Protocol Implementation Conformance Extra Information for Testing

PIXIT for Server Test Procedures for Edition 2

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Table of Contents

1   INTRODUCTION

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in C264 with firmware system version DS Agile V7.

Together with the PICS and the MICS the PIXIT forms the basis for a conformance test according to IEC 61850-10. The PIXIT entries contain information which is not available in the PICS, MICS, TICS documents or SCL file.

Each table specifies the PIXIT for applicable ACSI service model as structured in IEC 61850-10. The "Ed" column indicates if the entry is applicable for IEC 61850 Edition 1 and/or Edition 2.

2   PIXIT FOR ASSOCIATION MODEL

ID	Ed	Description	Value / Clarification	
As1	1	Maximum number of clients that can set-up an association simultaneously	Depend on configuration, up to 20 for C264	
As2	1,2	TCP_KEEPALIVE value.	15 seconds	
As3	1,2	Lost connection detection time	Maximum detection time of 35 seconds	
As4	-	Authentication is not supported yet		
As5	1,2	What association parameters are necessary for successful association	Transport selector	Y
			Session selector	Y
			Presentation selector	Y
			AP Title	N
			AE Qualifier	N
As6	1,2	If association parameters are necessary for association, describe the correct values e.g.	Transport selector	0001
			Session selector	0001
			Presentation selector	00000001
			AP Title	any
			AE Qualifier	any
As7	1,2	What is the maximum and minimum MMS PDU size	Max MMS PDU size	65 535 Bytes
			Min MMS PDU size	512 Bytes
As8	1,2	What is the maximum start up time after a power supply interrupt	160 seconds	
As9	1,2	Does this device function only as test equipment?	No	

3   PIXIT FOR SERVER MODEL

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

ID	Ed	Description	Value / Clarification	
			Y Oscillatory	
			Y Failure	
			Y OldData	
			Y Inconsistent	
			N Inaccurate	
			Source:	
			Y Process	
			Y Substituted	
			Y Test	
			N OperatorBlocked	
Sr3	-	What is the maximum number of data object references in one GetDataValues request	Deprecated	
Sr4	-	What is the maximum number of data object references in one SetDataValues request	Deprecated	
Sr5	1	Which Mode values are supported	On	Y
			[On-]Blocked	Y
			Test	Y
			Test/Blocked	Y
			Off	Y

4   PIXIT FOR 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)	1000
Ds2	1	How many persistent data sets can be created by one or more clients	No data sets can be created by client
Ds3	1	How many non-persistent data sets can be created by one or more clients	No data sets can be created by client

5   PIXIT FOR SUBSTITUTION MODEL

ID	Ed	Description	Value / Clarification
Sb1	1	Are substituted values stored in volatile memory	N

6 PIXIT FOR REPORTING MODEL

ID	Ed	Description	Value / Clarification
Rp1	1	The supported trigger conditions are	integrity Y data change Y quality change Y data update Y (event can never happen) general interrogation Y
Rp2	1	The supported optional fields are	sequence-number Y report-time-stamp Y reason-for-inclusion Y data-set-name Y data-reference Y buffer-overflow Y entryID Y conf-rev Y segmentation Y
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	Send report immediately
Rp5	1	Multi client URCB approach	Each URCB is visible to all clients (indexed reports)
Rp6	-	What is the format of EntryID	Deprecated
Rp7	1,2	What is the buffer size for each BRCB or how many reports can be buffered	1 000 events
Rp8	-	Pre-configured RCB attributes that are dynamic, compare SCL report settings	Deprecated

ID	Ed	Description	Value / Clarification
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 ms Fixed
Rp11	1	Does the device support to pre-assign a RCB to a specific client in the SCL	Y
Rp12	2	After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart	Restored from original configuration
		Pre-assigned RCB are reserved for exclusive use of one client	Client is identified by communication parameters (IP address, AP-Title and AE-Qualifier)

7 PIXIT FOR GOOSE PUBLISH MODEL

ID	Ed	Description	Value / Clarification
Gp1	1,2	Can the test (Ed1) / simulation (Ed2) flag in the published GOOSE be set	N
Gp2	1	What is the behaviour when the GOOSE publish configuration is incorrect	NdsCom=T DUT keeps GoEna=F
Gp3	1,2	Published FCD supported common data classes are	SPS, ENS, INS, BCR, SPC, DPC, BSC, INC, ENC, APC, MV, CMV Arrays are not supported
Gp4	1,2	What is the slow retransmission time Is it fixed or configurable	60 s Configured by SCL
Gp5	1,2	What is the fastest retransmission time Is it fixed or configurable	10 ms Configured by SCL
Gp6	-	Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)	Deprecated
Gp7	1,2	What is the initial GOOSE sqNum after restart	sqNum = 0 when IED starts and sqNum = 1 after transition of GoEna to true.
Gp8	1	May the GOOSE data set contain: - structured data objects (FCD) - timestamp data attributes	 Y Y

8   PIXIT FOR 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?	N destination MAC address Y APPID Y gocbRef Y timeAllowedtoLive Y datSet Y goID N t Y stNum Y sqNum Y simulation / test Y confRev Y ndsCom Y numDatSetEntries
Gs2	1,2	When is a subscribed GOOSE marked as lost (TAL = time allowed to live value from the last received GOOSE message)	message does not arrive prior to TAL

ID	Ed	Description	Value / Clarification
Gs3	1,2	What is the behaviour when one or more subscribed GOOSE messages isn't received or syntactically incorrect (missing GOOSE)	When TAL occurs (no valid GOOSE received from last accepted GOOSE), all associated data inputs linked to data entries of the GOOSE switch with quality = questionable and detail quality = old data. Depending on client application, questionable could be considered as quality invalid and value reset. When application is acting as a pure proxy, quality questionable is kept. As soon as a new valid GOOSE message is received, data value is reprocessed normally and quality is updated.
Gs4	1,2	What is the behaviour when a subscribed GOOSE message is out-of-order	There is no check of the sequence order of the GOOSE message received. GOOSE is ignored if sqNum is not greater than the previous one.
Gs5	1,2	What is the behaviour when a subscribed GOOSE message is duplicated	Duplicated GOOSE is ignored because sqNum is not greater than the previous one.
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 (FCD) - timestamp data attributes	 Y Y
Gs8	1,2	Subscribed FCD supported common data classes are	SPS, DPS, ENS, INS, BCR, SPC, DPC, BSC, INC, ENC, APC, MV, CMV, ACT, ACD Arrays are not supported

ID	Ed	Description	Value / Clarification
Gs9	1,2	Are subscribed GOOSE with test=T (Ed1) / simulation=T (Ed2) accepted in test/simulation mode	N (simulation mode is not managed)
Gs10	1,2	Max number of dataset members	100

9   PIXIT FOR CONTROL MODEL

ID	Ed	Description	Value / Clarification
Ct1	1	What control models are supported	DOns: Y SBOns: N DOes: Y SBOes: Y
Ct2	1,2	Is the control model fixed, configurable and/or dynamic	Configurable (with DS Agile Configurator)
Ct3	-	Is TimeActivatedOperate supported	N, deprecated
Ct4	1,2	Is "operate-many" supported	Y
Ct5	1	Will the DUT activate the control output when the test attribute is set in the SelectWithValue and/or Operate request	Y, if IED is in test.
Ct6	-	What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request	Deprecated
Ct7	-	Is pulse configuration supported	Deprecated
Ct8	1	What is the behaviour of the DUT when the check conditions are set	Y synchrocheck Y interlock-check DUT uses the check value to perform the check.
		Is this behaviour fixed, configurable, online changeable	Fixed

ID	Ed	Description	Value / Clarification
Ct9	1,2	Which additional cause diagnosis are supported	Y Unknown Y Not-supported Y Blocked-by-switching-hierarchy N Select-failed Y Invalid-position Y Position-reached N Parameter-change-in-execution Y Step-limit Y Blocked-by-Mode N 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 Y Ended-with-overshoot Y Abortion-due-to-deviation Y Abortion-by-communication-loss N Blocked-by-command Y None Y Inconsistent-parameters Y Locked-by-other-client
Ct10	1,2	How to force a "test-not-ok" respond with SelectWithValue request	SelectWithValue request when control is already selected for example.

ID	Ed	Description	Value / Clarification
Ct11	1,2	How to force a "test-not-ok" respond with Select request	SBOns not supported
Ct12	1,2	How to force a "test-not-ok" respond with Operate request	Operate request with orCat 0 or 9 for example
Ct13	1,2	Which origin categories are supported / accepted	Y bay-control Y station-control Y remote-control Y automatic-bay Y automatic-station Y automatic-remote Y maintenance Y process
Ct14	1,2	What happens if the orCat value is not supported or invalid	Negative response with AddCause "Not-supported". Only orCat from 1 to 8 are supported.
Ct15	1,2	Does the IED accept a SelectWithValue / Operate with the same control value as the current status value Is this behaviour configurable	DOns: Y (there is no feedback status) SBOns: N/A DOes: N SBOes: N Configurable Y
Ct16	1	Does the IED accept a select/operate on the same control object from 2 different clients at the same time	DOns: Y/N (default Y) SBOns: Y/N (default N) DOes: Y/N (default Y) SBOes: Y/N (default N)
Ct17	1	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (Tissue #334)	SBOns: N/A SBOes: Y

ID	Ed	Description	Value / Clarification
Ct18	1,2	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step	SelectWithValue and Operate
Ct19	-	Can a control operation be blocked by Mod=Off or [On-]Blocked	Deprecated
Ct20	1,2	Does the IED support local / remote operation	Y
Ct21	1,2	Does the IED send an InformationReport with LastApplError as part of the Operate response- for control with normal security	SBOns: N/A DOns: Y
Ct22	2	How to force a "parameter-change-in-execution"	SBOns: SBOes:
Ct23	1,2	How many SBOns/SBOes control objects be selected at the same time?	SBOns: N/A SBOes: n = "N/A" or "1" or "multiple"
Ct24	1,2	Does the DUT support any operate timeout > 0	N
Ct25	1,2	When CDC=DPC is supported, is it possible to have DPC (Controllable Double Point) go to the intermediate state? (00)	Y

10 PIXIT FOR TIME SYNCHRONISATION MODEL

ID	Ed	Description	Value / Clarification
Tm1	1	What time quality bits are supported	N LeapSecondsKnown N ClockFailure Y ClockNotSynchronized
Tm2	1,2	Describe the behaviour when the time server(s) ceases to respond What is the time server lost detection time	Quality bit ClockNotSynchronized is set. From 180 to 240 seconds
Tm3	1,2	How long does it take to take over the new time from time server	From 30 to 96 seconds
Tm4	1,2	When is the time quality bit "ClockFailure" set	Never set
Tm5	1,2	When is the time quality bit "Clock not Synchronized" set	When connection to all time servers is lost
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	Y
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 N RX/TX timestamp fields are checked for reasonableness Y SNTP version 3 and/or 4 N other (describe)
Tm9	1,2	Do the COMTRADE files have local time or UTC time and is this configurable	Local N Configurable

11 PIXIT FOR 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	Flat file system with pseudo folders /LD/<IED+LD>/COMTRADE Not zipped
Ft2	1,2	Directory names are separated from the file name by	"/"
Ft3	1	The maximum file name size including path (recommended 64 chars)	255 chars (83 chars for disturbance record)
Ft4	1,2	Are directory/file name case sensitive	Case sensitive
Ft5	1,2	Maximum file size for SetFile	SetFile not managed yet
Ft6	1	Is the requested file path included in the MMS fileDirectory respond file name	Y
Ft7	1	Is the wild char supported MMS fileDirectory request	Yes, wild card = *
Ft8	1,2	Is it allowed that 2 clients get a file at the same time	Y same file Y different files

REVISION HISTORY

Version	Date	Author	Remarks
1.0	17102016	Christophe.Camélis	Initial version for final conformance test