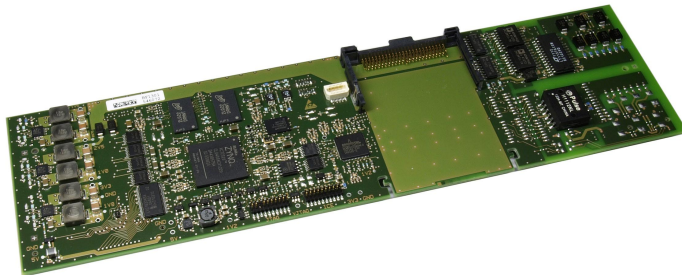


SIEMENS

SICAM AK
SICAM TM
SICAM BC

SM-2558/ETA3

Protocol element for Ethernet acc. IEC 61850 Edition 1



Protocol element for communication via LAN/WAN

- Standard according to IEC 61850 Edition 1 (Client + Server)
 - Fast Ethernet 100 Mbit/s, IEEE 802.3, 100BaseTX, electrical
 - TCP/IP
 - Mapping from IEC 60870-5-101/104 to IEC 61850
 - Data formats according to IEC 61850
 - Time synchronization via network time protocol (NTP)
 - Time synchronization of client via network time protocol (NTP) and simple network time protocol (SNTP)
 - Time synchronization of server via network time protocol (NTP)

the protocol element can be attached to master control and communication elements of SICAM RTUs

Optionally it can be expanded with a serial interface by SM-0551/PROTOCOL

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Disclaimer of Liability

Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded.

The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases. Any suggestions for improvement are welcome.

Subject to change without prior notice.
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Application

The protocol element described herein can be used in several automation units based on SICAM RTUs.

- SICAM AK
- SICAM TM
- SICAM BC

Protocol elements process specific communication protocols when SICAM RTUs communicate with each other or with devices of third-party manufacturers, in the field of telecontrol, automation and protection.

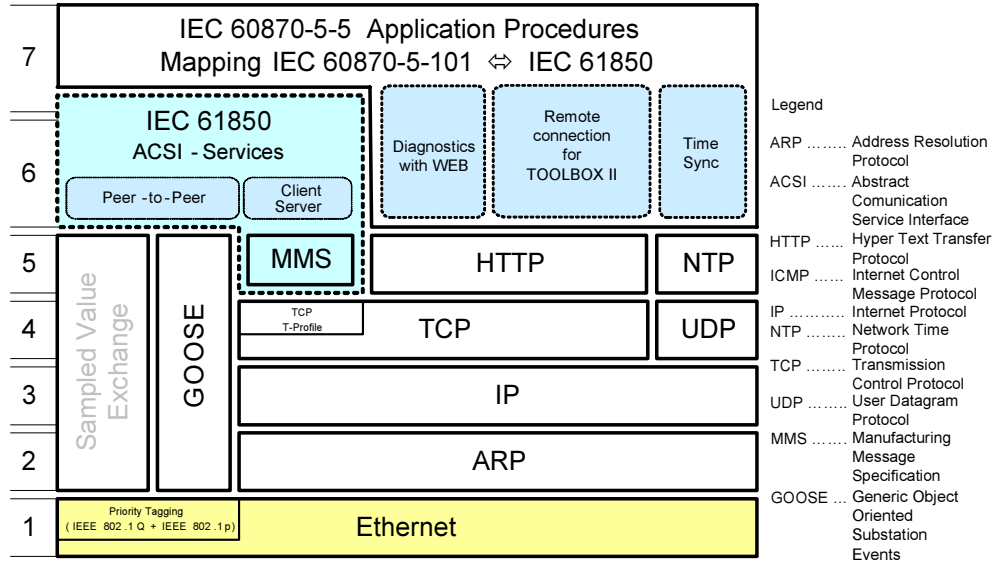
Due to its features, protocol element technology has a successful tradition for many years at SIEMENS. A fundamental characteristic is the separation of protocol-bound communication from application tasks of an automation unit.

- Each interface has its own protocol processor
 - communication has no impact on the application, and vice versa
 - each processor runs one communication protocol
 - various different protocols run on one and the same hardware
 - all protocols can be loaded with SICAM TOOLBOX II
- You can change the communication protocol without retroactive effect to the application tasks of an automation unit
- Each automation unit can be equipped with various protocols This allows easy implementation of data nodes and frontends.

Engineering is done using SICAM TOOLBOX II.

Features and Functions

Protocols according to the standard IEC 61850 are based on the OSI layer model.



Layer	Task	Functions, Characteristics, Comments
7 - Application	Application	<ul style="list-style-type: none"> • Transmission Handling • Reception Handling • Management of multiple connections
6 - Presentation	Data format	<ul style="list-style-type: none"> • IEC 61850 ACSI to Ax 1703 / SICAM RTUs and compatible systems In the "private range" according to IEC 60870-5-104, Ax 1703 / SICAM RTUs-specific system messages and some user data are implemented (i.e. transmission of fault records to SICAM DISTO)
5 - Session	Interface between data format and communication protocol	<ul style="list-style-type: none"> • GOOSE • MMS • HTTP • NTP client and server according to RFC 1305
4 - Transport 3 - Network	Communication protocol	<ul style="list-style-type: none"> • TCP/IP according to RFC 791 and RFC 793 • ICMP according to RFC 792; GOOSE according to IEC 61850-8-1
2 - Data Link 1 - Physical	LAN interface	<ul style="list-style-type: none"> • Ethernet 100 Mbps full duplex according to IEEE 802.3 • Connection technique (RJ45 on the master control or communication element) • ARP according to RFC 826 • IP Encapsulation according to RFC 894

Communication according to IEC 61850

Description	Value	Note
Max. number of connections	100	
Max. number of remote stations	50 (recommended: 20)	
Total number of data points	5000 (recommended: 2000)	Corresponds to the number of IEC 60870-5-101/104 messages that consist respectively of min. 3 IEC 61850 attributes (corresponds therefore approx. 9000 IEC 61850 single attributes)
ACSI Services	Supported restricted	
Data Classes	Only Common Data Classes supported	Not all the fields are assigned with validen values
Attributes	Supported restricted	
Communication parameters	Supported	"Unbuffered Control Block" etc.
System parameters	not supported	

General Functions IEC 61850 Client

Communication of a client with one or several servers (IEC 61850)

- LAN Communication via Ethernet TCP/IP according to IEC 61850 (Edition 1)
 - Supported functionality according to
 - PICS (Protocol Implementation Conformance Statement)
 - PIXIT (Protocol Implementation Extra Information)
 - Supported Logical Nodes and their Attributes
 - Server ⇔ Client
 - Acquisition of events
 - * Static Data Sets, Dynamic Data Sets
 - * Unbuffered Reports, Buffered Reports
 - * Change monitoring for measured values
 - * Monitoring of intermediate and faulty position for double-point binary informations
 - Transmission of files
 - * Disturbance records to SICAM DISTO
 - Transmission of integrated totals
 - Client ⇔ Server
 - General interrogation
 - Command Transmission
 - * Set control location, control location check
 - * Command Locking
 - * Direct Control with Normal Security, Direct Control with Enhanced Security, SBO Control with Enhanced Security (Select Before Operate)
 - Setting groups
- Clock synchronization according to NTP (Network Time Protocol) according to RFC 1305
 - NTP Client: Clock synchronization with one or several NTP-Server
 - NTP Server: integrated NTP Server for clock synchronization for one or several NTP -Clients
- Functions for supporting redundant communication routes
- SICAM TOOLBOX II connection over LAN/WAN ("remote connection")
 - connection via proprietary protocol based on TCP/IP and HTTP (one SICAM TOOLBOX II session can be served at the same time)
- Web server
 - Integrated web server to display connection- statistic- and developer information
 - Access to the web server with standard web browser via HTTP (Hyper Text Transfer Protocol)

General Functions IEC 61850 Server

Communication of a server with one client (IEC 61850)

- LAN Communication via Ethernet TCP/IP according to IEC 61850 (Edition 1)
 - Supported functionality according to
 - PICS (Protocol Implementation Conformance Statement)
 - PIXIT (Protocol Implementation Extra Information)
 - MICS (Model Implementation Conformance Statement)
 - Supported Logical Nodes and their Attributes
 - Client ⇔ Server
 - Acquisition of events
 - * Static Data Sets
 - * Unbuffered Reports
 - * Change monitoring for measured values
 - * Monitoring of intermediate and faulty position for double-point binary informations
 - Transmission of files * Disturbance records to SICAM DISTO
 - Transmission of integrated totals
 - Server ⇔ Client
 - General interrogation
 - Command Transmission
 - * Set control location, control location check
 - * Command Locking
 - * Direct Control with Normal Security, Direct Control with Enhanced Security, SBO Control with Enhanced Security
 - Setting groups
- Clock synchronization according to NTP (Network Time Protocol) according to RFC 1305
 - NTP Client: Clock synchronization with one or several NTP-Server
 - NTP Server: integrated NTP Server for clock synchronization for one or several NTP -Clients
- Functions for supporting redundant communication routes
- SICAM TOOLBOX II connection over LAN/WAN ("remote connection")
 - connection via proprietary protocol based on TCP/IP and HTTP (one SICAM TOOLBOX II session can be served at the same time)
- Web server
 - Integrated web server to display connection- statistic- and developer information
 - Access to the web server with standard web browser via HTTP (Hyper Text Transfer Protocol)

Communication

For the stations to communicate with each other, suitable transmission facilities and/or network components may be needed in addition. An optical connection is possible via media converter or switch.

Client

System	System Element	Protocol Element	Note
SICAM AK	CP-2014/CPCX25 CP-2017/PCCX25	SM-2558/ETA3 SM-2556/ET03	
SICAM BC	CP-5014/CPCX55	SM-2558/ETA3 SM-2556/ET03	
SICAM TM	CP-6014/CPCX65	SM-2558/ETA3 SM-2556/ET03	
Third-party system			IEC 61850 interoperability

Server

System	System Element	Protocol Element	Note
SICAM AK	CP-2014/CPCX25 CP-2017/PCCX25	SM-2558/ETA3 SM-2556/ET03	
SICAM BC	CP-5014/CPCX55	SM-2558/ETA3 SM-2556/ET03	
SICAM TM	CP-6014/CPCX65	SM-2558/ETA3 SM-2556/ET03	
Third-party system			IEC 61850 interoperability

Configurations

The following table lists supported configurations. In addition to one or two SM-2558, all parts (SIM, carrier module, connection board, patch plug, etc.) listed for the chosen configuration are needed:

Configuration			Interfaces			
Carrier Module	Connection Board ¹⁾	Patch Plug ¹⁾	SIM0		SIM1	
			S10	S11	S12	S13
CP-2014	CM-2839	2)	✓ ⁴⁾	✓		
CP-2017	CM-2838	2)	✓ ⁴⁾	✓	✓ ⁴⁾	✓
CP-5014	one integrated patch module per S1x ³⁾		✓ ⁴⁾	✓		
CP-6014	---	2)	✓ ⁴⁾	✓	✓ ⁴⁾	✓

- 1) one connection board for each carrier module, one patch plug for each interface
- 2) For patch plugs for standard protocols in standard configurations as supported see *Modes of Operation*.
- 3) each variant of SICAM BC which can be ordered comes with a determined patch module for each interface
- 4) serial interface (V.24/V.28) – can be added optionally (SM--0551)



Hint

Details on assembly of SIMs and Patch Plugs can be found in the user manual of the respective SICAM RTU, chapter *Setup of external Communication Connections*.

Modes of Operation

Operating mode	Patch Plug/Modul	Extras ¹⁾	Note
Electrical ethernet-interface (twisted pair)	CM-2860 ²⁾ CM-5860 ³⁾	–	<ul style="list-style-type: none"> • Fast Ethernet acc. IEEE 802.3, 100Base-TX • Transmission rate up to 100 Mbps • RJ45 connector 8-pin according to IEC 603.7
Optical ethernet interface (multimode fibre optic)	CM-2860 ²⁾	Media Converter or Switch ⁴⁾	<ul style="list-style-type: none"> • Fast Ethernet acc. IEEE 802.3, 100Base-TX • Transmission rate up to 100 Mbps

1) Extras are optional equipments

2) Patch plug for SICAM AK, SICAM TM

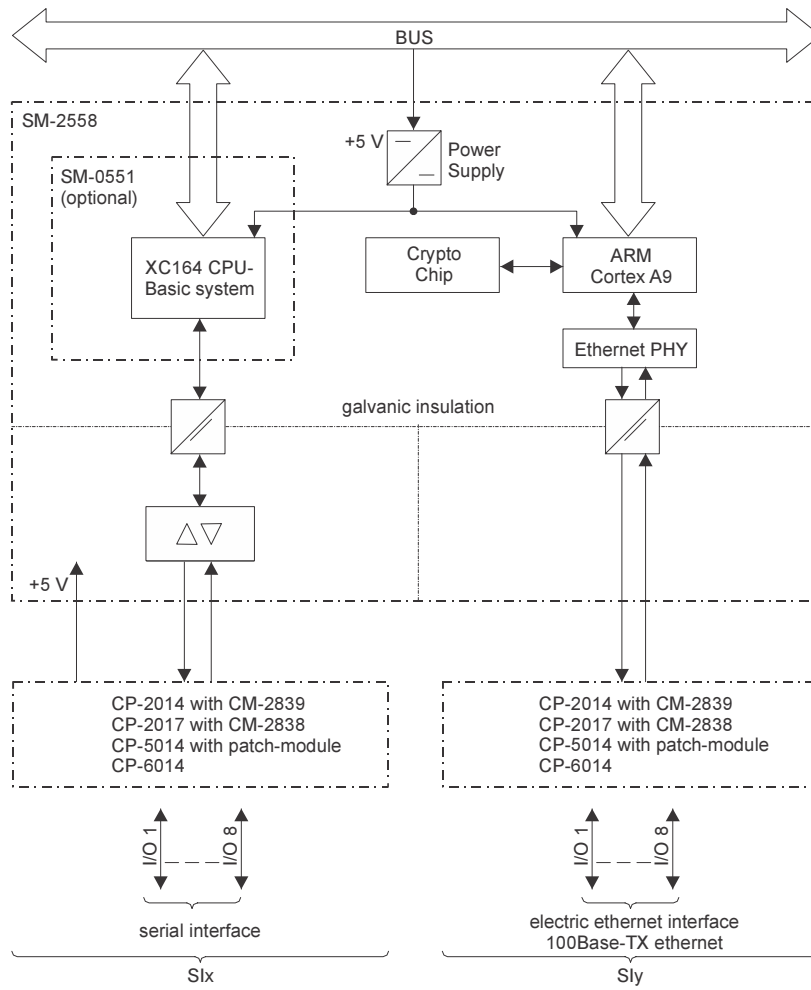
3) Patch module for SICAM BC

4) acc. SICAM RTUs Platforms • Configuration Automation Units and Automation unit Networks

Technical Specifications

Communication Circuits			
Electrical LAN interface (twisted pair)	Fast Ethernet acc. IEEE 802.3, 100Base-TX Data rate 100 Mbit/s Line lengths up to 100 m (using CAT 5e cables)		
1 serial interface (SM-0551 can be added optional)	Technical Specifications see data sheet <i>SM-x551/PROTOCOL (MC0-003-2.00)</i>		
Power Supply			
Operating voltage	4.75 .. 5.25 VDC,	typ. 400 mA,	max. 500 mA (without SM-0551)
	4.75 .. 5.25 VDC,	typ. 525 mA,	max. 770 mA (with SM-0551)
	The voltage is supplied by the carrier module.		
Mechanics			
Dimensions	227.3 x 63.5 mm		
Weight	Approx. 90 g		

Block Diagram

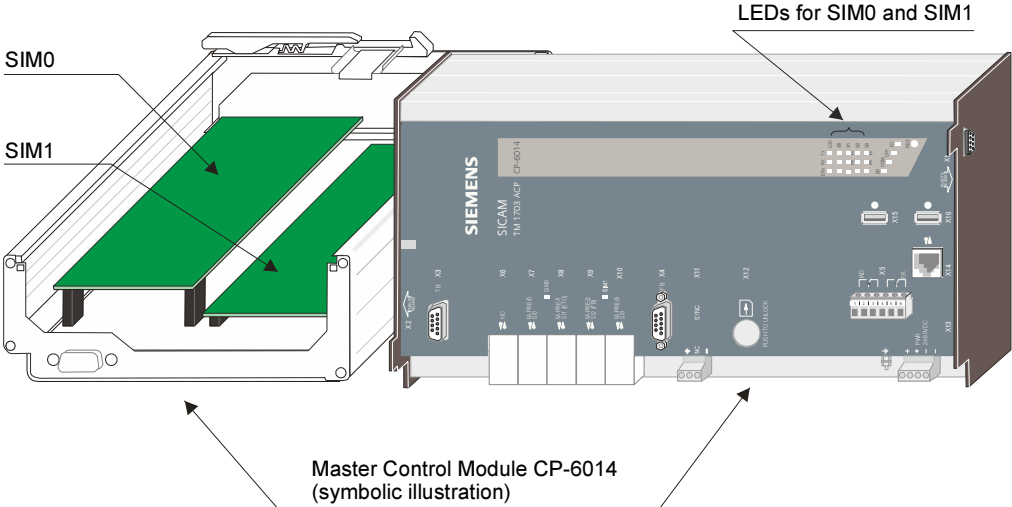
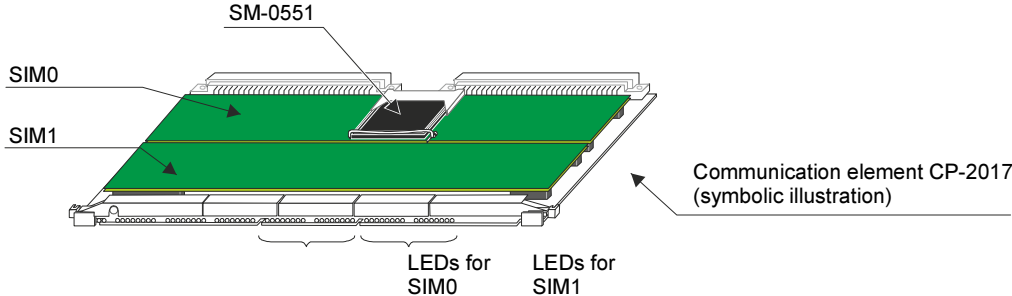
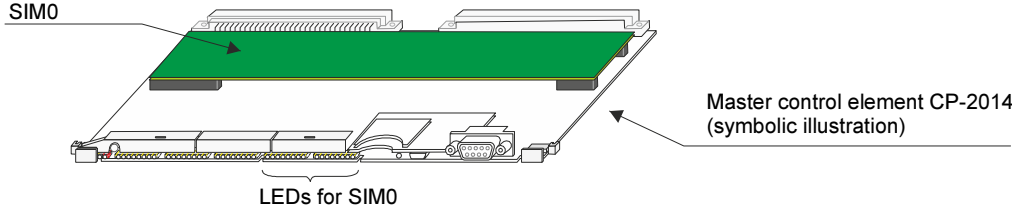


Status and Function display

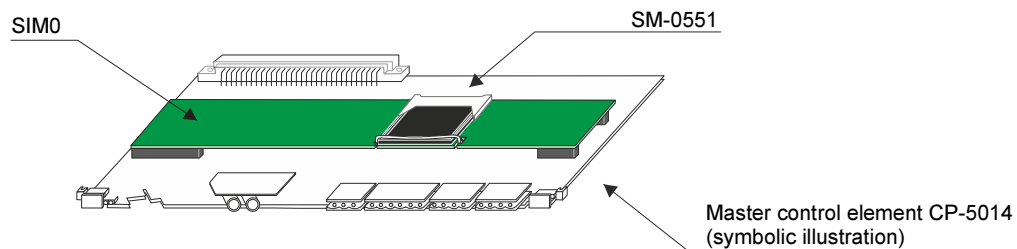
The protocol element SM-2558/ETA3 itself has neither a front panel nor LEDs to display status and functions.

It uses the LEDs of the master control unit or communication elements. The meaning of these LED displays is described in the manual of the concerning system element.

Protocol elements – Mounting place and LED display SICAM AK/SICAM TM



Protocol elements – Mounting place SICAM BC



Hint

SICAM BC has no LED's for status and function display of protocol elements.

Pin Assignment

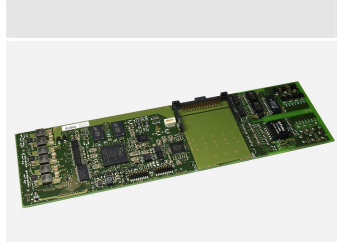
According to its application, the interfaces of a communication element (RJ45 socket connector) are on the carrier module itself (SICAM BC), on the connection board (SICAM AK) or on the housing (SICAM TM).

RJ45 socket connector	
SI1	on CM-2839 with CP-2014
SI1, SI3	on CM-2838 with CP-2017
SI1	on CM-5860 (patch module) on CP-5014
SI1, SI3	on housing of CP-6014

Pin	Signal	Meaning
1	TxD+	Transmit Data +
2	TxD-	Transmit Data -
3	RxD+	Receive Data +
4	-	not used
5	-	not used
6	RxD-	Receive Data -
7	-	not used
8	-	not used

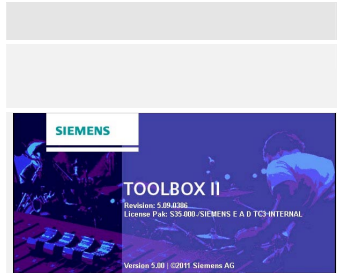
System Components

Hardware



Designation	Item-Number/MLFB
SM-2558 Ethernet Interface 1x100Base-TX (+1 ser. Interface)	BC2-558 6MF10130CF580AA0

Firmware



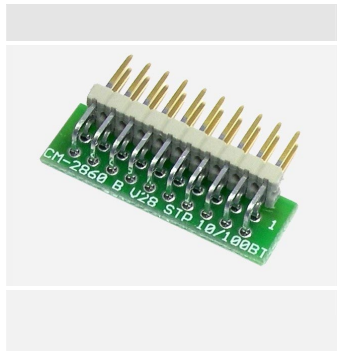
Designation	Item-Number/MLFB
ETA3 Ethernet Interface according to IEC 61850	SC0-580-1
TU ETA3 TB II-Update	SC0-580-1.XX/53

Can be equipped optional



Designation	Item-Number/MLFB
SM-0551 Serial Interface Processor, 1 serial Interface	BC0-551 6MF10130AF510A00

Accessories



Designation	Item-Number/MLFB
CM-2860 Patch Plug Standard V28, ET, TR	CA2-860 6MF12110CJ600AA0
CM-5860 Patch Modul el. V.28/ET	CC5-860 6MF12130FJ600AA0

Placement into the Information Landscape

Document name	Item Number
SICAM RTUs • Ax 1703 Common Functions Protocol Elements	DC0-023-2
SICAM RTUs Platforms Configuration Automation Units and Automation Networks	DC0-021-2
SICAM RTUs SM-xx51/PROTOCOL	MC0-003-2

A. Protocol Implementation Conformance Statement (PICS)

A.1. PICS ETA3

The tables in the following sections correspond to the standard IEC 61850-8-1, chapter 24.

Here, the conformance statements that are described under the term "Protocol Implementation Conformance Statement" are clarified.

A.1.1. Profile Conformance

A-Profile Support

A-Profile	Profile Description	Client	Server	Value/ Comment
		supported		
A1	Client/Server	✓	✓	
A2	GOOSE/GSE Management		✓	
A3	GSSE A			
A4	TimeSync	✓	✓	

T-Profile Support

T-Profile	Profile Description	Client	Server	Value/ Comment
		supported		
T1	TCP/IP	✓	✓	
T2	OSI			
T3	GOOSE/GSE		✓	
T4	GSSE			
T5	TimeSync	✓	✓	

A.1.2. MMS Conformance

A.1.2.1. Environmental Services

A.1.2.1.1. Initiate Conformance

MMS Initiate Request General Parameters

InitiateRequest	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
InitiateRequest				
localDetailCalling	✓		✓	
proposedMaxServOutstandingCalling	✓	6	✓	6
proposedMaxServOustandingCalled	✓	6	✓	6
initRequestDetail	✓		✓	
InitiateRequestDetail				
proposedVersionNumber	✓		✓	
proposedParameterCBB	✓		✓	
servicesSupportedCalling	✓		✓	
additionalSupportedCalling				
additionalCbbSupportedCalling				
privilegeClassIdentityCalling				

MMS Initiate Response General Parameters

InitiateResponse	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
InitiateResponse				
localDetailCalled	✓		✓	
negotiatedMaxServOutstandingCalling	✓		✓	
negotiatedMaxServOustandingCalled	✓		✓	
initResponseDetail	✓		✓	
InitiateResponseDetail				
negotiatedVersionNumber	✓		✓	
negotiatedParameterCBB	✓		✓	
servicesSupportedCalled	✓		✓	
additionalSupportedCalled				
additionalCbbSupportedCalled				
privilegeClassIdentityCalled				

MMS Service Supported Conformance Table

MMS Service Supported CBB	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
status	✓		✓	
getNameList	✓		✓	
identify	✓		✓	
rename				
read	✓		✓	
write	✓		✓	
getVariableAccessAttributes	✓		✓	
defineNamedVariable				
defineScatteredAccess				
getScatteredAccessAttributes				
deleteVariableAccess				
defineNamedVariableList	✓			
getNamedVariableListAttributes	✓		✓	
deleteNamedVariableList	✓			
defineNamedType				
getNamedTypeAttributes				
deleteNamedType				
input				
output				
takeControl				
relinquishControl				
defineSemaphore				
deleteSemaphore				
reportPoolSemaphoreStatus				
reportSemaphoreStatus				
initiateDownloadSequence				
downloadSegment				
terminateDownloadSequence				
initiateUploadSequence				
uploadSegment				
terminateUploadSequence				
requestDomainDownload				
requestDomainUpload				
loadDomainContent				
storeDomainContent				
deleteDomain				
getDomainAttributes				
createProgramInvocation				
deleteProgramInvocation				
start				

MMS Service Supported CBB	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
stop				
resume				
reset				
kill				
getProgramInvocationAttributes				
obtainFile				
defineEventCondition				
deleteEventCondition				
getEventConditionAttributes				
reportEventConditionStatus				
alterEventConditionMonitoring				
triggerEvent				
defineEventAction				
deleteEventAction				
alterEventEnrollment				
reportEventEnrollmentStatus				
getEventEnrollmentAttributes				
acknowledgeEventNotification				
getAlarmSummary				
getAlarmEnrollmentSummary				
readJournal				
writeJournal				
initializeJournal				
reportJournalStatus				
createJournal				
deleteJournal				
fileOpen	✓			
fileRead	✓			
fileClose	✓			
fileRename				
fileDelete				
fileDirectory	✓			
unsolicitedStatus				
informationReport	✓		✓	
eventNotification				
attachToEventCondition				
attachToSemaphore				
conclude	✓		✓	
cancel				
getDataExchangeAttributes				
exchangeData				

MMS Service Supported CBB	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
defineAccessControlList				
getAccessControlListAttributes				
reportAccessControlledObjects				
deleteAccessControlList				
alterAccessControl				
reconfigureProgramInvocation				

MMS Parameter Conformance Building Block (CBB)

MMS Parameter CBB	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
STR1	✓		✓	
STR2	✓		✓	
NEST	✓	5	✓	5
VNAM	✓		✓	
VADR				
VALT				
bit 5				
TPY				
VLIS	✓		✓	
bit 8				
bit 9				
CEI				
ACO				
SEM				
CSR				
CSNC				
CSPLC				
CSPI				

A.1.2.1.2. GetNameList Conformance

GetNameList Conformance Statement

GetNameList	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
ObjectClass	✓		✓	
ObjectScope	✓		✓	
DomainName	✓		✓	
ContinueAfter	✓		✓	
Response				
List Of Identifier	✓		✓	
MoreFollows	✓		✓	
Response				
Error Type	✓		✓	

A.1.2.2. Variable Access Conformance

A.1.2.2.1. Supporting Productions

AlternateAccessSelection Conformance Statement

AlternateAccessSelection	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
accessSelection				
component				
index				
indexRange				
allElements				
alternateAccess				
selectAccess				
component				
index				
indexRange				
allElements				

VariableAccessSpecification Conformance Statement

VariableAccessSpecification	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
listOfVariable	✓		✓	
variableSpecification	✓		✓	
alternateAccess				
variableListName	✓		✓	

VariableSpecification Conformance Statement

VariableSpecification	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
name	✓		✓	
address	✓		✓	
variableDescription				
scatteredAccessDescription				
invalidated				

A.1.2.2.2. Read

Read Conformance Statement

Read	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
specificationWithResult				
variableAccessSpecification	✓		✓	
Response				
variableAccessSpecification	✓		✓	
listOfAccessResult	✓		✓	

A.1.2.2.3. Write

Write Conformance Statement

Write	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
variableAccessSpecification	✓		✓	
listOfData	✓		✓	
Response				
failure	✓		✓	
success	✓		✓	

A.1.2.2.4. InformationReport

InformationReport Conformance Statement

InformationReport	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
variableAccessSpecification	✓		✓	
listOfAccessResult	✓		✓	

A.1.2.2.5. GetVariableAccessAttributes

GetVariableAccessAttributes Conformance Statement

GetVariableAccessAttributes	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
name	✓		✓	
address				
Response				
mmsDeletable				
address	✓		✓	
typeSpecification	✓		✓	

A.1.2.2.6. DefineNamedVariableList

DefineNamedVariableList Conformance Statement

DefineNamedVariableList	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
variableListName	✓		✓	
listOfVariable	✓		✓	
variableSpecification	✓		✓	
alternateAccess				
Response	✓			

A.1.2.2.7. GetNamedVariableListAttributes

GetNamedVariableListAttributes Conformance Statement

GetNamedVariableListAttributes	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
ObjectName	✓		✓	
Response				
mmsDeletable				
listOfVariable	✓		✓	
variableSpecification	✓		✓	
alternateAccess				

A.1.2.2.8. DeleteNamedVariableList

DeleteNamedVariableList Conformance Statement

DeleteNamedVariableList	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
Scope	✓		✓	
listOfVariableListName	✓		✓	
domainName				
Response				
numberMatched	✓		✓	
numberDeleted	✓		✓	

DeleteNamedVariableList-Error	✓		✓	
-------------------------------	---	--	---	--

A.1.2.3. Journal management services

A.1.2.3.1. ReadJournal

ReadJournal Conformance Statement

ReadJournal	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
invokeID				
journalName				
rangeStartSpecification				
startingTime				
EntrytoStartAfter				
rangeStopSpecification				
endingTime				
numberOfEntries				
EntryToStartAfter				
TimeSpecification				
EntrySpecification				
Response				
invokeID				
listOfJournalEntry				
entryIdentifier				
originatingApplication				
entryContent				
moreFollows				

JournalEntry Conformance Statement

Ref	Parameter	Client-CR		Server-CR	
		supported	Value/ Range	supported	Value/ Range
1	occurrenceTime				
2	additionalDetail				
3	entryForm				
4	data				
5	event				
6	currentState				

7	listofVariable				
8	variableTag				
9	valueSpecification				
10	annotation				

A.1.2.3.2. InitializeJournal

InitializeJournal Conformance Statement

InitializeJournal	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
journalName				
limitSpecification				
limitingTime				
limitingEntry				
Response+				
entriesDeleted				

A.1.2.4. File Management Services

A.1.2.4.1. FileDirectory

FileDirectory Conformance Statement

FileDirectory	Client-CR		Server-CR	
	supported	Value/Range	supported	Value/Range
Request				
filespecification	✓			
continueAfter	✓			
Response+				
listOfDirectoryEntry	✓			
moreFollows	✓			

A.1.2.4.2. FileOpen

FileOpen Conformance Statement

FileOpen	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
filename	✓			
initialPosition				
Response+				
frsmID	✓			
fileAttributes	✓			

A.1.2.4.3. FileRead

FileRead Conformance Statement

FileRead	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
frsmID	✓			
Response+				
fileData	✓			
moreFollows	✓			

A.1.2.4.4. FileClose

FileClose Conformance Statement

FileClose	Client-CR		Server-CR	
	supported	Value/ Range	supported	Value/ Range
Request				
frsmID	✓			
Response+	✓			

A.2. PICS Statement

A.2.1. Logical Device

A.2.1.1. GOOSE Services

GOOSE Conformance Statement

GOOSE	Subscriber	Publisher	Value/Range
GOOSE Services			
SendGOOSEMessage		✓ *)	
GetGoReference			
GetGOOSEElementNumber			
GetGoCBValues			
SetGoCBValues			
GSENotSupported			
GOOSE Control Block (GoCB)			

*) only IEC 61850 Server

GSSE Conformance Statement

GSSE	Subscriber	Publisher	Value/Range
GSSE Services			
SendGSSEMessage			
GetGsReference			
GetGSSEDataOffset			
GetGsCBValues			
SetGsCBValues			
GSENotSupported			
GSSE Control Block (GsCB)			

B. Protocol Implementation Extra Information for Testing (PIXIT)

B.1. PIXIT ETA3 Client

The tables in the following sections contain statements about special informations for tests corresponding to the standard IEC 61850-10.

Here, the statements that are described under the term "Protocol Implementation Extra Information for Testing" are clarified. The definition of the single informations is device-specific and not in the scope of the standard.

B.1.1. Association Model

Description	Value/Range	Remarks
Max. number of connected servers	100	
Connection failure recognition (TCP KEEPALIVE)	1...255 s	
Authentication	NO	
Maximum MMS PDU size	8000	

B.1.2. Dataset Model

Description	Value/Range	Remarks
Number of "data elements" per dataset	Not limited	
Number of datasets	Not limited	

B.1.3. Setting Group Control Model

Description	Value/Range	Remarks
Change of a setting group	YES	
Edit a setting group	NO	

B.1.4. Reporting Model

Description	Value/Range	Remarks
Trigger conditions		
integrity	YES	
data change	YES	
quality change	YES	
data updated	YES	
GI	YES	
Optional fields		
sequence number	YES	
report time stamp	YES	
reason for inclusion	YES	
dataset	YES	
buffer overflow	YES	
entry id	YES	
conf rev	YES	
segmentation	YES	

B.1.5. Control Model

Description	Value/Range	Remarks
Control model		
status only	YES	
direct with normal security	YES	
SBO with normal security	NO	
direct with enhanced security	YES	
SBO with enhanced security	YES	
Time activated operate	NO	
Number of simultaneous commands	10	
Check attribute		
synchrocheck	YES	
interlockcheck	YES	
Service errors	All	conversion to ACTCON neg. resp. ACTTERM neg.
Additional causes diagnosis	All	conversion to ACTCON neg. resp. ACTTERM neg.
Cancel request		Only for a currently running command
Format control time stamp T	Time stamp	

B.1.6. Time and Time Synchronization Model

Description	Value/Range	Remarks
Quality bits		
Leap seconds known	NO	
Clock failure	YES	
Clock not synchronized	NO	
Time accuracy	Not evaluated	

B.1.7. File Transfer Model

Description	Value/Range	Remarks
Directory indication	" / " or " \ "	
Length of filename (incl. directory)	40 ASCII characters	
Maximum file size	1 MB	
Interrogation simultaneously to several servers	NO	