

# SIEMENS

## SIPROTEC

7SJ66

IEC61850

PIXIT, PICS, TICS

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# Preface

## Purpose of this manual

In this Manual, you will find the Specification of the applications of the IEC 61850 interface 7SJ66.

## Target audience

This manual is intended mainly for all persons who configure, parameterize and operate SIPROTEC 4, SIPROTEC Compact and Reyrolle IED devices.

## Scope of validity

This manual is valid for 7SJ66. Edition 1 is available for all version of 7SJ66. Edition 2 is available for V4.10 and higher.

## 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 7SJ66.

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## 1.1 General

This manual specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface 7SJ66.

The following applicable ACSI service models are specified:

- Association model
- Server model
- Data set model
- Reporting model
- Setting Group model
- GOOSE publish model
- GOOSE subscribe model
- Control model
- Time and time synchronisation model
- File transfer model
- General items

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

The mapping between the IEC 61850 server data model and the SIPROTEC 4 or SIPROTEC Compact specific data is specified in the device specific MICS Descriptions, Chapter 2.3.



## 1.2 Association model

ID	ED	Description	Value / Clarification
As1	1	Maximum number of clients that can set-up an association simultaneously	6
As2	1, 2	TCP_KEEPALIVE value	20 seconds
As3	1, 2	Lost connection detection time range	10 seconds
As4		Authentication is not supported	Not supported
As5	1, 2	What association parameters are necessary for successful association ?	Y Transport selector Y Session selector Y Presentation selector Y AP Title (ANY) Y AE Qualifier (ANY)  Where Y means: as defined within the ICD-File ANY means: any value accepted
As6	1, 2	If association parameters are necessary for association, describe the correct values e.g.	Transport selector 0001 Session selector 0001 Presentation selector 00000001
As7	1, 2	What is the maximum and minimum MMS PDU size ?	Max MMS PDU size 32768 Min MMS PDU size 8192
As8	1, 2	What is the maximum startup time after a power supply interrupt ?	Typical 40 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: Y Good, Y Invalid, N Reserved, Y Questionable Y Overflow Y OutofRange N BadReference N Oscillatory Y Failure Y OldData N Inconsistent Y Inaccurate  Source: Y Process N Substituted Y Test N OperatorBlocked
Sr2	1, 2	Which status value (ST) quality bits are supported (can be set by server) ?	Validity: Y Good, Y Invalid, N Reserved, Y Questionable N BadReference Y Oscillatory Y Failure Y OldData N Inconsistent N Inaccurate  Source: Y Process N Substituted Y Test N OperatorBlocked
Sr3		What is the maximum number of data values in one GetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above.
Sr4		What is the maximum number of data values in one SetDataValues request ?	Not restricted; depends on the max. MMS PDU size given above.
Sr5		Which Mode / Behaviour values are supported?	Y On N (On-)Blocked Y Test N Test/Blocked Y Off

## 1.4 Data set model

ID	ED	Description	Value / Clarification
Ds1	1	What is the maximum number of data elements in one data set? (compare ICD setting)	Not limited by an internal configuration parameter. It depends on the available memory and MMS PDU size. Maximum value above 2000 data elements in total, no limitation for one single data set. Assuming that the maximum number of data sets is used in the device, and each has the same amount of data members, a maximum of 30 members per dataset can be used.
Ds2	1	How many persistent data sets can be created by one or more clients ?	64 data sets for each LD. It depends on the available memory.
Ds3	1	How many non-persistent data sets can be created by one or more clients ?	10 data sets. It depends on the available memory.

## 1.5 Setting group control model

ID	ED	Description	Value / Clarification
Sg1	1	What is the number of supported setting groups for each logical device?	Setting groups available for LLN0 only in LD PROT. The number of supported setting groups is 1 or 4, it depends on the given configuration. Specified in the ICD-File.
Sg2	1, 2	What is the effect of when and how the non-volatile storage is updated ? (compare IEC 61850-8-1 §16.2.4)	Not applicable
Sg3	1	Can multiple clients edit the same setting group?	Not applicable
Sg4	1	What happens if the association is lost while editing a setting group?	Not applicable
Sg5	1	Is EditSG value 0 allowed?	Not applicable
Sg6	2	When ResvTms is not present how long is an edit setting group locked?	Not applicable

## 1.6 Reporting model

ID	ED	Description	Value / Clarification
Rp1	1	The supported trigger conditions are (compare PICS)	Y Integrity Y Data change Y Quality change Y Data update Y General Interrogation
Rp2	1	The supported optional fields are	Y Sequence-number Y Report-time-stamp Y Reason-for-inclusion Y Data-set-name Y Data-reference Y Buffer-overflow - for Buffered report Y EntryID - for Buffered report Y Conf-rev Y Segmentation
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 immediatly for Buffered Report: Buffer the Entry Send report if the report is enabled
Rp5	1	Multi client URCB approach (Compare IEC 61850-7-2 §14.2.1)	All clients can access all URCB's
Rp6	-	What is the format of EntryID?	First 2 Byte : Integer Last 6 Bytes: BTime6 time stamp
Rp7	1, 2	What is the buffer size for each BRCB or how many reports can be buffered ?	About 5 MB are available for the buffering. Each BRCB has an extension attribute Memory that display the percentage of those 1 MB that have been reserved/forseen for its own entries. Default amount 5 MB/(2*Number of logical devices *12)
Rp8	-	Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	For Buffered and Unbuffered:  All pre-configured RCB attributes can be changed online when RptEna = FALSE
Rp9	1	May the reported data set contain: - structured data objects? - data attributes?	Y Y
Rp10	1, 2	What is the scan cycle for binary events? Is this fixed, configurable	1 msecond Fixed
Rp11	1	Does the device support to pre-assign a RCB to a specific client in SCL	N
Rp12	2	After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart	Restore from original configuration
additional items:			
		Interrupt of general interrogation	Running GI could not be interrupted. If a new GI request occurs during a running GI, the current GI will be finished first before the second GI request will be processed.

ID	ED	Description	Value / Clarification
		Integrity period	Configurable $\geq 1$ second;
		URCB reservation after an abort of the client/server association	Reservation of the URCB is lost. After a re-establishment of the association the URCB reservation has to be renewed by the client. This behavior is implemented to avoid unnecessary memory residuals if temporarily client associations (e.g. for maintenance) are established.
		Configured URCB reservation after an abort of the client/server association	Reservation of the URCB is lost.
		Optional use of a flow control for transmitting history of a BRCB	As specified in the IEC61850-7-2, transmission of entries may require some time, depending of the amount of entries that have to be transmitted. Therefore, the 7SJ66 has an optional flow control feature to accelerate the transmission of the entries: each BRCB has an extended attribute MaxOutReports that can be set from the associated-client to change the transmission strategy of the entries. Those attributes are located in VMD variables. The number ordered will then be transmitted as long as they exist in the buffer; the server then reset the attribute to 0 and wait for the client to set it again in order to continue the history transmission with MaxOutReports entries. The attribute only influences the flow control of entries while dealing with the history, and not after the history transmission has completed.
		Clearing the reservation of the URCB	The configuration revision value of the URCB shall be reset to its original configuration.

## 1.7 GOOSE publish model

ID	ED	Description	Value / Clarification
Gp1	1, 2	Can the test flag in the published GOOSE be turned on / off	N
Gp2	1	What is the behavior when the GOOSE publish configuration is incorrect	DUT will send GOOSE with NdsCom = TRUE as long as the minimum required configuration is available (dstAddress, dataSet)
Gp3	1, 2	Published FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, APC, BAC, BSC Arrays are not supported
Gp4	1, 2	What is the slow retransmission time? Is it fixed or configurable?	Configured by SCD file
Gp5	1, 2	What is the fast retransmission time? Is it fixed or configurable?	Configured by SCD file
Gp6	-	Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)	Deprecated See PICS - SetGoCBValues
Gp7	1, 2	What is the initial GOOSE sqNum after restart	sqNum = 1
Gp8	1	May the GOOSE data set contain: - structured data objects (FCD)? - Timestamp data attributes?	Y Y
additional items:			
		Maximum number of GOOSE messages which could be sent	≤ 16 ; It depends on the available memory.
		GOOSE retransmission schema	For all messages, TAL = 3000. The time interval between messages after data change doubles for each message. For the first message, the time interval is 10ms. For the second message, it is 20ms etc. Until the maximum is reached, which is 2000ms.

## 1.8 GOOSE subscribe model

ID	ED	Description	Value / Clarification
Gs1	1, 2	What elements of a subscribed GOOSE header are checked to decide the message is valid and the allData values are accepted? If yes, describe the conditions. Note: the VLAN tag may be removed by a ethernet switch and should not be checked	N Source MAC address Y Destination MAC address Y Ethertype = 0x88B8 Y APPIP Y gocbRef N timeAllowedtoLive Y datSet Y goID N t Y stNum Y sqNum Y test/simulation Y confRev Y ndsCom Y numDatSetEntries Y TAL
Gs2	1, 2	When is a subscribed GOOSE marked as lost ? (TAL = time allowed to live value from the last received GOOSE message)	When message does not arrive by $2 \cdot \text{TAL}$ . If message does not arrive beyond $2 \cdot \text{TAL}$ , the quality of object will be set to Questionable and Old data.
Gs3	1, 2	What is the behavior when one or more subscribed GOOSE message isn't received or syntactically incorrect ? (missing GOOSE)	The telegram will be discarded (i.e not forwarded to the application) since it is corrupt or syntactically incorrect and therefore not readable. The data objects will be declared as invalid after a timeout detection since no telegram have been received by the application.
Gs4	1, 2	What is the behavior when a subscribed GOOSE message is out-of-order ?	When a given state number $n$ , sequence number $l$ is received, only the following telegrams will be accepted: $n, l + 1$ $n, l + 2$ $n + 1, 0$ $n + 1, 1$ $1, 0$ All other telegrams are ignored
Gs5	1, 2	What is the behavior when a subscribed GOOSE message is duplicated ?	The repetition will be ignored
Gs6	1	Does the device subscribe to GOOSE messages with/without the VLAN tag?	Y with the VLAN tag Y without the VLAN tag
Gs7	1	May the GOOSE data set contain: - structured data objects? - timestamp data attributes?	Y Y
Gs8	1, 2	Subscribed FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, BSC, ISC, APC, BAC Arrays are not supported
additional items:			
		Maximum number of GOOSE messages which could be received	$\leq 128$ ; It depends on the available memory.



ID	ED	Description	Value / Clarification
		Interpretation of GOOSE messages at subscriber side	<ol style="list-style-type: none"> <li>1. Received GOOSE data objects without assigned quality attribute are interpreted as invalid.</li> <li>2. Received GOOSE data objects which quality attribute are set to questionable are changed to invalid.</li> </ol>
		GOOSE subscriber behavior in case of missing GOOSE messages	<p>After a GOOSE multicast application association has been interrupted, the reception of a valid GOOSE telegram is required to validate the state of this GOOSE association again.</p> <p>However, the IED tolerates a missing telegram as long as the next telegram (expected n, received n+1) is received within the time allowed to live time out detection (the time allowed to live timeout detection occurs after <math>2 \cdot \text{TAL}</math>).</p>
		<p>What is the behavior when a GOOSE header parameter is mismatching with the expected one? (datSet, goID, confRev, numDatSetEntries, number of allData)</p>	<p>Error message will be stored into the error buffer (could be accessed by 7SJ66 web-server). The received telegram with the mismatched attribute will be discarded: It has not been subscribed.</p>
		What is the behavior when there is an out-of-order entry in the allData?	<p>The confRev attribute in the header guarantees that the allData entries are in the correct order. Therefore, it's necessary to check the confRev attribute. There is no chance to detect a semantic out-of-order if the types are identical.</p>
		What is the behavior when numDatSetEntries and number of allData are inconsistent?	<p>The telegram is discarded since it is corrupt (not well formed). After the timeout detection (no telegram forwarded to the application) the data objects are declared invalid.</p>
		Does the device support fixed Offset of GOOSE?	N

## 1.9 Control model

ID	ED	Description	Value / Clarification
Ct1	-	What control models are supported? (compare PICS)	Y Status-only Y Direct-with-normal-security N Sbo-with-normal-security Y Direct-with-enhanced-security Y Sbo-with-enhanced-security
Ct2	1, 2	Is the control model fixed, configurable and/ or online changeable?	Fixed
Ct3	-	Is TimeActivatedOperate supported (compare PICS or SCL)	N
Ct4	-	Is "operate-many" supported (compare sboClass)?	N
Ct5	1	What is the behavior of the DUT when the test attribute is set in the SelectWithValue and/or Operate request	The request will be proceed if the Beh of the logical node where the controllable object is located is test. Otherwise, it will be rejected.
Ct6	-	What are the conditions for the time (T) at- tribute in the SelectWithValue and/or Operate request	Time attribute is not relevant.
Ct7	-	Is pulse configuration supported ?	N
Ct8	1	What is the behavior of the DUT when the check conditions are set  Is this behavior fixed, configurable, online changeable?	Y synchrocheck Y interlock-check The interlocking is only supported and checked for SBO control objects. DUT uses the check value to perform the check according to the control request.  Configurable

ID	ED	Description	Value / Clarification
Ct9	1, 2	What additional cause diagnosis are supported	Y Blocked-by-switching-hierarchy Y Select-failed Y Invalid-position Y Position-reached Y Parameter-change-in-execution (in Ed1 only) Y Step-limit Y Blocked-by-Mode Y Blocked-by-process Y Blocked-by-interlocking Y Blocked-by-synchrocheck Y Command-already-in-execution N Blocked-by-health Y 1-of-n-control Y Abortion-by-cancel Y Time-limit-over N Abortion-by-trip Y Object-not-selected  Edition 2 specific values:  Y 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 Y Inconsistent-parameters Y Locked-by-other-client
Ct10	1, 2	How to force a "test-not-ok" respond with SelectWithValue request?	DTU will give a nagtive feedback with AddCause "not-supported"
Ct11	1, 2	How to force a "test-not-ok" respond with Select request?	When the control object has already been selected
Ct12	1, 2	How to force a "test-not-ok" respond with Operate request?	DOns: Command will be excuted, but no actually output, after operate timeout, DUT will give a nagtive feedback with AddCause "Invalid-position" SBOs: na DOes: Command will be excuted, but no actually output, after operate timeout, DUT will give a nagtive feedback with AddCause "Invalid-position" SBOes: Command will be excuted, but no actually output, after operate timeout, DUT will give a nagtive feedback with AddCause "Invalid-position"
Ct13	1, 2	Which origin categories are supported?	Bay-control, station-control, remote-control, automatic-station, automatic-remote, maintenance, process
Ct14	1, 2	What happens if the orCat value is not supported?	DOns: Operate.Resp- SBOs: na DOes: Operate.Resp-, addCause = not-supported SBOes: SelectWithValue.Resp-, addCause = not-supported

ID	ED	Description	Value / Clarification
Ct15	1, 2	Does the IED accept a SelectWithValue/Operate with the same ctrlVal as the current status value?	DOs: Y SBOs: na DOes: N SBOes: Y SBOes SelectWithValue: Y SBOes Operate: N Depending if the verify check has been disabled with DIGSI
Ct16	1	Does the IED accept a Select/Operate on the same control object from 2 different clients at the same time?	DOs: Y SBOs: na DOes: N SBOes: N No, if the second request occurred when the object is not in unselected state (SBOes), resp. Ready state (DOs, DOes), then it will lead to a negative response
Ct17	1	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (tissue 334)	SBOs: na SBOes: N
Ct18	1, 2	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	Operate
Ct19	-	Can a control operation be blocked by Mod=Off or Blocked	Y
Ct20	1, 2	Does the IED support local / remote operation?	Y
Ct21	1, 2	Does the IED send an InformationReport with LastAppError as part of the Operate response for control with normal security?	SBOs: na DOs: N
Ct22	2	How to force a "parameter-change-in-execution"	SBOs: na SBOes: parameter-change-in-execution is supported in Ed1 only
additional items:			
		Inconsistency between SelectWithValue and (Operate or Cancel)	Operate or Cancel will be acknowledged with negative response if inconsistencies to the SelectWithValue request are detected. The following attributes will not be checked in this case: T (Time) The controlled object returns then in state "unselected"
		Cancel request could be sent after an operate request.	Y
		Format of the control time stamp attribute ?	Time stamp instead of EntryTime acc. to the 7-2 Errata List.
		What is the behavior of the control state machines when the association is lost with the client that issued a successful control?	For SBOes: If the current state is "Ready", then the selection ends.
		Select and Operate time out values:	fixed as 300s

ID	ED	Description	Value / Clarification
		Which type of control object supports the control model DOes in the IED?	Type of intsp (internal SP)

## 1.10 Time and time synchronisation model

ID	ED	Description	Value / Clarification
Tm1	1, 2	What quality bits are supported (may be set by the IED)?	N LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
Tm2	1, 2	Describe the behavior when the time synchronization signal/messages are lost	The quality attribute "ClockNotSynchronized" will be set to TRUE after a configured time period
Tm3	1, 2	How long does it take to take over the new time from time server	Configurable Default: 10 min
Tm4	1, 2	When is the time quality bit "Clock failure" set?	Clock failure is set when the device internal clock drifts from the external synchronization For example, the source of time synchronization is not configured in the IED.
Tm5	1, 2	When is the time quality bit "Clock not synchronized" set?	The "ClockNotSynchronized" attribute is set to TRUE as long as no time synchronization is established.
Tm6	-	Is the timestamp of a binary event adjusted to the configured scan cycle?	Deprecated
Tm7	1	Does the device support time zone and daylight saving?	N
Tm8	1,2	Which attributes of the SNTP response packet are validated?	N Leap indicator not equal to 3? Y Mode is equal to SERVER Y OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp Y RX/TX timestamp fields are checked for reasonableness Y SNTP version 3 and/or 4 Y Other (describe): Stratum is not KISS OF DEATH Clock of STNP Server is synchronized Response comes from the server to which the request was sent
Tm9	1, 2	Do the COMTRADE files have local time or UTC time and is this configurable	Local time Not configurable
additional items:			
		What is the behaviour when the time synchronisation messages indicate that the stratum is greater than 3?	A stratum with a value greater than 3 with the SNTP time synchronization messages indicates that the time server has a questionable synchronisation. It might also indicate that no GPS connection are available. Therefore the time quality attribute "ClockNotSynchronized" will be set to TRUE as long as the stratum content is greater than 3.

## 1.11 File transfer model

ID	ED	Description	Value / Clarification
Ft1	1	What is structure of files and directories? Where are the COMTRADE files stored? Are COMTRADE Files zipped and what files are included in each zip file?	Directory name / COMTRADE / *; Files according to the comtrade standard and not zipped.
Ft2	1, 2	Directory names are separated from the file name by	"/"
Ft3	1	The maximum file name size including path (default 64 chars)	64
Ft4	1, 2	Are directory/file name case sensitive	Case sensitive
Ft5	1, 2	Maximum file size for SetFile	SetFile is not supported
Ft6	1	Is the requested file path included in the file name of the MMS fileDirectory respond?	Y
Ft7	1	Is the wild char supported MMS fileDirectory request?	Y only as *; not as name completion wild card
Ft8	1, 2	Is it allowed that 2 clients get a file at the same time?	N
additional items:			
		Maximum number of clients that can use the File transfer service simultaneously	1
		Maximum number of files that can be accessed simultaneously	1
		Maximum time the file transfer service is locked for one client	10 min

## 1.12 General items

ID	ED	Description	Value / Clarification
additional items:			
		What is the type of the attribute actVal in the BCR (Binary Counter Reading) CDC?	Depending on the edition mode used. The type is integer 32 (INT32) if the software is running in edition 1 mode, otherwise it is integer 64 (INT64).
		What is the behaviour of the Device by GetAllDataValues?	GetAllDataValues is not supported without functional constraint indication.



## 1.13 TICS - Technical Issues Implementation Conformance Statement

### 1.13.1 TISSUES Edition 1

The implemented TISSUES are only relevant when the Edition Setting is set to Edition 1, otherwise those TISSUES are not relevant for Edition 2.

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Object Directory	433	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=433">http://tissue.iec61850.com/tissue.aspx?issueid=433</a>	Order of attributes in specialized CDCs for control service mapping	-
	422	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=422">http://tissue.iec61850.com/tissue.aspx?issueid=422</a>	Order of extension data objects and data attributes	-
	168	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=168">http://tissue.iec61850.com/tissue.aspx?issueid=168</a>	Order of attributes in MMS components	-
	141	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=141">http://tissue.iec61850.com/tissue.aspx?issueid=141</a>	Desc: object reference length extended to 129	x <sup>1)</sup>
Object Model	120	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=120">http://tissue.iec61850.com/tissue.aspx?issueid=120</a>	Type - Mod.stVal and Mod.ctlVal	-
	146	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=146">http://tissue.iec61850.com/tissue.aspx?issueid=146</a>	CtxInt	-
	173	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=173">http://tissue.iec61850.com/tissue.aspx?issueid=173</a>	Ctl modelling harmonization	-
	234	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=234">http://tissue.iec61850.com/tissue.aspx?issueid=234</a>	New type CtxInt	x
	75	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=75">http://tissue.iec61850.com/tissue.aspx?issueid=75</a>	Desc: Str and Op Data Object in GAPC	-
Services	377	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=377">http://tissue.iec61850.com/tissue.aspx?issueid=377</a>	DeleteDataSet response-	-
	276	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=276">http://tissue.iec61850.com/tissue.aspx?issueid=276</a>	File Services Negative Responses	-
	183	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=183">http://tissue.iec61850.com/tissue.aspx?issueid=183</a>	GetNameList error handling	x
	165	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=165">http://tissue.iec61850.com/tissue.aspx?issueid=165</a>	Improper Error Response for GetDataSetValues	x
	116	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=116">http://tissue.iec61850.com/tissue.aspx?issueid=116</a>	GetNameList with empty response?	x

## 1.13 TICS - Technical Issues Implementation Conformance Statement

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Reporting	474	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=474">http://tissue.iec61850.com/tissue.aspx?issueid=474</a>	GI for URCB	-
	453	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=453">http://tissue.iec61850.com/tissue.aspx?issueid=453</a>	Reporting & Logging model revision	x
	438	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=438">http://tissue.iec61850.com/tissue.aspx?issueid=438</a>	EntryTime base should be GMT	-
	349	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=349">http://tissue.iec61850.com/tissue.aspx?issueid=349</a>	BRCB TimeOfEntry has two definitions	x
	348	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=348">http://tissue.iec61850.com/tissue.aspx?issueid=348</a>	URCB class and report	x
	344	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=344">http://tissue.iec61850.com/tissue.aspx?issueid=344</a>	TimeOfEntry misspelled	-
	335	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=335">http://tissue.iec61850.com/tissue.aspx?issueid=335</a>	Clearing of Bufovfl	x
	332	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=332">http://tissue.iec61850.com/tissue.aspx?issueid=332</a>	Ambiguity in use of trigger options	x
	329	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=329">http://tissue.iec61850.com/tissue.aspx?issueid=329</a>	Reporting and BufOvl	x
	322	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=322">http://tissue.iec61850.com/tissue.aspx?issueid=322</a>	Write Configuration attribute of BRCBs	
	301	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=301">http://tissue.iec61850.com/tissue.aspx?issueid=301</a>	SqNum in Buffered Reports	-
	300	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=300">http://tissue.iec61850.com/tissue.aspx?issueid=300</a>	Attribute Resv in BRCB	x
	298	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=298">http://tissue.iec61850.com/tissue.aspx?issueid=298</a>	Type of SqNum	x
	297	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=297">http://tissue.iec61850.com/tissue.aspx?issueid=297</a>	Sequence number	x
	278	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=278">http://tissue.iec61850.com/tissue.aspx?issueid=278</a>	EntryId not valid for a server	x
	275	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=275">http://tissue.iec61850.com/tissue.aspx?issueid=275</a>	Confusing statement on GI usage	x
	191	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=191">http://tissue.iec61850.com/tissue.aspx?issueid=191</a>	BRCB: Integrity and buffering reports	x
	190	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=190">http://tissue.iec61850.com/tissue.aspx?issueid=190</a>	BRCB: EntryId and TimeOfEntry	x
	177	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=177">http://tissue.iec61850.com/tissue.aspx?issueid=177</a>	Ignoring OptFlds bits for URCB	-
	52	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=52">http://tissue.iec61850.com/tissue.aspx?issueid=52</a>	Ambiguity GOOSE SqNum	x
49	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=49">http://tissue.iec61850.com/tissue.aspx?issueid=49</a>	BRCB TimeOfEntry?	x	

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Control Model	46	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=46">http://tissue.iec61850.com/tissue.aspx?issueid=46</a>	Synchro check cancel	x
	44	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=44">http://tissue.iec61850.com/tissue.aspx?issueid=44</a>	AddCause - Object not sel	x
	30	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=30">http://tissue.iec61850.com/tissue.aspx?issueid=30</a>	control parameter T	x
	520	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=520">http://tissue.iec61850.com/tissue.aspx?issueid=520</a>	Desc: control canceling at connection loss	-
Setting Group	593	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=593">http://tissue.iec61850.com/tissue.aspx?issueid=593</a>	Desc: Setting Group Canceling, eding	x
File Transfer	545	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=545">http://tissue.iec61850.com/tissue.aspx?issueid=545</a>	Files Directories	x

1) No impact as long as the IED Name and the logical device inst have together a length smaller than 13 char.

### 1.13.2 TISSUES Edition 2

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

Topic	TISSUE No.	Link	Description	Impact of Interoper.
Object Model	671	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=671">http://tissue.iec61850.com/tissue.aspx?issueid=671</a>	Mistake in definition of Mod & Beh	x
	686	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=686">http://tissue.iec61850.com/tissue.aspx?issueid=686</a>	Desc: New annex H - enums types in XML	x
	722	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=722">http://tissue.iec61850.com/tissue.aspx?issueid=722</a>	Desc: unit enumeration for min and h	x
	742	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=742">http://tissue.iec61850.com/tissue.aspx?issueid=742</a>	Desc: GAPC.Str, Op, StrVal are not intanceable	x
	929	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=929">http://tissue.iec61850.com/tissue.aspx?issueid=929</a>	AC_SCAV presence condition definition	x
Configuration	719	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=719">http://tissue.iec61850.com/tissue.aspx?issueid=719</a>	ConfDataSet - maxAttributes definition is confusing	x
	823	<a href="http://tissue.iec61850.com/tissue.aspx?issueid=823">http://tissue.iec61850.com/tissue.aspx?issueid=823</a>	ValKind for structured data attributes	



## 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.

2.1	Definitions of the ISO/OSI Reference Model	28
2.2	Definition of the Communication Services Acc. to Standard (PICS)	29
2.3	Model Implementation Conformance Statement (MICS)	35

## 2.1 Definitions of the ISO/OSI Reference Model

To achieve stable data exchange, all communication is based on the OSI Reference Model (OSI/IEC 7498-1) for a multi-layer communication function. Fig. 2-1 shows the seven layers defined there.

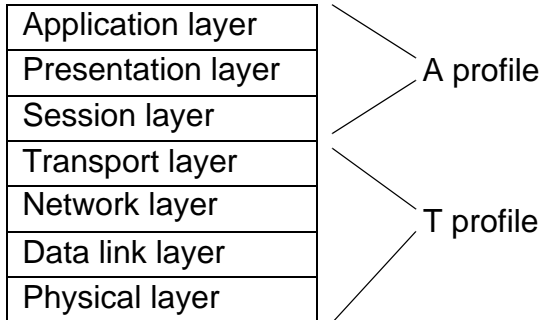


Fig. 2-1 OSI reference model and profiles

This section on using the ISO application (application profile) and transport profiles (T profile) describes the various stack profiles. An ISO application profile is a set of specifications and declarations regarding the top 3 layers of the ISO/OSI reference model (i.e. the application, presentation, and session layers). The T profile is a set of specifications and declarations regarding the lower 4 layers (i.e. transport, network, data link, and physical layers).

A and T profiles can be combined in various ways to form different types of services and information items that can be exchanged. The services specified in Part 7-2 of the IEC 61850 standard are mapped onto 4 different combinations of the profiles. These 4 combinations are used for

- Client/server services,
- GOOSE services,
- Time synchronization,
- Services for sampled measured values.

## 2.2 Definition of the Communication Services Acc. to Standard (PICS)

The tables in the sections below are specified according to IEC61850 Part 7-2 Annex A.

The descriptions below refer to implementation in the SIPROTEC 4, the SIPROTEC Compact and the Reyrolle IED device range.

The tables give the names stated in the standard.

### 2.2.1 Profile Compliance

#### Basic conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
<b>Client-Server roles</b>				
B11	<b>Server</b> side (of TWO-PARTY-APPLICATION-ASSOCIATION)	--	Y	
B12	<b>Client</b> side (of TWO-PARTY-APPLICATION-ASSOCIATION)	N	--	
<b>SCSMs supported</b>				
B21	<b>SCSM:</b> IEC 6185-8-1 used	Y	Y	
B22	<b>SCSM:</b> IEC 6185-9-1 used			
B23	<b>SCSM:</b> IEC 6185-9-2 used			
B24	<b>SCSM:</b> other			
<b>Generic substation event model (GSE)</b>				
B31	<b>Publisher</b> side	--	Y	
B32	<b>Subscriber</b> side	Y	--	
<b>Transmission of sample value model (SVC)</b>				
B41	<b>Publisher</b> side	--	N	
B42	<b>Subscriber</b> side	N	--	
Y = supported N or empty = not supported				

## ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
If <b>Server or Client</b> side (B11/12) supported				
M1	<b>Logical device</b>		Y	
M2	<b>Logical node</b>		Y	
M3	<b>Data</b>		Y	
M4	<b>Data set</b>		Y	
M5	<b>Substitution</b>		N	
M6	<b>Setting group control</b>		Y	
	<b>Reporting</b>			
M7	<b>Buffered report control</b>		Y	
M7-1	sequence-number		Y	
M7-2	report-time-stamp		Y	
M7-3	reason-for-inclusion		Y	
M7-4	data-set-name		Y	
M7-5	data-reference		Y	
M7-6	buffer-overflow		Y	
M7-7	entryID		Y	
M7-8	BufTim		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M7-11	conf-revision		Y	
M8	<b>Unbuffered report control</b>		Y	
M8-1	sequence-number		Y	
M8-2	report-time-stamp		Y	
M8-3	reason-for-inclusion		Y	
M8-4	data-set-name		Y	
M8-5	data-reference		Y	
M8-6	BufTim		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
M8-9	conf-revision		Y	
	<b>Logging</b>		N	
M9	<b>Log control</b>		N	
M9-1	IntgPd		N	
M10	<b>Log</b>		N	
M11	<b>Control</b>		Y	

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		Client/ Subscriber	Server/ Publisher	Value/Comments
If <b>GSE</b> (B31/32) is supported				
M12	<b>GOOSE</b>	Y	Y	
M13	<b>GSSE</b>	N	N	
If <b>SVC</b> (41/42) is supported				
M14	Multicast SVC	N	N	
M15	Unicast SVC	N	N	
If <b>Server or Client</b> side (B11/B12) supported				
M16	<b>Time</b>	Y	N	
M17	<b>File Transfer</b>	N	Y	
Y = supported N or empty = not supported				

**ACSI service conformance statement**

	Services	AA: TP/MC	Client (C)	Server (S)	
<b>Server</b>					
S1	GetServerDirectory	TP	N	Y	
<b>Application association</b>					
S2	Associate	TP	N	Y	
S3	Abort	TP	N	Y	
S4	Release	TP	N	Y	
<b>Logical device</b>					
S5	GetLogicalDeviceDirectory	TP	N	Y	
<b>Logical Node</b>					
S6	GetLogicalNodeDirectory	TP	N	Y	
S7	GetAllDataValues	TP	N	Y	
<b>Data</b>					
S8	GetDataValues	TP	N	Y	
S9	SetDataValues	TP	N	Y	
S10	GetDataDirectory	TP	N	Y	
S11	GetDataDefinition	TP	N	Y	
<b>Data set</b>					
S12	GetDataSetValues	TP	N	Y	
S13	SetDataSetValues	TP	N	N	
S14	CreateDataSet	TP	N	Y	
S15	DeleteDataSet	TP	N	Y	
S16	GetDataSetDirectory	TP	N	Y	
<b>Substitution</b>					
S17	SetDataValues	TP	N	N	
<b>Setting group control</b>					
S18	SelectActiveSG	TP	N	Y	
S19	SelectEditSG	TP	N	N	
S20	SetSGValues/ SetEditSGValue	TP	N	N	
S21	ConfirmEditSGValues	TP	N	N	
S22	GetSGValues/ GetEditSGValue	TP	N	N	
S23	GetSGCBValues	TP	N	Y	

	Services	AA: TP/MC	Client (C)	Server (S)	
<b>Reporting</b>					
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	Y	
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	Y	
S28	GetURCBValues	TP	N	Y	
S29	SetURCBValues	TP	N	Y	
<b>Logging</b>					
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	
<b>Generic substation event model (GSE)</b>					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC	Y	Y	
S36	GetGoReference	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	GetGSSEDataOffset	TP	N	N	
S43	GetGsCBValues	TP	N	N	
S44	SetGsCBValues	TP	N	N	

2.2 Definition of the Communication Services Acc. to Standard (PICS)

	Services	AA: TP/MC	Client (C)	Server (S)	
<b>Transmission of sample value model (SVC)</b>					
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	
<b>Control</b>					
S51	Select	TP	N	N	
S52	SelectWithValue	TP	N	Y	
S53	Cancel	TP	N	Y	
S54	Operate	TP	N	Y	
S55	Command-Termination	TP	N	Y	
S56	TimeActivated-Operate	TP	N	N	
<b>File transfer</b>					
S57	GetFile	TP	N	Y	
S58	SetFile	TP	N	N	
S59	DeleteFile	TP	N	N	
S60	GetFileAttributeValues	TP	N	Y	
<b>Time</b>					
T1	Time resolution of internal clock			10 (1 ms)	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	-		10 (approx. 0.9 ms)	nearest negative power of 2 in seconds
Y = supported N or empty = not supported					

## 2.3 Model Implementation Conformance Statement (MICS)

### Content of the statement

This statement contains the description of all objects that are provided by a device and is especially important if devices are connected to a central system that supplies data to certain applications via the objects provided by the device.

In the case of SIPROTEC 4 or SIPROTEC Compact or Reyrolle IEDs, this document depends on both the device type and the defined user objects and can therefore not be a permanent part of the manual. It is therefore generated from DIGSI.

### Generation in DIGSI 4

Generation is selected in the device processing via menu items *File* → *Export* → *IEC 61850 System Interface for Documentation (PDF)*. The dialog that opens let you enter a device-related, editable filename under which the MICS document to be generated will be stored.

The document is generated with the correct version and device type data. It shows the assignment lists of the devices to IEC 61850 and vice versa. The whole document is shown in a hyperlinked table of contents. The MICS is a readable form of the current mapping of a device on IEC 61850.



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## **P**

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## **W**

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