

IpConv Protocol Stack

Conformance Statement

**IEC 61850
Client**



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1 PICS

1.1 Notation

For the following Clause, the following definitions apply:

- m: mandatory support. The item shall be implemented.
- c: conditional support. The item shall be implemented if the stated condition exists.
- o: optional support. The implementation may decide to implement the item.
- x: excluded. The implementation shall not implement this item.
- i: out-of-scope. The implementation of the item is not within the scope of this standard.
- F/S: Functional Standard. Should be applied.
- Base: Shall be applied in any application claiming conformance to this standard.

1.2 Profile conformance

1.2.1 PICS for A-Profile support

A-Profile shortcut	Profile Description	Client		Server		Value/comment
		F/S		F/S		
A1	Client/server A-Profile	c1	<input checked="" type="checkbox"/>	c1		Refer to 8.2
A2	GOOSE/GSE management A-Profile	c2	<input checked="" type="checkbox"/>	c2		Refer to 8.3
A3	GSSE A-Profile	c3		c3		Refer to 8.4
A4	TimeSync A-Profile	c4	<input checked="" type="checkbox"/>	c4		Refer to 8.5
c1	Shall be 'm' if support for any service specified in Table 2 are declared within the ACSI basic conformance statement.					
c2	Shall be 'm' if support for any service specified in Table 8 are declared within the ACSI basic conformance statement.					
c3	Shall be 'm' if support for any service specified in Table 9 are declared within the ACSI basic conformance statement.					
c4	Support for at least one other A-Profile shall be declared (e.g. in A1-A3) in order to claim conformance to IEC 81850-8-1.					

1.2.2 PICS for T-Profile support

T-Profile	Profile Description	Client		Server		Value/Comment
		F/S		F/S		
T1	TCP/IP T-Profile	c1	<input checked="" type="checkbox"/>	c1		Refer to 8.2
T2	OSI T-Profile	c2		c2		Refer to 8.2
T3	GOOSE/GSE T-Profile	c3	<input checked="" type="checkbox"/>	c3		Refer to 8.3
T4	GSSE T-Profile	c4		c4		Refer to 8.4
T5	TimeSync T-Profile	o	<input checked="" type="checkbox"/>	o		Refer to 8.5

c1 Shall be 'm' if support for A1 is declared. Otherwise, shall be 'i'.

c2 Shall be 'o' if support for A1 is declared. Otherwise, shall be 'i'.

c3 Shall be 'm' if support for A2 is declared. Otherwise, shall be 'i'.

c4 Shall be 'm' if support for A3 is declared. Otherwise shall be 'i'.

1.3 PICS Statement

This Subclause describes the Protocol Implementation Conformation Statement Proforma (PICS). Every implementor shall complete the entire PICS. Refer to IEC 61850-7-2 ACSI basic conformance statement. The PICS, in the following Subclauses, shall also be completed.

1.4 Logical device

The following PICs represents the conformance requirements if support for the logical device model is declared within the ACSI basic conformance statement.

1.5 GOOSE conformance statement

	Subscriber	Publisher	Value/comment
GOOSE Services	c1	c1	
SendGOOSEMessage	m	m	<input checked="" type="checkbox"/>
GetGoReference	o	c3	
GetGOOSEElementNumber	o	c4	
GetGoCBValues	o	o	
SetGoCBValues	o	o	
GSENotSupported	c2	c5	
GOOSE Control Block (GoCB)	o	o	

c1 Shall be 'm' if support is declared within ACSI basic conformance statement.

c2 Shall be 'm' if ACSI basic conformance support for either GetGoReference or GetGOOSEElementNumber is declared.

c3 Shall be 'm' if support for ACSI basic conformance of GetGoReference is declared.

c4 Shall be 'm' if support for ACSI basic conformance of GetGOOSEElementNumber.

c5 Shall be 'm' if no support for ACSI basic conformance of GetGOOSEElementNumber is declared.

1.6 GSSE conformance statement

	Subscriber	Publisher	Value/comment
GSSE Services	c1	c1	
SendGSSEEMessage	m	m	
GetGsReference	o	c3	
GetGSSEDataOffset	o	c4	
GetGsCBValues	o	o	
SetGsCBValues	c	o	
GSENotSupported	c2	c5	
GSSE Control Block (GsCB)	o	o	

c1 Shall be 'm' if support is declared within ACSI basic conformance statement.

c2 Shall be 'm' if ACSI basic conformance support for either GetGsReference or GetGSSEDataOffset is declared.

c3 Shall be 'm' if support for ACSI basic conformance of GetGsReference is declared.

c4 Shall be 'm' if support for ACSI basic conformance of GetGSSEDataOffset.

c5 Shall be 'm' if no support for ACSI basic conformance of GetGSSEDataOffset is declared.

2 SCL Conformance

	SCL Conformance	Client-CR			Server-CR		
		Base	F/S	Value/range	Base	F/S	Value/range
SCL.1	SCL file for implementation available (offline)				m	m	
SCL.2	SCL file available from implementation (online)	o	o		o	O	
SCL.3	SCL implementation reconfiguration supported online	o	o		o	o	

3 ACSI

3.1 ACSI basic conformance statement

		Client/ subscriber	Server/ publisher	Value/ comments
Client-server roles				
B11	Server side (of TWO-PARTY- APPLICATION-ASSOCIATION)	–	c1	
B12	Client side of (TWO-PARTY- APPLICATION-ASSOCIATION)	c1	–	<input checked="" type="checkbox"/>
SCSMs supported				
B21	SCSM : IEC 61850-8-1 used			<input checked="" type="checkbox"/>
B22	SCSM : IEC 61850-9-1 used			
B23	SCSM : IEC 61850-9-2 used			
B24	SCSM : other			
Generic substation event model (GSE)				
B31	Publisher side	–	o	
B32	Subscriber side	o	–	<input checked="" type="checkbox"/>
Transmission of sampled value model (SVC)				
B41	Publisher side	–	o	
B42	Subscriber side	o	–	
c1 – shall be 'm' if support for LOGICAL-DEVICE model has been declared. o – Optional m – Mandatory				

3.2 ACSI models conformance statement

		Client/ subscriber	Server/ publisher	Value/ comments
If Server side (B11) supported				
M1	Logical device	c2	c2	<input checked="" type="checkbox"/>
M2	Logical node	c3	c3	<input checked="" type="checkbox"/>
M3	Data	c4	c4	<input checked="" type="checkbox"/>
M4	Data set	c5	c5	<input checked="" type="checkbox"/>
M5	Substitution	o	o	
M6	Setting group control	o	o	
	Reporting			<input checked="" type="checkbox"/>
M7	Buffered report control	o	o	<input checked="" type="checkbox"/>
M7-1	sequence-number			<input checked="" type="checkbox"/>
M7-2	report-time-stamp			<input checked="" type="checkbox"/>
M7-3	reason-for-inclusion			<input checked="" type="checkbox"/>
M7-4	data-set-name			<input checked="" type="checkbox"/>
M7-5	data-reference			<input checked="" type="checkbox"/>
M7-6	buffer-overflow			<input checked="" type="checkbox"/>
M7-7	entryID			<input checked="" type="checkbox"/>
M7-8	BufTm			<input checked="" type="checkbox"/>
M7-9	IntgPd			<input checked="" type="checkbox"/>
M7-10	GI			<input checked="" type="checkbox"/>
M8	Unbuffered report control	o	o	<input checked="" type="checkbox"/>
M8-1	sequence-number			<input checked="" type="checkbox"/>
M8-2	report-time-stamp			<input checked="" type="checkbox"/>
M8-3	reason-for-inclusion			<input checked="" type="checkbox"/>
M8-4	data-set-name			<input checked="" type="checkbox"/>
M8-5	data-reference			<input checked="" type="checkbox"/>
M8-6	BufTm			<input checked="" type="checkbox"/>
M8-7	IntgPd			<input checked="" type="checkbox"/>
M8-8	GI			<input checked="" type="checkbox"/>
	Logging	o	o	
M9	Log control	o	o	
M9-1	IntgPd			
M10	Log	o	o	
M11	Control	m	m	<input checked="" type="checkbox"/>
If GSE (B31/ B32) is supported				
	GOOSE	o	o	<input checked="" type="checkbox"/>
M12-1	entryID			
M12-2	DataRefInc			
M13	GSSE	o	o	

		Client/ subscriber	Server/ publisher	Value/ comments
If SVC (B41/B42) is supported				
M14	Multicast SVC	o	o	
M15	Unicast SVC	o	o	
M16	Time	m	m	<input checked="" type="checkbox"/> Time source with required accuracy shall be available
M17	File Transfer	o	o	<input checked="" type="checkbox"/>
<p>c2 – shall be 'm' if support for LOGICAL-NODE model has been declared.</p> <p>c3 – shall be 'm' if support for DATA model has been declared.</p> <p>c4 – shall be 'm' if support for DATA-SET, Substitution, Report, Log Control, or Time model has been declared.</p> <p>c5 – shall be 'm' if support for Report, GSE, or SV models has been declared.</p> <p>m – Mandatory</p>				

3.3 ACSI service conformance statement

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments
Server (Clause 6)					
S1	ServerDirectory	TP		m	
Application association (Clause 7)					
S2	Associate		m	m	<input checked="" type="checkbox"/>
S3	Abort		m	m	<input checked="" type="checkbox"/>
S4	Release		m	m	<input checked="" type="checkbox"/>
Logical device (Clause 8)					
S5	LogicalDeviceDirectory	TP	m	m	
Logical node (Clause 9)					
S6	LogicalNodeDirectory	TP	m	m	
S7	GetAllDataValues	TP	o	m	
Data (Clause 10)					
S8	GetDataValues	TP	m	m	<input checked="" type="checkbox"/>
S9	SetDataValues	TP	o	o	<input checked="" type="checkbox"/>
S10	GetDataDirectory	TP	o	m	
S11	GetDataDefinition	TP	o	m	
Data set (Clause 11)					
S12	GetDataSetValues	TP	o	m	
S13	SetDataSetValues	TP	o	o	
S14	CreateDataSet	TP	o	o	
S15	DeleteDataSet	TP	o	o	
S16	GetDataSetDirectory	TP	o	o	

Substitution (Clause 12)					
S17	SetDataValues	TP	m	m	

Setting group control (Clause 13)					
S18	SelectActiveSG	TP	o	o	
S19	SelectEditSG	TP	o	o	
S20	SetSGValues	TP	o	o	
S21	ConfirmEditSGValues	TP	o	o	
S22	GetSGValues	TP	o	o	
S23	GetSGCBValues	TP	o	o	

Reporting (Clause 14)					
Buffered report control block (BRCB)					
S24	Report	TP	c6	c6	<input checked="" type="checkbox"/>
S24-1	data-change (dchg)				<input checked="" type="checkbox"/>
S24-2	qchg-change (qchg)				<input checked="" type="checkbox"/>
S24-3	data-update (dupd)				<input checked="" type="checkbox"/>
S25	GetBRCBValues	TP	c6	c6	<input checked="" type="checkbox"/>
S26	SetBRCBValues	TP	c6	c6	<input checked="" type="checkbox"/>
Unbuffered report control block (URCB)					
S27	Report	TP	c6	c6	<input checked="" type="checkbox"/>
S27-1	data-change (dchg)				<input checked="" type="checkbox"/>
S27-2	qchg-change (qchg)				<input checked="" type="checkbox"/>
S27-3	data-update (dupd)				<input checked="" type="checkbox"/>
S28	GetURCBValues	TP	c6	c6	<input checked="" type="checkbox"/>
S29	SetURCBValues	TP	c6	c6	<input checked="" type="checkbox"/>
c6 – shall declare support for at least one (BRCB or URCB).					

Logging (Clause 14)					
Log control block					
S30	GetLCBValues	TP	m	m	
S31	SetLCBValues	TP	o	m	
Log					
S32	QueryLogByTime	TP	c7	m	
S33	QueryLogAfter	TP	c7	m	
S34	GetLogStatusValues	TP	m	m	
c7 – shall declare support for at least one (QueryLogByTime or QueryLogAfter).					

	Services	AA: TP/MC	Client/ subscriber	Server/ publisher	Comments
Generic substation event model (GSE) (14.3.5.3.4)					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	mc	c8	c8	<input checked="" type="checkbox"/>
S36	GetGoReference	TP	o	c9	
S37	GetGOOSEElementNumber	TP	o	c9	
S38	GetGoCBValues	TP	o	o	
S39	SetGoCBValues	TP	o	o	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	mc	c8	c8	
S41	GetGsReference	TP	o	c9	
S42	GetGSSEElementNumber	TP	o	c9	
S43	GetGsCBValues	TP	o	o	
S44	SetGsCBValues	TP	o	o	
c8 – shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage). c9 – shall declare support if TP association is available.					

Transmission of sampled value model (SVC) (Clause 16)					
Multicast SVC					
S45	SendMSVMessage	mc	c10	c10	
S46	GetMSVCBValues	TP	o	o	
S47	SetMSVCBValues	TP	o	o	
Unicast SVC					
S48	SendUSVMessage	TP	c10	c10	
S49	GetUSVCBValues	TP	o	o	
S50	SetUSVCBValues	TP	o	o	
c10 – shall declare support for at least one (SendMSVMessage or SendUSVMessage).					

Control (17.5.1)					
S51	Select		m	o	<input checked="" type="checkbox"/>
S52	SelectWithValue	TP	m	o	<input checked="" type="checkbox"/>
S53	Cancel	TP	o	o	<input checked="" type="checkbox"/>
S54	Operate	TP	m	m	<input checked="" type="checkbox"/>
S55	Command-Termination	TP	m	o	<input checked="" type="checkbox"/>
S56	TimeActivated-Operate	TP	o	o	

File transfer (Clause 20)					
S57	GetFile	TP	o	m	<input checked="" type="checkbox"/>
S58	SetFile	TP	o	o	
S59	DeleteFile	TP	o	o	<input checked="" type="checkbox"/>
S60	GetFileAttributeValues	TP	o	m	<input checked="" type="checkbox"/>

Services		AA: TP/MC	Client/ subscriber	Server/ publisher	Comments
Time (5.5)					
T1	Time resolution of internal clock			-10 (1ms)	Nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			-10 (1ms)	T1
T3	Supported TimeStamp resolution			-10 (1ms)	Nearest value of $2^{**}n$ in seconds

4 Logical Node conformance statement

Logical Node	Supported
Logical Nodes for management functions LN Group: L	
LN: Physical device information Name: LPHD	
LN: Logical node zero Name: LLN0	
Logical Nodes for protection functions LN Group: P	
LN: Differential Name: PDIF	
LN: Direction comparison Name: PDIR	
LN: Distance Name: PDIS	
LN: Directional overpower Name: PDOP	
LN: Directional underpower Name: PDUP	
LN: Rate of change of frequency Name: PFRC	
LN: Harmonic restraint Name: PHAR	
LN: Ground detector Name: PHIZ	
LN: Instantaneous overcurrent Name: PIOC	
LN: Motor restart inhibition Name: PMRI	
LN: Motor starting time supervision Name: PMSS	
LN: Over power factor Name: POPF	
LN: Phase angle measuring Name: PPAM	
LN: Protection scheme Name: PSCH	
LN: Sensitive directional earthfault Name: PSDE	
LN: Transient earth fault Name: PTEF	
LN: Time overcurrent Name: PTOC	
LN: Over frequency Name: PTOF	
LN: Overvoltage Name: PTOV	
LN: Protection trip conditioning Name: PTRC	
LN: Thermal overload Name: PTTR	
LN: Undercurrent Name: PTUC	
LN: Undervoltage Name: PTUV	
LN: Under power factor Name: PUPF	
LN: Under frequency Name: PTUF	
LN: Voltage controlled time overcurrent Name: PVOC	
LN: Volts per Hz Name: VVPH	
LN: Zero speed or underspeed Name: PZSU	
Logical Nodes for protection related functions LN Group: R	
LN: Disturbance recorder function Name: RDRE	
LN: Disturbance recorder channel analogue Name: RADR	
LN: Disturbance recorder channel binary Name: RBDR	
LN: Disturbance record handling Name: RDRS	
LN: Breaker failure Name: RBRF	
LN: Directional element Name: RDIR	
LN: Fault locator Name: RFLO	
LN: Power swing detection/blocking Name: RPSB	
LN: Autoreclosing Name: RREC	
LN: Synchronism-check or synchronising Name: RSYN	
Logical Nodes for control LN Group: C	

Logical Node	Supported
LN: Alarm handling Name: CALH	
LN: Cooling Group Control Name: CCGR	
LN: Interlocking Name: CILO	
LN: Point-on-wave switching Name: CPOW	
LN: Switch controller Name: CSWI	
Logical nodes for generic references LN Group: G	
LN: Generic automatic process control Name: GAPC	
LN: Generic process I/O Name: GGIO	
LN: Generic security application Name: GSAL	
Logical Nodes for interfacing and archiving LN Group: I	
LN: Archiving Name: IARC	
LN: Human machine interface Name: IHMI	
LN: Telecontrol interface Name: ITCI	
LN: Telemonitoring interface Name: ITMI	
Logical Nodes for automatic control LN Group: A	
LN: Neutral current regulator Name: ANCR	
LN: Reactive power control Name: ARCO	
LN: Automatic tap changer controller Name: ATCC	
LN: Voltage control Name: AVCO	
Logical Nodes for metering and measurement LN Group: M	
LN: Differential measurements Name: MDIF	
LN: Harmonics or interharmonics Name: MHAI	
LN: Non phase related harmonics or interharmonics Name: MHAN	
LN: Metering Name: MMTR	
LN: Non phase related Measurement Name: MMXN	
LN: Measurement Name: MMXU	
LN: Sequence & imbalance Name: MSQI	
LN: Metering Statistics Name: MSTA	
Logical Nodes for sensors and monitoring LN Group: S	
LN: Monitoring and diagnostics for arcs Name: SARC	
LN: Insulation medium supervision (gas) Name: SIMG	
LN: Insulation medium supervision (liquid) Name: SIML	
LN: Monitoring and diagnostics for partial discharges Name: SPDC	
Logical Nodes for switchgear LN Group: X	
LN: Circuit breaker Name: XCBR	
LN: Circuit switch Name: XSWI	
Logical Nodes for instrument transformers LN Group: T	
LN: Current transformer Name: TCTR	
LN: Voltage transformer Name: TVTR	
Logical Nodes for power transformers LN Group: Y	
LN: Earth fault neutralizer (Petersen coil) Name: YEFN	
LN: Tap changer Name: YLTC	
LN: Power shunt Name: YPSH	
LN: Power transformer Name: YPTR	
Logical Nodes for Further Power System Equipment LN Group: Z	

Logical Node	Supported
LN: Auxiliary network Name: ZAXN	
LN: Battery Name: ZBAT	
LN: Bushing Name: ZBSH	
LN: Power cable Name: ZCAB	
LN: Capacitor bank Name: ZCAP	
LN: Converter Name: ZCON	
LN: Generator Name: ZGEN	
LN: Gas insulated line Name: ZGIL	
LN: Power overhead line Name: ZLIN	
LN: Motor Name: ZMOT	
LN: Reactor Name: ZREA	
LN: Rotating reactive component Name: ZRRC	
LN: Surge arrestor Name: ZSAR	
LN: Thyristor controlled frequency converter Name: ZTCF	
LN: Thyristor controlled reactive component Name: ZTCR	

5 Common data class conformance statement

5.1 SPS: Single point status

SPS class						
Attribute name	Attribute type	FC	TrgOp	Value/value range	M/O/C	Supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>status</i>						
stVal	BOOLEAN	ST	dchg	FALSE TRUE	M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>Substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	BOOLEAN	SV		TRUE FALSE	PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.2 DPS: Double point status

DPS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>status</i>						
stVal	ENUMERATED	ST	dchg, dupd		M	
q	Quality	ST	qchg		M	
t	TimeStamp	ST			M	
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	CODED ENUM	SV		intermediate-state off on bad-state	PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.3 ENS: Enumerated status

ENS class						
Attribute name	Attribute type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>status</i>						
stVal	ENUMERATED	ST	dchg, dupd		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>substitution and blocked</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	ENUMERATED	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
blkEna	BOOLEAN	BL			O	
<i>configuration, description and extension</i>						
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.4 ACT: Protection activation information

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>status</i>						
general	BOOLEAN	ST	dchg		M	<input checked="" type="checkbox"/>
phsA	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
phsB	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
phsC	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
neut	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>configuration, description and extension</i>						
operTm	TimeStamp	CF			O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.5 ACD: Directional protection activation information

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>status</i>						
general	BOOLEAN	ST	dchg		M	<input checked="" type="checkbox"/>
dirGeneral	ENUMERATED	ST	dchg	unknown forward backward both	M	
phsA	BOOLEAN	ST	dchg		GC_2 (1)	<input checked="" type="checkbox"/>
dirPhsA	ENUMERATED	ST	dchg	unknown forward backward both	GC_2 (1)	
phsB	BOOLEAN	ST	dchg		GC_2 (2)	<input checked="" type="checkbox"/>
dirPhsB	ENUMERATED	ST	dchg	unknown forward backward both	GC_2 (2)	
phsC	BOOLEAN	ST	dchg		GC_2 (3)	<input checked="" type="checkbox"/>
dirPhsC	ENUMERATED	ST	dchg	unknown forward backward both	GC_2 (3)	
neut	BOOLEAN	ST	dchg		GC_2 (4)	<input checked="" type="checkbox"/>
dirNeut	ENUMERATED	ST	dchg	unknown forward backward both	GC_2 (4)	
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>configuration, description and extension</i>						
operTm	TimeStamp	CF			O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.6 INS: Integer status

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>status</i>						
stVal	INT32	ST	dchg		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	INT32	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.7 BCR: Binary counter reading

8						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>status</i>						
actVal	INT 64	ST	dchg		M	<input checked="" type="checkbox"/>
frVal	INT 64	ST	dupd		GC_2_1	<input checked="" type="checkbox"/>
frTm	TimeStamp	ST			GC_2_1	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>configuration, description and extension</i>						
units	Unit	CF	dchg	see Annex A	O	
pulsQty	FLOAT 32	CF	dchg		M	
frEna	BOOLEAN	CF	dchg		GC_2_1	
strTm	TimeStamp	CF	dchg		GC_2_1	
frPd	INT 32	CF	dchg		GC_2_1	
frRs	BOOLEAN	CF	dchg		GC_2_1	
d	VISIBLE STRING255	DC			O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.8 MV: Measured value

MV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>measured attributes</i>						
instMag	AnalogueValue	MX			O	<input checked="" type="checkbox"/>
mag	AnalogueValue	MX	dchg		M	<input checked="" type="checkbox"/>
range	ENUMERATED	MX	dchg	normal high low high-high low-low ...	O	
q	Quality	MX	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	MX			M	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subMag	AnalogueValue	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
units	Unit	CF		see Annex A	O	
db	INT32U	CF		0 ... 100 000	O	
zeroDb	INT32U	CF		0 ... 100 000	O	
sVC	ScaledValueConfig	CF			AC_SCAV	
rangeC	RangeConfig	CF			GC_CON	
smpRate	INT32U	CF			O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.9 CMV: Complex measured value

MV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>measured attributes</i>						
instCVal	Vector	MX			O	<input checked="" type="checkbox"/>
cVal	Vector	MX	dchg		M	<input checked="" type="checkbox"/>
range	ENUMERATED	MX	dchg	normal high low high-high low-low ...	O	
q	Quality	MX	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	MX			M	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subCVal	Vector	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
units	Unit	CF		see Annex A	O	
db	INT32U	CF		0 ... 100 000	O	
zeroDb	INT32U	CF		0 ... 100 000	O	
rangeC	RangeConfig	CF			GC_CON	
magSVC	ScaledValueConfig	CF			AC_SCAV	
angSVC	ScaledValueConfig	CF			AC_SCAV	
angRef	ENUMERATED	CF		V A other ...	O	
smpRate	INT32U	CF			O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.10 WYE: Phase to ground related measured values of a three phase system

MV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
Data						
phsA	CMV MX				GC_1	<input checked="" type="checkbox"/>
phsB	CMV MX				GC_1	<input checked="" type="checkbox"/>
phsC	CMV MX				GC_1	<input checked="" type="checkbox"/>
neut	CMV MX				GC_1	<input checked="" type="checkbox"/>
net	CMV MX				GC_1	<input checked="" type="checkbox"/>
res	CMV MX				GC_1	<input checked="" type="checkbox"/>
DataAttribute						
<i>configuration, description and extension</i>						
angRef	ENUMERATED	CF		Va Vb Vc Aa Ab Ac Vab Vbc Vca Vother Aother	O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.11 DEL: Phase to phase related measured values of a three phase system

MV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
Data						
phsAB	CMV MX				GC_1	<input checked="" type="checkbox"/>
phsBC	CMV MX				GC_1	<input checked="" type="checkbox"/>
phsCA	CMV MX				GC_1	<input checked="" type="checkbox"/>
DataAttribute						
<i>configuration, description and extension</i>						
angRef	ENUMERATED	CF		Va Vb Vc Aa Ab Ac Vab Vbc Vca Vother Aother	O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.12 SPC: Controllable single point

SPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>control and status</i>						
ctlVal	BOOLEAN	CO		off (FALSE) on (TRUE)	AC_CO_M	<input checked="" type="checkbox"/>
operTm	TimeStamp	CO			AC_CO_O	
origin	Originator	CO, ST			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	CO, ST		0..255	AC_CO_O	<input checked="" type="checkbox"/>
stVal	BOOLEAN	ST	dchg	FALSE TRUE	AC_ST	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		AC_ST	<input checked="" type="checkbox"/>
t	TimeStamp	ST			AC_ST	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		AC_CO_O	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	BOOLEAN	SV		FALSE TRUE	PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
pulseConfig	PulseConfig	CF			AC_CO_O	
ctlModel	CtlModels	CF			M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF			AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF			AC_CO_O	<input checked="" type="checkbox"/>
d	VISIBLE STRING255	DC		Text	O	<input checked="" type="checkbox"/>
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.13 DPC: Controllable double point

SPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>control and status</i>						
ctlVal	BOOLEAN	CO		off (FALSE) on (TRUE)	AC_CO_M	<input checked="" type="checkbox"/>
operTm	TimeStamp	CO			AC_CO_O	
origin	Originator	CO, ST			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	CO, ST		0..255	AC_CO_O	<input checked="" type="checkbox"/>
stVal	CODED ENUM	ST	dchg	intermediate-state off on bad-state	AC_ST	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		AC_ST	<input checked="" type="checkbox"/>
t	TimeStamp	ST			AC_ST	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		AC_CO_O	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	CODED ENUM	SV		intermediate-state off on bad-state	PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
pulseConfig	PulseConfig	CF			AC_CO_O	<input checked="" type="checkbox"/>
ctlModel	CtlModels	CF			M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF			AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF			AC_CO_O	<input checked="" type="checkbox"/>
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLND_M	
cdcName	VISIBLE STRING255	EX			AC_DLND_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.14 INC: Controllable integer status

SPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>control and status</i>						
ctlVal	INT32	CO			AC_CO_M	<input checked="" type="checkbox"/>
operTm	TimeStamp	CO			AC_CO_O	
origin	Originator	CO, ST			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	CO, ST		0..255	AC_CO_O	<input checked="" type="checkbox"/>
stVal	INT32	ST	dchg		AC_ST	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		AC_ST	<input checked="" type="checkbox"/>
t	TimeStamp	ST			AC_ST	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		AC_CO_O	<input checked="" type="checkbox"/>
<i>substitution</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	INT32	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
<i>configuration, description and extension</i>						
ctlModel	CtlModels	CF			M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF			AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF			AC_CO_O	<input checked="" type="checkbox"/>
minVal	INT32	CF			O	
maxVal	INT32	CF			O	
stepSize	INT32U	CF		1 ... (maxVal – minVal)	O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.15 ENC: Controllable enumerated status

ENC class						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>status and control mirror</i>						
origin	Originator	ST			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	ST		0..255	AC_CO_O	<input checked="" type="checkbox"/>
stVal	ENUMERATED	ST	dchg		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
opRcvd	BOOLEAN	OR	dchg		O	
opOk	BOOLEAN	OR	dchg		O	
tOpOk	TimeStamp	OR			O	
<i>substitution and blocked</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	ENUMERATED	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
blkEna	BOOLEAN	BL			O	
<i>configuration, description and extension</i>						
ctlModel	CtlModels	CF	dchg		M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
operTimeout	INT32U	CF	dchg		AC_CO_O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	
<i>parameters for control services</i>						
Service parameter name	Service parameter type	Value/value range				
ctlVal	ENUMERATED				<input checked="" type="checkbox"/>	

5.16 BSC: Binary controlled step position information

BSC class						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>status and control mirror</i>						
origin	Originator	ST			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	ST		0..255	AC_CO_O	<input checked="" type="checkbox"/>
valWTr	ValWithTrans	ST	dchg		AC ST	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		AC ST	<input checked="" type="checkbox"/>
t	TimeStamp	ST			AC ST	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
opRcvd	BOOLEAN	OR	dchg		O	
opOk	BOOLEAN	OR	dchg		O	
tOpOk	TimeStamp	OR			O	
<i>substitution and blocked</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	ValWithTrans	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
blkEna	BOOLEAN	BL			O	
<i>configuration, description and extension</i>						
persistent	BOOLEAN	CF	dchg		M	<input checked="" type="checkbox"/>
ctlModel	CtlModels	CF	dchg		M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
minVal	INT8	CF	dchg		O	
maxVal	INT8	CF	dchg		O	
operTimeout	INT32U	CF	dchg		AC_CO_O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLND_A_M	
cdcName	VISIBLE STRING255	EX			AC_DLND_A_M	
dataNs	VISIBLE STRING255	EX			AC_DLND_M	
<i>parameters for control services</i>						
Service parameter name		Service parameter type		Value/value range		
ctlVal		CODED ENUM		stop lower higher reserved		<input checked="" type="checkbox"/>

5.17 APC: Controllable analogue process value

APC class						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>measured attributes and control mirror</i>						
origin	Originator	MX			AC_CO_O	<input checked="" type="checkbox"/>
ctlNum	INT8U	MX		0..255	AC_CO_O	<input checked="" type="checkbox"/>
mxVal	AnalogueValue	MX	dchg		AC_ST	<input checked="" type="checkbox"/>
q	Quality	MX	qchg		AC_ST	<input checked="" type="checkbox"/>
t	TimeStamp	MX			AC_ST	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	MX	dchg		O	<input checked="" type="checkbox"/>
opRcvd	BOOLEAN	OR	dchg		O	
opOk	BOOLEAN	OR	dchg		O	
tOpOk	TimeStamp	OR			O	
<i>substitution and blocked</i>						
subEna	BOOLEAN	SV			PICS_SUBST	
subVal	AnalogueValue	SV			PICS_SUBST	
subQ	Quality	SV			PICS_SUBST	
subID	VISIBLE STRING64	SV			PICS_SUBST	
blkEna	BOOLEAN	BL			O	
<i>configuration, description and extension</i>						
ctlModel	CtlModels	CF	dchg		M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF	dchg		AC_CO_O	<input checked="" type="checkbox"/>
units	Unit	CF	dchg	see Annex A	O	
db	INT32U	CF	dchg	0 ... 100 000	O	
sVC	ScaledValueConfig	CF	dchg		AC_SCAV	
minVal	AnalogueValue	CF	dchg		O	
maxVal	AnalogueValue	CF	dchg		O	
stepSize	AnalogueValue	CF	dchg	0 ... (maxVal – minVal)	O	
operTimeout	INT32U	CF	dchg		AC_CO_O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	
<i>parameters for control services</i>						
Service parameter name	Service parameter type	Value/value range				
ctlVal	AnalogueValue					<input checked="" type="checkbox"/>

5.18 ING: Integer status setting

ING class						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data Attribute						
<i>setting</i>						
setVal	INT32	SP	dchg		AC_NSG_M	<input checked="" type="checkbox"/>
setVal	INT32	SG, SE			AC_SG_M	
<i>configuration, description and extension</i>						
minVal	INT32	CF	dchg		O	
maxVal	INT32	CF	dchg		O	
stepSize	INT32U	CF	dchg	1 ... (maxVal – minVal)	O	
units	Unit	CF	dchg		O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLND_M	
cdcName	VISIBLE STRING255	EX			AC_DLND_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.19 ASG: Analogue setting

ASG class						
Data attribute name	Type	FC	TrgOp	Value/value range	M/O/C	supported
DataName	Inherited from GenDataObject Class or from GenSubDataObject Class (see IEC 61850-7-2)					
Data attribute						
<i>setting</i>						
setMag	AnalogueValue	SP	dchg		AC_NSG_M	<input checked="" type="checkbox"/>
setMag	AnalogueValue	SG, SE			AC_SG_M	
<i>configuration, description and extension</i>						
units	Unit	CF	dchg	see Annex A	O	
sVC	ScaledValueConfig	CF	dchg		AC_SCAV	
minVal	AnalogueValue	CF	dchg		O	
maxVal	AnalogueValue	CF	dchg		O	
stepSize	AnalogueValue	CF	dchg	0 ... (maxVal – minVal)	O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLND_M	
cdcName	VISIBLE STRING255	EX			AC_DLND_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.20 DPL: Device name plate

DPL class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>configuration, description and extension</i>						
vendor	VISIBLE STRING255	DC			M	
hwRev	VISIBLE STRING255	DC			O	
swRev	VISIBLE STRING255	DC			O	
serNum	VISIBLE STRING255	DC			O	
model	VISIBLE STRING255	DC			O	
location	VISIBLE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5.21 LPL: Logical node name plate

LPL class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/C	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
DataAttribute						
<i>configuration, description and extension</i>						
vendor	VISIBLE STRING255	DC			M	
swRev	VISIBLE STRING255	DC			M	
d	VISIBLE STRING255	DC			M	
dU	UNICODE STRING255	DC			O	
configRev	VISIBLE STRING255	DC			AC_LN0_M	
ldNs	VISIBLE STRING255	EX		shall be included in LLN0 only; for example "IEC 61850-7-4:2003"	AC_LN0_EX	
lnNs	VISIBLE STRING255	EX			AC_DLD_M	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

6 Wind power plant specific common data classes (IEC 61400-25-2)

6.1 SPV: Setpoint value

SPV class						
Attribute name	Attribute type	FC	TrgOp	Explanation and value / range	M/O	supported
DataName	Inherited from Data Class (see Table 20 of IEC 61850-7-2)					
Data						
<i>Control and status information</i>						
chaManRs	SPC			Manual forced reset of characteristic information	O	<input checked="" type="checkbox"/>
ctIVal	BOOLEAN	CO		Reset (TRUE)	M	<input checked="" type="checkbox"/>
origin	Originator	CO, ST		Operator identifier of last reset	M	<input checked="" type="checkbox"/>
stVal	BOOLEAN	ST	dchg		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
ctlModel	CtlModels	CF		direct-with-normal-security	M	<input checked="" type="checkbox"/>
<i>Set point information</i>						
actVal	APC			Demand value of setpoint or parameter	M	<input checked="" type="checkbox"/>
ctIVal	Analogue Value	CO	dchg		M	<input checked="" type="checkbox"/>
origin	Originator	CO, MX		Operator identifier of last change	M	<input checked="" type="checkbox"/>
operTm	TimeStamp	CO			O	
mxVal	Analogue Value	MX	dchg		M	<input checked="" type="checkbox"/>
q	Quality	MX	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	MX			M	<input checked="" type="checkbox"/>
stSeld	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
ctlModel	CtlModels	CF		direct-with-normal-security sbo-with-normal-security direct-with-enhanced-security sbo-with-enhanced-security	M	<input checked="" type="checkbox"/>
sboTimeout	INT32U	CF			O	<input checked="" type="checkbox"/>
sboClass	SboClasses	CF			O	<input checked="" type="checkbox"/>
oldVal	APC			Previous setpoint	O	<input checked="" type="checkbox"/>
ctIVal	Analogue Value	CO			M	<input checked="" type="checkbox"/>
origin	Originator	CO, MX		Operator identifier of previous change	O	<input checked="" type="checkbox"/>
operTm	TimeStamp	CO			O	
mxVal	Analogue Value	MX	dchg		O	<input checked="" type="checkbox"/>
q	Quality	MX	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	MX			M	<input checked="" type="checkbox"/>
ctlModel	CtlModels	CF		status-only	M	<input checked="" type="checkbox"/>
Data attribute						
<i>Characteristics information</i>						
minMxVal	Analogue Value	MX		Minimum measured value	O	
maxMxVal	Analogue Value	MX		Maximum measured value	O	
totAvVal	Analogue Value	MX		Total average value of data	O	
sdvVal	Analogue Value	MX		Standard deviation of data	O	
<i>Configuration, description and extension information</i>						
units	Unit	CF			O	
minVal	Analogue Value	CF	dchg	Allowed lower limit	O	
maxVal	Analogue Value	CF	dchg	Allowed upper limit	O	
incRate	Analogue Value	CF	dchg	Rate of increase	O	

decRate	Analogue Value	CF	dchg	Rate of decrease	O	
spAcs	CODED ENUM	CF		Setpoint or parameter access level Low medium high	O	
chaPerRs	CODED ENUM	CF		Time periodical reset hly dly wly mly	O	
d	VISIBLE STRING255	DC			O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_	
					M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLESTRING255	EX			AC_DLN_M	
NOTE 1 chaManRs is a transient data.						
NOTE 2 oldVal gives the information about the previous demanded setpoint. It shall not allow any kind of service of the control model.						

6.2 STV: Status Value

STV class						
Attribute name	Attribute type	FC	TrgOp	Explanation and Value / Range	M/O	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
Data						
<i>Status Information</i>						
actSt	INS			Actual status	M	<input checked="" type="checkbox"/>
stVal	CtxInt	ST	dchg		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
oldSt	INS			Previous Status	O	<input checked="" type="checkbox"/>
stVal	CtxInt	ST	dchg		M	<input checked="" type="checkbox"/>
q	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
t	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>Statistical Information</i>						
stTm	TMS			Time duration of active status	O	
stCt	CTE			Number of changes to active status	O	
Data attribute						
<i>Configuration, Description And Extension Information</i>						
preTmms	INT32U	CF		Pre-trigger time	AC_PRE_TRG	
pstTmms	INT32U	CF		Post-trigger time	AC_PST_TRG	
smpTmms	INT16U	CF		Sample time for data attributes sampled during the Pre-trigger and Post-trigger time	AC_TRG	
datSetMx	ObjectReference	CF	dchg	Analogue data related to this status value	O	
d	VISIBLE STRING255	DC		Text	O	
dU	UNICODE STRING255	DC			O	
cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

6.3 CMD: Command

CMD class						
Attribute name	Attribute type	FC	TrgOp	Explanation and value / range	M/O	supported
DataName	Inherited from Data Class (see IEC 61850-7-2)					
Data						
<i>Control and status information</i>						
actSt	INC		Actual controllable status		M	<input checked="" type="checkbox"/>
actVal	CtxInt	CO	dchg		M	<input checked="" type="checkbox"/>
actOrigin	Originator	CO,S T			M	<input checked="" type="checkbox"/>
actStVal	CtxInt	ST	dchg		M	<input checked="" type="checkbox"/>
actQ	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
actT	TimeStamp	ST			M	<input checked="" type="checkbox"/>
actStSeld	BOOLEAN	ST	dchg		O	<input checked="" type="checkbox"/>
actCtlModel	CtlModels	CF		direct-with-normal-security, sbo-with-normal,security, direct-with-enhanced-security, sbo-with-enhanced-security	M	<input checked="" type="checkbox"/>
actSboTimeout	INT32U	CF			O	<input checked="" type="checkbox"/>
actSboClass	SboClasses	CF			O	<input checked="" type="checkbox"/>
oldSt	INS		Old status		O	<input checked="" type="checkbox"/>
oldVal	CtxInt	ST	dchg		M	<input checked="" type="checkbox"/>
oldQ	Quality	ST	qchg		M	<input checked="" type="checkbox"/>
oldT	TimeStamp	ST			M	<input checked="" type="checkbox"/>
<i>statistical information</i>						
cmTm	TMS		Duration of active command status		O	
cmCt	CTE		Number of command activation events		O	
Data attribute						
<i>Configuration, description and extension</i>						
cmAcs	INT8U	CF		Command Access Level	O	
cmd	VISIBLE STRING255	DC		Text	O	
cmdU	UNICODE STRING255	DC			O	
cmdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cmdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
cmdaNns	VISIBLE STRING255	EX			AC_DLN_M	

7 TISSUES Implementation Conformance Statement

Template version 0.3

Date: October 28, 2010

7.1 Introduction

This document provides a template for the tissues conformance statement. According to the UCA IUG QAP the tissue conformance statement is required to perform a conformance test and is referenced on the certificate.

This document is applicable for IPCOMM ipConv Gateway with firmware version 2.01.

7.2 Mandatory Intop Tissues

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 implemented IntOp Tissues.

Part	Tissue Nr	Description	Implemented Y/na
8-1	116	GetNameList with empty response?	na
	165	Improper Error Response for GetDataSetValues	na
	183	GetNameList error handling	na
7-4	None		
7-3	28	Definition of APC	na
	54	Point def xVal, not cVal	na
	55	Ineut = Ires ?	na
	60	Services missing in tables	na
	63	mag in CDC CMV	na
	219	operTm in ACT	na
7-2	270	WYE and DEL rms values	na
	30	control parameter T	Y
	31	Typo	na
	32	Typo in syntax	na
	35	Typo Syntax Control time	na
	36	Syntax parameter DSet-Ref missing	na
	37	Syntax GOOSE "T" type	na
	39	Add DstAddr to GoCB	na
	40	GOOSE Message "AppID" to "GoID"	na
	41	GsCB "AppID" to "GslD"	na
	42	SV timestamp: "EntryTime" to "TimeStamp"	na
	43	Control "T" semantic	Y
	44	AddCause - Object not sel	Y
	45	Missing AddCauses (neg range)	Y
	46	Synchro check cancel	na
	47	"." in LD Name?	Y
	49	BRCB TimeOfEntry (part of #453)	-
	50	LNNName start with number?	Y
	51	ARRAY [0..num] missing	na
	52	Ambiguity GOOSE SqNum	na
53	Add DstAddr to GsCB, SV	na	
151	Name constraint for control blocks etc.	Y	
166	DataRef attribute in Log	na	

Part	Tissue Nr	Description	Implemented Y/na
	185	Logging - Integrity periode	na
	189	SV Format	na
	190	BRCB: EntryId and TimeOfEntry (part of #453)	-
	191	BRCB: Integrity and buffering reports (part of #453)	-
	234	New type CtxInt (Enums are mapped to 8 bit integer)	na
	275	Confusing statement on GI usage (part of #453)	-
	278	EntryId not valid for a server (part of #453)	-
Part 6	1	Syntax	Y
	5	tExtensionAttributeNameEnum is restricted	Y
	8	SIUnit enumeration for W	Y
	10	Base type for bitstring usage	na
	17	DAI/SDI elements syntax	Y
	169	Ordering of enum differs from 7-3	Y

NOTE: Tissue 49, 190, 191, 275 and 278 are part of the optional tissue #453, all other technical tissues in the table are mandatory if applicable.

NOTE: Editorial tissues are marked as "na".

NOTE: Final proposal on tissue 45 is not defined yet

7.3 Optional IntOp Tissues

After the approval of the server conformance test procedures version 2.2 the following IntOp tissues were added or changed. It is optional to implement these tissues.

Part	Tissue Nr	Description	Implemented Y/N/na
8-1	246	Control negative response (SBOs) with LastAppIError	na
8-1	545	Skip file directories with no files	Y
7-2	333	Enabling of an incomplete GoCB	na
7-2	453	Combination of all reporting and logging tissues	Y
6	245	Attribute RptId in SCL is optional	Y
6	529	Replace sev - Unknown by unknown	na

7.4 Other Implemented Tissues

<Complete below table of other implemented tissues, these tissues should have no impact on interoperability>

Part	Tissue Nr	Description

8 PIXIT

8.1 Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in the client system: IPCOMM ipConv, IEC 61850 Client, 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”.

8.2 PIXIT for Configuration

Description	Value / Clarification
Describe how the client handles nameplate configuration revision mismatches	<i>ignored</i>
Describe how the client handles report control block configuration revision mismatches	<i>ignored</i>
<additional items>	

8.3 PIXIT for Association model

Description	Value / Clarification
Guaranteed number of servers that can set-up an association simultaneously (one association per server)	25
Lost connection detection time range (default range of TCP_KEEPALIVE is 1 – 20 seconds)	5 seconds Configurable
Lost (abort) connection retry time	0 seconds
Is authentication supported	N
What is the maximum and minimum MMS PDU size	Max MMS PDU size = 65000 Min MMS PDU size = no limit
What is the typical startup time after a power supply interrupt	60 seconds
Connection abortion	The association abort is performed via TCP FIN message

8.4 PIXIT for Server model

Description	Value / Clarification
Maximum object identification length	129 octets: <64>/<64>
Does client support autodescription	The data model is taken from the SCL-File. Online autodescription features of the server are not used
What analogue value (MX) quality bits are used in the client	Y Good, Y Invalid, N Reserved, Y Questionable Y Overflow N OutofRange N BadReference N Oscillatory N Failure NOldData N Inconsistent N Inaccurate N Process Y Substituted N Test Y OperatorBlocked
Which status value (ST) quality bits are used in the client	Y Good, Y Invalid, N Reserved, Y Questionable N BadReference N Oscillatory N Failure NOldData N Inconsistent N Inaccurate N Process Y Substituted N Test Y OperatorBlocked
Describe how to view/display quality values	Logging
Describe how to force a SetDataValues request	NA

Description	Value / Clarification
Describe how to force a GetAllDataValues request	NA
Describe how the client behaves in case of: <ul style="list-style-type: none">- GetDataDefinition response-- GetLogicalDeviceDirectory response-- GetAllDataValues response-- GetDataValues response-- SetDataValues response-	NA

8.5 PIXIT for Data set model

Description	Value / Clarification
Describe how to force a GetDataSetValues request	NA
Describe how to force a SetDataSetValues request	NA
Describe how to force a DeletaDataSet request	NA
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	The client processes the dataset elements based on the imported SCL file.
Describe how the client behaves in case of: - GetLogicalNodeDirectory(DATA-SET) response- - GetDataSetDirectory response-	NA
Does the client support the creation of: - persistent datasets - non-persistent datasets	N N
Describe how the client behaves in case of: - CreateDataSetDirectory response- - DeleteDataSet response-	NA
<additional items>	

8.6 PIXIT for Substitution model

Description	Value / Clarification
Describe how to substitute a value	NA
<additional items>	

8.7 PIXIT for Setting group control model

Description	Value / Clarification
Describe how to change the active setting group	NA
Describe how to get the actual setting group values	NA
Describe how to edit setting group values	NA
Describe how the client behaves in case of: <ul style="list-style-type: none"> - GetSGCBValues response- - The configured SG is different then the actual setting group 	NA
<additional items>	

8.8 PIXIT for Reporting model

Description	Value / Clarification												
Does the client search for RCB in all logical nodes? when not specify the logical nodes	Those RCBs to be subscribed by the client must be explicitly configured												
Which dynamic RCB attributes are/can be configured by the client	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">RptID</td> <td style="width: 30%;">N (set automatically)</td> </tr> <tr> <td>DataSet</td> <td>N</td> </tr> <tr> <td>Optional fields</td> <td>N (set automatically)</td> </tr> <tr> <td>Trigger conditions</td> <td>Y</td> </tr> <tr> <td>Buffer time</td> <td>Y</td> </tr> <tr> <td>Integrity period</td> <td>Y</td> </tr> </table>	RptID	N (set automatically)	DataSet	N	Optional fields	N (set automatically)	Trigger conditions	Y	Buffer time	Y	Integrity period	Y
RptID	N (set automatically)												
DataSet	N												
Optional fields	N (set automatically)												
Trigger conditions	Y												
Buffer time	Y												
Integrity period	Y												
Does the client supports IED's with indexed and non-indexed report control blocks (RCB)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Buffered RCB indexed</td> <td style="width: 30%;">Y</td> </tr> <tr> <td>Buffered RCB not indexed</td> <td>Y</td> </tr> <tr> <td>Unbuffered RCB indexed</td> <td>Y</td> </tr> <tr> <td>Unbuffered RCB not indexed</td> <td>Y</td> </tr> </table>	Buffered RCB indexed	Y	Buffered RCB not indexed	Y	Unbuffered RCB indexed	Y	Unbuffered RCB not indexed	Y				
Buffered RCB indexed	Y												
Buffered RCB not indexed	Y												
Unbuffered RCB indexed	Y												
Unbuffered RCB not indexed	Y												
The supported trigger conditions are	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">integrity</td> <td style="width: 30%; text-align: right;">Y</td> </tr> </table>	integrity	Y										
integrity	Y												

	data change Y quality change Y data update Y general interrogation Y
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 Y entryID Y conf-rev Y
Does the client support segmented reports	Y
Does the client support pre-assigned RCB	N
Does the client support reported data set containing structured data objects or data attributes?	reporting of data objects Y reporting of data attributes Y
Describe how the client does respond when an URCB is already reserved	Client is trying to allocate it cyclically
Describe how the client does respond when a BRCB is already reserved	Client is trying to allocate it cyclically
Describe how the client does respond on a SetBRCBValues(EntryID) negative response	Client continues with operation. Error is reported but has not effect on communication.
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	If dataSet is not set within SCL-Definition of RCB, configuration error is reported. If online different dataset name is detected, RCB remains disabled.
Describe how the client detect reporting configuration changes (mismatches). Does it check the "configuration revision" attributes and/or does it check the dataset members?	Dataset members are not checked. Configuration revision is checked and must be the same as defined within SCL file. If mismatch is detected, RCB remains disabled.
Describe how to force the client to change the RCB buffertime	Buffertime can be set by a configuration parameter for each RCB
<additional items>	

8.9 PIXIT for Logging model

Description	Value / Clarification
-------------	-----------------------

Does the client search for LCB in all logical nodes? when not specify the logical nodes	NA
Describe how to change LOG and LCB attributes	NA
<additional items>	

8.10 PIXIT for Generic substation events model

Description	Value / Clarification
What elements of a subscribed GOOSE header are checked to decide the message is valid and the allData values are accepted? Ignored = element value is not checked, message will be accepted SCL match = element value should match with the configuration, otherwise the GOOSE message will be ignored	N source MAC address = ignored
	Y dest. MAC address = SCL match
	N VLAN id =
	ignored
	N VLAN priority = ignored
	Y Ethertype =
	0x88B8
	Y/N gocbRef = SCL match
	Y/N timeAllowedtoLive = see below
	Y/N datSet = SCL match
	Y/N goID = SCL match
	N t = ignored
	Y/N stNum = <describe>
	Y/N sqNum = see below
Y/N test = false (true will be ignored)	
Y/N confRev = SCL match	
Y/N ndsCom = false (true will be ignored)	
Y/N numDatSetEntries = SCL match	
For the checked GOOSE header elements describe the checking conditions in more detail when necessary	
What is the behavior when one subscribed GOOSE message isn't received or syntactically incorrect (missing GOOSE)	
What is the behavior when one subscribed GOOSE	

Description	Value / Clarification
message exceeds the previous time Allowed to Live (TAL)	
What is the behavior when a subscribed GOOSE message is out-of-order	
What is the behavior when a subscribed GOOSE message is duplicated	
May the GOOSE data set contain structured data objects?	Y/N
<additional items>	

8.11 PIXIT for Control model

Description	Value / Clarification
What control modes are supported	Y status-only Y direct-with-normal-security Y sbo-with-normal-security Y direct-with-enhanced-security Y sbo-with-enhanced-security
Is Time activated operate (operTm) supported	N
Is "operate-many" supported	N
Can the client set the test flag?	N
What check conditions can be set	N synchrocheck N interlock-check
Which originator categories are supported and what is the originator identification?	Remote-control
Describe if and how the client sets/increments the ctlNum	ctlNum is incremented on each control sequence
What does the client when its receives a LastApplicationError and describe how to view the additional cause?	LastApplicationError is displayed within the logfile
What does the client when its receives a Select, SelectWithValue or Operate respond negative ?	The control sequence is aborted and negative confirmation is issued to the command source
Can the client change the control model via online services?	No

Description	Value / Clarification
What does the client when the ctlModel is not initialized in the SCL?	Commands are not executed
<additional items>	

8.12 PIXIT for Time and time synchronization model

Description	Value / Clarification
Described how to view the internal time & quality or how to expose the timestamp and timestamp quality via the IEC 61850 interface	View: logging Expose: for example in Operate request
What time quality bits are supported	N LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
What is the behavior when the time synchronization signal/messages are lost	Timestamps in control direction are marked as ' ClockNotSynchronized'
When is the quality bit "Clock failure" set?	'ClockFailure' is not set in control direction. It can be processed in monitoring direction.
When is the quality bit "Clock not synchronised" set?	'ClockNotSynchronized' is set in control direction on loss of synchronization. It can be processed in monitoring direction
<additional items>	

8.13 PIXIT for File transfer model

Description	Value / Clarification
Describe when or how to force the client to request GetServerDirectory(FILE) and what it does with the responded filenames	Behavior is configurable.
Does the client uses a wildcard in the GetServerDirectory(FILE) request	Yes, wildcard = "*" or "*.*" No
Does the client support IED's that include the path in the file name in the GetServerDirectory(FILE) respond?	Y/N path included Y/N path not included
Does the client support IED's that use the fileseparator	Y/N "/" Y/N "\
What is the maximum file name size including path	256
Can the client read a file with size 0	Y/N
Are directory/file name case sensitive	Case sensitive
Maximum file size	unlimited
Describe how the client behaves in case of: - GetFileAttributes response-	
<additional items>	

8.14 Instruction and comments on using this template

- **Comments**

- Tissue 235 "Extension of name length" for dataset references has been changed from IntOp to Ed.2 and has been removed from the IntOp list
- Tissue 38 "Change Appld into Gold" to match part 7-2 with part 8-1 has been changed from IntOp to Ed.2 and has been removed from the IntOp list
- Tissue 45 "Additional AddCauses" has been changed from green to red
- Tissue 65 category has been changed from IntOp to Ed2
- Even intop tissues may change. Compare <http://www.tissues.iec61850.com> for most recent status
- Questions and comments can be e-mailed to: helpdesk@ucausersgroup.org

- **Instructions**

- format of the document may be changed into your company format
- enter the applicable IED name and firmware version
- update the Y/na values in the Mandatory tissue table
- update the Y/N/na values in the Optional tissue table
- remove the instructions, comments and revision history of the template

8.15 Revision history

Revision	Remarks
0.1	First version of the UCAIUG template
0.2 (okt 2008)	Removed tissue 38 from the list Added a note on tissue 45
0.3 (okt 2010)	Tissue 65 category has been changed from IntOp to Ed2. Removed tissue 65 from the intop list

9 MMS Conformance

9.1 Initiate conformance

9.1.1 InitiateRequest general parameters

InitiateRequest	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
InitiateRequest						
localDetailCalling	m	m		m	m	
proposedMaxServOutstandingCalling	m	m	1 or greater	m	m	1 or greater
proposedMaxServOustandingCalled	m	m	1 or greater	m	m	1 or greater
initRequestDetail	m	m		m	m	
InitiateRequestDetail						
proposedVersionNumber	m	m	Shall be 2.1	m	m	Shall be 2.1
proposedParameterCBB	m	m	See 24.2.2.2.1.1	m	m	See 24.2.2.2.1.1
servicesSupportedCalling	m	m		m	m	
additionalSupportedCalling	c1	x		c1		
additionalCbbSupportedCalling	c1	x		c1		
privilegeClassIdentityCalling	c1	x		c1		
c1 Conditional upon Parameter CBS CSPI — see Table 90.						

9.1.2 InitiateResponse general parameters

InitiateResponse	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
InitiateResponse						
localDetailCalled	m	m		m	m	
negotiatedMaxServOutstandingCalling	m	m	1 or greater	m	m	1 or greater
negotiatedMaxServOustandingCalled	m	m	1 or greater	m	m	1 or greater
initResponseDetail	m	m		m	m	
InitiatedResponseDetail						
negotiatedVersionNumber	m	m	Shall be 2.1	m	m	Shall be 2.1
negotiatedParameterCBB	m	m	See 24.2.2.2.1.2	m	m	See 24.2.2.2.1.2
servicesSupportedCalled	m	m	See 9.2	m	m	See 9.2
additionalSupportedCalled	c1	x		c1	x	
additionalCbbSupportedCalled	c1	x		c1	x	
privilegeClassIdentityCalled	c1	x		c1	x	
c1 Conditional upon Parameter CBS CSPI— see Table 90.						

9.2 MMS service supported conformance table

MMS service supported CBB	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
status	o	o	☑	o	m	
getNamelist	o	o		o	c1	
identify	o	o		m	m	
rename	o	o		o	0	
read	o	o	☑	o	c2	
write	o	o	☑	o	c3	
getVariableAccessAttributes	o	o		o	c4	
defineNamedVariable	o	o		o	o	
defineScatteredAccess	o	i		o	i	
getScatteredAccessAttributes	o	i		o	i	
deleteVariableAccess	o	o		o	o	
defineNamedVariableList	o	o		o	o	
getNamedVariableListAttributes	o	o		o	c5	
deleteNamedVariableList	o	o		o	c6	
defineNamedType	o	i		o	i	
getNamedTypeAttributes	o	i		o	i	
deleteNamedType	o	i		o	i	
input	o	i		o	i	
output	o	i		o	i	
takeControl	o	i		o	i	
relinquishControl	o	i		o	i	
defineSemaphore	o	i		o	i	
deleteSemaphore	o	i		o	i	
reportPoolSemaphoreStatus	o	i		o	i	
reportSemaphoreStatus	o	i		o	i	
initiateDownloadSequence	o	i		o	i	
downloadSegment	o	i		o	i	
terminateDownloadSequence	o	i		o	i	
initiateUploadSequence	o	i		o	i	
uploadSegment	o	i		o	i	
terminateUploadSequence	o	i		o	i	
requestDomainDownload	o	i		o	i	
requestDomainUpload	o	i		o	i	
loadDomainContent	o	i		o	i	
storeDomainContent	o	i		o	i	
deleteDomain	o	i		o	i	
getDomainAttributes	o	o		o	c14	
createProgramInvocation	o	i		o	i	

MMS service supported CBB	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
deleteProgramInvocation	o	i		o	i	
start	o	i		o	i	
stop	o	i		o	i	
resume	o	i		o	i	
reset	o	i		o	i	
kill	o	i		o	i	
getProgramInvocationAttributes	o	i		o	i	
obtainFile	o	c9		o	c9	
defineEventCondition	o	i		o	i	
deleteEventCondition	o	i		o	i	
getEventConditionAttributes	o	i		o	i	
reportEventConditionStatus	o	i		o	i	
alterEventConditionMonitong	o	i		o	i	
triggerEvent	o	i		o	i	
defineEventAction	o	i		o	i	
deleteEventAction	o	i		o	i	
alterEventEnrollment	o	i		o	i	
reportEventEnrollmentStatus	o	i		o	i	
getEventEnrollmentAttributes	o	i		o	i	
acknowledgeEventNotification	o	i		o	i	
getAlarmSummary	o	i		o	i	
getAlarmEnrollmentSummary	o	i		o	i	
readJournal	o	c13		o	c13	
writeJournal	o	o		o	o	
initializeJournal	o	o		o	c12	
reportJournalStatus	o	i		o	i	
createJournal	o	i		o	i	
deleteJournal	o	i		o	i	
fileOpen	o	c8	<input checked="" type="checkbox"/>	o	c8	
fileRead	o	c8	<input checked="" type="checkbox"/>	o	c8	
fileClose	o	c8	<input checked="" type="checkbox"/>	o	c8	
fileRename	o	i		o	i	
fileDelete	o	c9	<input checked="" type="checkbox"/>	o	c9	
fileDirectory	o	c11	<input checked="" type="checkbox"/>	o	c11	
unsolicitedStatus	o	i		o	i	
informationReport	o	c7	<input checked="" type="checkbox"/>	o	c7	
eventNotification	o	i		o	i	
attachToEventCondition	o	i		o	i	
attachToSemaphore	o	i		o	i	
conclude	m	m	<input checked="" type="checkbox"/>	m	m	

MMS service supported CBB	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
cancel	o	o		o	m	
getDataExchangeAttributes	o	c10		o	c10	
exchangeData	o	c10		o	c10	
defineAccessControllist	o	c10		o	c10	
getAccessControlListAttributes	o	c10		o	c10	
reportAccessControlledObjects	o	c10		o	c10	
deleteAccessControllist	o	c10		o	c10	
alterAccessControl	o	c10		o	c10	
reconfigureProgramInvocation	o	c10		o	c10	
<p>c1 Shall be 'm' if logical device or logical node model support 3 declared in ACSI basic conformance statement.</p> <p>c2 Shall be 'm' if logical node model support 3 declared in ACSI basic conformance statement or if support for the MMS write service is declared.</p> <p>c3 Shall be 'm' if ACSI support for SetDataValues service 3 declared or implied.</p> <p>c4 Shall be 'm' if logical node model support 3 declared m ACSI basic conformance statement.</p> <p>c5 Shall be 'm' if data set support 3 declared in the ACSI basic conformance statement.</p> <p>c6 Shall be 'm' if support for defineNamedVariableList 3 declared.</p> <p>c7 Shall be 'm' if support for ACSI Report or ACSI command termination is declared.</p> <p>c8 Shall be 'm' if support for ACSI GetFile 3 declared.</p> <p>c9 Shall be 'm' if support for ACSI SetFile 3 declared.</p> <p>c10 Shall not be present since MMS minor version 3 declared to be 1.</p> <p>c11 Shall be 'm' if support for ACSI GetFileAttributeValues 3 declared.</p> <p>c12 Shall be 'm' if support for the ACSI log model is declared.</p> <p>c13 Shall be 'm' if support for the ACSI QuerylogByTime or QueryLogAfter is declared.</p> <p>c14 Shall be 'm' if support for the ACSI logical device model is declared.</p>						

9.3 MMS Parameter CBB

MMS parameter CBB	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
STR1	o	o	<input checked="" type="checkbox"/>	o	c1	
STR2	O	o	<input checked="" type="checkbox"/>	o	o	
NEST	1	1 or greater	5	1	c2	
VNAM	o	o	<input checked="" type="checkbox"/>	o	c1	
VADR	o	o		o	o	
VALT	o	o	<input checked="" type="checkbox"/>	o	c1	
bit 5	x			x	x	
TPY	o	o		o	o	
VLIS	o	c1	<input checked="" type="checkbox"/>	o	c3	
bit 8	x	x		x	x	
bit 9	x	x		x	x	
CEI	o	i		o	i	

ACO	o	c4		o	c4	
SEM	o	c4		o	c4	
CSR	o	c4		o	c4	
CSNC	o	c4		o	c4	
CSPLC	o	c4		o	c4	
CSPI	o	c4		o	c4	
<p>c1 Shall be 'm' if ACSI logical node model support declared.</p> <p>c2 Shall be five(5) or greater if ACSI logical node model support 5 declared.</p> <p>c3 Shall be 'm' if ACSI data set, reporting, GOOSE, or logging model support is declared</p> <p>c4 Shall not be present. Receiving implementations shall assume not supported.</p>						

9.4 GetNameList conformance

GetNameList	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
ObjectClass	m	m		m	m	
ObjectScope	m	m		m	m	
DomainName	o	o		m	m	
ContinueAfter	o	m		m	m	
Response+						
List Of Identifier	m	m		m	m	
MoreFollows	m	m		m	m	
Response-						
Error Type	m	m		m	m	
<p>NOTE Object class 'vmd' (for meny VMDSpecific in MAIS V1.0) shall not appear. If a request contains this ObjectClass, an MMS Reject shall be issued.</p>						

9.5 Variable access conformance

9.5.1 Supporting productions

9.5.1.1 AlternateAccessSelection

AlternateAccessSelection	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
accessSelection	o	o		o	m	
component	o	i		o	m	
index	o	i		o	i	
indexRange	o	i		o	i	
allElements	o	i		o	x	
alternateAccess	o	o		o	m	
selectAccess	o	o		o	m	
component	o	o		o	m	
index	o	i		o	i	
indexRange	o	i		o	i	
allElements	o	i		o	x	

9.5.1.2 VariableAccessSpecification

VariableAccessSpecification	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
listOfVariable	o	o	<input checked="" type="checkbox"/>	o	c1	
variableSpecification	o	o	<input checked="" type="checkbox"/>	o	c1	
alternateAccess	o	o	<input checked="" type="checkbox"/>	o	c1	
variablelistName	o	o	<input checked="" type="checkbox"/>	o	c1	

c1 Shall be 'm' if ACSI support for Logical Node Model is declared.
c2 Shall be 'm' if ACSI support for ACSI DataSets, reporting, or logging is declared.

9.5.1.3 VariableSpecification

VariableSpecification	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
name	o	o	<input checked="" type="checkbox"/>	o	m	
address	o	o		o	i	
variableDescription	o	a		o	i	
scatteredAccessDescription	o	x		o	x	
invalidated	o	x		o	x	

9.5.1.4 Read

Read	Client-CR	Server-CR
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	Base	F/S	Value/range	Base	F/S	Value/range
Request						
specificationWithResult	o	o	<input checked="" type="checkbox"/>	o	m	
variableAccessSpecification	m	m	<input checked="" type="checkbox"/> See 9.5.1.2	m	m	
Response						
variableAccessSpecification	o	o	<input checked="" type="checkbox"/>	o	m	
listOfAccessResult	m	m	<input checked="" type="checkbox"/>	m	m	

9.5.1.5 Write

Write	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
variableAccessSpecification	m	m	<input checked="" type="checkbox"/> See 9.5.1.2	m	m	
listOfData	m	m	<input checked="" type="checkbox"/>	m	m	
Response						
failure	m	m	<input checked="" type="checkbox"/>	m	m	
success	m	m	<input checked="" type="checkbox"/>	m	m	

9.5.1.6 InformationReport

InformationReport	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
variableAccessSpecification	m	m	<input checked="" type="checkbox"/> See 9.5.1.2	m	m	
listOfAccessResult	m	m	<input checked="" type="checkbox"/>	m	m	

9.5.1.7 GetVariableAccessAttributes

GetVariableAccessAttributes	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
name	o	o		m	m	
address	o	o		m	x	
Response						
mmsDeletable	m	m		m	m	
address	o	x		o	x	
typeSpecification	m	m		m	m	

9.5.1.8 DefineNamedVariableList

DefineNamedVariableList	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						

variableListName	m	m		m	m	
listOfVariable	m	m		m	m	
variableSpecification	m	m		m	m	
alternateAccess	o	i		o	m	
Response	m	m		m	m	

9.5.1.9 GetNamedVariableListAttributes

GetNamedVariableListAttributes	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
ObjectName	m	m		m	m	
Response						
mmsDeletable	m	m		m	m	
listOfVariable	m	m		m	m	
variableSpecification	m	m		m	m	
alternateAccess	o	m		o	i	

9.5.1.10 DeleteNamedVariableList

DeleteNamedVariableList	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
Scope	m	m		m	m	
listOfVariableListName	m	m		m	m	
domainName	o	m		o	m	
Response						
numberMatched	m	m		m	m	
numberDeleted	m	m		m	m	
DeleteNamedVariableList-Error	m	m		m	m	

9.5.2 Journal management services

9.5.2.1 ReadJournal

ReadJournal	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
invokeID	m	m		m	m	
JournalName	m	m		m	m	
rangeStartSpecification	o	m		o	m	
startingTime	o	c1		o	m	
EntrytoStartAfter	o	o		o	m	
rangeStopSpecification	o	m		o	m	
endingTime	o	c2		o	m	
numberOfEntries	o	o		o	m	
EntryToStartAfter	o	c2		o	m	
TimeSpecification	m	m		m	m	
EntrySpecification	m	m		m	m	
Response						
invokeID	m	m		m	m	
listOfJournalEntry	m	m		m	m	
entryIdentifier	o	m		m	m	
originatingApplication	m	m		m	m	
entryContent	m	m		m	m	
moreFollows	m	m		o	m	
c1 At least one shall be present.						
c2 At least one shall be present.						

9.5.2.2 JournalEntry conformance statement

Ref	Parameter	Client-CR			Server-CR		
		Base	F/S	Value/range	Base	F/S	Value/range
1	occurrenceTime	m	m		m	m	
2	additionalDetail	x	x		x	x	
3	entryForm	m	m		m	m	
4	data	o	m		o	c1	
5	event	o	m		o	o	
8	currentState	o	m		o	c2	
7	listofVariable	o	m		o	c3	
8	variableTag	o	m		o	c4	
9	valueSpecification	o	m		o	c4	
10	annotation	o	m		o	c1	

- c1 Either data or annotation shall be present.
 c2 If event is present, then m.
 c3 If data is present, then m.
 c4 If listOfVariable present, then m.

9.5.2.3 InitializeJournal

InitializeJournal	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						
journalName	m	m		m	m	
limitSpecification	m	m		m	m	
limitingTime	m	m		m	m	
limitingEntry	o	o		o	m	
Response+						
entriesDeleted	m	m		m	m	

9.5.3 File management services

9.5.3.1 FileDirectory

FileDirectory	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						<input checked="" type="checkbox"/>
filespecification	o	o		m	m	<input checked="" type="checkbox"/>
continueAfter	o	o		m	m	<input checked="" type="checkbox"/>
Response+						<input checked="" type="checkbox"/>
listOfDirectoryEntry	m	m		m	m	<input checked="" type="checkbox"/>
MoreFollows	m	m		m	m	<input checked="" type="checkbox"/>

9.5.3.2 FileOpen

FileOpen	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						<input checked="" type="checkbox"/>
filename	m	m		m	m	<input checked="" type="checkbox"/>
initialPosition	o	o		m	m	<input checked="" type="checkbox"/>
Response+						<input checked="" type="checkbox"/>
frsmID	m	m		m	m	<input checked="" type="checkbox"/>
fileAttributes	m	m		m	m	<input checked="" type="checkbox"/>

9.5.3.3 FileRead

FileRead	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range

Request						<input checked="" type="checkbox"/>
frsmID	m	m		m	m	<input checked="" type="checkbox"/>
Response+						<input checked="" type="checkbox"/>
fileData	m	m		m	m	<input checked="" type="checkbox"/>
moreFollows	m	m		m	m	<input checked="" type="checkbox"/>

9.5.3.4 FileClose

FileClose	Client-CR			Server-CR		
	Base	F/S	Value/range	Base	F/S	Value/range
Request						<input checked="" type="checkbox"/>
frsmID	m	m		m	m	<input checked="" type="checkbox"/>
Response+	m	m		m	m	<input checked="" type="checkbox"/>