SIEMENS

SICAM A8000 Series

CP-8000

PIXIT for IEC 61850 Ed. 2 Client (ET85)

Protocol Implementation extra Information for Testing (PIXIT) the IEC 61850 Ed.2 Client Interface in SICAM A8000 CP-8000

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Preface

This document is applicable to the following product(s):

- SICAM A8000 CP-8000

Purpose of this manual

This manual describes the Protocol Implementation extra Information for Testing (PIXIT) for the IEC 61850 Ed. 2 Client interface in:

- Siemens A8000 CP-8000 using firmware ”ET85 Rev. 03.04”

Note:
PIXIT “Protocol Implementation extra Information for Testing” contains additional information on how the IEC 61850 is implemented and used.

Target Group

The document you are reading right now is addressed to users, who are in charge of the following engineering tasks:

- Customers
- Sales engineering and technical clarification
- Conceptual activities, as for example design and configuration
- Technical system maintenance

Notes

This document is based on:

- UCA International Users Group
  Testing Sub Committee
  Template version 1.0
  Date 18 December 2014

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1 Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in the client system: **SICAM A8000 CP-8000** with version ”**ET85 Rev. 03.04”** which are further referred to as “client”.

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

The following chapters specify the PIXIT for each applicable ACSI service model as structured in IEC 61850-10 and the “Conformance Test Procedures for Client System with IEC 61850-8-1 interface”.

1.1 SICAM A8000 CP-8000 “Device Under Test” (DUT)

Series	Device	MLFB	Description
SICAM A8000	CP-8000	6MF2101-0AB10-0AA0	SICAM A8000 CP-8000 24…60 VDC Temperature range –25 to +70°C

[1)] SICAM A8000 CP-8000 “on board Ethernet interface” with **ET85 Rev. 03.04 firmware**.

Notes:
- the red marked interface connector is assigned to IEC61850 Ed. 2 Client with ET85 firmware.
- the red marked interface connector is also used for WEB-Browser interface for IEC61850 Ed. 2 Client.
- the blue marked interface connector is used for engineering Software TOOLBOX II.

Firmware Revisions

	System element	HW#	FW#	Rev	TBII-Update	SetRev	P	SSE#	Task	Supportof system elements
M	CP-8000/CPC80	8000	8080	11	11 [11]					Supported
M-PRE/1	SM-8098/ET85	8098	8505	03.04	03.04 [03.04]			129		Supported
M-Bus0/PBA-0	USIO81	8099	8098	04.01	04.01 [04.01]			0		Supported

Note: IEC61850 Ed.2 functionality is included in firmware ET85 Rev. 03.04

Power Supply / CPU-Boards / Interface Cards

	Designation	Item-Number/MLFB
	SICAM A8000 CP-8000 24…60 VDC Temperature range –25 to +70°C	6MF2101-0AB10-0AA0

2 PIXIT for Configuration

ID	Ed	Description	Value / Clarification
Cf1	1,2	Describe how the client handles nameplate configuration revision mismatches	The client does not check any nameplate configuration mismatches.
Cf2	1,2	Describe how the client handles report control block configuration revision mismatches	Configuration revision will not be checked. The client reads the Data set reference of each URCB and the dataset elements from the server at startup. In case of configuration mismatches, only missing dataset elements can be detected by the client. Missing entries in a dataset will receive via cyclic read request. If for any reason, any missing dataset element cannot be retrieved in that way, it will be marked as invalid (NT) in the client.
Cf3	1,2	Number of logical devices that can be handled by client	100
		<additional items>	

3 PIXIT for Association model

ID	Ed	Description	Value / Clarification
As1	1,2	Guaranteed number of servers that can set-up an association simultaneously (one association per server)	10
As2	1,2	Lost connection detection time range (default range of TCP_KEEPALIVE is 1 – 20 seconds)	60 seconds
As3	1,2	Lost (abort) connection retry time	There is a time that can be configure by setting "Timeout IEC61850 connection establishment (s)" in the DUT configuration tool. If an Abort request or negative Association response is received, after this configurable time, the DUT will send a tp0 disconnect request. On the other hand, new Associate request will be tried in a maximum of 120 seconds.
As4	3	Is authentication supported	N
As5	1,2	What is the maximum and minimum MMS PDU size	Max MMS PDU size 20000 bytes Min MMS PDU size 1500 bytes
As6	1,2	What is the typical startup time after a power supply interrupt	40 seconds (in the worst case scenario)
As7	1,2	How does the client disconnect from the server?	Only “release“ supported. (“abort“ is not implemented)
		<additional items>	

4 PIXIT for Server model

ID	Ed	Description	Value / Clarification
Sr1	1,2	Maximum object identification length	128 octets: <64>/<64>
Sr2	1,2	Does client support auto description	Y Depending on the reporting and dataset services supported by the server (for that purpose the client checks the imported SCD used for the DUT configuration), the client will initiate different auto description procedure: - **If the sever support dynamic datasets and dynamic reporting**, after startup the client reads the complete directory from the server and creates a presistent dataset (dataset name = Client MAC address + number) with all the parameterized datapoints defined in the server up to maxAttributes (DynDataSet in SCL file). This process will be repeated until all datapoints are contained in datasets. The client enables the first available URCBs/BRCBs (all instances are used) with the created persistent datasets (dataset name = Client MAC address + number) for each logical device and Logical Node. **- If the server does not support dynamic datasets neither dynamic reporting**, the client reads the complete directory from the server and tries to enable the first instance of every URCB/BRCB that is available for each logical device and logical Node. If one dataset is referenced in more than one URCB/BRCB, only one of them will be enabled to avoid the reception of duplicated information. In both cases, the client performs GetServerDirectory requests cyclically. The client sends GetDataValues requests for reading data objects in a polling mode when they have been parameterized in the DUT and they can not be retreived by reporting.
Sr3	1,2	Describe how to view data values	Data values can be displayed thru the WEB browser -> Client -> Routing receive

ID	Ed	Description	Value / Clarification
Sr4	1,2	What analogue value (MX) quality bits are used in the client	Y Good, Y Invalid, N Reserved, Y Questionable Y Overflow Y OutofRange Y BadReference Y Oscillatory Y Failure Y OldData Y Inconsistent Y Inaccurate Y Process Y Substituted Y Test Y OperatorBlocked IEC61850 quality is mapped to a different format (based on IEC60870-5-104) in the WEB browser: Invalid → NT Questionable → IV Substituted → SB Test → T OperatorBlocked → BL Overflow → OV
Sr5	1,2	Which status value (ST) quality bits are used in the client	Y Good, Y Invalid, N Reserved, Y Questionable Y Overflow Y OutofRange Y BadReference Y Oscillatory Y Failure Y OldData Y Inconsistent Y Inaccurate Y Process Y Substituted Y Test Y OperatorBlocked IEC61850 quality is mapped to a different format (based on IEC60870-5-104) in the WEB browser: Invalid → NT Questionable → IV Substituted → SB Test → T OperatorBlocked → BL Overflow → OV

ID	Ed	Description	Value / Clarification
Sr6	1,2	Describe how to view/display quality values	Attribute q can be displayed after mapping to IEC60870-5-104 in the WEB browser thru “Client -> routing receive”: - Validity: Invalid → NT = 1 - Validity: Invalid + Overflow = true → OV = 1 - Validity: Questionable - Failure = true → IV = 1 - Validity: Questionable - OldData = true → IV = 1 - Source: Substituted → SB = 1 - OperatorBlocked = true → BL = 1 The Test bit can be displayed with the WEB Browser thru Developer information -> Dataflow test and is marked with T at the datapoint
Sr7	1,2	Describe how to force a SetDataValues request	SetDataValues request can be forced via SICAM TOOLBOX II (IEC60870-5-101/104 command/setpoint). Available for FC=SP.
Sr8	1,2	Describe how to force a GetDataValues request	The client is able to perform GetDataValues automatically: - The client sends GetDataValues requests for reading data objects in a polling mode when they have been parameterized in the DUT and they can not be retreived by reporting.
Sr9	1,2	Describe how to force a GetAllDataValues request	n.a.
Sr10	1,2	Does the client support writing blkEna values?	N
Sr11	1,2	Describe how the client behaves in case of: (1) GetDataDefinition response- (2) GetDataDefinition response+ with more or less attributes as expected (3) GetLogicalDeviceDirectory response- (4) GetAllDataValues response- (5) GetAllDataValues response+ with more or less attributes as expected (6) GetDataValues response- (7) GetDataValues response+ with more or less attributes as expected (8) SetDataValues response-	Because the DUT implements autodescription: **(1)** Wrong GetDataDefinition request can not be issued by the client. Therefore, GetDataDefinition response- can not be forced. **(2) and (7)** Unexpected additional attributes are ignored. Missing attributes are marked in blue and as "Count not in server database" in the WEB browser. **(3)** Wrong GetLogicalDevideDirectory request can not be issued by the client. Therefore, GetLogicalDevideDirectory response- can not be forced. **(4) and (5)** n.a. **(6)** DUT uses autodescription to prevent sending wrong GetDataValues requests. **(8)** DUT uses autodescription to prevent sending wrong SetDataValues requests. But if for any reason an unexpected SetDataValues response- is received (e.g. read-only DA), error message is registered in the command Log that is shown thru the WEB browser. “Server -> Client, EXE CON, neg.” After that, the DUT continues as normal.
Sr12	1,2	Which time quality attributes from the server are used in the client	N Leap Second Known, Y ClockFailure Y Clock not synchronized N Accuracy Time quality attributes are displayed in the WEB browser as follows: ClockFailure → IV ClockNotSynchronized -> IV ClockFailure + ClockNotSynchronized → IV

ID	Ed	Description	Value / Clarification
Sr13	1,2	Describe how to view time quality attributes	The time can be shown in the Web browser thru “Client -> Routing receive”. The time format is local time. The time quality can be shown in the Web browser thru “Client -> Routing receive”. Only the IV of time will be shown here (converted from Clock not synchronized or Clock failure). Number of bits in the time format can not be displayed.

Note: in case quality/timequality is displayed in a different format clarify the mapping

5 PIXIT for Data set model

ID	Ed	Description	Value / Clarification
Ds1	1,2	Describe how to force a GetDataSetValues request	n.a.
Ds2	1,2	Describe how to force a SetDataSetValues request	n.a.
Ds3	1,2	Describe how to force a DeleteDataSet request	After connecting to the server, if the sever supports dynamic datasets and dynamic reporting, after startup the client will try to delete its own previously created datasets (Client MAC address + number).
Ds4	1,2	Describe how the client handles following dataset mismatches between the SCL and the data sets exposed via MMS: (1) new dataset element (2) missing dataset element (3) Reordered dataset members in a dataset of a different data type (4) Reordered dataset members in a dataset of the same data type	Dataset names and elements are read from the server via MMS Services (auto description): (1) New dataset elements are recognized and processed correctly if they were previously defined in the server although they were not used in the dataset before; otherwise, they are ignored. (2) The missing data objects, not contained in any dataset, are polled via GetDataValues at configurable interval. (3) and (4) The order of dataset elements does not matter, they are processed as normal.
Ds5	1,2	Describe how the client behaves in case of: (1) GetLogicalNodeDirectory(DATA-SET) response- (2) GetDataSetDirectory response- (3) GetDataSetValues response- (4) SetDataSetValues response-	(1) and (2) Because the DUT implements autodescription, no negative GetLogicalNodeDirectory(DATA-SET) and GetDataSetDirectory responses can be forced. (3) and (4) n.a.
Ds6	1,2	Maximum name length for dataset Maximum name length for dataset member, including LD and FC	<64/16$32> <64/61+3>
Ds11	1,2	Describe how to force a CreateDataSet request (1) persistent (2) non-persistent	(1) If the sever support dynamic datasets and dynamic reporting, after startup the client will create a persistent dataset (dataset name = Client MAC address + number, where number starts from 0 to 65535) with all the parameterized datapoints defined in the server up to maxAttributes (DynDataSet in SCL file). This process will be repeated until all datapoints are contained in datasets. (2) The Client does not support non-persistent datasets.

ID	Ed	Description	Value / Clarification
Ds12	1,2	Describe how the client behaves in case of: (1) CreateDataSet response- (2) DeleteDataSet response-	(1) In case of CreateDataSet response-, the client sends GetDataValues requests in a polling mode to retrieve the dataset elements that were referenced in the failed created dataset. (2) Negative DeleteDataSet responses are not logged, so the Client continues with a normal operation.
Ds13		Describe how to force GetLogicalNodeDirectory (DATA-SET) and GetDataSetDirectory requests	The DUT can perform GetLogicalNodeDirectory (DATA-SET) and GetDataSetDirectory requests in the follwing ways: (1) During startup, by means of Autodescription. In this case the DUT only performs GetDataSetDirectory requests for those datasets that are used in RCBs. (2) By forcing it via WEB browser: Overview->Connections-> request NV. In this case, the DUT performs GetDataSetDirectory requests for ALL datasets defined in the server.
Ds14		Describe how the client check if dyn datasets is supported by a server	The client detects the support of dynamic datasets: (1) during import of the SCL file in the SICAM TOOLBOX II, indicated in the parameter “dynamic data-sets” (2) during autoconfig if the server reports in the “initiate re sponse” the support of “ “DefineNamedVariableList”. The autoconfig detection of dynamic datasets has a higher priority as the SCL file import.
		<additional items>	

6 PIXIT for Setting group control model

ID	Ed	Description	Value / Clarification
Sg1	1,2	How can the client be forced to send a GetLogicalNodeDirectory(SGCB) request	During autoconfiguration the complete server directory will be read.
Sg2	1,2	Describe how to change the active setting group	The active setting group can be changed with IEC60870-5-104 commands. For each setting group n single commands (n=number of setting groups) (TI45) are used where every command has an individual IEC60870-5-104 address; for each command the corresponding setting group value is parametrized in the DUT. The setting group is activated if the single command (TI45) is sent with value ON and cause 6 (activation).
Sg3	1,2	Describe how to get the actual setting group values	The active setting group is polled from the server in a parametrizable cycle (default=3 sec). The active setting group is parametrized with n (n=number of setting groups) IEC60870-5-104 single point informations (TI30) with the corresponding setting group value and an individual IEC60870-5-104 address. Only the single point information with the correspondant setting group value is set to ON, all others are OFF.
Sg4	1,2	Describe how to edit setting group values	n.a.

ID	Ed	Description	Value / Clarification
Sg5	1,2	Describe how the client behaves in case of: (1) GetSGCBValues response- (2) SelectEditSG response- (3) SetEditSGValue response- (4) SelectActiveSG response- (5) ConfirmEditSGValues response-	(1) The client does not update the correspond-ing IEC60870-5-104 single point information for each setting group and continues with normal operation. (2) n.a. (3) n.a. (4) An neg. Confirmation on the IEC60870-5-104 interface will be generated. Error message is registered in the Command log that is shown thru the WEB browser: “Server -> Client, EXE CON, neg.“ (5) n.a.
		<additional items>	

7 PIXIT for Reporting model

ID	Ed	Description	Value / Clarification
Rp1	1,2	Does the client search for RCB in all logical nodes? If not, specify the logical nodes	(1) If the server supports dynamic datasets and dynamic RCBs, the client enables the first available URCBs/BRCBs (all instances are used) with the created persistent datasets (dataset name = Client MAC address + num ber) for each logical device and Logical Node. (2) If the server does not support dynamic datasets neither dynamic RCBs, the client tries to enable the first instance of every URCB/BRCB that is available for each logical device and logical Node. If one dataset is referenced in more than one URCB/BRCB, only one of them will be enabled to avoid the reception of duplicated information. (3) Additionally, the user can select which URCBs/BRCBs will be enable during startup by DUT configuration. (4) BRCBs/URCBs whose datasets only contains non-supported CDCs will not be enabled.
Rp2	1,2	Which dynamic RCB attributes are/can be configured by the client	RptID Y DataSet Y Optional fields Y Trigger conditions Y Buffer time Y Integrity period Y
Rp3	1,2	Does the client supports IED's with indexed and non-indexed report control blocks (RCB)	Buffered RCB indexed Y Buffered RCB not indexed Y Unbuffered RCB indexed Y Unbuffered RCB not indexed Y
Rp4	1,2	The supported trigger conditions are	integrity Y data change Y quality change Y data update Y general interrogation Y The supported trigger conditions to be enabled in the server can be configured in the client before its startup.
Rp5	1,2	The minimum required optional fields are	sequence-number Y report-time-stamp Y reason-for-inclusion Y data-set-name N data-reference N buffer-overflow N entryID N conf-rev N
Rp6	1,2	Does the client support segmented reports	Y

ID	Ed	Description	Value / Clarification
Rp7	1	Does the client support pre-assigned RCB	Y Pre-assigned reports are configured via SICAM TOOLBOX II. During the import of an ICD/SCD/IID file for a client the reports can be pre-assigned with the option “import reports”,where the user can select the needed reports from a list of all available reports for the client. The user will see only available reports for the actual client (that means reports already pre-assigned to another client are not shown in the list). How to prevent usage of wrong reports (assigned to another client): During the SCD import, if the SICAM TOOLBOX II detects a server that uses pre-assigned reports (ClientLN), it automatically selects all preassigned reports from the server. Therefore the SICAM TOOLBOX II only shows available reports for the client; that means pre-assigned reports for the own client and free reports. If in any case the user disables one of the pre-assigned reports, the user receives a warning/error. If in any case the user disables all preassigned reports, the user receives another warning/error.
Rp8	1,2	Does the client support reported data set containing structured data objects or data attributes?	reporting of data objects Y reporting of data attributes Y
Rp9	1,2	Describe how the client does respond when an previously used URCB is reserved by another client for: (1) Indexed URCB with max>1 configured in SCL (static reporting) (2) Indexed URCB with max=1 configured in SCL (static reporting) (3) URCB not configured in SCL (dynamic reporting)	The client reads during the initialization all “RptEna” and “DatSet” values of all reports. (1) Indexed URCB with max>1 configured in SCL (static reporting) The client checks if UBRCB is used or not by another client by reading RptEna value. If it is set to TRUE, the client uses the next free in stance configured in the client. (2) Indexed URCB with max=1 configured in SCL (static reporting) Because the Client can not enable the URCB, data will be recovered by polling (cyclic GetDataValues requests). (3) URCB not configured in SCL (dynamic report ing) If the client detects a dataset that was previous ly created by it (its MAC address in the dataset name), then the client will try to disable the report by setting RptEna=F. After that, the client will reserve the report by setting Resv=T and will try always to delete the dataset from the report and then the dataset itself. This behavior is independent from the RptEna attribute, that means even if another client uses this report, the client will try to remove the dataset from the previous used report. The reason is to prevent a possible memory leak if the old dataset is not deleted and the server has not reset the RptEna attribute. Finally, if the client cannot enable the dynamic URCB, it will check if the next configured URCB is free (if RptEna=F) for using it.

ID	Ed	Description	Value / Clarification
Rp10	1,2	Describe how the client does respond when an previously used BRCB is reserved by another client for: (1) Indexed BRCB with max>1 configured in SCL (static reporting) (2) Indexed BRCB with max=1 configured in SCL (static reporting) (3) BRCB not configured in SCL (dynamic reporting)	The client reads during the initialization all "RptEna" and "DatSet" values of all reports. (1) **Indexed BRCB with max>1 configured in SCL (static reporting)** The client checks if BRCB is used or not by another client by reading RptEna value. If it is set to TRUE, the client uses the next free in stance configured in the client. (2) **Indexed BRCB with max=1 configured in SCL (static reporting)** Because the Client can not enable the BRCB, data will be recovered by polling (cyclic GetDataValues requests). (3) **BRCB not configured in SCL (dynamic reporting)** If the client detects a dataset that was previous ly created by it (its MAC address in the dataset name), then the client will try to disable the report by setting RptEna=F. After that, the client will try always to delete the dataset from the report and then the dataset itself. This behavior is independent from the RptEna attribute, that means even if another client uses this report, the client will try to remove the dataset from the previous used report. The reason is to prevent a possible memory leak if the old dataset is not deleted and the server has not reset the RptEna attribute. Finally, if the client cannot enable the dynamic BRCB, it will check if the next configured BRCB is free (if RptEna=F) for using it.
Rp11	1,2	Describe how the client does respond on a SetBRCBValues(EntryID) respond-	The client continues with normal operation (no retry) and tries to enable the report and sends a GI after report enable
Rp12	1,2	Describe how the client does respond when a report has an unknown: dataset, RptID, unexpected number of dataset entries, and/or unexpected data type format entries	Because the DUT implements autodescription: a) **Unknown dataset** The client updates and manages correctly the updated BRCB b) **Unknown RptID** The client updates and manages correctly the updated BRCB c) **Unexpected number of dataset entries, and/or unexpected data type format entries** The order of dataset elements does not matter, they are processed as normal. The client detects missing dataset elements and tries to retrieve them via cyclic GetDataValues. New dataset elements are recognized and processed correctly if they were previously defined in the server although they were not used in the dataset before; otherwise, they are ignored.

ID	Ed	Description	Value / Clarification
Rp13	1,2	Describe how the client detects reporting configuration changes (mismatches). Does it check the “configuration revision” attributes and/or does it check the dataset members? Is the dataset update done online or offline?	Configuration revision will not be checked. The client reads the Data set reference of each URCB/BRCB and the dataset elements from the server at startup. In case of configuration mismatches, only missing dataset elements can be detected by the client. Missing entries in a dataset will receive via cyclic read request. If for any reason, any missing dataset element cannot be retrieved in that way, it will be marked as invalid (NT) in the client. Missing elements in the server directory are marked with the color blue in the Web browser thru “Client -> Routing receive” and are also counted and displayed in the Web browser as “count not in server database”. Dataset update is done “online”.
Rp14	1,2	Describe how to force the client to change the RCB buffer time	The buffer time can be changed via parameter setting in the connection definition of the client for each parametrized connection.
Rp15	1,2	Does client set server TrgOps.GI prior to first issuance of GI command?	N The Client always performs SetBRCBValues of GI=TRUE, even if TrgOps.GI = FALSE.
Rp16	1,2	Describe how to force the client to send the GI request	The client performs only one GI after connecting to the server.
Rp17	1,2	Describe how to force the client to enable a RCB	During startup available RCBs are used automatically (see Rp1).
Rp18	1,2	Describe how the client does respond when a report control block is renamed or deleted (1) Does it prevent reading the deleted RCB (2) If it reads the missing RCB, how does it handle the GetURCBValues or GetBRCBValues response-	(1) Because the client implements autodescription, it prevents reading the deleted RCB. In case of a previous reserved RCB is deleted, the client does not enable this report. After that, if for any reason the previous deleted RCB is available again, the client will try to enable it after a new association is restored. Applicable for BRCB: If the “timeout buffered reports” parameter configured in the client is different than 0 (this timeout starts with connection breakdown) and the timeout is not expired when the server is available again, the client releases the connection and starts the connection again if a previous BRCB is detected as deleted. In this way the client learns the new BRCBs and uses them to prevent a fatal error. After that, if for any reason the previous deleted BRCB is available again (before the timeout buffered reports expires), the client will not try to enable it, unless the timeout buffered reports expires. (2) n.a.
Rp19	1,2	Describe how the client behaves in case of: (1) SetURCBValues response- (2) Unsupported optional fields (3) Unsupported trigger condition(s)	(1) The Client continues as normal after receiving a negative SetBRCBValues/SetURCBValues response of: RptID, OptFlds, TrgOps, IntgPd and BufTm. However, if negative SetBRCBValues/SetURCBValues response of RptEna or DatSet is received, the Client will try to use the next free RCB instance. If there is no more available RCBs to be used, the Client retreives dataset data by cyclic GetDataValues requests. (2) and (3) n.a.

ID	Ed	Description	Value / Clarification
Rp20	1,2	Describe how the client behaves in case of Buffer overflow	The client always executes a GI after enabling a BRCB to avoid losing information in case of Buffer-overflow. Because the client always performs SetBRCBValues of GI=TRUE, even if TrgOps. GI = FALSE, the user is responsible of setting TrgOps.GI = TRUE prior GI during the client configuration.
Rp21	1,2	Describe how to force the client to send SetBRCBValues request for (1) EntryID (2) PurgeBuf	There is a configurable parameter called "timeout buffered reports" that is used for setting ResvTms (when applicable) and as a timeout in the client. (1) If "timeout buffered reports" is different than 0, the timeout in the client starts when the client detects a communication breakdown to the server. If the client-server connection is restored again before timeout is expired, the client behaves as follows: (1.1) If the server uses ResvTms, the Client sets the ResvTms to the time configured in "timeout buffered reports" and then sets the EntryID to the last received EntryID. (1.2) If the server does not use ResvTms, the Client only sets the EntryID to the last received EntryID. (2) If "timeout buffered reports" is 0 or the client-server connection is not restored again before timeout is expired, the client performs a SetBRCBValues of PurgeBuf to TRUE. In this case, if the server uses ResvTms, it will be set to 2 sec.
Rp22	1,2	Does the client support writing resvTms	Y (see Rp21)
Rp23	1,2	Does the client support reading owner	N
Rp24	1,2	How "timeout buffered report" parameter affects to URCB and BRCB management.	If a combinacion of BRCBs and URCBs are configured in the client and "timeout buffered reports" is different than zero, when the communication between the client and the server is lost, after restablishing the asociation before the timeout is expired, only BRCBs will be enabled again and the signals included in the datasets of the URCBs will be retrieve by polling. If the communication is restored after expiring timeout, BRCBs and URCBs will be enabled.
		<additional items>	

8 PIXIT for Control model

ID	Ed	Description	Value / Clarification
Ctl1	1,2	What control modes are supported	Y status-only Y direct-with-normal-security N sbo-with-normal-security Y direct-with-enhanced-security Y sbo-with-enhanced-security
Ctl2	1,2	Is Time activated operate (operTm) supported	N
Ctl3	1,2	Is “operate-many” supported	N
Ctl4	1,2	Can the client set the test flag?	Y
Ctl5	1,2	What check conditions can be set	Y synchro-check Y interlock-check Client maps IEC60870-5-101/104 Qualifier of Command (QOC) to IEC 61850 Attribute Check as described: - QOC = 9 → Check = “00” - QOC = 10 → Check = “10” (synchro check) - QOC = 11 → Check = “11” (interlocking + synchro check) - QOC = **0**, 1, 2 or 3 → Check = “01” (interlocking)
Ctl6	1,2	Which originator categories are supported and what is the originator identification?	Remote control The identification string is: “ET03: aaa.bbb.ccc.ddd Rxxx Kyyy Origin: zzz” aaa.bbb.ccc.ddd = IP address of the IEC61850-Client Rxxx, Kyyy = internal device address, Origin: zzz = origin from IEC60870-5-101/104
Ctl7	1,2	Describe if and how the client sets/increments the ctlNum	After a reboot, the client initializes ctlNum to “0”. It is incremented in one on each complete command sequence for direct commands and direct command with enhanced security and it is incremented in two on each complete sequence for select with enhanced security. e.g. 1. SBOes: ctlNum=16 (SelectWithValue + Operate) 2. DOns: ctlNum=18 (Operate) 3. SBOes: ctlNum=19 (SelectWithValue + Operate) 4. SBOes: ctlNum=21 (SelectWithValue + Operate) 5. DOes: ctlNum=23 (Operate) 6. DOes: ctlNum=24 (Operate)
Ctl8	1,2	What does the client when it receives a LastApplicationError and describe how to view the additional cause?	AddCause is shown in the Client - Command Log thru the web browser.
Ctl9	1,2	What does the client when its receives a Select, SelectWithValue or Operate respond negative ?	Error messages are registered in the Command log that are shown thru the WEB browser: (1) Select response-: n.a. (2) SelectWithValue response-: “Server -> Client, SEL CON, neg.“ (3) Operate response-: “Server -> Client, EXE CON, neg.“
Ctl10	1,2	Can the client change the control model via online services?	No

ID	Ed	Description	Value / Clarification
Ctl11	1	What does the client when the ctlModel is not initialized in the SCL?	The configured ctlModel in the SCL will not be checked. The client uses auto description in order to ensure the data-model in the client is always up to date and to ensure that the correct Operate and/or SelectWithValue request is issued. The client reads the ctlModel from the connected IED and configures itself to either Normal Security or Enhanced Security, the user issues a control request via IEC60870-5-101/104 command. In case a SelectWithValue is required based upon the configuration this request will be issued first and when this SelectWithValue was successful then the actual Operate command is issued. The auto description mechanism will always ensure that a correct Operate sequence is performed; in daily operations it is not possible to issue for example an Operate on a SBOw control object without issuing a SelectWithValue first.
Ctl12	1,2	What does the client when the ctlModel in SCD and in SERVER SIMULATOR is different?	See Ctl11
Ctl13	1,2	Describe how to view a (1) CommandTermination request+ (2) CommandTermination request- (3) TimeActivatedOperateTermination request+ and request-	The following messages are registered in the Command Log that are shown thru the WEB browser: (1) “Server -> Client, INFO TERM, pos” (2) “Server -> Client, INFO TERM, neg” (3) n.a.
		<additional items>	

9 PIXIT for Time and time synchronization model

ID	Ed	Description	Value / Clarification
Tm1	1,2	Describe how to view the internal time & quality or how to expose the timestamp and timestamp quality via the IEC 61850 interface	(1) The internal time and quality are displayed in the WEB Browser, in overview. Time is always shown as local time. (2) Timestamp and timestamp quality are exposed by by sending SelectWithValue and Operate requests.
Tm2	1,2	What time quality bits are supported	N LeapSecondsKnown N ClockFailure Y ClockNotSynchronized
Tm3	1,2	What is the behavior when the time synchronization signal/messages are lost	After a parameterizable timeout, internal time is set to “time not set” (IV is enabled on the client) and the time quality bit “ClockNotSynchronized” is enabled. The time and the status of the time can be displayed in the WEB browser thru “Overview”. The “time not set” status is showed with IV next to the time.
Tm4	1,2	When is the quality bit "Clock failure" set?	Not used
Tm5	~~1,2~~	When is the quality bit "Clock not synchronized” set?	• After a loss of timesync signal for a parameterizable timeout. • When the value of the “stratum” used by the SNTP server is out of the allowed range.
Tm6		SNTP client synchronization	Normally the SNTP client accesses to the SNTP server every "parametrized frequency" (by default = 60 sec). Nevertheless, the time between accesses can be reduced by some circumstances. e.g. (1) When the DUT does not receive SNTP server responses. (2) When the SNTP client function detects a time change or a time delay during transmit/receive of the packets. Synchronization takes place every full minute after accepting new time from the SNTP server. It means that if new time is received and accepted at 10:10:30, it will be updated in the client at 10:11:00.

10 PIXIT for File transfer model

ID	Ed	Description	Value / Clarification
Ft1	1,2	Describe when or how to force the client to request GetServerDirectory(FILE) and what it does with the responded filenames	GetServerDirectory request can be forced via web browser: Client -> Connections -> Request files. Then responded filenames are shown in the web browser, so they can be retrieve via GetFile request. They will be downloaded in the default download folder, depending on the OS.
Ft2	1,2	Does the client uses a wildcard in the GetServerDirectory(FILE) request	N The DUT sends GETServerDirectory(FILE) requests without a file name specification. Wildcard "*" is not supported.
Ft3	1,2	Does the client support IED's that include the path in the file name in the GetServerDirectory(FILE) respond?	Y path included Y path not included
Ft4	1,2	Does the client support IED's that use the file separator	Y "/" Y "\"
Ft5	1,2	What is the maximum file name size including path	64
Ft6	1,2	Can the client read a file with size 0	Y
Ft7	1,2	Are directory/file names case sensitive	Case sensitive
Ft8	1,2	Maximum file size	2 Megabyte
Ft9	1,2	Describe how the client behaves in case of: (1) GetFile response- (2) GetFileAttributes response- (3) SetFile response-	(1) **GetFile response-** In the default download folder, it is created a file with the name of the requested file that contains the following error message: "error opening file"." (2) **GetFileAttributes response-** n.a. (3) **SetFile response-** n.a.
		<additional items>	