Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in AQ-F215

UCA International Users Group
Testing Sub Committee

PIXIT template extracted from server test procedures version 2.3 and updated according to TPCL version 1.7

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Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in AQ-F215 with firmware version v1.0.3.

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

Contents of this document

Each chapter specifies the PIXIT for each applicable ACSI service model as structured in IEC 61850-10.

PIXIT for Association model

ID	Description	Value / Clarification
As1	Maximum number of clients that can set-up an association simultaneously	4
As2	TCP_KEEPALIVE value	10 seconds
As3	Lost connection detection time	20 seconds
As4	Is authentication supported	N
As5	What association parameters are necessary for successful association	Transport selector Y Session selector Y Presentation selector Y AP Title N AE Qualifier N
As6	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	What is the maximum and minimum MMS PDU size	Max MMS PDU size 65000bytes Min MMS PDU size 2 bytes
As8	What is the maximum start up time after a power supply interrupt	120 seconds
	<additional items>	

PIXIT for Server model

ID	Description	Value / Clarification
Sr1	Which analogue value (MX) quality bits are supported (can be set by server)	Validity: Y Good, Y Invalid, N Reserved, N Questionable N Overflow N OutofRange N BadReference N Oscillatory Y Failure N OldData N Inconsistent N Inaccurate Source: Y Process Y Substituted N Test N OperatorBlocked
Sr2	Which status value (ST) quality bits are supported (can be set by server)	Validity: Y Good, Y Invalid, N Reserved, N Questionable N BadReference N Oscillatory Y Failure N OldData N Inconsistent N Inaccurate Source: Y Process Y Substituted N Test N OperatorBlocked
Sr3	What is the maximum number of data values in one GetDataValues request	100
Sr4	What is the maximum number of data values in one SetDataValues request	100
Sr5	Which Mode / Behaviour values are supported	On Y Blocked N Test N Test/Blocked N Off N
	Alternate access supported	N

PIXIT for Data set model

ID	Description	Value / Clarification
Ds1	What is the maximum number of data elements in one data set (compare ICD setting)	250 data attributes
Ds2	How many persistent data sets can be created by one or more clients (this number includes predefined datasets)	Not supported service
Ds3	How many non-persistent data sets can be created by one or more clients	Not supported service
	<additional items>	

PIXIT for Substitution model

ID	Description	Value / Clarification
Sb1	Are substituted values stored in volatile memory?	Not supported service
	<additional items>	

PIXIT for Setting group control model

ID	Description	Value / Clarification
Sg1	What is the number of supported setting groups for each logical device (compare NumSG in the SGCB)	Not supported service
Sg2	What is the effect of when and how the non-volatile storage is updated (compare IEC 61850-8-1 $16.2.4)	Not supported service
Sg3	Can multiple clients edit the same setting group	Not supported service
Sg4	What happens if the association is lost while editing a setting group	Not supported service
Sg5	Is EditSG value 0 allowed?	Not supported service
	<additional items>	

PIXIT for Reporting model

ID	Description	Value / Clarification	
Rp1	The supported trigger conditions are (compare PICS)	integrity data change quality change data update general interrogation	Y Y Y Y Y
Rp2	The supported optional fields are	sequence-number report-time-stamp reason-for-inclusion data-set-name data-reference buffer-overflow entryID conf-rev segmentation	Y Y Y Y Y Y Y Y N

ID	Description	Value / Clarification
Rp3	Can the server send segmented reports	N
Rp4	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 immediately
Rp5	Multi client URCB approach (compare IEC 61850-7-2 $14.2.1)	Each URCB is visible to all clients
~~Rp6~~	(unused), was “What is the format of EntryID”	
Rp7	What is the buffer size for each BRCB or how many reports can be buffered	25000 bytes per report control block. ~100 single event reports.
Rp8	Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	None
Rp9	May the reported data set contain: - structured data objects? - data attributes?	 Y Y
Rp10	What is the scan cycle for binary events? Is this fixed, configurable	5 Mseconds Fixed
Rp11	Does the device support to pre-assign a RCB to a specific client in the SCL	N
	<additional items>	

PIXIT for Logging model

ID	Description	Value / Clarification
Lg1	What is the default value of LogEna (Compare IEC 61850-8-1 $17.3.3.2.1, the default value should be FALSE)	Not supported service
Lg2	What is the format of EntryID (Compare IEC 61850-8-1 $17.3.3.3.1)	Not supported service
Lg3	If there are multiple Log Control Blocks that specify the Journaling of the same MMS NamedVariable and TrgOps and the Event Condition (Compare IEC 61850-8-1 $17.3.3.3.2)	Not supported service
Lg4	Pre-configured LCB attributes that cannot be changed online	Not supported service
	<additional items>	

PIXIT for Generic substation events model

ID	Description	Value / Clarification
Go1	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	Not supported service
Go2	Can the test flag in the published GOOSE be turned on / off	Not supported service
Go3	Does the DUT accept a configuration with a Goose control block with empty data set or too large data set?	Not supported service
Go3	What is the behaviour when the GOOSE publish configuration is incorrect	Not supported service
Go4	When is a subscribed GOOSE marked as lost? (TAL = time allowed to live value from the last received GOOSE message)	Not supported service
Go5	What is the behaviour when one or more subscribed GOOSE messages isn't received or syntactically incorrect (missing GOOSE)	Not supported service
Go6	What is the behaviour when a subscribed GOOSE message is out-of-order	Not supported service
Go7	What is the behaviour when a subscribed GOOSE message is duplicated	Not supported service
Go8	Does the device subscribe to GOOSE messages with/without the VLAN tag?	Not supported service

ID	Description	Value / Clarification
Go9Not supported service	May the GOOSE data set contain: - structured data objects (FCD)? - timestamp data attributes? Note: data attributes (FCDA) is mandatory	Not supported service
Go10	Published FCD supported common data classes / data types are	Not supported service
Go11	Subscribed FCD supported common data classes / data types are	Not supported service
Go12	What is the slow retransmission time? Is it fixed or configurable?	Not supported service
Go13	What is the minimum supported retransmission time? What is the maximum supported retransmission time? Is it fixed or configurable?	Not supported service
Go14	Can the Goose publish be turned on / off by using SetGoCBValues(GoEna)	Not supported service
	<additional items>	

TAL = Time Allowed to Live

PIXIT for GOOSE performance

ID	Description		Value / Clarification
Gp1	Performance class		P1 or P2/P3
Gp2	GOOSE ping-pong processing method		Event driven based or Scan cycle based
Gp3	Application logic scan cycle(ms)	Max.	Boolean 103 ms / DP 200ms
		Min.	Boolean 0 ms / DP 0 ms
Gp4	Maximum number of data attributes in GOOSE dataset (value and quality has to be counted as separate attributes)		16
Gp5	Maximum number of GOOSE to be published		5
Gp6	Maximum number of GOOSE to be subscribed		50
Gp7	Data types in GOOSE dataset for published GOOSEs According to 7-2 Table 2		Boolean / Double Point / Int. 64
Gp8	Data types in GOOSE dataset for subscribed GOOSEs According to 7-2 Table 2		Boolean / Double Point / Int. 64

PIXIT for Control model

ID	Description	Value / Clarification
Ct1	What control models are supported (compare PICS)	Y status-only Y direct-with-normal-security N sbo-with-normal-security N direct-with-enhanced-security N sbo-with-enhanced-security
Ct2	Is the control model fixed, configurable and/or online changeable?	Fixed
Ct3	Is TimeActivatedOperate supported	N
Ct4	Is “operate-many” supported	N
Ct5	Will the DUT activate the control output when the test attribute is set in the SelectWithValue and/or Operate request (when N test procedure Ctl2 is applicable)	N
Ct6	What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request	DUT ignores the time value and execute the command as usual
Ct7	Is pulse configuration supported	N
Ct8	What is the behaviour of the DUT when the check conditions are set Is this behaviour fixed, configurable, online changeable?	N synchrocheck N interlock-check DUT ignores the check value and always perform the check Fixed
Ct9	What additional cause diagnosis are supported	Y Blocked-by-switching-hierarchy N Select-failed Y Invalid-position Y Position-reached Y Parameter-change-in-execution N Step-limit N Blocked-by-Mode N Blocked-by-process N Blocked-by-interlocking N Blocked-by-synchrocheck Y Command-already-in-execution N Blocked-by-health Y 1-of-n-control N Abortion-by-cancel Y Time-limit-over N Abortion-by-trip

ID	Description	Value / Clarification
Ct10	How to force a “test-not-ok” respond with SelectWithValue request?	Set Local/Remote switch to “Local”
Ct11	How to force a “test-not-ok” respond with Select request?	Set Local/Remote switch to “Local”
Ct12	How to force a “test-not-ok” respond with Operate request?	DOns: Set Local/Remote switch to “Local” SBOns: Set Local/Remote switch to “Local” DOes: Set Local/Remote switch to “Local” SBOes: Set Local/Remote switch to “Local”
Ct13	Which origin categories are supported?	Bay control Station control Remote control Automatic bay Automatic station Automatic remote Maintenance Process
Ct14	What happens if the orCat value is not supported?	DOns: Error SBOns: Error (Addcause=Not supported) DOes: Error (Addcause=Not supported) SBOes: Error (Addcause=Not supported)
Ct15	Does the IED accept a SelectWithValue/Operate with the same ctlVal as the current status value?	DOns: N SBOns: N DOes: N SBOes: N
Ct16	Does the IED accept a select/operate on the same control object from 2 different clients at the same time?	DOns: Y (default Y) SBOns: N (default N) DOes: N (default Y) SBOes: N (default N)

ID	Description	Value / Clarification
Ct17	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (tissue 334)	SBOns: N SBOes: N
Ct18	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 Blocked	N
Ct20	Does the IED support local / remote operation?	Y
Ct21	Does the IED send an InformationReport with LastApplError as part of the Operate response- for control with normal security?	SBOns: Y DOns: Y
	<additional items>	

PIXIT for Time and time synchronisation model

ID	Description	Value / Clarification
Tm1	What quality bits are supported (may be set by the IED)	Y LeapSecondsKnown Y ClockFailure N ClockNotSynchronized
Tm2	Describe the behaviour when the time synchronization signal/messages are lost	Use internal time
Tm3	When is the time quality bit "ClockFailure" set?	Upon HW clock chip failure
Tm4	When is the time quality bit "Clock not synchronised" set?	Not supported
Tm5	Is the timestamp of a binary event adjusted to the configured scan cycle?	Y
Tm6	Does the device support time zone and daylight saving?	Y
Tm7	Which attributes of the SNTP response packet are validated?	Y 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)
	<additional items>	

PIXIT for File transfer model

ID	Description	Value / Clarification
Ft1	What is structure of files and directories? Where are the COMTRADE files stored?	Not supported service

ID	Description	Value / Clarification
	Are comtrade files zipped and what files are included in each zip file?	
Ft2	Directory names are separated from the file name by	Not supported service
Ft3	The maximum file name size including path (recommended 64 chars)	Not supported service
Ft4	Are directory/file name case sensitive	Not supported service
Ft5	Maximum file size	Not supported service
Ft6	Is the requested file path included in the MMS fileDirectory respond file name?	Not supported service
Ft7	Is the wild char supported MMS fileDirectory request?	Not supported service
Ft8	Is it allowed that 2 clients get a file at the same time?	Not supported service
	<additional items>	

Instruction and comments on using this template

Comments

- This template is extracted from the PIXIT template the server conformance test procedures version 2.3 and updated according TPCL version 1.7
- Questions and comments can be e-mailed to: helpdesk@ucausersgroup.org

Instructions

- format of this document should be changed into your company format
- enter the applicable IED name and firmware version
- remove the non-applicable clauses
- remove the <additional items> row
- add new rows when/where applicable to describe additional functionality important for testing

Revision history

Revision	Remarks
1.0 March 2012	First version based on the server conformance test procedures version 2.3 and updated according TPCL version 1.5
November 9	Updated according TPCL 1.6: Go3
January 23, 2013	Included the PIXIT table for Goose Performance (copied from the GOOSE performance test procedures)
February 25, 2013	Updated according to TPCL 1.7, removed Rp6