Protocol Implementation eXtra Information for Testing (PIXIT)

PIXIT for Client Test Procedures for Edition 2

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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: "DS Agile C264" with version "V7", 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".

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2   PIXIT FOR CONFIGURATION

ID	Ed	Description	Value / Clarification
Cf1	1,2	Describe how the client handles nameplate configuration revision mismatches	Nameplate configuration revision is checked after association with the server. If configuration revision doesn't match with configuration revision used to configure the client, a log is done and communication with the server is suspended.
Cf2	1,2	Describe how the client handles report control block configuration revision mismatches	Report control block is not enabled and so it is not used but other report control blocks are used.

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)	250
As2	1,2	Lost connection detection time range (default range of TCP_KEEPALIVE is 1 – 20 seconds)	15 seconds
As3	1,2	Lost (abort) connection retry time	5 seconds
As4	3	Is authentication supported	N
As5	1,2	What is the maximum and minimum MMS PDU size	Max MMS PDU size : 65 535 Bytes Min MMS PDU size : 512 Bytes
As6	1,2	What is the typical startup time after a power supply interrupt	90 seconds but needs additional 30 seconds to make the first association.
As7	1,2	How does the client disconnect from the server?	When Mod of C264 switches to Off, it releases the association with all connected servers.

4 PIXIT FOR SERVER MODEL

ID	Ed	Description	Value / Clarification
Sr1	1,2	Maximum object identification length	129 octets: <64>/<64>
Sr2	1,2	Does client support auto description	Auto description is not supported.
Sr3	1,2	Describe how to view data values	Data values are proceeded by application and could be used in automatism. A log could be displayed to see the value.
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 N Inconsistent N Inaccurate Y Process Y Substituted Y Test Y OperatorBlocked

ID	Ed	Description	Value / Clarification	
Sr5	1,2	Which status value (ST) quality bits are used in the client	Y	Good,
			Y	Invalid,
			Y	Reserved,
			Y	Questionable
			Y	BadReference
			Y	Oscillatory
			Y	Failure
			Y	OldData
			N	Inconsistent
			N	Inaccurate
			Y	Process
			Y	Substituted
			Y	Test
			Y	OperatorBlocked
Sr6	1,2	Describe how to view/display quality values	Same way as display data values.	
Sr7	1,2	Describe how to force a SetDataValues request	SetDataValues could not be done.	
Sr8	1,2	Describe how to force a GetDataValues request	GetDataValues could not be done.	
Sr9	1,2	Describe how to force a GetAllDataValues request	GetAllDataValues could not be done.	
Sr10	1,2	Does the client support writing blkEna values?	N	

ID	Ed	Description	Value / Clarification
Sr11	1,2	Describe how the client behaves in case of: - GetDataDefinition response- - GetDataDefinition response+ with more or less attributes as expected - GetLogicalDeviceDirectory response- - GetAllDataValues response- - GetAllDataValues response+ with more or less attributes as expected - GetDataValues response- - GetDataValues response+ with more or less attributes as expected - SetDataValues response-	All are not managed yet.
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
Sr13	1,2	Describe how to view time quality attributes	Data value are logged in the application. There are some internal logs on data transmitted by communication component.

5 PIXIT FOR DATA SET MODEL

ID	Ed	Description	Value / Clarification
Ds1	1,2	Describe how to force a GetDataSetValues request	GetDataSetValues request is done automatically to check report control block configuration before enabling it.
Ds2	1,2	Describe how to force a SetDataSetValues request	Never done. Dynamic data sets are not managed.
Ds3	1,2	Describe how to force a DeleteDataSet request	Never done. Dynamic data sets are not managed.
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	All data set entry of dataset are checked before enabling RCB and GOOSE. If there is a mismatch, a log is done by communication stack and RCB or GOOSE is not used.
Ds5	1,2	Describe how the client behaves in case of: - GetLogicalNodeDirectory(DATA-SET) response- - GetDataSetDirectory response- - GetDataSetValues response- - SetDataSetValues response-	If there is a negative response on request performed to check dataset using GetDataSetDirectory, a log is done by communication stack and RCB or GOOSE is not used.

ID	Ed	Description	Value / Clarification
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 - non-persistent - persistent	Never done. Dynamic data sets are not managed
Ds12	1,2	Describe how to force a DeleteDataSet request - non-persistent - persistent	Never done. Dynamic data sets are not managed
Ds13	1,2	Describe how the client behaves in case of: - CreateDataSet response- - DeleteDataSet response-	Never done. Dynamic data sets are not managed.

6   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	Client could be configured to use RCB in any logical nodes. RCB are searched only in the path used during configuration.	
Rp2	1,2	Which dynamic RCB attributes are/can be configured by the client	RptID	Y
			DataSet	N
			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)	BRCB indexed	Y
			BRCB not indexed	Y
			URCB indexed	Y
			UCB 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

ID	Ed	Description	Value / Clarification	
Rp5	1,2	The minimum required optional fields are	sequence-number	N
			report-time-stamp	N
			reason-for-inclusion	N
			data-set-name	N
			data-reference	N
			buffer-overflow	N
			entryID	Y for BRCB
			confRev	N
Rp6	1,2	Does the client support segmented reports	Y	
Rp7	1	Does the client support pre-assigned RCB	Y	
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 a previously used URCB is reserved by another client for: • Indexed URCB with max>1 configured in SCL (static reporting) • Indexed URCB with max=1 configured in SCL (static reporting) • URCB not configured in SCL (dynamic reporting	Client will search for a free URCB and configure it in case 1. For case 2, only one index of URCB has been configured, so client doesn't try the other one. Case 3 is not managed because it concerns dynamic reporting.	

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ID	Ed		Description	Value / Clarification
Rp10	1,2		Describe how the client does respond when a previously used BRCB is reserved by another client for: • Indexed BRCB with max>1 configured in SCL (static reporting) • Indexed BRCB with max=1 configured in SCL (static reporting) • BRCB not configured in SCL (dynamic reporting	Same behavior as URCB.
Rp11	1,2		Describe how the client does respond on a SetBRCBValues(EntryID) respond-	According to the Reporting guideline for client systems the client will send a GI
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	According to the Reporting guideline for client systems the client will verify the dataset name and elements or confrev
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?	Check ConfRev Y Check dataset members Y
Rp14	1,2		Describe how to force the client to change the RCB buffer time	When Client is configured to use a different buffer time than
Rp15	1,2		Does client set server TrgOps.GI prior to first issuance of GI command?	Y
Rp16		1,2	Describe how to force the client to send the GI request	GI is done each time than report control block is enabled..
Rp17		1,2	Describe how to force the client to enable a RCB	When client is configured to use a report, it enables it.

ID	Ed	Description	Value / Clarification
Rp18	1,2	Describe how the client does respond when a report control block is renamed or deleted - Does it prevent reading the deleted RCB - If it reads the missing RCB, how does it handle the GetURCBValues or GetBRCBValues response-	Client reads the missing RCB, logs an error when it receives the negative response, and it doesn't use this RCB.
Rp19	1,2	Describe how the client behaves in case of: - SetURCBValues response- - Unsupported optional fields - Unsupported trigger condition(s)	A log is done by communication stack and RCB is not used.
Rp20	1,2	Describe how the client behaves in case of: - Buffer overflow	A log is done by communication stack.
Rp21	1,2	Describe how to force the client to send SetBRCBValues request for - EntryID - PurgeBuf	EntryID is set to resynchronize after a disconnection with the server. PurgeBuf is done when resynchronization ends.
Rp22	1,2	Does the client support writing ResvTms?	Y
Rp23	1,2	Does the client support reading Owner?	Y
		rptId of all reports used by client must be unique to identify it.	

7 PIXIT FOR GOOSE CONTROL BLOCK MODEL

ID	Ed	Description	Value / Clarification
		When publisher handles a server, GOOSE control block of subscribed GOOSE are checked regarding ConfRev, data set entries. If there is a mismatch, subscription to GoCB is not done.	

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	Y
Ctl4	1,2	Can the client set the test flag?	Y
Ctl5	1,2	What check conditions can be set	Y synchrocheck Y interlock-check
Ctl6	1,2	Which originator categories are supported and what is the originator identification?	All orCat are supported and not checked by Client. orIdent is configurable.
Ctl7	1,2	Describe if and how the client sets/increments the ctlNum	It is incremented each time a new sequence control is done.
Ctl8	1,2	What does the client when it receives a LastApplicationError and describe how to view the additional cause?	An event is generated with the information.
Ctl9	1,2	What does the client when its receives a Select, SelectWithValue or Operate respond negative?	An event is generated with the information control is aborted.
Ctl10	1,2	Can the client change the control model via online services?	Client never changes the control model via online services.
Ctl11	1	What does the client when the ctlModel is not initialized in the SCL?	ctlModel in the SCL is checked and control is not done.

ID	Ed	Description	Value / Clarification
Ctl12	1,2	What does the client when the ctlModel in SCD and in SERVER SIMULATOR is different?	ctlModel is not checked in Server and control is done.
Ctl13	1,2	Describe how to view a - CommandTermination request+ - CommandTermination request- - TimeActivatedOperateTermination request+ and request-	An event is generated with the information.

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	View: log is done by application. Expose: for example in Operate request.
Tm2	1,2	What time quality bits are supported?	Y LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
Tm3	1,2	What is the behavior when the time synchronization signal/messages are lost	ClockNotSynchronized bit is set.
Tm4	1,2	When is the quality bit "Clock failure" set?	never set
Tm5	1	When is the quality bit "Clock not synchronized" set?	connection to time master is lost

REVISION HISTORY

Version	Date	Author	Remarks
1.0	16122016	Christophe.Camélis	Initial version for pre-test
1.1	11062017	Christophe.Camélis	Update for C264 client final conformance test
A1.2	12062017	Christophe.Camélis	Add a comment for As6 regarding time for first association