

MiCOM P341

Interconnection Protection Relay

P341/EN PM/F74

Version 36

PICS & MICS

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1 PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS)

1.1 Introduction

This specification is the Protocol Implementation Conformance Statement (PICS) and presents the ACSI conformance statements as defined in Annex A of Part 7-2 of the IEC 61850 standard specifications.

1.2 ACSI basic conformance statement

The basic conformance statement shall be as defined in Table 1.

Client-Server roles		Client/ subscriber	Server/ publisher	Value/ comments
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	
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				

Table 1: Basic conformance statement

1.3 ACSI models conformance statement

The ACSI models conformance statement shall be as defined in Table 2.

		Client/ subscriber	Server/ publisher	Value/ comments
If Server or Client side (B11/12) is supported				
M1	Logical Device		Y	
M2	Logical Node		Y	
M3	Data		Y	
M4	Data set		Y	

		Client/ subscriber	Server/ publisher	Value/ comments
M5	Substitution			
M6	Setting group control		Y	
	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	BufTim		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M7-11	conf-revision		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	BufTim		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
M8-9	conf-revision		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			
If Server or Client side (B11/12) is supported				
M16	Time	Y	Y	Time source with required accuracy shall be available.
M17	File Transfer		Y	

	Client/ subscriber	Server/ publisher	Value/ comments
Y = service is supported			
N or empty = service is not supported			

Table 2: Models conformance statement**1.4****ACSI service conformance statement**

The ACSI service conformance statement shall be as defined in Table 3 (depending on the statements in Table 1).

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
Server					
S1	ServerDirectory	TP		Y	
Application association					
S2	Associate			Y	
S3	Abort			Y	
S4	Release			Y	
Logical Device					
S5	LogicalDeviceDirectory	TP		Y	
Logical Node					
S6	LogicalNodeDirectory	TP		Y	
S7	GetDataValues	TP		Y	
Data					
S8	GetDataValues	TP		Y	
S9	SetDataValues	TP		Y	
S10	GetDataDirectory	TP		Y	
S11	GetDataDefinition	TP		Y	
Data set					
S12	GetDataSetValues	TP		Y	
S13	SetDataSetValues	TP			
S14	CreateDataSet	TP			
S15	DeleteDataSet	TP			
S16	GetDataSetDirectory	TP		Y	
Substitution					
S17	SetDataValues	TP			

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
Setting group control					
S18	SelectActiveSG	TP		Y	
S19	SelectEditSG	TP			
S20	SetSGValues	TP			
S21	ConfirmEditSGValues	TP			
S22	GetSGValues	TP		Y	
S23	GetSGCBValues	TP		Y	
Reporting					
Buffered report control block (BRCB)					
S24	Report	TP		Y	
S24-1	data-change (dchg)			Y	
S24-2	qchg-change (qchg)				
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	qchg-change (qchg)				
S27-3	data-update (dup)				
S28	GetURCBValues	TP		Y	
S29	SetURCBValues	TP		Y	
Logging					
Log control block					
S30	GetLCBValues	TP			
S31	SetLCBValues	TP			
Log					
S32	QueryLogByTime	TP			
S33	QueryLogByEntry	TP			
S34	GetLogStatusValues	TP			
Generic substation event model (GSE)					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC		Y	IED supports GOOSE publish & subscription.
S36	GetReference	TP			
S37	GetGOOSEElementNumber	TP			

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
S38	GetGoCBValues	TP		Y	
S39	SetGoCBValues	TP		Y	
GSSE-CONTROL- BLOCK					
S40	SendGSSEMessage	MC			
S41	GetReference	TP			
S42	GetGSSElementNumber	TP			
S43	GetGsCBValues	TP			
S44	SetGsCBValues	TP			
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	
S52	SelectWithValue	TP		Y	
S53	Cancel	TP		Y	
S54	Operate	TP		Y	
S55	Command- Termination	TP		Y	
S56	TimeActivated-Operate	TP			
File transfer					
S57	GetFile	TP		Y	
S58	SetFile	TP			
S59	DeleteFile	TP		Y	Only from /dr_unextracted/ Operation may only be performed on .cfg files.
S60	GetFileAttributeValues	TP		Y	
Time					
T1	Time resolution of internal clock			1 ms	Nearest negative power of 2 in seconds.
T2	Time accuracy of internal clock			1 ms	T0
					T1

	Services	AA: TP/MC	Client (C)	Server (S)	Comments
					T2
					T3
					T4
					T5
T3	Supported TimeStamp resolution	-		1 ms	Nearest negative power of 2 in seconds.

Table 3: Service conformance statement

AA: Application association type

TP: Two part (for MMS)

MC: Multicast (for GOOSE and SMV)

2 MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

2.1 Introduction

This specification is the Model Implementation Conformance Statement (MICS) and presents the top-level IEC 61850 data model that has been implemented. The definitions of all used Logical Nodes and their associated Common Data Classes, components and associated enumerated values are also included for completeness.

The reader is expected to be conversant with the terminology presented within the IEC 61850 part 7 series of specifications.

2.2 Objective

To provide comprehensive details of the standard data object model elements supported by the device. The MICS is conformant to the devices associated ICD (Substation Configuration Language) file, according to part 6 of the IEC 61850 standards. The layout of the presented tables within this document are conformant to the part 7 series of the IEC 61850 standard specifications with the following exceptions:

- The "Trigger Options" field is not presented
- The "M/O" field is not present as the definitions are as deployed within the model
- An additional column "X" is used to signify Schneider Electric custom attributes

2.3 Logical Device definitions

The MiCOM relay implements an IEC 61850 server that can contain one or more Logical Devices. Each Logical Device contains a data model built from instances of specific Logical Nodes and must consist of at least an instance of the LPHD Logical Node (which is responsible for providing physical device information) and an instance of the LLN0 Logical Node (for addressing common issues across the Logical Device).

The IEC 61850 data model is contained within the Logical Devices detailed in the table below. All MiCOM devices will name the supported Logical Devices consistently to ensure that data model variables with the same purpose will have the same name within each MiCOM server.

Logical Device	Comment/Usage
Control	P341 Control
Measurements	P341 Measurements
Protection	P341 Protection
Records	P341 Records
System	P341 System

2.3.1 IEC 61850 Logical Device data model

The IEC 61850 Logical Device top-level data model consists of instances of Logical Nodes. The data model name for a Logical Node instance is constructed from an optional prefix (known as the wrapper), the Logical Node name, and an instance ID (or suffix).

The presented data model is in an alphabetically sorted order, rather than a logical order, because this is the natural order of the data when presented by a native MMS browser. (Higher level browsers can of course impart any ordering that they desire).

LD	LN Instance	LN Type	Description
Control			
	AscRSYN1	RSYN_DIFCLC	System Checks - Check Sync 1
	AscRSYN2	RSYN_DIFCLC	System Checks - Check Sync 2
	CILO1	CILO_INTERLOCK	XCBR Interlocking
	LLN0	LLN0_CONTROL	LLN0 for control LD
	LPHD1	LPHD_STANDARD	Physical Device Information
	XCBR1	XCBR_BASIC_ALL	Circuit Breaker Monitoring for All Module
Measurements			
	DfpMMXU1	MMXU_DFDT	df/dt
	LLN0	LLN0_STANDARD	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	PriCsvMMXU1	MMXU_CSV	Primary C/S Measurements
	PriFouMMXU1	MMXU_DERIVED_P341	Primary Fourier Derived Measurands - P341 only
	PriFxdMSTA1	MSTA_STANDARD	Primary Fixed demand measurements
	PriHa3MMXU1	MMXU_THIRD_HARMONIC_NO_VN	P341/P342 only third harmonic measurements (no VN)
	PriMMTR1	MMTR_PRIV	Primary based Energy flow metering quantities
	PriPkdMSTA1	MSTA_STANDARD	Primary Peak demand measurements
	PriRmsMMXU1	MMXU_RMS	Primary RMS measurements
	PriRodMSTA1	MSTA_STANDARD	Primary Rolling demand measurements
	PriSenMMXU1	MMXU_SENSITIVE	Primary Sensitive power measurements
	PriSeqMSQI1	MSQI_ALL	Primary Sequence measurements
	PriStdMMXU1	MMXU_STANDARD_P341	Primary Standard MMXU measurements for P341 only
	SecCsvMMXU1	MMXU_CSV	Secondary C/S Measurements
	SecFouMMXU1	MMXU_DERIVED_P341	Secondary Fourier Derived Measurands - P341 only

LD	LN Instance	LN Type	Description
	SecFxdMSTA1	MSTA_STANDARD	Secondary Fixed demand Measurements
	SecHa3MMXU1	MMXU_THIRD_HARMONIC_NO_VN	Secondary P341/P342 only Third Harmonic Measurements
	SecMMTR1	MMTR_PRIV	Secondary based Energy flow metering quantities
	SecPkdMSTA1	MSTA_STANDARD	Secondary Peak Demand measurements
	SecRmsMMXU1	MMXU_RMS	Secondary RMS measurements
	SecRodMSTA1	MSTA_STANDARD	Secondary Rolling Demand measurements
	SecSenMMXU1	MMXU_SENSITIVE	Secondary Sensitive Power measurements
	SecSeqMSQI1	MSQI_ALL	Secondary Sequence measurements
	SecStdMMXU1	MMXU_STANDARD_P341	Secondary Standard MMXU measurements for P341 only
Protection			
	CbfRBRF1	RBRF_EXTTRIP	CB Fail 1
	CbfRBRF2	RBRF_EXTTRIP	CB Fail 2
	CliAlmPTUC1	PTUC_NEU	CLIO Input 1 Alarm
	CliAlmPTUC2	PTUC_NEU	CLIO Input 2 Alarm
	CliAlmPTUC3	PTUC_NEU	CLIO Input 3 Alarm
	CliAlmPTUC4	PTUC_NEU	CLIO Input 4 Alarm
	CliRCLI1	RCLI_STANDARD	Current loop input supervision - channel 1
	CliRCLI2	RCLI_STANDARD	Current loop input supervision - channel 2
	CliRCLI3	RCLI_STANDARD	Current loop input supervision - channel 3
	CliRCLI4	RCLI_STANDARD	Current loop input supervision - channel 4
	CliTrpPTUC1	PTUC_NEU	Current Loop Input 1 Trip
	CliTrpPTUC2	PTUC_NEU	Current Loop Input 2 Trip
	CliTrpPTUC3	PTUC_NEU	Current Loop Input 3 Trip
	CliTrpPTUC4	PTUC_NEU	Current Loop Input 4 Trip

LD	LN Instance	LN Type	Description
	ConPLMP1	PLMP_NEU	Reconnection timer
	DfpPFRC1	PFRC_NO_SEG	df/dt> 1 Frequency Rate of Change
	DfpPFRC2	PFRC_NO_SEG	df/dt> 2 Frequency Rate of Change
	DfpPFRC3	PFRC_NO_SEG	df/dt> 3 Frequency Rate of Change
	DfpPFRC4	PFRC_NO_SEG	df/dt> 4 Frequency Rate of Change
	EftPTOC1	PTOC_NO_SEG	Earth fault - stage 1
	EftPTOC2	PTOC_NO_SEG	Earth fault - stage 2
	EftPTOC3	PTOC_NO_SEG	Earth fault - stage 3
	EftPTOC4	PTOC_NO_SEG	Earth fault - stage 4
	FrqPTOF1	PTOF_NO_SEG	F> 1 Overfrequency
	FrqPTOF2	PTOF_NO_SEG	F> 2 Overfrequency
	FrqPTUF1	PTUF_NO_SEG	F< 1 Underfrequency
	FrqPTUF2	PTUF_NO_SEG	F< 2 Underfrequency
	FrqPTUF3	PTUF_NO_SEG	F< 3 Underfrequency
	FrqPTUF4	PTUF_NO_SEG	F< 4 Underfrequency
	LLN0	LLN0_P341	LLN0 for P341
	LPHD1	LPHD_STANDARD	Physical Device Information
	NpsPTOC1	PTOC_NEU	NPS Overcurrent - stage 1
	NpsPTOC2	PTOC_NEU	NPS Overcurrent - stage 2
	NpsPTOC3	PTOC_NEU	NPS Overcurrent - stage 3
	NpsPTOC4	PTOC_NEU	NPS Overcurrent - stage 4
	NpsPTOV1	PTOV_NEU	NPS Overvoltage
	OcpPTOC1	PTOC_NEU	I>1Phase overcurrent
	OcpPTOC2	PTOC_NEU	I>2 Phase overcurrent
	OcpPTOC3	PTOC_NEU	I>3 Phase overcurrent
	OcpPTOC4	PTOC_NEU	I>4 Phase overcurrent
	PdpPPWR1	PPWR_NORMAL	Power protection (3-phase) stage 1
	PdpPPWR2	PPWR_NORMAL	Power protection (3-phase) stage 2
	PTRC1	PTRC_NO_SEG	Trip Conditioning
	SenPdpPPWR1	PPWR_NORMAL	Sensitive power (Single phase) stage 1
	SenPdpPPWR2	PPWR_NORMAL	Sensitive power (Single phase) stage 2
	SenRefPDIF1	PDIF_NEU	IREF> 1 Restricted Earth Fault
	SenSefPTOC1	PTOC_NO_SEG	ISEF>1 Protection

LD	LN Instance	LN Type	Description
	SenSefPTOC2	PTOC_NO_SEG	ISEF>2 Protection
	SenSefPTOC3	PTOC_NO_SEG	ISEF>3 Protection
	SenSefPTOC4	PTOC_NO_SEG	ISEF>4 Protection
	SvnRVCS1	RVCS_STANDARD_NO_CT2	Supervision without CTS2.
	ThmPTTR1	PTTR_NO_SEG_PRIV	Thermal Overload
	VtpPhsPTOV1	PTOV_NO_SEG	Phase Overvoltage - stage 1
	VtpPhsPTOV2	PTOV_NO_SEG	Phase Overvoltage - stage 2
	VtpPhsPTUV1	PTUV_NO_SEG	Phase Undervoltage - Stage 1
	VtpPhsPTUV2	PTUV_NO_SEG	Phase Undervoltage - Stage 2
	VtpResPTOV1	PTOV_NO_SEG	Residual Over Voltage - stage 1
	VtpResPTOV2	PTOV_NO_SEG	Residual Over Voltage - stage 2
	VtpResPTOV3	PTOV_NO_SEG	Residual Over Voltage - stage 3
	VtpResPTOV4	PTOV_NO_SEG	Residual Over Voltage - stage 4
	VvsPVSP1	PVSP_STANDARD	Voltage vector shift
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	GosGGIO1	GGIO_IND_64	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	LedGGIO1	GGIO_IND_8	8 programmable LEDS
	LLN0	LLN0_SYSTEM	Sys Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	OptGGIO1	GGIO_IND_24	Opto Inputs (24 off)
	OrdRunGGIO1	GGIO_IND_64	(64 off)Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND_32_CTRL	Controllable Inputs

LD	LN Instance	LN Type	Description
	RlyGGIO1	GGIO_IND_24	Output Contacts (24 off)

2.4

Logical Node definitions

The definition tables for each of the Logical Nodes in the top-level data model are presented in the following sub-sections.

The following table presents a summary of the Logical Node templates used across the Logical Devices within the overall IEC 61850 product data model:

LN Type	(LN)	Description	Name Space
CILO_INTERLOCK	(CILO)	Control Interlocking	IEC 61850-7-4:2003
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2003
GGIO_IND_24	(GGIO)	Generic Process I/O	IEC 61850-7-4:2003
GGIO_IND_32	(GGIO)	Generic Process I/O (w.r.t 32 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_32_CTRL	(GGIO)	Generic Process I/O	IEC 61850-7-4:2003
GGIO_IND_64	(GGIO)	Generic Process I/O(w.r.t 64 Indication Elements)	IEC 61850-7-4:2003
GGIO_IND_8	(GGIO)	Generic Process I/O (w.r.t 8 Indication Elements)	IEC 61850-7-4:2003
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2003
LLN0_SYSTEM	(LLN0)	System Logical Node 0	IEC 61850-7-4:2003
LLN0_P341	(LLN0)	Logical Node 0	IEC 61850-7-4:2003
LLN0_CONTROL	(LLN0)	Control Domain Logical Node 0	IEC 61850-7-4:2003
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2003
MMTR_PRIV	(MMTR)	Metering	IEC 61850-7-4:2003
MMXU_CSV	(MMXU)	Measurements for C/S	IEC 61850-7-4:2003
MMXU_DERIVED_P341	(MMXU)	Standard measurements (w.r.t Standard Values - P341)	IEC 61850-7-4:2003
MMXU_DFDT	(MMXU)	Standard measurements(for dfdt only)	IEC 61850-7-4:2003
MMXU_RMS	(MMXU)	Measurements (RMS values)	IEC 61850-7-4:2003
MMXU_SENSITIVE	(MMXU)	Sensitive measurements	IEC 61850-7-4:2003
MMXU_STANDARD_P341	(MMXU)	Standard measurements (w.r.t Fourier Derived Values - P341)	IEC 61850-7-4:2003
MMXU_THIRD_HARMONIC	(MMXU)	Measurements (w.r.t 3rd Harmonic, no VN for P341/P342)	IEC 61850-7-4:2003
_NO_VNMSQI_ALL	(MSQI)	Sequence and imbalance (w.r.t Pos, Neg, Zero)	IEC 61850-7-4:2003
MSTA_STANDARD	(MSTA)	Standard measurements (w.r.t Fourier Derived Values)	IEC 61850-7-4:2003
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2003
PFRC_NO_SEG	(PFRC)	Rate of change of frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PLMP_NEU	(PLMP)	Loss of mains protection, similar to PTOC but without current setting and modified meanings for the pick up and drop off timers	SE-SII:PCS-Px40
PPWR_NORMAL	(PPWR)	Power Protection with Pole Dead Inhibit	SE-SII:PCS-Px40

LN Type	(LN)	Description	Name Space
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC 61850-7-4:2003
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTOF_NO_SEG	(PTOF)	Overfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC 61850-7-4:2003
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2003
PTRC_NO_SEG	(PTRC)	Protection trip conditioning (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTTR_NO_SEG_PRIV	(PTTR)	Thermal overload for Thermal State and NPS Thermal (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUC_NEU	(PTUC)	Models timed under-current protection	IEC 61850-7-2:2003
PTUF_NO_SEG	(PTUF)	Underfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PTUV_NO_SEG	(PTUV)	Undervoltage (w.r.t No Phase Segregation)	IEC 61850-7-4:2003
PVSP_STANDARD	(PVSP)	Voltage Vector Shift protection	SE-SII:PCS-Px40
RBRF_EXTTRIP	(RBRF)	Breaker Failure (w.r.t External Tripping)	IEC 61850-7-4:2003
RCLI_STANDARD	(RCLI)	Current loop monitoring and reporting	SE-SII:PCS-Px40
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2003
RSYN_DIFCLC	(RSYN)	Synchronism-check / Synchronising (w.r.t Calculated Differential Measurements)	IEC 61850-7-4:2003
RVCS_STANDARD_NO_C	(RVCS)	VTS/CTS monitoring and report	SE-SII:PCS-Px40
T2XCBR_BASIC_ALL	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes Only)	IEC 61850-7-4:2003

2.4.1

Logical Node: **CILO_INTERLOCK**

Description: Control Interlocking

LN Class: CILO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
EnaOpn	SPS_WD	Enable OPEN Commands		
EnaCls	SPS_WD	Enable CLOSE Commands		

2.4.2

Logical Node: **GGIO_ALM_96**

Description: Generic Process I/O (w.r.t 96 Alarm Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Alm1	SPS_D	General single alarm		
Alm2	SPS_D	General single alarm		
Alm3	SPS_D	General single alarm		
Alm4	SPS_D	General single alarm		
Alm5	SPS_D	General single alarm		
Alm6	SPS_D	General single alarm		
Alm7	SPS_D	General single alarm		
Alm8	SPS_D	General single alarm		
Alm9	SPS_D	General single alarm		
Alm10	SPS_D	General single alarm		
Alm11	SPS_D	General single alarm		
Alm12	SPS_D	General single alarm		
Alm13	SPS_D	General single alarm		
Alm14	SPS_D	General single alarm		
Alm15	SPS_D	General single alarm		
Alm16	SPS_D	General single alarm		
Alm17	SPS_D	General single alarm		
Alm18	SPS_D	General single alarm		
Alm19	SPS_D	General single alarm		
Alm20	SPS_D	General single alarm		
Alm21	SPS_D	General single alarm		
Alm22	SPS_D	General single alarm		
Alm23	SPS_D	General single alarm		
Alm24	SPS_D	General single alarm		
Alm25	SPS_D	General single alarm		
Alm26	SPS_D	General single alarm		
Alm27	SPS_D	General single alarm		
Alm28	SPS_D	General single alarm		
Alm29	SPS_D	General single alarm		
Alm30	SPS_D	General single alarm		
Alm31	SPS_D	General single alarm		
Alm32	SPS_D	General single alarm		
Alm33	SPS_D	General single alarm		
Alm34	SPS_D	General single alarm		
Alm35	SPS_D	General single alarm		
Alm36	SPS_D	General single alarm		
Alm37	SPS_D	General single alarm		
Alm38	SPS_D	General single alarm		
Alm39	SPS_D	General single alarm		
Alm40	SPS_D	General single alarm		
Alm41	SPS_D	General single alarm		
Alm42	SPS_D	General single alarm		
Alm43	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm44	SPS_D	General single alarm		
Alm45	SPS_D	General single alarm		
Alm46	SPS_D	General single alarm		
Alm47	SPS_D	General single alarm		
Alm48	SPS_D	General single alarm		
Alm49	SPS_D	General single alarm		
Alm50	SPS_D	General single alarm		
Alm51	SPS_D	General single alarm		
Alm52	SPS_D	General single alarm		
Alm53	SPS_D	General single alarm		
Alm54	SPS_D	General single alarm		
Alm55	SPS_D	General single alarm		
Alm56	SPS_D	General single alarm		
Alm57	SPS_D	General single alarm		
Alm58	SPS_D	General single alarm		
Alm59	SPS_D	General single alarm		
Alm60	SPS_D	General single alarm		
Alm61	SPS_D	General single alarm		
Alm62	SPS_D	General single alarm		
Alm63	SPS_D	General single alarm		
Alm64	SPS_D	General single alarm		
Alm65	SPS_D	General single alarm		
Alm66	SPS_D	General single alarm		
Alm67	SPS_D	General single alarm		
Alm68	SPS_D	General single alarm		
Alm69	SPS_D	General single alarm		
Alm70	SPS_D	General single alarm		
Alm71	SPS_D	General single alarm		
Alm72	SPS_D	General single alarm		
Alm73	SPS_D	General single alarm		
Alm74	SPS_D	General single alarm		
Alm75	SPS_D	General single alarm		
Alm76	SPS_D	General single alarm		
Alm77	SPS_D	General single alarm		
Alm78	SPS_D	General single alarm		
Alm79	SPS_D	General single alarm		
Alm80	SPS_D	General single alarm		
Alm81	SPS_D	General single alarm		
Alm82	SPS_D	General single alarm		
Alm83	SPS_D	General single alarm		
Alm84	SPS_D	General single alarm		
Alm85	SPS_D	General single alarm		
Alm86	SPS_D	General single alarm		
Alm87	SPS_D	General single alarm		

Attribute	Attr. Type	Explanation	T	X
Alm88	SPS_D	General single alarm		
Alm89	SPS_D	General single alarm		
Alm90	SPS_D	General single alarm		
Alm91	SPS_D	General single alarm		
Alm92	SPS_D	General single alarm		
Alm93	SPS_D	General single alarm		
Alm94	SPS_D	General single alarm		
Alm95	SPS_D	General single alarm		
Alm96	SPS_D	General single alarm		

2.4.3

Logical Node: GGIO_IND_24

Description: Generic Process I/O

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPit	LPL_LN	name Plate		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		
Ind3	SPS_D	General Indication		
Ind4	SPS_D	General Indication		
Ind5	SPS_D	General Indication		
Ind6	SPS_D	General Indication		
Ind7	SPS_D	General Indication		
Ind8	SPS_D	General Indication		
Ind9	SPS_D	General Indication		
Ind10	SPS_D	General Indication		
Ind11	SPS_D	General Indication		
Ind12	SPS_D	General Indication		
Ind13	SPS_D	General Indication		
Ind14	SPS_D	General Indication		
Ind15	SPS_D	General Indication		
Ind16	SPS_D	General Indication		
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		
Ind19	SPS_D	General Indication		
Ind20	SPS_D	General Indication		
Ind21	SPS_D	General Indication		
Ind22	SPS_D	General Indication		
Ind23	SPS_D	General Indication		

Attribute	Attr. Type	Explanation	T	X
Ind24	SPS_D	General Indication		

2.4.4

Logical Node: GGIO_IND_32

Description: Generic Process I/O (w.r.t 32 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind32	SPS_D	General indication (binary input)		

2.4.5

Logical Node: GGIO_IND_32_CTRL

Description: Generic Process I/O

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SPCSO1	SPC_CONTROL	Single point controllable status output		
SPCSO2	SPC_CONTROL	Single point controllable status output		
SPCSO3	SPC_CONTROL	Single point controllable status output		
SPCSO4	SPC_CONTROL	Single point controllable status output		
SPCSO5	SPC_CONTROL	Single point controllable status output		
SPCSO6	SPC_CONTROL	Single point controllable status output		
SPCSO7	SPC_CONTROL	Single point controllable status output		
SPCSO8	SPC_CONTROL	Single point controllable status output		
SPCSO9	SPC_CONTROL	Single point controllable status output		
SPCSO10	SPC_CONTROL	Single point controllable status output		
SPCSO11	SPC_CONTROL	Single point controllable status output		
SPCSO12	SPC_CONTROL	Single point controllable status output		
SPCSO13	SPC_CONTROL	Single point controllable status output		
SPCSO14	SPC_CONTROL	Single point controllable status output		
SPCSO15	SPC_CONTROL	Single point controllable status output		
SPCSO16	SPC_CONTROL	Single point controllable status output		
SPCSO17	SPC_CONTROL	Single point controllable status output		
SPCSO18	SPC_CONTROL	Single point controllable status output		
SPCSO19	SPC_CONTROL	Single point controllable status output		
SPCSO20	SPC_CONTROL	Single point controllable status output		
SPCSO21	SPC_CONTROL	Single point controllable status output		
SPCSO22	SPC_CONTROL	Single point controllable status output		
SPCSO23	SPC_CONTROL	Single point controllable status output		
SPCSO24	SPC_CONTROL	Single point controllable status output		
SPCSO25	SPC_CONTROL	Single point controllable status output		
SPCSO26	SPC_CONTROL	Single point controllable status output		
SPCSO27	SPC_CONTROL	Single point controllable status output		
SPCSO28	SPC_CONTROL	Single point controllable status output		
SPCSO29	SPC_CONTROL	Single point controllable status output		
SPCSO30	SPC_CONTROL	Single point controllable status output		
SPCSO31	SPC_CONTROL	Single point controllable status output		

Attribute	Attr. Type	Explanation	T	X
SPCSO32	SPC_CONTROL	Single point controllable status output		

2.4.6

Logical Node: GGIO_IND_64

Description: Generic Process I/O(w.r.t 64 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		
Ind6	SPS_D	General indication (binary input)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		
Ind9	SPS_D	General indication (binary input)		
Ind10	SPS_D	General indication (binary input)		
Ind11	SPS_D	General indication (binary input)		
Ind12	SPS_D	General indication (binary input)		
Ind13	SPS_D	General indication (binary input)		
Ind14	SPS_D	General indication (binary input)		
Ind15	SPS_D	General indication (binary input)		
Ind16	SPS_D	General indication (binary input)		
Ind17	SPS_D	General indication (binary input)		
Ind18	SPS_D	General indication (binary input)		
Ind19	SPS_D	General indication (binary input)		
Ind20	SPS_D	General indication (binary input)		
Ind21	SPS_D	General indication (binary input)		
Ind22	SPS_D	General indication (binary input)		
Ind23	SPS_D	General indication (binary input)		
Ind24	SPS_D	General indication (binary input)		
Ind25	SPS_D	General indication (binary input)		
Ind26	SPS_D	General indication (binary input)		
Ind27	SPS_D	General indication (binary input)		
Ind28	SPS_D	General indication (binary input)		
Ind29	SPS_D	General indication (binary input)		
Ind30	SPS_D	General indication (binary input)		
Ind31	SPS_D	General indication (binary input)		
Ind32	SPS_D	General indication (binary input)		
Ind33	SPS_D	General indication (binary input)		
Ind34	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind35	SPS_D	General indication (binary input)		
Ind36	SPS_D	General indication (binary input)		
Ind37	SPS_D	General indication (binary input)		
Ind38	SPS_D	General indication (binary input)		
Ind39	SPS_D	General indication (binary input)		
Ind40	SPS_D	General indication (binary input)		
Ind41	SPS_D	General indication (binary input)		
Ind42	SPS_D	General indication (binary input)		
Ind43	SPS_D	General indication (binary input)		
Ind44	SPS_D	General indication (binary input)		
Ind45	SPS_D	General indication (binary input)		
Ind46	SPS_D	General indication (binary input)		
Ind47	SPS_D	General indication (binary input)		
Ind48	SPS_D	General indication (binary input)		
Ind49	SPS_D	General indication (binary input)		
Ind50	SPS_D	General indication (binary input)		
Ind51	SPS_D	General indication (binary input)		
Ind52	SPS_D	General indication (binary input)		
Ind53	SPS_D	General indication (binary input)		
Ind54	SPS_D	General indication (binary input)		
Ind55	SPS_D	General indication (binary input)		
Ind56	SPS_D	General indication (binary input)		
Ind57	SPS_D	General indication (binary input)		
Ind58	SPS_D	General indication (binary input)		
Ind59	SPS_D	General indication (binary input)		
Ind60	SPS_D	General indication (binary input)		
Ind61	SPS_D	General indication (binary input)		
Ind62	SPS_D	General indication (binary input)		
Ind63	SPS_D	General indication (binary input)		
Ind64	SPS_D	General indication (binary input)		

2.4.7

Logical Node: GGIO_IND_8

Description: Generic Process I/O (w.r.t 8 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Ind1	SPS_D	General indication (binary input)		
Ind2	SPS_D	General indication (binary input)		
Ind3	SPS_D	General indication (binary input)		
Ind4	SPS_D	General indication (binary input)		
Ind5	SPS_D	General indication (binary input)		

Attribute	Attr. Type	Explanation	T	X
Ind6	SPS_D	General indication (binary input)		
Ind7	SPS_D	General indication (binary input)		
Ind8	SPS_D	General indication (binary input)		

2.4.8

Logical Node: LLN0_CONTROL

Description: Control Domain Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
AscMod	INC_CTRL_PRIV	Check Synchronisation		X
AscBeh	INS_BEH_D_PRIV	Check Synchronisation		X

2.4.9

Logical Node: LLN0_P341

Description: Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
PdpMod	INC_CTRL_PRIV	Power Protection Mode		
PdpBeh	INS_BEH_D_PRIV	Power Protection Behaviour		
EftMod	INC_CTRL_PRIV	Earth Fault 1 (Measured) Mode		
EftBeh	INS_BEH_D_PRIV	Earth Fault 1 (Measured) Behaviour		
FrqMod	INC_CTRL_PRIV	Overfrequency/Underfrequency Mode		
SenMod	INC_CTRL_PRIV	Sensitive Power Mode		
FrqBeh	INS_BEH_D_PRIV	Overfrequency/Underfrequency Behaviour		
SenBeh	INS_BEH_D_PRIV	Sensitive Power Behaviour		
DfpMod	INC_CTRL_PRIV	df/dt Mode		
DfpBeh	INS_BEH_D_PRIV	df/dt Behaviour		
ThmMod	INC_CTRL_PRIV	Thermal Overload Mode		
ThmBeh	INS_BEH_D_PRIV	Thermal Overload Behaviour		
CbfMod	INC_CTRL_PRIV	CB Fail Mode		
CbfBeh	INS_BEH_D_PRIV	Circuit Breaker Fail Behaviour		
SvnBeh	INS_BEH_D_PRIV	VTS/CTS Supervision Behaviour		
SvnMod	INC_CTRL_PRIV	VTS/CTS Supervision Mode		
NvdMod	INC_CTRL_PRIV	Residual Overvoltage NVD Mode		
NvdBeh	INS_BEH_D_PRIV	Residual Overvoltage NVD Behaviour		
VtpMod	INC_CTRL_PRIV	Overvoltage/Undervoltage Mode		
VtpBeh	INS_BEH_D_PRIV	Overvoltage/Undervoltage Behaviour		

Attribute	Attr. Type	Explanation	T	X
VvsMod	INC_CTRL_PRIV	Voltage vector Shift Mode		
VvsBeh	INS_BEH_D_PRIV	Voltage vector shift Behaviour		
OcpMod	INC_CTRL_PRIV	Overcurrent Mode		
OcpBeh	INS_BEH_D_PRIV	Overcurrent Behaviour		
RctMod	INC_CTRL_PRIV	Reconnection Delay Mode		
RctBeh	INS_BEH_D_PRIV	Reconnection Delay Behaviour		
CliMod	INC_CTRL_PRIV	CLIO Inputs Mode		
CliBeh	INS_BEH_D_PRIV	CLIO Inputs Behaviour		
SefMod	INC_CTRL_PRIV	SEF/REF Mode		
SefBeh	INS_BEH_D_PRIV	SEF/REF Behaviour		
SycMod	INC_CTRL_PRIV	System Checks Mode		
SycBeh	INS_BEH_D_PRIV	System Checks Behaviour		

2.4.10 Logical Node: LLN0_STANDARD

Description: General Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		

2.4.11 Logical Node: LLN0_SYSTEM

Description: System Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LLN0	Name Plate		
LEDRs	SPC_CONTROL	LED reset	T	
OrdRun	SPS_WD_NS	Indicate the IED is operating a control object (Order Running)		X
SyncSt	SPS_WD_NS	Indicate time synchronisation in the IED is active or inactive		X

2.4.12 Logical Node: LPHD_STANDARD

Description: Px40 Physical Device Information

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical device name plate		
PhyHealth	INS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		

Attribute	Attr. Type	Explanation	T	X
PwrUp	SPS_D	Power up detected		

2.4.13**Logical Node: MMTR_PRIV**

Description: Metering

LN Class: MMTR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SupWh	BCR_PRIV	Real energy supply (Energy flow towards bus bar)		
SupVARh	BCR_PRIV	Reactive energy supply (Energy flow towards bus bar)		
DmdWh	BCR_PRIV	Real energy demand (Energy flow from bus bar)		
DmdVARh	BCR_PRIV	Reactive energy demand (Energy flow from bus bar)		
MTRRs	SPC_CTRL_PRIV	Reset Energy Measurements		X

2.4.14**Logical Node: MMXU_CSV**

Description: Measurements for C/S

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
CSVol	WYE_RES_ANG_D_NS	C/S Voltage		X

2.4.15**Logical Node: MMXU_DERIVED_P341**

Description: Standard measurements (w.r.t Standard Values - P341)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Hz	MV_FLOAT			
PPV	DEL_SEG	Phase-Phase Magnitudes		
A	WYE_SEG	IN-I derived magnitude		
A2	WYE_RES_ANG_D	IN Derived Magnitude Angle		
W	WYE_SEG	Phase watts		
VA	WYE_SEG	VA 3 phase		

Attribute	Attr. Type	Explanation	T	X
PF	WYE_SEG			
AngA	WYE_SEG_NS	IN-I Derived magnitude angle		
AngPPV	DEL_SEG_NS	Phase-Phase Angles		
AvgPF	MV_FLOAT_NS			
AngV	WYE_SEG_NS	VN derived angle		
AvgWatts	MV_FLOAT_NS			
AvgVArS	MV_FLOAT_NS			
AvgVA	MV_FLOAT_NS	3 phase Average VA		
V	WYE_SEG_NS	VN derived magnitude		
VArS	WYE_SEG_NS	Phase VArS		
VN	WYE_RES_ANG_D_NS	VN Derived Magnitude Angle		

2.4.16 Logical Node: MMXU_DFDT

Description: Standard measurements(for dfdt only)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Dfdt	MV_FLOAT_NS	df/dt		X

2.4.17 Logical Node: MMXU_RMS

Description: Measurements (RMS values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Beh	INS_BEH	Behaviour		
Mod	INC_MOD	Mode		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
PhV	WYE_SEG	Phase to Ground voltages		
A	WYE_SEG	RMS Current		

2.4.18 Logical Node: MMXU_SENSITIVE

Description: Sensitive measurements

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
A	WYE_SEG_PHASEA	Current Sensitive		
W	WYE_RES_MAG_NS	watts		

Attribute	Attr. Type	Explanation	T	X
PwrAng	MV_FLOAT_NS	Power angle		X
VArs	MV_FLOAT_NS	VArs		X

2.4.19**Logical Node: MMXU_STANDARD_P341**

Description: Standard measurements (w.r.t Fourier Derived Values - P341)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
VN	WYE_RES_ANG_D_NS			

2.4.20**Logical Node: MMXU_THIRD_HARMONIC_NO_VN**

Description: Measurements (w.r.t 3rd Harmonic, no VN for P341/P342)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		

2.4.21**Logical Node: MSQI_ALL**

Description: Sequence and imbalance (w.r.t Pos, Neg, Zero)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
SeqA	SEQ_MAG_ANG	Positive, Negative and Zero sequence current		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero sequence voltage		

2.4.22**Logical Node: MSTA_STANDARD**

Description: Standard measurements (w.r.t Fourier Derived Values)

LN Class: MSTA

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		

Attribute	Attr. Type	Explanation	T	X
TotRtPwr	MV_FLOAT_NS	Total reactive power (Total Q)		X
TotPwr	MV_FLOAT_NS	Total active power (Total P)		X
PhApPwr	WYE_SEG_NS	Phase apparent power (S)		X

2.4.23**Logical Node: PDIF_NEU**

Description: Differential (w.r.t Neutral)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Op	ACT_NO_SEG	Operate	T	

2.4.24**Logical Node: PFRC_NO_SEG**

Description: Rate of change of frequency (w.r.t No Phase Segregation)

LN Class: PFRC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.25**Logical Node: PLMP_NEU**

Description: Loss of mains protection, similar to PTOC but without current setting and modified meanings for the pickup and drop off timers

LN Class: PLMP

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_P	Name Plate		
Op	ACT_NO_SEG	Operate (Trip)		

2.4.26**Logical Node: PPWR_NORMAL**

Description: Power Protection with Pole Dead Inhibit

LN Class: PPWR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN_P	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Trip	T	

2.4.27 Logical Node: PTOC_NEU

Description: Timed Overcurrent (w.r.t Neutral)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.28 Logical Node: PTOC_NO_SEG

Description: Timed Overcurrent (w.r.t No Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.29 Logical Node: PTOF_NO_SEG

Description: Overfrequency (w.r.t No Phase Segregation)

LN Class: PTOF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.30 Logical Node: PTOV_NEU

Description: Overvoltage (w.r.t Neutral)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		

Attribute	Attr. Type	Explanation	T	X
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.31**Logical Node: PTOV_NO_SEG**

Description: Overvoltage (w.r.t Phase Segregation)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.32**Logical Node: PTRC_NO_SEG**

Description: Protection trip conditioning (w.r.t No Phase Segregation)

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Tr	ACT_NO_SEG	Trip		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

2.4.33**Logical Node: PTTR_NO_SEG_PRIV**

Description: Thermal overload for Thermal State and NPS Thermal (w.r.t No Phase Segregation)

LN Class: PTTR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
TmpRI	MV_FLOAT	Relation between temperature and maximum temperature		
Op	ACT_NO_SEG	Operate	T	
AlmThm	ACT_NO_SEG	Thermal alarm	T	

Attribute	Attr. Type	Explanation	T	X
MTRRs	SPC_CTRL_PRIV	Reset Thermal State		X

2.4.34**Logical Node: PTUC_NEU**

Description: Models timed under-current protection

LN Class: PTUC

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Started		
Op	ACT_NO_SEG	Operate	T	
ModOvA	SPS_WD_NS	Overcurrent Mode Indication		X

2.4.35**Logical Node: PTUF_NO_SEG**

Description: Underfrequency (w.r.t No Phase Segregation)

LN Class: PTUF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.36**Logical Node: PTUV_NO_SEG**

Description: Undervoltage (w.r.t No Phase Segregation)

LN Class: PTUV

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

2.4.37**Logical Node: PVSP_STANDARD**

Description: Voltage Vector Shift protection

LN Class: PVSP

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		

Attribute	Attr. Type	Explanation	T	X
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_P	name plate with namespace		
Op	ACT_NO_SEG	Trip status	T	
StrVal	ASG_FLOAT	V Shift Angle		

2.4.38**Logical Node: RBRF_EXTTRIP**

Description: Breaker Failure (w.r.t External Tripping)

LN Class: RBRF

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
OpEx	ACT_NO_SEG	Breaker failure trip ("External trip")	T	

2.4.39**Logical Node: RCLI_STANDARD**

Description: Current loop monitoring and reporting

LN Class: RCLI

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_P	Name Plate		
Val	MV_FLOAT	current loop input measured value		
Blk	SPS_WD	Block (TRUE = current loop blocked)		
Min	ASG_FLOAT	Minimum input of current loop		
Max	ASG_FLOAT	Maximum input of current loop		

2.4.40**Logical Node: RDRE_BASIC**

Description: Disturbance Recorder function (w.r.t Mandatory Attributes only)

LN Class: RDRE

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
RcdMade	SPS_WD	Recording made		
FltNum	INS_BASIC	Fault number		

2.4.41**Logical Node: RSYN_DIFCLC**

Description: Synchronism-check / Synchronising (w.r.t Calculated Differential Measurements)

LN Class: RSYN

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Rel	SPS_WD	Release		
VInd	SPS_WD	Voltage difference indicator		
AngInd	SPS_WD	Angle difference indicator		
HzInd	SPS_WD	Frequency difference indicator		
DifVClc	MV_FLOAT	Calculated difference in voltage		
DifHzClc	MV_FLOAT	Calculated difference in frequency		
DifAngClc	MV_FLOAT	Calculated difference of phase angle		

2.4.42**Logical Node: RVCS_STANDARD_NO_CT2**

Description: VTS/CTS monitoring and report

LN Class: RVCS

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN_P	Name Plate		
SlwVTSBlk	SPS_D	slow VTS block status		
FstVTSBlk	SPS_D	fast VTS block status		
CTSBk	SPS_D	CTS block status		

2.4.43**Logical Node: XCBR_BASIC_ALL**

Description: Circuit Breaker (w.r.t Mandatory Attributes only)

LN Class: XCBR

Attribute	Attr. Type	Explanation	T	X
Mod	INC_MOD	Mode		
Beh	INS_BEH	Behaviour		
Health	INS_HEALTH	Health		
NamPlt	LPL_LN	Name Plate		
Loc	SPS_WD	Local operation		
EEHealth	INS_HEALTH	External equipment health		
OpCnt	INS_BASIC	Operation counter		
Pos	DPC_STATUS_P341	Switch position		
BlkOpn	SPC_STATUS	Block opening		
BlkCls	SPC_STATUS	Block closing		
CBOpCap	INS_CB_OPCAP	Circuit Breaker operating capability		

Attribute	Attr. Type	Explanation	T	X
Lock	SPC_CTRL_PRIV	Prevention, i.e. Lock, Trip/Close Operation of Circuit Breaker over IEC 61850		X

2.5 Common Data Class definitions

The definition tables for each of the Common Data Classes used in the Logical Node definitions are presented in the following sub-sections.

From an application point-of-view the data attributes of a Common Data Class are classified according to their specific use. The characterization of data attributes, and the services that they support/provide, will be through the use of 'Functional Constraints'. The Functional Constraints are specified by the table below:

FC Name	Semantic	Source Definition
BR	Buffered reports	IEC 61850-7-2
CF	Configuration	IEC 61850-7-2
CO	Control	IEC 61850-7-2
DC	Description	IEC 61850-7-2
EX	Extended Definition	IEC 61850-7-2
GO	GOOSE Control	IEC 61850-7-2
GS	GSSE Control (UCA2 GOOSE)	IEC 61850-7-2
LG	Logging	IEC 61850-7-2
MS	Multicast sampled value control	IEC 61850-7-2
MX	Measurands (Analogue values)	IEC 61850-7-2
RP	Unbuffered reports	IEC 61850-7-2
SE	Setting Group Editable	IEC 61850-7-2
SG	Setting Group	IEC 61850-7-2
SP	Set Point	IEC 61850-7-2
ST	Status Information	IEC 61850-7-2
SV	Substitution Values	IEC 61850-7-2
US	Unicast sampled value control	IEC 61850-7-2
XX	Data attribute service parameters	IEC 61850-7-2

2.5.1 Common Data Class: ACD_NO_SEG

Description: Directional Protection Activation Information (w,r,t No Phase Segregation)

CDC Class: ACD

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
dirGeneral	ENUMERATED8 (MMS Type: INT8)	ST	dir	General direction (unknown, forward, backward or both)	
q	Quality	ST		Quality of the protection activation information	

Attribute	Type	FC	Enumeration	Comment	X
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.2 Common Data Class: ACT_NO_SEG

Description: Protection Activation Information (w.r.t No Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

2.5.3 Common Data Class: ASG_FLOAT

Description: Analogue Setting

CDC Class: ASG

Attribute	Type	FC	Enumeration	Comment	X
setMag	AnalogueValue_Float	SE		Setting value	
d	VISIBLE_STRING255	DC		Description of the status element	
units	Unit_multiplier	CF		Unit of the attribute representing the data	

2.5.4 Common Data Class: BCR_PRIV

Description: Binary Counter Reading

CDC Class: BCR

Attribute	Type	FC	Enumeration	Comment	X
actVal	INT128	ST		Binary counter status represented as an integer	
q	Quality	ST		Quality of counter value	
t	TimeStamp	ST		Time of last counter change	
pulsQty	FLOAT32	CF		Magnitude of the counted value 'per count' (value = actVal x pulsQty)	

2.5.5 Common Data Class: CMV_MAG_ANG_FLOAT

Description: Complex Measured value (w.r.t Floating Point Magnitude and Angle)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_MagnitudeAngle_Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

2.5.6

Common Data Class: CMV_MAG_FLOAT

Description: Complex Measured value (w.r.t Floating Point Magnitude)

CDC Class: CMV

Attribute	Type	FC	Enumeration	Comment	X
cVal	Vector_Magnitude_Float	MX		Deadbanded complex measured vector. Updated to the current value of instCVal when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

2.5.7

Common Data Class: DEL_SEG

Description: Phase to phase measurements for a 3-Phase system (w.r.t Phase Segregation)

CDC Class: DEL

Attribute	Type	FC	Enumeration	Comment	X
phsAB	CMV_MAG_FLOAT	--		Measurement values for Phase A to Phase B	
phsBC	CMV_MAG_FLOAT	--		Measurement values for Phase B to Phase C	
phsCA	CMV_MAG_FLOAT	--		Measurement values for Phase C to Phase A	

2.5.8**Common Data Class: DEL_SEG_NS**

Description: DEL_SEG with namespace DO dataNs

CDC Class: DEL

Attribute	Type	FC	Enumeration	Comment	X
phsAB	CMV_MAG_FLOAT	--		Measurement values for Phase A to Phase B	
phsBC	CMV_MAG_FLOAT	--		Measurement values for Phase B to Phase C	
phsCA	CMV_MAG_FLOAT	--		Measurement values for Phase C to Phase A	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.9**Common Data Class: DPC_STATUS_P341**

Description: Controllable Double Point (w.r.t Status only)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	CODED_ENUM (MMS Type: _BSTR2)	ST	Dbpos	Status value of the data (Intermediate state, Off, On or Bad-state)	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

2.5.10**Common Data Class: DPL_STANDARD**

Description: Standard Device Name Plate

CDC Class: DPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	

Attribute	Type	FC	Enumeration	Comment	X
hwRev	VISIBLE_STRING255	DC		Hardware revision	
swRev	VISIBLE_STRING255	DC		Software revision	
serNum	VISIBLE_STRING255	DC		Serial Number	
model	VISIBLE_STRING255	DC		Model Number	
location	VISIBLE_STRING255	DC		Physical location of device	

2.5.11

Common Data Class: INC_CTRL_PRIV

Description: Controllable Integer Status

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	INT32	CO		Control value	
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.12

Common Data Class: INC_MOD

Description: Controllable Integer Status (w.r.t Mode)

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Mod	Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

2.5.13

Common Data Class: INS_BASIC

Description: Integer Status (w.r.t Mandatory Options only)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	ST		The element status	

Attribute	Type	FC	Enumeration	Comment	X
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.14 Common Data Class: **INS_BEH**

Description: Integer Status (w.r.t Behaviour)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.15 Common Data Class: **INS_BEH_D_PRIV**

Description: Integer Status (w.r.t Behaviour, with Description (Private DO))

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Beh	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.16 Common Data Class: **INS_CB_OPCAP**

Description: Integer Status (w.r.t CB Operating capability)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	CBOpCap	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.17 Common Data Class: **INS_HEALTH**

Description: Integer Status (w.r.t health)

CDC Class: INS

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32 (MMS Type: INT8)	ST	Health	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.18**Common Data Class: LPL_LLNO**

Description: Logical Node 0 Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
configRev	VISIBLE_STRING255	DC		Uniquely identifies the configuration of a local device instance	
ldNs	VISIBLE_STRING255	EX		Logical Device name space	

2.5.19**Common Data Class: LPL_LN**

Description: Standard Logical Node Name Plate

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	

2.5.20**Common Data Class: LPL_LN_P**

Description: Logical Node Name Plate for Propriety LN

CDC Class: LPL

Attribute	Type	FC	Enumeration	Comment	X
vendor	VISIBLE_STRING255	DC		Name of the vendor	
swRev	VISIBLE_STRING255	DC		Software revision	
d	VISIBLE_STRING255	DC		Description	
lnNs	VISIBLE_STRING255	EX		Logical Node name space	

2.5.21**Common Data Class: MV_FLOAT**

Description: Measured value (w.r.t. Floating Point value)

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

2.5.22

Common Data Class: MV_FLOAT_NS

Description: MV_FLOAT with dataNs for extra Dos

CDC Class: MV

Attribute	Type	FC	Enumeration	Comment	X
mag	AnalogueValue_Float	MX		Deadbanded magnitude of the instantaneous value of a measured value or harmonic value. Updated to the current value of instMag when the value has changed according to the configuration parameter db.	
q	Quality	MX		Quality of the measurement value	
t	TimeStamp	MX		Time deadbanded magnitude last exceeded its db configuration parameter	
units	Unit_multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_Deadband	CF		Measurement range configuration attributes	

Attribute	Type	FC	Enumeration	Comment	X
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.23

Common Data Class: SEQ_MAG_ANG

Description: Sequence components of a measurement value (w.r.t Magnitudes + Angles)

CDC Class: SEQ

Attribute	Type	FC	Enumeration	Comment	X
c1	CMV_MAG_ANG_FLOAT	--		Sequence component 1 (For semantic meaning see seqT)	
c2	CMV_MAG_ANG_FLOAT	--		Sequence component 2 (For semantic meaning see seqT)	
c3	CMV_MAG_ANG_FLOAT	--		Sequence component 3 (For semantic meaning see seqT)	
seqT	ENUMERATED8 (MMS Type: INT8)	MX	seqT	Sequence quantity measurement type (Pos-Neg-Zero or Dir-Quad-Zero)	

2.5.24

Common Data Class: SPC_CONTROL

Description: Controllable Single Point

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	

2.5.25

Common Data Class: SPC_CTRL_PRIV

Description: Controllable Single Point

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	BOOLEAN	CO		Control value (Off - FALSE, On - TRUE)	

Attribute	Type	FC	Enumeration	Comment	X
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	
sboTimeout	INT32U	CF		Select Before Operate timeout period (in milliseconds)	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.26**Common Data Class: SPC_STATUS**

Description: Controllable Single Point (w.r.t Status only)

CDC Class: SPC

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		Status value of the data	
q	Quality	ST		Quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state of status value	
ctlModel	ENUMERATED8 (MMS Type: INT8)	CF	ctlModel	Control model (Corresponding to the behaviour of the data)	

2.5.27**Common Data Class: SPS_D**

Description: Standard Single Point Status (with Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.28**Common Data Class: SPS_WD**

Description: Single Point Status (without Description)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

2.5.29**Common Data Class: SPS_WD_NS**

Description: Single Point Status (without Description, with namespace)

CDC Class: SPS

Attribute	Type	FC	Enumeration	Comment	X
stVal	BOOLEAN	ST		The element status (TRUE or FALSE)	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.30**Common Data Class: WYE_RES_ANG_D**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Residual + Description + Angle)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	
d	VISIBLE_STRING255	DC		Description of the status element	

2.5.31**Common Data Class: WYE_RES_ANG_D_NS**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Residual + Description + Angle)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.32**Common Data Class: WYE_RES_MAG_NS**

Description: Phase to ground measurements for a 1-Phase system, magnitude only

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
res	CMV_MAG_FLOAT	--		Measurement values for the residual system current	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.33**Common Data Class: WYE_SEG**

Description: Phase to ground measurements for a 3-Phase system (w.r.t Phase Segregation)

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	

2.5.34**Common Data Class: WYE_SEG_NS**

Description: WYE_SEG with dataNs DO

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_FLOAT	--		Measurement values for Phase A	
phsB	CMV_MAG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_FLOAT	--		Measurement values for Phase C	
dataNs	VISIBLE_STRING255	EX		Data name space	

2.5.35**Common Data Class: WYE_SEG_PHASEA**

Description: Phase to ground measurements for a 3-Phase system

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
phsA	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase A	

2.6**Common data attribute type definitions**

Common data attribute types, known herein as components, are defined for use in the Common Data Classes defined in the sections above.

2.6.1**Component: AnalogueValue_Float**

Comment: General analogue value (w.r.t Floating Point value)

Parent Type: AnalogueValue

Attribute	Type	Enumeration	Comment	X
f	FLOAT32		Floating point value	

2.6.2**Component: Originator**

Comment: Originator of the last change of data attribute representing the value of a controllable data object

Parent Type:

Attribute	Type	Enumeration	Comment	X
orIdent	OCTET_STRING64		Originator identification (Null value indicates unknown or not reported)	
orCat	ENUMERATED8 (MMS Type: INT8)	orCategory	Originator category (Not-supported, bay-control, station-control, remote-control, automatic-bay, automatic-station, automatic-remote, maintenance or process)	

2.6.3**Component: RangeConfig_Deadband**

Comment: Measurement range configuration

Parent Type: RangeConfig

Attribute	Type	Enumeration	Comment	X
min	AnalogueValue_Float		Minimum process measurement for which values of i and f are considered within limits	
max	AnalogueValue_Float		Maximum process measurement for which values of i and f are considered within limits	
lLim	AnalogueValue_Float		Low Low range limit	
lLim	AnalogueValue_Float		Low range limit	
hLim	AnalogueValue_Float		High range limit	
hhLim	AnalogueValue_Float		High High range limit	

2.6.4**Component: Unit_multiplier**

Comment: SI Unit definitions

Parent Type: Unit

Attribute	Type	Enumeration	Comment	X
SIUnit	ENUMERATED16 (MMS Type: INT8)	SIUnit	SI Unit	
multiplier	ENUMERATED16 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	

2.6.5**Component: Vector_Magnitude_Float**

Comment: Complex vector (w.r.t Floating Point Magnitude value)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	

2.6.6

Component: Vector_MagnitudeAngle_Float

Comment: Complex vector (w.r.t Floating Point Magnitude and Angle values)

Parent Type: Vector

Attribute	Type	Enumeration	Comment	X
mag	AnalogueValue_Float		The magnitude of the complex value	
ang	AnalogueValue_Float		The angle of the complex value (the unit is degrees)	

2.7

Enumerated type definitions

The following sub-sections specify the enumerations that are associated to some Common Data Class attributes. The definition of the enumerations are according to IEC 61850-7-3 and IEC 61850-7-4 unless otherwise stated.

2.7.1

Enumerated type: AddCause

Description: Add Cause

Ordinal	Semantic
0	Unknown
1	Not-supported
2	Blocked-by-switching-hierarchy
3	Select-failed
4	Invalid-position
5	Position-reached
6	Parameter-change-in-execution
7	Step-limit
8	Blocked-by-Mode
9	Blocked-by-process
10	Blocked-by-interlocking
11	Blocked-by-synchrocheck
12	Command-already-in-execution
13	Blocked-by-health
14	1-of-n-control
15	Abortion-by-cancel
16	Time-limit-over
17	Abortion-by-trip
18	Object-not-selected

2.7.2

Enumerated type: Beh

Description: Behaviour

Ordinal	Semantic
1	on

Ordinal	Semantic
2	blocked
3	test
4	test/blocked
5	off

2.7.3 Enumerated type: Bypass

Description:

Ordinal	Semantic
0	locking-bypass
1	mode-bypass
2	automation-bypass
3	uniqueness-bypass
4	select-bypass
5	status-bypass

2.7.4 Enumerated type: CBOpCap

Description: CB Operating Capability

Ordinal	Semantic
1	None
2	Open
3	Close-Open
4	Open-Close-Open
5	Close-Open-Close-Open

2.7.5 Enumerated type: ctlModel

Description: Control Model

Ordinal	Semantic
0	status-only
1	direct-with-normal-security
2	sbo-with-normal-security
3	direct-with-enhanced-security
4	sbo-with-enhanced-security

2.7.6 Enumerated type: Dbpos

Description: Circuit Breaker position

Ordinal	Semantic
0	intermediate
1	off
2	on
3	bad

2.7.7 Enumerated type: dir

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

2.7.8**Enumerated type: Health**

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

2.7.9**Enumerated type: Mod**

Description: Mode

Ordinal	Semantic
1	on
2	blocked
3	test
4	test/blocked
5	off

2.7.10**Enumerated type: multiplier**

Description: Exponents of the multiplier value in base 10.

Ordinal	Semantic
-24	y
-21	z
-18	a
-15	f
-12	p
-9	n
-6	μ
-3	m
-2	c
-1	d
0	
1	da
2	h
3	k
6	M
9	G
12	T
15	P
18	E

Ordinal	Semantic
21	Z
24	Y

2.7.11

Enumerated type: orCategory

Description: or Category

Ordinal	Semantic
0	not-supported
1	bay-control
2	station-control
3	remote-control
4	automatic-bay
5	automatic-station
6	automatic-remote
7	maintenance
8	process

2.7.12

Enumerated type: seqT

Description: Sequence Measurement Type

Ordinal	Semantic
0	pos-neg-zero
1	dir-quad-zero

2.7.13

Enumerated type: SIUnit

Description: SI Units derived from ISO/IEC 1000

Ordinal	Semantic
-16	years
-15	months
-14	weeks
-13	V/s
-12	mins
-11	hours
-10	days
-9	°F
-8	ratio
-7	miles
-6	inches
-5	feet
-4	df/dt
-3	Hz/s
-2	%
-1	pu
1	none
2	m

Ordinal	Semantic
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr
21	Gy
22	q
23	°C
24	Sv
25	F
26	C
27	S
28	H
29	V
30	ohm
31	J
32	N
33	Hz
34	lx
35	Lm
36	Wb
37	T
38	W
39	Pa
41	m ²
42	m ³
43	m/s
44	m/s ²
45	m ³ /s
46	m/m ³
47	M
48	kg/m ³
49	m ² /s
50	W/m K
51	J/K
52	ppm
53	1/s
54	rad/s
61	VA
62	Watts

Ordinal	Semantic
63	VAr
64	phi
65	cos(phi)
66	Vs
67	V ²
68	As
69	A ²
70	A ² t
71	VAh
72	Wh
73	VArh
74	V/Hz

2.8

MMS data-type conversions

The following table shows the relationships between the Part 7 and Part 8-1 data types. The definitions presented above use Part 7 data types, however these are subject to 'translation' when exposed over an MMS (Part 8-1) interface:

Part 7 Type	MMS Type	Part 7 Description
BOOLEAN	Bool	Logical TRUE/FALSE value
BSTR16	Bstring16	Bit String 16
BVstring13	BVstring13	Variable bit string (upto 13 bits)
Check	BVstring2	Control Object check flags
CODED_ENUM	Byte	Coded enumeration
CODED_ENUM2	Byte	Coded enumeration (2)
EntryTime	Btime6	8.1 Section 8.1.3.7
ENUMERATED16	Short	16 bit enumerated value
ENUMERATED8	Byte	8 bit enumerated value
FLOAT32	Float	32 bit floating point value
FLOAT64	Double	64 bit floating point value
INT128	Int64	128 bit signed integer value
INT16	Short	16 bit signed integer value
INT16U	Ushort	16 bit unsigned integer value
INT24U	Ulong	24 bit unsigned integer value
INT32	Long	32 bit signed integer value
INT32U	Ulong	32 bit unsigned integer value
INT8	Byte	8 bit signed integer value
INT8U	Ubyte	8 bit unsigned integer value
OCTET_STRING6	Ostring6	6 character string (8 bits per character)
OCTET_STRING64	OVstring64	64 character string (8 bits per character)
OCTET_STRING8	OVstring8	8 character string (8 bits per character)
Quality	BVstring13	IEC 61850 Quality
TimeStamp	Utctime	IEC 61850 Time stamp
UNICODE_STRING255	UTF8Vstring255	255 character string (16 bits per unicode character)
UTC_TM	Utctime	UTC Timestamp

Part 7 Type	MMS Type	Part 7 Description
VISIBLE_STRING255	Vstring255	255 character string
VISIBLE_STRING64	Vstring64	64 character string
VISIBLE_STRING65	Vstring65	65 character string
VISIBLE_STRING97	Vstring97	97 character string



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