Hadron Xtorm Series
IEC 61850
Device Profile Document

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altus

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DEVICE PROFILE REVISION HISTORY

Date	Revision	Reason for change	Edited by
11/02/2015	A	First edition.	Roque Eduardo Dapper
21/06/2016	B	Include some new Logical Nodes	Roque Eduardo Dapper

Summary

1 Model Implementation Conformance Statement

This model implementation conformance statement (MICS) is applicable for the IEC 61850 Server driver of Hadron Xtorm Series, and specifies the modelling extensions compared to IEC 61850 edition 1. The following section contains the list of implemented logical nodes.

1.1 List of Logical Nodes

The following table contains the list of logical nodes implemented in the device:

L: System Logical Nodes
LPHD (Physical device information)
LLN0 (Logical node zero)
P: Logical Nodes for protection functions
PDIF (Differential)
PDIR (Direction comparison)
PDIS (Distance)
PDOP (Directional overpower)
PDUP (Directional underpower)
PFRC (Rate of change of frequency)
PHAR (Harmonic restraint)
PHIZ (Ground detector)
PIOC (Instantaneous overcurrent)
PMRI (Motor restart inhibition)
PMSS (Motor starting time supervision)
POPF (Over power factor)
PPAM (Phase angle measuring)
PSCH (Protection scheme)
PSDE (Sensitive directional earthfault)
PTEF (Transient earth fault)
PTOC (Time overcurrent)
PTOF (Overfrequency)
PTOV (Overvoltage)
PTRC (Protection trip conditioning)
PTTR (Thermal overload)

PTUC (Undercurrent)
PTUF (Underfrequency)
PTUV (Undervoltage)
PUPF (Underpower factor)
PVOC (Voltage controlled time overcurrent)
PVPH (Volts per Hz)
PZSU (Zero speed or underspeed)
R: Logical nodes for protection related functions
RBRF (Breaker failure)
RDIR (Directional element)
RDRE (Disturbance recorder function)
RDRS (Disturbance record handling)
RFLO (Fault locator)
RPSB (Power swing detection/blocking)
RREC (Autoreclosing)
RSYN (Synchronism-check or synchronising)
C: Logical Nodes for control
CALH (Alarm handling)
CCGR (Cooling group control)
CILO (Interlocking)
CPOW (Point-on-wave switching)
CSWI (Switch controller)
G: Logical Nodes for generic references
GAPC (Generic automatic process control)
GGIO (Generic process I/O)
GSAL (Generic security application)
I: Logical Nodes for interfacing and archiving
IARC (Archiving)
IHMI (Human machine interface)
ITCI (Telecontrol interface)
ITMI (Telemonitoring interface)
A: Logical Nodes for automatic control

ANCR (Neutral current regulator)
ARCO (Reactive power control)
ATCC (Automatic tap changer controller)
AVCO (Voltage control)
M: Logical Nodes for metering and measurement
MDIF (Differential measurements)
MMTR (Metering)
MMXN (Non phase related Measurement)
MMXU (Measurement)
MSQI (Sequence and imbalance)
MSTA (Metering Statistics)
S: Logical Nodes for sensors and monitoring
SARC (Monitoring and diagnostics for arcs)
SIMG (Insulation medium supervision (gas))
SIML (Insulation medium supervision (liquid))
SLTC (Tap changer supervision)
SPDC (Monitoring and diagnostics for partial discharges)
SPTR (Power transformer supervision)
X: Logical Nodes for switchgear
XCBR (Circuit breaker)
XSWI (Switch)
T: Logical Nodes for instrument transformers
TCTR (Current transformer)
TVTR (Voltage transformer)
TPRS (Pressure sensor)
Y: Logical Nodes for power transformers
YEFN (Earth fault neutralizer (Petersen coil))
YLTC (Tap changer)
YPSH (Power shunt)
YPTR (Power transformer)
Z: Logical Nodes for further power system equipment
ZAXN (Auxiliary network)

ZBAT (Battery)
ZBSH (Bushing)
ZCAB (Power cable)
ZCAP (Capacitor bank)
ZCON (Converter)
ZGEN (Generator)
ZGIL (Gas insulated line)
ZLIN (Power overhead line)
ZMOT (Motor)
ZREA (Reactor)
ZRRC (Rotating reactive component)
ZSAR (Surge arrestor)
ZTCF (Thyristor controlled frequency converter)
ZTCR (Thyristor controlled reactive component)
K: Logical Nodes for further power system equipment
KFAN (Fan)
KFIL (Filter)
KPMP (Pump)
KVLV (Valve control)
F: Logical nodes for functional blocks
FXOT (Action at over threshold Name)
FXUT (Action at under threshold Name)
H: Hydropower specific logical nodes
HBRG (Turbine – generator shaft bearing)
HCON (Combinator)
HDAM (Hydropower dam)
HDLS (Dam leakage supervision)
HGPI (Gate position indicator)
HGTE (Dam Gate)
HITG (Intake Gate)
HJCL (Power plant joint control function)
HLKG (Leakage supervision)

HLVL (Dam water level indicator)
HMBR (Mechanical brake for the generator shaft)
HNDL (Needle control)
HNHD (Net head data)
HOTP (Dam overtopping protection)
HRES (Water reservoir)
HSEQ (Start/stop sequencer)
HSPD (Speed monitoring)
HUNT (Hydropower production unit)
HWCL (Water control function)

2 Protocol Implementation Conformance Statement

This protocol implementation conformance statement (PICS) is used to provide an overview and details about the IEC 61850 Server driver of Hadron Xtorm Series, and it is composed by the following ACSI conformance statements:

— ASCI basic conformance statement

— ACSI models conformance statement

— ACSI service conformance statement

These statements specify the communication features mapped to IEC 61850-8-1.

2.1 ASCI Basic Conformance Statement

The basic conformance statement is defined in Table A.1.

Table A.1 – Basic conformance statement

		Client/ Subscriber	Server/ Publisher	Value/ Comments
Client-Server roles				
B11	**Server** side (of TWO-PARTY-APPLICATION-ASSOCIATION)	—	Y	
B12	**Client** side of (TWO-PARTY-APPLICATION-ASSOCIATION)		—	
SCSMs supported				
B21	**SCSM**: IEC 6185-8-1 used	Y	Y	
B22	**SCSM**: IEC 6185-9-1 used			
B23	**SCSM**: IEC 6185-9-2 used			
B24	**SCSM**: other			
Generic substation event model (GSE)				
B31	**Publisher** side		Y	
B32	**Subscriber** side	Y		
Transmission of sampled value model (SVC)				
B41	**Publisher** side			
B42	**Subscriber** side			
– Y = supported N or empty = not supported				

2.2 ACSI Models Conformance Statement

The ACSI models conformance statement is defined in Table A.2.

Table A.2 – ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/Comments
If **Server or Client** side (B11/12) supported				
M1	**Logical device**		Y	
M2	**Logical node**		Y	
M3	**Data**		Y	
M4	**Data set**		Y	
M5	**Substitution**			
M6	**Setting group control**			
	Reporting			
M7	**Buffered report control**		Y	
M7-1	sequence-number		Y	
M7-2	report-time-stamp		Y	
M7-3	reason-for-inclusion		Y	
M7-4	data-set-name		Y	
M7-5	data-reference		Y	
M7-6	buffer-overflow		Y	
M7-7	entryID		Y	
M7-8	BufTm		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M8	**Unbuffered report control**		Y	
M8-1	sequence-number		Y	
M8-2	report-time-stamp		Y	
M8-3	reason-for-inclusion		Y	
M8-4	data-set-name		Y	
M8-5	data-reference		Y	
M8-6	BufTm		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
	Logging			
M9	**Log control**			
M9-1	IntgPd			
M10	**Log**			
M11	**Control**		Y	
If **GSE** (B31/32) is supported				
M12	**GOOSE**	Y	Y	
M13	**GSSE**			
If **SVC** (41/42) is supported				
M14	Multicast SVC			
M15	Unicast SVC			

		Client/ Subscriber	Server/ Publisher	Value/Comments
If **Server or Client** side (B11/12) supported				
M16	**Time**		Y	
M17	**File Transfer**			
Y = service is supported N or empty = service is not supported				

2.3 ACSI Service Conformance Statement

The ACSI service conformance statement is defined in Table A.3 (depending on the statements in Table A.1).

Table A.3 – ACSI service Conformance statement

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
Server					
S1	GetServerDirectory	TP		Y	
Application association					
S2	Associate			Y	
S3	Abort			Y	
S4	Release			Y	
Logical device					
S5	GetLogicalDeviceDirectory	TP		Y	
Logical node					
S6	GetLogicalNodeDirectory	TP		Y	
S7	GetAllDataValues	TP		Y	
Data					
S8	GetDataValues	TP		Y	
S9	SetDataValues	TP			
S10	GetDataDirectory	TP		Y	
S11	GetDataDefinition	TP		Y	
Data set					
S12	GetDataSetValues	TP		Y	
S13	SetDataSetValues	TP			
S14	CreateDataSet	TP		Y	
S15	DeleteDataSet	TP		Y	
S16	GetDataSetDirectory	TP		Y	
Substitution					
S17	SetDataValues	TP			
Setting group control					
S18	SelectActiveSG	TP			
S19	SelectEditSG	TP			
S20	SetSGValues	TP			
S21	ConfirmEditSGValues	TP			
S22	GetSGValues	TP			

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S23	GetSGCBValues	TP			
Reporting					
Buffered report control block (BRCB)					
S24	Report	TP		Y	
S24-1	data-change (dchg)			Y	
S24-2	quality-change (qchg)			Y	
S24-3	data-update (dupd)				
S25	GetBRCBValues	TP		Y	
S26	SetBRCBValues	TP		Y	
Unbuffered report control block (URCB)					
S27	Report	TP		Y	
S27-1	data-change (dchg)			Y	
S27-2	quality-change (qchg)			Y	
S27-3	data-update (dupd)				
S28	GetURCBValues	TP		Y	
S29	SetURCBValues	TP		Y	
Logging					
Log control block					
S30	GetLCBValues	TP			
S31	SetLCBValues	TP			
Log					
S32	QueryLogByTime	TP			
S33	QueryLogAfter	TP			
S34	GetLogStatusValues	TP			
Generic substation event model (GSE)					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC		Y	
S36	GetGoReference	TP		Y	
S37	GetGOOSEElementNumber	TP		Y	
S38	GetGoCBValues	TP		Y	
S39	SetGoCBValues	TP		Y	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC			
S41	GetGsReference	TP			
S42	GetGSSEDataOffset	TP			
S43	GetGsCBValues	TP			
S44	SetGsCBValues	TP	Y/N		
Transmission of sampled value model (SVC)					
Multicast SVC					
S45	SendMSVMessage	MC			
S46	GetMSVCBValues	TP			
S47	SetMSVCBValues	TP			
Unicast SVC					
S48	SendUSVMessage	TP			
S49	GetUSVCBValues	TP			
S50	SetUSVCBValues	TP			
Control					
S51	Select			Y	

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S52	SelectWithValue	TP			
S53	Cancel	TP			
S54	Operate	TP		Y	
S55	CommandTermination	TP			
S56	TimeActivatedOperate	TP			
File transfer					
S57	GetFile	TP			
S58	SetFile	TP			
S59	DeleteFile	TP			
S60	GetFileAttributeValues	TP			
Time					
T1	Time resolution of internal clock			20	nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			T1	T0 (10ms) T1 (1ms) T2 (100µs) T3 (25µs) T4 (4µs) T5 (1µs)
T3	Supported TimeStamp resolution			20	nearest negative power of 2 in seconds
Y = service is supported N or empty = service is not supported					

3 Protocol Implementation Extra Information for Testing

This chapter specifies the protocol implementation extra information for testing (PIXIT) for the IEC 61850 Server driver of Hadron Xtorm Series. Together with the PICS and the MICS, the PIXIT forms the basis for a conformance test according to IEC 61850-10.

The following sections specify the PIXIT for each applicable ACSI service model as structured in IEC 61850-10.

3.1 PIXIT for Association Model

ID	Description	Value / Clarification
As1	Maximum number of clients that can set-up an association simultaneously	5
As2	TCP_KEEPALIVE value	20 seconds
As3	Lost connection detection time	60 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
As7	What is the maximum MMS PDU size	65000
As8	What is the maximum start up time after a power supply interrupt	25 seconds

3.2 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, Y Reserved, Y Questionable Y Overflow Y OutofRange Y BadReference Y Oscillatory Y Failure Y OldData

ID	Description	Value / Clarification
		Y　　　Inconsistent
		Y　　　Inaccurate
		Source:
		Y　　　Process
		Y　　　Substituted
		Y　　　Test
		Y　　　OperatorBlocked
Sr2	Which status value (ST) quality bits are supported (can be set by server)	Validity:
		Y　　　Good,
		Y　　　Invalid,
		Y　　　Reserved,
		Y　　　Questionable
		Y　　　BadReference
		Y　　　Oscillatory
		Y　　　Failure
		Y　　　OldData
		Y　　　Inconsistent
		Y　　　Inaccurate
		Source:
		Y　　　Process
		Y　　　Substituted
		Y　　　Test
		Y　　　OperatorBlocked
Sr3	What is the maximum number of data values in one GetDataValues request	1000
Sr4	What is the maximum number of data values in one SetDataValues request	1000
Sr5	Which Mode / Behaviour values are supported	On　　　　　　　Y
		Blocked　　　　　Y
		Test　　　　　　Y
		Test/Blocked　　Y
		Off　　　　　　　Y

3.3 PIXIT for Dataset Model

ID	Description	Value / Clarification
Ds1	What is the maximum number of data elements in one data set (compare ICD setting)	No fixed limit, it depends on the available memory.
Ds2	How many persistent data sets can be created by one or more clients	100
Ds3	How many non-persistent data sets can be created by one or more clients	10

3.4 PIXIT for Reporting Model

ID	Description	Value / Clarification	
Rp1	The supported trigger conditions are (compare PICS)	integrity	Y
		data change	Y
		quality change	Y
		data update	N
		general interrogation	Y
Rp2	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	N
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 one client only	
Rp6	What is the format of EntryID	Octect64	
Rp7	What is the buffer size for each BRCB or how many reports can be buffered	20000 bytes	
Rp8	Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	-	
Rp9	May the reported data set contain:		
	- structured data objects?	Y	
	- data attributes?	Y	
Rp10	What is the scan cycle for binary events? Is this fixed, configurable	Fixed 120 uS (IO Module detecting events, eg HX1120) Configurable 5 – 100 mS (if detecting events in the scan cycle)	
Rp11	Does the device support to pre-assign a RCB to a specific client in the SCL	N	

3.5 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	Y source MAC address N destination MAC address Y Ethertype = 0x88B8 Y APPID Y gocbRef N timeAllowedtoLive N datSet Y goID N t N stNum N sqNum N test N confRev N ndsCom Y numDatSetEntries
Go2	Can the test flag in the published GOOSE be turned on / off	N
Go3	Does the DUT accept a configuration with a GOOSE control block with empty data set or too large data set?	No, the GoCB need to be removed from the configuration
Go4	What is the behaviour when the GOOSE publish configuration is incorrect	DUT will send GOOSE with NdsCom=T
Go5	When is a subscribed GOOSE marked as lost? (TAL = time allowed to live value from the last received GOOSE message)	a) message does not arrive prior to TAL
Go6	What is the behaviour when one or more subscribed GOOSE messages isn't received or syntactically incorrect (missing GOOSE)	If GOOSE message is not received, timeout diagnostic is set and memory is kept with last value. If message is received incorrect, receive error diagnostic is set and memory is not updated and last value is kept.
Go7	What is the behaviour when a subscribed GOOSE message is out-of-order	Memory is not updated and last value is kept.
Go8	What is the behaviour when a subscribed GOOSE message is duplicated	Memory is not updated and last value is kept.
Go9	Does the device subscribe to GOOSE messages with/without the VLAN tag?	Y with the VLAN tag
Go10	May the GOOSE data set contain: - structured data objects (FCD)? - timestamp data attributes? Note: data attributes (FCDA) is mandatory	Subscribed Published Y Y Y Y

ID	Description	Value / Clarification
Go11	Published FCD supported common data classes / data types are	ACD BSC CMV CURVE DPC DPS SEQ MV CMV WYE
Go12	Subscribed FCD supported common data classes / data types are	ACD BSC CMV CURVE DPC DPS SEQ MV CMV WYE
Go13	What is the slow retransmission time? Is it fixed or configurable?	4294967295 ms with TAL = 4294967295 ms Configured by proprietary IED Configurator.
Go14	What is the minimum supported retransmission time? What is the maximum supported retransmission time? Is it fixed or configurable?	1 ms 4294967295 ms Configurable
Go15	Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)	Y

TAL = Time Allowed to Live

3.6 PIXIT for GOOSE Performance

ID	Description		Value / Clarification
Gp1	Performance class		P2/P3
Gp2	GOOSE ping-pong processing method		Scan cycle based
Gp3	Application logic scan cycle(ms)	Max.	100 ms (MainTask)
		Min.	1 ms (ProtTask)
Gp4	Maximum number of data attributes in GOOSE dataset (value and quality has to be counted as separate attributes)		300
Gp5	Maximum number of GOOSE to be published		100

ID	Description	Value / Clarification
Gp6	Maximum number of GOOSE to be subscribed	100
Gp7	Data types in GOOSE dataset for published GOOSEs According to 7-2 Table 2	BOOLEAN INT8 INT16 INT24 INT32 INT128 INT8U INT16U INT24U INT32U FLOAT32 FLOAT64 ENUMERATED CODED ENUM OCTET STRING VISIBLE STRING UNICODE STRING
Gp8	Data types in GOOSE dataset for subscribed GOOSEs According to 7-2 Table 2	BOOLEAN INT8 INT16 INT24 INT32 INT128 INT8U INT16U INT24U INT32U FLOAT32 FLOAT64 ENUMERATED CODED ENUM OCTET STRING VISIBLE STRING UNICODE STRING

3.7 PIXIT for Control Model

ID	Description	Value / Clarification
Ct1	What control models are supported (compare PICS)	Y status-only Y direct-with-normal-security Y sbo-with-normal-security N direct-with-enhanced-security N sbo-with-enhanced-security

ID	Description	Value / Clarification
Ct2	Is the control model fixed, configurable and/or online changeable?	Online changeable
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 (if blocked by the user)
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	Y
Ct8	What is the synchron of the DUT when the check conditions are set Is this synchron fixed, configurable, online changeable?	N synchrocheck N interlock-check Fixed
Ct9	What additional cause diagnosis are supported	NA
Ct10	How to force a "test-not-ok" respond with SelectWithValue request?	NA
Ct11	How to force a "test-not-ok" respond with Select request?	Select a data object which is selected by another client.
Ct12	How to force a "test-not-ok" respond with Operate request?	Operate a data object which is selected by another client.
Ct13	Which origin categories are supported?	All
Ct14	What happens if the orCat value is not supported?	All originator categories are supported by default.
Ct15	Does the IED accept a SelectWithValue/Operate with the same ctlVal as the current status value?	Dons: N SBOns: N Does: NA SBOes: NA
Ct16	Does the IED accept a select/operate on the same control object from 2 different clients at the same time?	Dons: N SBOns: N Does: N SBOes: N
Ct17	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (tissue 334)	SBOns: Y SBOes: NA
Ct18	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	NA
Ct19	Can a control operation be blocked by Mod=Off or Blocked	Y
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?	NA

3.8 PIXIT for Time and Time Synchronized On Model

ID	Description	Value / Clarification	
Tm1	What quality bits are supported (may be set by the IED)	Y LeapSecondsKnown N ClockFailure Y ClockNotSynchronized	
Tm2	Describe the synchron when the time synchronization signal/messages are lost	The IED sets ClockNotSynchronized	
Tm3	When is the time quality bit "ClockFailure" set?	NA	
Tm4	When is the time quality bit "Clock not synchronized" set?	The IED sets ClockNotSynchronized when there is a loss of SNTP or IRIG time synchronization	
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 Y Y N Y	Leap indicator not equal to 3? Mode is equal to SERVER OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp RX/TX timestamp fields are checked for reasonableness SNTP version 3 and/or 4

4 Tissues Conformance Statement

This Tissues conformance statement (TICS) is applicable for the IEC 61850 Server driver of Hadron Xtorm Series, and describes the Technical Issues that were implemented on this product.

During the October 2006 meeting IEC TC57 working group 10 decided that:

• Green Tissues with the category "IntOp" are mandatory for IEC 61850 edition 1

• Tissues with the category "Ed.2" Tissues should not be implemented.

Below table gives an overview of the IntOp Tissues and testing status.

Tissues 45, 46, 49, 190 and 278 are not mandatory, all other tissues in the table are mandatory if applicable.

Part 8-1	116	GetNameList with empty response?	IntOp	Yes
	165	Improper Error Response for GetDataSetValues	IntOp	Yes
	183	GetNameList error handling	IntOp	Yes
	235	Extension of Name length	IntOp	Yes
Part 7-4	None			
Part 7-3	28	Definition of APC	IntOp	Yes
	54	Point def xVal, not cVal	IntOp	Yes
	55	Ineut = Ires ?	IntOp	Appl
	60	Services missing in tables	IntOp	Yes
	63	mag in CDC CMV	IntOp	Appl
	65	Deadband calculation of a Vector and trigger option	IntOp	Appl
	219	operTm in ACT	IntOp	Yes
	270	WYE and DEL rms values	IntOp	Appl
Part 7-2	30	control parameter T	IntOp	Yes
	31	Typo	IntOp	Appl
	32	Typo in syntax	IntOp	Yes
	35	Typo Syntax Control time	IntOp	Yes
	36	Syntax parameter DSet-Ref missing	IntOp	Yes
	37	Syntax GOOSE "T" type	IntOp	Yes
	38	Syntax "AppID" or "GoID"	IntOp	Yes
	39	Add DstAddr to GoCB	IntOp	Yes
	40	GOOSE Message "AppID" to "GoID"	IntOp	Yes
	41	GsCB "AppID" to "GsID"	IntOp	Yes
	42	SV timestamp: "EntryTime" to "TimeStamp"	IntOp	Yes
	43	Control "T" semantic	IntOp	Yes
	44	AddCause - Object not sel	IntOp	Yes
	45(*)	Missing AddCauses	IntOp(*)	Yes
	46(*)	Synchro check cancel	IntOp(*)	Appl
	47	"." in LD Name?	IntOp	Yes
	49(*)	BRCB TimeOfEntry?	IntOp(*)	Yes
	50	LNName start with number?	IntOp	Yes
	51	ARRAY [0..num] missing	IntOp	Yes
	52**	Ambiguity GOOSE SqNum	IntOp	Yes
	53	Add DstAddr to GsCB, SV	IntOp	Yes
	151	Name constraint for control blocks etc.	IntOp	Yes
	166	DataRef attribute in Log	IntOp	Yes
	185	Logging - Integrity periode	IntOp	Yes
	189	SV Format	IntOp	N/A
	190(*)	BRCB: EntryId and TimeOfEntry	IntOp(*)	Yes
	191**	BRCB: Integrity and buffering reports	IntOp	Yes
	234**	New type CtxInt	IntOp	Ed2
	275**	Confusing statement on GI usage	IntOp	Yes
	278(*)	EntryId not valid for a server	IntOp(*)	Yes
Part 6	1	Syntax	IntOp	Yes
	5	tExtensionAttributeNameEnum is restricted	IntOp	Yes

8	SIUnit enumeration for W	IntOp	Yes
10	Base type for bitstring usage	IntOp	Yes
17	DAI/SDI elements syntax	IntOp	Yes
169	Ordering of enum differs from 7-3	IntOp	Yes

(*) = Tissue is not clarified in enough detail for testing

** = Tissue status is not green, but is clarified in enough detail for testing

Implementation notes:

     Yes – implemented in the library

     Appl – must be implemented in application (user) code

     N/A – doesn't apply (Sampled values not implemented)

     Ed2 – adds classes that are new in Edition 2