49	GetUSVCBValues	TP	N	N	
S50	SetUSVCBValues	TP	N	N	

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

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

Time					
T1	Time resolution of internal clock			10 (1ms)	nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			+5 ms → T0 (n = 7)	T0 (10ms) T1 (1ms) T2 (100µs) T3 (25µs) T4 (4µs) T5 (1µs)
T3	Supported TimeStamp resolution			10 (1ms)	nearest negative power of 2 in seconds