GE VERNOVA

MiCOM P40 Agile

P54C, P54E

MICS
Model Implementation Conformance Statement - IEC 61850 Edition 2

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CONTENTS

1	Model Implementation Conformance Statement (MICS)	3
1.1	Introduction	3
1.2	Objective	3
1.3	Logical Device Definitions	3
1.4	Logical Node Definitions	8
1.5	Common Data Class Definitions	29
1.6	Common Data Attribute Type Definitions	44
1.7	Enumerated Type Definitions	46
1.8	MMS Data-Type Conversions	52

1 MODEL IMPLEMENTATION CONFORMANCE STATEMENT (MICS)

1.1 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.

1.2 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 GE Vernova custom attributes

1.3 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
AutoControl	Commands and controls used for Automatic Control
AutoRec1	Auto Reclose Control Domain for CB
AutoSynChk1	Automatically Synchronism Check Control Domain for CB
CBControl	Commands and controls for CB
CtlCB1	Control CB
CtlCB1Fail	CB Fail Control Domain for CB
Measurements	Measurements Domain
ProtDif	Differential Protection Domain
Protection	Protection Domain
ProtEfd	EFD Protection Domain
ProtFrq	Frequency Protection Domain
ProtNegSeq	Negative Sequence Protection Domain
ProtNvd	NVD Protection Domain
ProtOvCur	Overcurrent Protection Domain
ProtOvThm	Thermal Over Protection Domain
ProtRteChgFrq	Frequence Rate Change Protection Domain
ProtSef	SEF Protection Domain
ProtVtp	VTP Protection Domain
Records	Records Domain
System	System Domain

1.3.1 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
AutoControl			
	LLN0	LLN0_STANDARD	Auto Control Logical Device
	LPHD1	LPHD_STANDARD	Px40 Physical Device Information
AutoRec1			
	ArcPTRC16	PTRC_INDIVID_NO_SEG	Protection Trip for CB 1 Auto Reclose
	ArcRREC1	RREC_NO_SEG	Auto Reclose Control Domain for CB 1
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Auto Reclose Control in CB1
AutoSynChk1			
	AscRSYN1	RSYN_DIFCLC_ENH	System Checks (CB 1) - Check Sync 1
	AscRSYN2	RSYN_DIFCLC_ENH	System Checks (CB 1) - Check Sync 2
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for CB1 Automatic Synchronism Check Control
CBControl			
	LLN0	LLN0_STANDARD	CB Control Logical Device
	LPHD1	LPHD_STANDARD	Px40 Physical Device Information
CtlCB1			
	CB1CILO1	CILO_INTERLOCK	Circuit Breaker Interlocking for CB1
	CB1CSWI1	CSWI_BASIC	Switch Controller for CB1
	CB1PTRC1	PTRC_GLOBAL	Protection trip for CB 1 Control
	CB1XCBR1	XCBR_BASIC	Circuit Breaker 1 Monitoring (Pole 1)
	CB1XCBR2	XCBR_BASIC	Circuit Breaker 1 Monitoring (Pole 2)
	CB1XCBR3	XCBR_BASIC	Circuit Breaker 1 Monitoring (Pole 3)
	CB1XCBR4	XCBR_BASIC	Circuit Breaker 1 Monitoring for 3-pole
	LLN0	LLN0_STANDARD	Logical Device for CB 1 Control
CtlCB1Fail			
	Cb1fPTRC18	PTRC_INDIVID_NO_SEG	Protection trip for CB1 Fail
	CbfRBRF1	RBRF_EXTTRP_SEG	CB1 Fail 1
	CbfRBRF2	RBRF_EXTTRP_SEG	CB1 Fail 2
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for CB1 Fail Control
Measurements			
	LLN0	LLN0_STANDARD_MEA	Measurements Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	PriAvgMMXU1	MMXU_METER_AV	Primary Average Value of Fixed Measurements
	PriAvgMMXU2	MMXU_METER_AV	Primary Average Value of Rolled Measurements
	PriDifMMXU1	MMXU_INDIFF	Primary Current Differential Measurements
	PriFltMLFR1	MLFR_FAULT_RECORD_INDIFF	Measurements during the Latest Fault Record for Fast Differential Protection
	PriFouMMXU1	MMXU_FOURIER_EXT	Primary Fourier Measurements including Df/Dt
	PriMaxMMXU1	MMXU_METER_MAX	Primary Maximum Value of Measurement
	PriMMTR1	MMTR_PRIV	Primary based metering quantities
	PriMSQI1	MSQI_ALL	Primary Sequence Measurements
	PriPreMLFR1	MLFR_PRE_FAULT	Fault Record before fault
	PriRmsMMXU1	MMXU_RMS	Primary RMS Measurements

LD	LN Instance	LN Type	Description
	PriVcpMSQI1	MSQI_VOLTAGE	Primary Compensated Overvoltage Measurements
	SecAvgMMXU1	MMXU_METER_AV	Secondary Average Value of Fixed Measurements
	SecAvgMMXU2	MMXU_METER_AV	Secondary Average Value of Rolled Measurements
	SecDifMMXU1	MMXU_INDIFF	Secondary Current Differential Measurements
	SecFouMMXU1	MMXU_FOURIER	Secondary Fourier Measurements
	SecMaxMMXU1	MMXU_METER_MAX	Secondary Maximum Value of Measurement
	SecMMTR1	MMTR_PRIV	Secondary based metering quantities
	SecMSQI1	MSQI_ALL	Secondary Sequence Measurements
	SecRmsMMXU1	MMXU_RMS	Secondary RMS Measurements
	SecVcpMSQI1	MSQI_VOLTAGE	Secondary Compensated Overvoltage Measurements
ProtDif			
	DifPDIF1	PDIF_BASIC	Current Differential
	DifPTRC4	PTRC_INDIVID_SEG	Protection trip for Differential protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Differential Protection
Protection			
	LLN0	LLN0_STANDARD	Protection Logical Device with Standard Template
	LPHD1	LPHD_STANDARD	Physical Device Information
ProtEfd			
	EfdPTOC1	PTOC_NEU	IN1> 1 Earth Fault (Derived)
	EfdPTOC2	PTOC_NEU	IN1> 2 Earth Fault (Derived)
	EfdPTOC3	PTOC_NEU	IN1> 3 Earth Fault (Derived)
	EfdPTOC4	PTOC_NEU	IN1> 4 Earth Fault (Derived)
	EfdPTRC9	PTRC_INDIVID_NO_SEG	Protection trip for Earth Fault (Derived) protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for EFD Protection
ProtFrq			
	FrqPTOF1	PTOF_NO_SEG	F> 1 Overfrequency
	FrqPTOF2	PTOF_NO_SEG	F> 2 Overfrequency
	FrqPTRC10	PTRC_INDIVID_NO_SEG	Protection trip for Frequency Protection
	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_STANDARD_WITH_CTRLMOD	Logical Device for Frequence Protection
ProtNegSeq			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Negative Sequence Protection
	NgcPTOC1	PTOC_NO_SEG	I2> 1 Negative Sequence
	NgcPTOC2	PTOC_NO_SEG	I2> 2 Negative Sequence
	NgcPTOC3	PTOC_NO_SEG	I2> 3 Negative Sequence
	NgcPTOC4	PTOC_NO_SEG	I2> 4 Negative Sequence
	NgcPTRC11	PTRC_INDIVID_NO_SEG	Protection trip for Negative Sequence Protection
ProtNvd			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for NVD Protection
	VtpResPTOV1	PTOV_NEU	VN> 1 Residual Overvoltage
	VtpResPTOV2	PTOV_NEU	VN> 2 Residual Overvoltage
	VtpResPTRC14	PTRC_INDIVID_NO_SEG	Protection trip for NVD protection
ProtOvCur			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Overcurrent Protection
	OcpPTOC1	PTOC_SEG	I> 1 Overcurrent
	OcpPTOC2	PTOC_SEG	I> 2 Overcurrent
	OcpPTOC3	PTOC_SEG	I> 3 Overcurrent

LD	LN Instance	LN Type	Description
	OcpPTOC4	PTOC_SEG	I> 4 Overcurrent
	OcpPTRC7	PTRC_INDIVID_NO_SEG	Protection trip for Overcurrent Protection
ProtOvThm			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Thermal Overload Protection
	ThmPTRC20	PTRC_INDIVID_NO_SEG	Protection Trip for Thermal Overload Protection
	ThmPTTR1	PTTR_NO_SEG	Thermal Overload
ProtRteChgFrq			
	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
	DfpPTRC8	PTRC_INDIVID_NO_SEG	Protection trip for Frequency Rate Change Protection
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for Frequency Rate Change Protection
ProtSef			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for SEF Protection
	SenEftPSDE1	PSDE_NEU	ISEF> 1 Sensitive Earth Fault
	SenEftPSDE2	PSDE_NEU	ISEF> 2 Sensitive Earth Fault
	SenEftPSDE3	PSDE_NEU	ISEF> 3 Sensitive Earth Fault
	SenEftPSDE4	PSDE_NEU	ISEF> 4 Sensitive Earth Fault
	SenEftPTRC13	PTRC_INDIVID_NO_SEG	Protection trip for Sensitive Earth Fault Protection
	SenRefPDIF1	PDIF_NEU	IREF> 1 Restricted Earth Fault
ProtVtp			
	LLN0	LLN0_STANDARD_WITH_CTRLMOD	Logical Device for VTP Protection
	VtpCmpPTOV1	PTOV_NO_SEG	Compensated V1> 1 Overvoltage
	VtpCmpPTOV2	PTOV_NO_SEG	Compensated V1> 2 Overvoltage
	VtpPhsPTOV1	PTOV_SEG	V> 1 Overvoltage
	VtpPhsPTOV2	PTOV_SEG	V> 2 Overvoltage
	VtpPhsPTRC12	PTRC_INDIVID_NO_SEG	Protection trip for VTP Protection
	VtpPhsPTUV1	PTUV_SEG	V< 1 Undervoltage
	VtpPhsPTUV2	PTUV_SEG	V< 2 Undervoltage
Records			
	LLN0	LLN0_STANDARD	Records Logical Device
	LPHD1	LPHD_STANDARD	Physical Device Information
	RDRE1	RDRE_BASIC	Disturbance Recorder
	RFLO1	RFLO_BASIC	Fault Locator
System			
	AlmGGIO1	GGIO_ALM_96	Alarms
	Ch1ITPC1	ITPC_MEAS_FLOAT_D	Measurements in float type over telecommunication interface channel 1, all data objects with description.
	Ch2ITPC1	ITPC_MEAS_FLOAT_D	Measurements in float type over telecommunication interface channel 2, all data objects with description.
	CtsAlmGGIO1	GGIO_IND_18	CT Supervision Alarm status (Local and Remote)
	CtsAlmGGIO2	GGIO_IND_2	CT Supervision Alarm status (Local and Remote)
	FnkGGIO1	GGIO_IND_10	Function Keys
	GosGGIO1	GGIO_IND_32	GOOSE Input Signals
	GosGGIO2	GGIO_IND_32	GOOSE Output Signals
	ImfInpGGIO1	GGIO_IND_8	InterMiCOM Fibre Inputs Status (Remote End 1)
	ImfInpGGIO2	GGIO_IND_8	InterMiCOM Fibre Inputs Status (Remote End 2)
	ImfInpGGIO3	GGIO_IND_8	InterMiCOM Fibre Inputs Status (Remote End 3)
	ImfInpGGIO4	GGIO_IND_8	InterMiCOM Fibre Inputs Status (Remote End 4)
	ImfInpGGIO5	GGIO_IND_8	InterMiCOM Fibre Inputs Status (Remote End 5)

LD	LN Instance	LN Type	Description
	ImfOutGGIO1	GGIO_IND_8	InterMiCOM Fibre Outputs Status
	ITPC1	ITPC_SYSTEM_MULTIEND_D	Teleprotection Communication Interfaces over Channel for Multi-end current diff, all data objects with description.
	LedGGIO1	GGIO_IND_18	Red LED Signals
	LedGGIO2	GGIO_IND_18	Green LED Signals
	LGOS1	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 1
	LGOS10	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 10
	LGOS11	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 11
	LGOS12	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 12
	LGOS13	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 13
	LGOS14	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 14
	LGOS15	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 15
	LGOS16	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 16
	LGOS17	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 17
	LGOS18	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 18
	LGOS19	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 19
	LGOS2	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 2
	LGOS20	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 20
	LGOS21	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 21
	LGOS22	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 22
	LGOS23	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 23
	LGOS24	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 24
	LGOS25	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 25
	LGOS26	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 26
	LGOS27	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 27
	LGOS28	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 28
	LGOS29	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 29
	LGOS3	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 3
	LGOS30	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 30
	LGOS31	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 31
	LGOS32	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 32
	LGOS4	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 4
	LGOS5	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 5
	LGOS6	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 6
	LGOS7	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 7
	LGOS8	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 8
	LGOS9	LGOS_SYSTEM	Monitoring of GOOSE Messages for External Publisher 9
	LLN0	LLN0_SYSTEM	System Logical Device
	LPHD1	LPHD_SYSTEM	Physical Device Information for System Logical Device
	NP2LCCH1	LCCH_SYSTEM	Physical communication channel supervision for NP2 (stationbus port and its redundant port).
	OptGGIO1	GGIO_IND_32	Opto (32) Inputs
	OrdRunGGIO1	GGIO_IND_32	Uniqueness of control "Order Running" indications for Control operations
	PloGGIO1	GGIO_IND_32_CTRL	Controllable Inputs
	RlyGGIO1	GGIO_IND_32	Output Contacts
	TVTR1	TVTR_SYSTEM	Voltage transformer monitor
	UsrGGIO1	GGIO_IND_DPS_8	User Mapped (PSL) Double Point Status Indications

1.4 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 Class)	Description	Name Space
CILO_INTERLOCK	(CILO)	Control Interlocking	IEC 61850-7-4:2007
CSWI_BASIC	(CSWI)	Switch controller	IEC 61850-7-4:2007
GGIO_ALM_96	(GGIO)	Generic Process I/O (w.r.t 96 Alarm Elements)	IEC 61850-7-4:2007
GGIO_IND_10	(GGIO)	Generic Process I/O (w.r.t 10 Indication Elements)	IEC 61850-7-4:2007
GGIO_IND_18	(GGIO)	Generic Process I/O (w.r.t 18 Indication Elements)	IEC 61850-7-4:2007
GGIO_IND_2	(GGIO)	Generic process I/O (w.r.t 2 Indication Elements)	IEC 61850-7-4:2007
GGIO_IND_32	(GGIO)	Generic Process I/O (w.r.t 32 Indication Elements)	IEC 61850-7-4:2007
GGIO_IND_32_CTRL	(GGIO)	Generic process I/O (w.r.t 32 Indications Ctrl i/p)	IEC 61850-7-4:2007
GGIO_IND_8	(GGIO)	Generic process I/O (w.r.t 8 Indication Elements)	IEC 61850-7-4:2007
GGIO_IND_DPS_8	(GGIO)	Generic process I/O (w.r.t 8 Dual Point Status Indication Elements)	IEC 61850-7-4:2007
ITPC_MEAS_FLOAT_D	(ITPC)	Teleprotection communication interfaces	IEC 61850-7-4:2007
ITPC_SYSTEM_MULTIEND_D	(ITPC)	Teleprotection communication interfaces (extended for Multi-end Signals) with description	IEC 61850-7-4:2007
LCCH_SYSTEM	(LCCH)	Physical communication channel supervision	IEC 61850-7-4:2007
LGOS_SYSTEM	(LGOS)	Monitoring of GOOSE messages	IEC 61850-7-4:2007
LLN0_STANDARD_MEA	(LLN0)	Measurements Logical Node 0	IEC 61850-7-4:2007
LLN0_STANDARD_WITH_CTRLMOD	(LLN0)	Logical Node 0	IEC 61850-7-4:2007
LLN0_SYSTEM	(LLN0)	System Logical Node 0	IEC 61850-7-4:2007
LLN0_STANDARD	(LLN0)	General Logical Node 0	IEC 61850-7-4:2007
LPHD_STANDARD	(LPHD)	Px40 Physical Device Information	IEC 61850-7-4:2007
LPHD_SYSTEM	(LPHD)	Px40 Physical Device Information (used for Logical Device System only)	IEC 61850-7-4:2007
MLFR_FAULT_RECORD_INDIFF	(MLFR)	Measurements of Fault Record for Fast Differential Protection	MiCOM-Px40:2025
MLFR_PRE_FAULT	(MLFR)	Measurements of Fault Record	MiCOM-Px40:2025
MMTR_PRIV	(MMTR)	Metering	IEC 61850-7-4:2007
MMXU_RMS	(MMXU)	Standard Measurements (w.r.t RMS Values)	IEC 61850-7-4:2007
MMXU_FOURIER	(MMXU)	Standard Measurements (w.r.t Fourier Values)	IEC 61850-7-4:2007
MMXU_FOURIER_EXT	(MMXU)	Standard measurements (w.r.t Fourier Values Including Df/Dt)	IEC 61850-7-4:2007
MMXU_INDIFF	(MMXU)	Standard Measurements (w.r.t Current Diff)	IEC 61850-7-4:2007
MMXU_METER_AV	(MMXU)	Metering Statistics (w.r.t Current, Real + Reactive Power - Average values)	IEC 61850-7-4:2007
MMXU_METER_MAX	(MMXU)	Standard measurements (w.r.t Current, Real + Reactive Power - Max values)	IEC 61850-7-4:2007
MSQI_ALL	(MSQI)	Sequence and imbalance (w.r.t Pos, Neg, Zero)	IEC 61850-7-4:2007
MSQI_VOLTAGE	(MSQI)	Sequence and imbalance (w.r.t Pos, Neg, Zero Voltage Only)	IEC 61850-7-4:2007
PDIF_BASIC	(PDIF)	Differential (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2007
PDIF_NEU	(PDIF)	Differential (w.r.t Neutral)	IEC 61850-7-4:2007
PFRC_NO_SEG	(PFRC)	Rate of change of frequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
PSDE_NEU	(PSDE)	Sensitive Directional Earth Fault	IEC 61850-7-4:2007
PTOC_NEU	(PTOC)	Timed Overcurrent (w.r.t Neutral)	IEC 61850-7-4:2007
PTOC_NO_SEG	(PTOC)	Timed Overcurrent (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
PTOC_SEG	(PTOC)	Timed Overcurrent (w.r.t Phase Segregation)	IEC 61850-7-4:2007
PTOF_NO_SEG	(PTOF)	Overfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
PTOV_NO_SEG	(PTOV)	Overvoltage (w.r.t No Phase Segregation)	IEC 61850-7-4:2007

LN Type	(LN Class)	Description	Name Space
PTOV_SEG	(PTOV)	Overvoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2007
PTOV_NEU	(PTOV)	Overvoltage (w.r.t Neutral)	IEC 61850-7-4:2007
PTRC_INDIVID_NO_SEG	(PTRC)	Protection trip for individual protection conditioning	IEC 61850-7-4:2007
PTRC_INDIVID_SEG	(PTRC)	Protection trip conditioning	IEC 61850-7-4:2007
PTRC_GLOBAL	(PTRC)	Protection trip for global protection conditioning	IEC 61850-7-4:2007
PTTR_NO_SEG	(PTTR)	Thermal overload (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
PTUF_NO_SEG	(PTUF)	Underfrequency (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
PTUV_SEG	(PTUV)	Undervoltage (w.r.t Phase Segregation)	IEC 61850-7-4:2007
RBRF_EXTTRP_SEG	(RBRF)	Breaker Failure (w.r.t External Tripping + Phase Segregation)	IEC 61850-7-4:2007
RDRE_BASIC	(RDRE)	Disturbance Recorder function (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2007
RFLO_BASIC	(RFLO)	Fault Locator (w.r.t Mandatory Attributes only)	IEC 61850-7-4:2007
RREC_NO_SEG	(RREC)	Autoreclosing (w.r.t No Phase Segregation)	IEC 61850-7-4:2007
RSYN_DIFCLC_ENH	(RSYN)	Synchronism-check/Synchronising (w.r.t Calculated Differential Measurements)	IEC 61850-7-4:2007
TVTR_SYSTEM	(TVTR)	Voltage transformer	IEC 61850-7-4:2007
XCBR_BASIC	(XCBR)	Circuit Breaker (w.r.t Mandatory Attributes Only)	IEC 61850-7-4:2007

1.4.1 LOGICAL NODE: CILO_INTERLOCK

Description: Control Interlocking

LN Class: CILO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EnaOpn	SPS_WD	Enable OPEN Commands		
EnaCls	SPS_WD	Enable CLOSE Commands		

1.4.2 LOGICAL NODE: CSWI_BASIC

Description: Switch Controller

LN Class: CSWI

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Loc	SPS_WD	Local control behaviour		
OpOpn	ACT_NO_SEG	Operation "open switch"	T	
OpCls	ACT_NO_SEG	Operation "close switch"	T	
OpCntRs	INC_MOD_STD	Resettable operation counter		
Pos	DPC_CTRL	Switch, general		

1.4.3 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
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
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		

Attribute	Attr. Type	Explanation	T	X
Alm43	SPS_D	General single alarm		
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		
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		

Attribute	Attr. Type	Explanation	T	X
Alm93	SPS_D	General single alarm		
Alm94	SPS_D	General single alarm		
Alm95	SPS_D	General single alarm		
Alm96	SPS_D	General single alarm		

1.4.4 LOGICAL NODE: GGIO_IND_10

Description: Generic Process I/O (w.r.t 10 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
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		

1.4.5 LOGICAL NODE: GGIO_IND_18

Description: Generic Process I/O (w.r.t 18 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
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		

Attribute	Attr. Type	Explanation	T	X
Ind17	SPS_D	General Indication		
Ind18	SPS_D	General Indication		

1.4.6 LOGICAL NODE: LOGICAL NODE: GGIO_IND_2

Description: Generic Process I/O (w.r.t 2 Indication Elements)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Ind1	SPS_D	General Indication		
Ind2	SPS_D	General Indication		

1.4.7 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
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
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		
Ind24	SPS_D	General Indication		
Ind25	SPS_D	General Indication		
Ind26	SPS_D	General Indication		

Attribute	Attr. Type	Explanation	T	X
Ind27	SPS_D	General Indication		
Ind28	SPS_D	General Indication		
Ind29	SPS_D	General Indication		
Ind30	SPS_D	General Indication		
Ind31	SPS_D	General Indication		
Ind32	SPS_D	General Indication		

1.4.8 LOGICAL NODE: GGIO_IND_32_CTRL

Description: Generic Process I/O (w.r.t 32 Indications Ctrl i/p)

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
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		
SPCSO32	SPC_CONTROL	Single point controllable status output		

1.4.9 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
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
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		

1.4.10 LOGICAL NODE: GGIO_IND_DPS_8

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

LN Class: GGIO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
DPCSO1	DPC_STATUS_D	Double Point Status		
DPCSO2	DPC_STATUS_D	Double Point Status		
DPCSO3	DPC_STATUS_D	Double Point Status		
DPCSO4	DPC_STATUS_D	Double Point Status		
DPCSO5	DPC_STATUS_D	Double Point Status		
DPCSO6	DPC_STATUS_D	Double Point Status		
DPCSO7	DPC_STATUS_D	Double Point Status		
DPCSO8	DPC_STATUS_D	Double Point Status		

1.4.11 LOGICAL NODE: ITPC_SYSTEM

Description: Teleprotection Communication Interfaces

LN Class: ITPC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
PropDly1	MV_FLOAT_D_PRIV	Propagation time from local to remote end 1 displayed in seconds		X
PropDly2	MV_FLOAT_D_PRIV	Propagation time from local to remote end 2 displayed in seconds		X
PropDly3	MV_FLOAT_D_PRIV	Propagation time from local to remote end 3 displayed in seconds		X

Attribute	Attr. Type	Explanation	T	X
PropDly4	MV_FLOAT_D_PRIV	Propagation time from local to remote end 4 displayed in seconds		X
PropDly5	MV_FLOAT_D_PRIV	Propagation time from local to remote end 5 displayed in seconds		X

1.4.12 LOGICAL NODE: ITPC_SYSTEM_MULTIEND_D

Description: Teleprotection Communication Interfaces (Extended for Multi-end Signals) with Description

LN Class: ITPC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EEName	DPL_PRIV	External equipment nameplate		
EEHealth	ENS_HEALTH	External equipment health		
LosSig	SPS_D	Alarm situation: No signal received, indicates a channel problem		
RxFail1	SPS_D_PRIV	Signal Fail on RX for Remote 1		X
RxFail2	SPS_D_PRIV	Signal Fail on RX for Remote 2		X
RxFail3	SPS_D_PRIV	Signal Fail on RX for Remote 3		X
RxFail4	SPS_D_PRIV	Signal Fail on RX for Remote 4		X
RxFail5	SPS_D_PRIV	Signal Fail on RX for Remote 5		X

1.4.13 LOGICAL NODE: LCCH_SYSTEM

Description: Physical Communication Channel Supervision

LN Class: LCCH

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
ChLiv	SPS_D	Physical channel status: true, if channel receives telegrams within a specified time interval.		
RedChLiv	SPS_D	Physical channel status of redundant channel		

1.4.14 LOGICAL NODE: LGOS_SYSTEM

Description: Monitoring of GOOSE Messages

LN Class: LGOS

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
St	SPS_WD	Status of the subscription (True = active, False=not active)		
SimSt	SPS_WD	Status showing that really Sim messages are received and accepted		
GoCBRef	ORG_SRC_REF	Reference to the subscribed GOOSE control block		
OoSeqGo	SPS_WD_PRIV	Out of order GOOSE indication		X

1.4.15 LOGICAL NODE: LLN0_STANDARD

Description: General Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLN0	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
GrRef	ORG_SRC_REF	Reference to a higher-level logical device		

1.4.16 LOGICAL NODE: LLN0_STANDARD_MEA

Description: Measurements Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLN0_MEA	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
GrRef	ORG_SRC_REF	Reference to a higher-level logical device		

1.4.17 LOGICAL NODE: LLN0_STANDARD_WITH_CTRLMOD

Description: Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLN0	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_CTRL_LD_MOD_2	Mode		
GrRef	ORG_SRC_REF	Reference to a higher-level logical device		

1.4.18 LOGICAL NODE: LLN0_SYSTEM

Description: System Logical Node 0

LN Class: LLN0

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LLN0	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_CTRL_LD_MOD	Mode		
LEDRs	SPC_CONTROL	LED reset	T	
OrdRun	SPS_WD_PRIV	Indicate IED is operating a Control Object		X
SyncSt	SPS_WD_PRIV	Indicate time synchronisation in the IED is active/inactive		X

1.4.19 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	ENS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		

1.4.20 LOGICAL NODE: LPHD_SYSTEM

Description: Px40 Physical Device Information (Used for Logical Device System Only)

LN Class: LPHD

Attribute	Attr. Type	Explanation	T	X
PhyNam	DPL_STANDARD	Physical device name plate		
PhyHealth	ENS_HEALTH	Physical device health		
Proxy	SPS_D	Indicates if this LN is a proxy		
PwrUp	SPS_D	Power up detected		
Sim	SPC_CONTROL	Receive simulated GOOSE or simulated SV		

1.4.21 LOGICAL NODE: MLFR_FAULT_RECORD_INDIFF

Description: Measurements of Fault Record for Fast Differential Protection

LN Class: MLFR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN_PRIV	Name Plate		
Beh	ENS_BEH_THREE_STATUS_DN	Behaviour		
Health	ENS_HEALTH_DN	Health		
Mod	ENC_MOD_THREE_STATUS_DN	Mode		
FltDur	MV_FLOAT_PRIV	Fault Duration		X
CB1OpTim	MV_FLOAT_PRIV	CB1 Operate Time		X
RlyTrTim	MV_FLOAT_PRIV	Relay Trip Time		X
AFlt	WYE_SEG_RES_D_PRIV	Fault Current		X
AmFlt	CMV_MAG_ANG_FLOAT_PRIV	Fault Mutual Current		X
PhVFlt	WYE_SEG_RES_D_PRIV	Fault Voltage		X
ALocFlt	WYE_SEG_PRIV	current of local end during fault		X
ARem1Flt	WYE_SEG_PRIV	Current of Remote end 1 during Fault		X
ARem2Flt	WYE_SEG_PRIV	Current of Remote end 2 during Fault		X
ARem3Flt	WYE_SEG_PRIV	Current of Remote end 3 during Fault		X
ARem4Flt	WYE_SEG_PRIV	Current of Remote end 4 during Fault		X
ARem5Flt	WYE_SEG_PRIV	Current of Remote end 5 during Fault		X
V1Rem	CMV_MAG_ANG_FLOAT_PRIV	Remote end V1		X
ADifFlt	WYE_SEG_PRIV	Differential Current during Fault		X
ABiasFlt	WYE_SEG_PRIV	Bias Current during Fault		X
Ch1R1PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R1 Channel1		X
Ch2R1PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R1 Channel2		X
Ch1R2PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R2 Channel1		X
Ch2R2PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R2 Channel2		X
Ch1R3PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R3 Channel1		X
Ch2R3PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R3 Channel2		X

Attribute	Attr. Type	Explanation	T	X
Ch1R4PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R4 Channel1		X
Ch2R4PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R4 Channel2		X
Ch1R5PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R5 Channel1		X
Ch2R5PrDly	MV_FLOAT_PRIV	Propagation time Delay of L-R5 Channel2		X

1.4.22 LOGICAL NODE: MLFR_PRE_FAULT

Description: Measurements of Fault Record

LN Class: MLFR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN_PRIV	Name Plate		
Beh	ENS_BEH_THREE_STATUS_DN	Behaviour		
Health	ENS_HEALTH_DN	Health		
Mod	ENC_MOD_THREE_STATUS_DN	Mode		
Hz	MV_FLOAT	System frequency		X
AmPreFlt	CMV_MAG_ANG_FLOAT_PRIV	Pre-fault mutual current		X
APreFlt	WYE_SEG_RES_D_PRIV	Pre-fault current		X
PhVPreFlt	WYE_SEG_RES_D_PRIV	Pre-fault voltage		X

1.4.23 LOGICAL NODE: MMTR_PRIV

Description: Metering

LN Class: MMTR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
TotWh	BCR_PRIV	Net real energy since last reset		
TotVArh	BCR_PRIV	Net reactive energy since last reset		
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 Meters		X

1.4.24 LOGICAL NODE: MMXU_FOURIER

Description: Standard Measurements (w.r.t Fourier Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ASef	WYE_NEU_ANG_D_PRIV	Phase currents (ISEF Magnitude)		X
AMut	WYE_NEU_ANG_D_PRIV	Phase currents (Mutual Magnitude)		X
TotW	MV_FLOAT	Total active power (Total P)		
TotVAr	MV_FLOAT	Total reactive power (Total Q)		

Attribute	Attr. Type	Explanation	T	X
TotVA	MV_FLOAT	Total apparent power (Total S)		
TotPF	MV_FLOAT	Average power factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		
PhV	WYE_SEG_ANG_D	Phase to Ground voltages		
A	WYE_SEG_ANG_RES_D	Phase currents		
W	WYE_SEG	Phase active power (P)		
VAr	WYE_SEG	Phase reactive power (Q)		
VA	WYE_SEG	Phase apparent power (S)		
PF	WYE_SEG	Phase power factor		
V1	WYE_RES_ANG_D_PRIV	VN Derived Magnitude Angle		X
DfDt	MV_FLOAT_PRIV	The measurement for Df/Dt		X

1.4.25 LOGICAL NODE: MMXU_FOURIER_EXT

Description: Standard Measurements (w.r.t Fourier Values Including Df/Dt)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ASef	WYE_NEU_ANG_D_PRIV	Phase currents (ISEF Magnitude)		X
AMut	WYE_NEU_ANG_D_PRIV	Phase currents (Mutual Magnitude)		X
TotW	MV_FLOAT	Total active power (Total P)		
TotVAr	MV_FLOAT	Total reactive power (Total Q)		
TotVA	MV_FLOAT	Total apparent power (Total S)		
TotPF	MV_FLOAT	Average power factor (Total PF)		
Hz	MV_FLOAT	Frequency		
PPV	DEL_SEG_ANG	Phase to Phase voltages		
PhV	WYE_SEG_ANG_D	Phase to Ground voltages		
W	WYE_SEG	Phase active power (P)		
A	WYE_SEG_ANG_RES_D	Phase currents		
VAr	WYE_SEG	Phase reactive power (Q)		
VA	WYE_SEG	Phase apparent power (S)		
PF	WYE_SEG	Phase power factor		
V1	WYE_RES_ANG_D_PRIV	VN Derived Magnitude Angle		X
DfDt	MV_FLOAT_PRIV		The measurement for Df/Dt	X

1.4.26 LOGICAL NODE: MMXU_INDIFF

Description: Standard Measurements (w.r.t Current Diff)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		

Attribute	Attr. Type	Explanation	T	X
ALoc	WYE_SEG_D	Phase currents (Local)		
ARem1	WYE_SEG_D_PRIV	Phase currents (Remote CH1)		X
ARem2	WYE_SEG_D_PRIV	Phase currents (Remote CH2)		X
ARem3	WYE_SEG_D_PRIV	Phase currents (Remote CH3)		X
ARem4	WYE_SEG_D_PRIV	Phase currents (Remote CH4)		X
ARem5	WYE_SEG_D_PRIV	Phase currents (Remote CH5)		X
Adif	WYE_SEG_D_PRIV	Phase currents (IDiff)		X
Abias	WYE_SEG_D_PRIV	Phase currents (IBias)		X

1.4.27 MMXU_METER_AV

Description: Metering Statistics (w.r.t Current, Real + Reactive Power - Average Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ClcExp	SPS_WD	Calculation period expired	T	
ClcMth	ENG_SET_WD_CLCMTH	Calculation method of statistical data objects		
ClcMod	ENG_SET_WD_CLCMOD	Calculation mode		
ClcIntvTyp	ENG_SET_WD_CLCINTVTYP	Calculation interval type		
ClcIntvPer	ING_SET_WD	number of units to consider to calculate the calculation interval duration		
AvWPhs	MV_FLOAT_D	Arithmetic average of the magnitude of active power of the 3 phases		
AvVArPhs	MV_FLOAT_D	Arithmetic average of the magnitude of reactive power of the 3 phases		
AvAPhsA	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ia current		X
AvAPhsB	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ib current		X
AvAPhsC	MV_FLOAT_D_PRIV	Arithmetic average of the magnitude of Ic current		X

1.4.28 LOGICAL NODE: MMXU_METER_MAX

Description: Standard Measurements (w.r.t Current, Real + Reactive Power - Max Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ClcExp	SPS_WD	Calculation period expired	T	
ClcMth	ENG_SET_WD_CLCMTH	Calculation method of statistical data objects		
ClcMod	ENG_SET_WD_CLCMOD	Calculation mode		
MaxWPhs	MV_FLOAT_D	Maximum magnitude of active power of the 3 phases		
MaxVArPhs	MV_FLOAT_D	Maximum magnitude of reactive power of the 3 phases		
MaxAPhsA	MV_FLOAT_D_PRIV	Maximum magnitude of Ia current		X
MaxAPhsB	MV_FLOAT_D_PRIV	Maximum magnitude of Ib current		X
MaxAPhsC	MV_FLOAT_D_PRIV	Maximum magnitude of Ic current		X

1.4.29 LOGICAL NODE: MMXU_RMS

Description: Standard Measurements (w.r.t RMS Values)

LN Class: MMXU

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
ClcMth	ENG_SET_WD_CLCMTH	Calculation method of statistical data objects		
PhV	WYE_SEG_D	Phase to Ground voltages		
A	WYE_SEG_D	Phase currents		

1.4.30 LOGICAL NODE: MSQI_ALL

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

LN Class: MSQI

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

1.4.31 LOGICAL NODE: MSQI_VOLTAGE

Description: Sequence and Imbalance (w.r.t Pos, Neg, Zero Voltage Only)

LN Class: MSQI

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health	T	
Mod	ENC_MOD_THREE_STATUS	Mode		
SeqV	SEQ_MAG_ANG	Positive, Negative and Zero sequence voltage		

1.4.32 LOGICAL NODE: PDIF_BASIC

Description: Differential (w.r.t Mandatory Attributes Only)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	
DifAClc	WYE_SEG_D	Differential current		
RstA	WYE_SEG_D	Restraint current		

1.4.33 LOGICAL NODE: PDIF_NEU

Description: Differential (w.r.t Neutral)

LN Class: PDIF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Op	ACT_NEU	Operate	T	

1.4.34 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
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

1.4.35 LOGICAL NODE: PSDE_NEU

Description: Sensitive Directional Earth Fault

LN Class: PSDE

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate		

1.4.36 LOGICAL NODE: PTOC_NEU

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

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

1.4.37 LOGICAL NODE: PTOC_NO_SEG

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

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

1.4.38 LOGICAL NODE: PTOC_SEG

Description: Timed Overcurrent (w.r.t Phase Segregation)

LN Class: PTOC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

1.4.39 LOGICAL NODE: PTOF_NO_SEG

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

LN Class: PTOF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

1.4.40 LOGICAL NODE: PTOV_NEU

Description: Overvoltage (w.r.t Neutral)

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NEU	Start		
Op	ACT_NEU	Operate	T	

1.4.41 LOGICAL NODE: PTOV_NO_SEG

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

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

1.4.42 LOGICAL NODE: PTOV_SEG

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

LN Class: PTOV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

1.4.43 LOGICAL NODE: PTRC_GLOBAL

Description: Protection Trip for Global Protection Conditioning

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Tr	ACT_SEG	Trip		
Op	ACT_SEG_NEU	Operate (combination of subscribed Op from protection functions)		
Str	ACD_SEG_NEU	Sum of all starts of all connected Logical Nodes		

1.4.44 LOGICAL NODE: PTRC_INDIVID_NO_SEG

Description: Protection Trip for Individual Protection Conditioning

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Op	ACT_NO_SEG	Operate (combination of subscribed Op from protection functions)		
Str	ACD_NO_SEG	Sum of all starts of all connected Logical Nodes		

1.4.45 LOGICAL NODE: PTRC_INDIVID_SEG

Description: Protection Trip Conditioning

LN Class: PTRC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
Op	ACT_SEG_NEU	Operate (combination of subscribed Op from protection functions)		
Str	ACD_SEG_NEU	Sum of all starts of all connected Logical Nodes		

1.4.46 LOGICAL NODE: PTTR_NO_SEG

Description: Thermal Overload (w.r.t No Phase Segregation)

LN Class: PTTR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Op	ACT_NO_SEG	Operate	T	
AlmThm	SPS_WD	Thermal alarm		
Amp	MV_FLOAT	Current for thermal load model		
TmpRl	MV_FLOAT	Relation between temperature and maximum temperature		
MTRRs	SPC_CTRL_PRIV	Reset Thermal State		X

1.4.47 LOGICAL NODE: PTUF_NO_SEG

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

LN Class: PTUF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
Str	ACD_NO_SEG	Start		
Op	ACT_NO_SEG	Operate	T	

1.4.48 LOGICAL NODE: PTUV_SEG

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

LN Class: PTUV

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		

Attribute	Attr. Type	Explanation	T	X
Str	ACD_SEG	Start		
Op	ACT_SEG	Operate	T	

1.4.49 LOGICAL NODE: RBRF_EXTTRP_SEG

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

LN Class: RBRF

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_FOUR_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_TWO_STATUS	Mode		
OpEx	ACT_SEG	Breaker failure trip ("External trip")	T	

1.4.50 LOGICAL NODE: RDRE_BASIC

Description: Disturbance Recorder Function (w.r.t Mandatory Attributes Only)

LN Class: RDRE

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

1.4.51 LOGICAL NODE: RFLO_BASIC

Description: Fault Locator (w.r.t Mandatory Attributes Only)

LN Class: RFLO

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
FltZ	CMV_MAG_FLOAT	Fault impedance		
FltDiskm	MV_FLOAT	Fault distance in km		

1.4.52 LOGICAL NODE: RREC_NO_SEG

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

LN Class: RREC

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		

Attribute	Attr. Type	Explanation	T	X
OpCls	ACT_NO_SEG	Operation "Close Switch" issued to close circuit breaker		
AutoRecSt	ENS_AUTORECST	Auto reclosing status		

1.4.53 LOGICAL NODE: RSYN_DIFCLC_ENH

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

LN Class: RSYN

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

1.4.54 LOGICAL NODE: TVTR_SYSTEM

Description: Voltage Transformer

LN Class: TVTR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EEName	DPL_PRIV	External equipment name plate		
EEHealth	ENS_HEALTH	External equipment health		
FuFail	SPS_WD	TVTR fuse failure		

1.4.55 LOGICAL NODE: XCBR_BASIC

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

LN Class: XCBR

Attribute	Attr. Type	Explanation	T	X
NamPlt	LPL_LN	Name Plate		
Beh	ENS_BEH_THREE_STATUS	Behaviour		
Health	ENS_HEALTH	Health		
Mod	ENC_MOD_THREE_STATUS	Mode		
EEHealth	ENS_HEALTH	External equipment health		
Loc	SPS_WD	Local operation		
OpCnt	INS_BASIC	Operation counter		
CBOpCap	ENS_CBCAP	Circuit Breaker operating capability		
SumSwARs	BCR_PRIV	Sum of switched amperes, resettable		
Pos	DPC_STATUS	Switch position		
BlkOpn	SPC_STATUS	Block opening		
BlkCls	SPC_STATUS	Block closing		

1.5 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
BL	Blocking	IEC 61850-7-2-2010
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
OR	Operate received	IEC 61850-7-2-2010
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
SR	Service response	IEC 61850-7-2-2010
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

1.5.1 COMMON DATA CLASS: ACD_NEU

Description: Directional Protection Activation Information (w.r.t Neutral)

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)	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
dirNeut	ENUMERATED8 (MMS Type: INT8)	ST	dir	Earth current direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

1.5.2 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	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

1.5.3 COMMON DATA CLASS: ACD_SEG

Description: Directional Protection Activation Information (w.r.t 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)	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
dirPhsA	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase A direction (unknown, forward or backward)	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
dirPhsB	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase B direction (unknown, forward or backward)	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
dirPhsC	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase C direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

1.5.4 COMMON DATA CLASS: ACD_SEG_NEU

Description: Directional Protection Activation Information (w.r.t Phase Segregation + Neutral)

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)	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
dirPhsA	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase A direction (unknown, forward or backward)	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
dirPhsB	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase B direction (unknown, forward or backward)	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
dirPhsC	ENUMERATED8 (MMS Type: INT8)	ST	dir	Phase C direction (unknown, forward or backward)	
neut	BOOLEAN	ST		Trip or start event with earth current has happened	
dirNeut	ENUMERATED8 (MMS Type: INT8)	ST	dir	Earth current direction (unknown, forward or backward)	
q	Quality	ST		Quality of the protection activation information	
t	TimeStamp	ST		Timestamp of the last change in state of protection activation information	

1.5.5 COMMON DATA CLASS: ACT_NEU

Description: Protection Activation Information (w.r.t Neutral)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
neut	BOOLEAN	ST		Trip or start event with earth current 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	

1.5.6 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	

1.5.7 COMMON DATA CLASS: ACT_SEG

Description: Protection Activation Information (w.r.t Phase Segregation)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
phsC	BOOLEAN	ST		Trip or start event of Phase C 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	

1.5.8 COMMON DATA CLASS: ACT_SEG_NEU

Description: Protection Activation Information (w.r.t Phase Segregation + Neutral)

CDC Class: ACT

Attribute	Type	FC	Enumeration	Comment	X
general	BOOLEAN	ST		Trip or start has happened	
phsA	BOOLEAN	ST		Trip or start event of Phase A has happened	
phsB	BOOLEAN	ST		Trip or start event of Phase B has happened	
phsC	BOOLEAN	ST		Trip or start event of Phase C has happened	
neut	BOOLEAN	ST		Trip or start event with earth current 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	

1.5.9 COMMON DATA CLASS: BCR_PRIV

Description: Binary Counter Reading

CDC Class: BCR

Attribute	Type	FC	Enumeration	Comment	X
actVal	INT64	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)	

1.5.10 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	

1.5.11 COMMON DATA CLASS: CMV_MAG_ANG_FLOAT_PRIV

Description: Complex Measured Value (Used for Extended DO)

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.12 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	

Attribute	Type	FC	Enumeration	Comment	X
units	Unit_Multiplier	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_DeadBand	CF		Measurement range configuration attributes	

1.5.13 COMMON DATA CLASS: DEL_SEG_ANG

Description: Phase to Phase Measurements for a 3-Phase System (w.r.t Phase Segregation + Angle)

CDC Class: DEL

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

1.5.14 COMMON DATA CLASS: DPC_CTRL

Description: Controllable Double Point (for CSWI.pos)

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)	

1.5.15 COMMON DATA CLASS: DPC_STATUS

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

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
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)	

1.5.16 COMMON DATA CLASS: DPC_STATUS_D

Description: Controllable Double Point (with Description)

CDC Class: DPC

Attribute	Type	FC	Enumeration	Comment	X
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)	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.17 COMMON DATA CLASS: DPL_PRIV

Description: Device Name Plate for 'Teleprotection' Communications Channel

CDC Class: DPL

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

1.5.18 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	
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	

1.5.19 COMMON DATA CLASS: ENC_CTRL_LD_MOD

Description: Controllable Enumerated Status

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	ENUMERATED32 (MMS Type: INT8)	CO	Mod_3	Control value	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	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)	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.20 COMMON DATA CLASS: ENC_CTRL_LD_MOD_2

Description: Controllable Enumerated Status (Includes Three Status, Used for Child LD.LLN0)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
ctlVal	ENUMERATED32 (MMS Type: INT8)	CO	Mod_2	Control value	
origin	Originator	ST		Originator of the last change of the controllable data	
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_2	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)	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.21 COMMON DATA CLASS: ENC_MOD_THREE_STATUS

Description: Controllable Enumerated Mode Status (with 3 Status)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	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)	

1.5.22 COMMON DATA CLASS: ENC_MOD_THREE_STATUS_DN

Description: Controllable Enumerated Status (with 3 Status and dataNs Used for the Mod in the Extended LN)

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_3	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)	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.23 COMMON DATA CLASS: ENC_MOD_TWO_STATUS

Description: Controllable Enumerated Status

CDC Class: ENC

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED32 (MMS Type: INT8)	ST	Mod_2	Status value of the mode used for LN which have two status	
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)	

1.5.24 COMMON DATA CLASS: ENG_SET_WD_CLCINTVTYP

Description: Enumerated Status Setting (for ClcIntvTyp)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcIntvTyp	Setting value	

1.5.25 COMMON DATA CLASS: ENG_SET_WD_CLCMOD

Description: Enumerated Status Setting (for ClcMod)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcMod	Setting value	

1.5.26 COMMON DATA CLASS: ENG_SET_WD_CLCMTH

Description: Enumerated Status Setting (for ClcMth)

CDC Class: ENG

Attribute	Type	FC	Enumeration	Comment	X
setVal	ENUMERATED8 (MMS Type: INT8)	SP	ClcMth	Setting value	

1.5.27 COMMON DATA CLASS: ENS_AUTORECST

Description: Enumerated Status

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	AutoRecSt	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

1.5.28 COMMON DATA CLASS: ENS_BEH_FOUR_STATUS

Description: Enumerated Behaviour Status (with 4 Status)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_4	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

1.5.29 COMMON DATA CLASS: ENS_BEH_THREE_STATUS

Description: Enumerated Behaviour Status (with 3 Status)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_3	The element status	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

1.5.30 COMMON DATA CLASS: ENS_BEH_THREE_STATUS_DN

Description: Enumerated Status (with 3 Status and dataNs Used for the Beh in the Extended LN)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (MMS Type: INT8)	ST	Beh_3	The element status	
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	

1.5.31 COMMON DATA CLASS: ENS_CBCAP

Description: Enumerated Status (w.r.t CB Operating Capability)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (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	

1.5.32 COMMON DATA CLASS: ENS_HEALTH

Description: Enumerated Status

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (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	

1.5.33 COMMON DATA CLASS: ENS_HEALTH_DN

Description: Enumerated Status (with dataNs Used for the Health in the Extended LN)

CDC Class: ENS

Attribute	Type	FC	Enumeration	Comment	X
stVal	ENUMERATED8 (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	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.34 COMMON DATA CLASS: INC_MOD_STD

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

CDC Class: INC

Attribute	Type	FC	Enumeration	Comment	X
stVal	INT32	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)	

1.5.35 COMMON DATA CLASS: ING_SET_WD

Description: Integer Status Setting

CDC Class: ING

Attribute	Type	FC	Enumeration	Comment	X
setVal	INT32	SP		Setting value	

1.5.36 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	
q	Quality	ST		The quality of the status value	
t	TimeStamp	ST		Timestamp of the last change in state	

1.5.37 COMMON DATA CLASS: LPL_LLN0

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	

1.5.38 COMMON DATA CLASS: LPL_LLN0_MEA

Description: Measurements 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	
configRev	VISIBLE_STRING255	DC		Uniquely identifies the configuration of a local device instance	
ldNs	VISIBLE_STRING255	EX		Logical Device name space	

1.5.39 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	

1.5.40 COMMON DATA CLASS: LPL_LN_PRIV

Description: Logical Node Name Plate (w.r.t GE Vernova Grid Solutions Extended)

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.41 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	

1.5.42 COMMON DATA CLASS: MV_FLOAT_D

Description: Measured Value (w.r.t Floating Point Value with Description)

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	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.43 COMMON DATA CLASS: MV_FLOAT_D_PRIV

Description: Measured 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	CF		Unit of the attribute representing the data	
db	INT32U	CF		Measurement deadband	
rangeC	RangeConfig_DeadBand	CF		Measurement range configuration attributes	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.44 COMMON DATA CLASS: MV_FLOAT_PRIV

Description: Measured Value (Used for Extended DO)

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.45 COMMON DATA CLASS: ORG_SRC_REF

Description: Object Reference Settings

CDC Class: ORG

Attribute	Type	FC	Enumeration	Comment	X
setSrcRef	ObjectReference	SP		The value of the object reference setting	

1.5.46 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)	

1.5.47 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)	

1.5.48 COMMON DATA CLASS: SPC_CTRL_PRIV

Description: Controllable Single Point (With Namespace)

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)	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.49 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)	

1.5.50 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	

1.5.51 COMMON DATA CLASS: SPS_D_PRIV

Description: Single Point Status (with Description and Name Space)

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	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.52 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	

1.5.53 COMMON DATA CLASS: SPS_WD_PRIV

Description: Single Point Status (without Description with Name Space)

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	

1.5.54 COMMON DATA CLASS: WYE_NEU_ANG_D_PRIV

Description: Phase to Ground Measurements for a 3-Phase System

CDC Class: WYE

Attribute	Type	FC	Enumeration	Comment	X
neut	CMV_MAG_ANG_FLOAT	--		Measurement values for neutral input	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.55 COMMON DATA CLASS: WYE_RES_ANG_D_PRIV

Description: Phase to Ground Measurements for a 3-Phase System

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	

1.5.56 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	

1.5.57 COMMON DATA CLASS: WYE_SEG_ANG_D

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	
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.58 COMMON DATA CLASS: WYE_SEG_ANG_RES_D

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	
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
res	CMV_MAG_ANG_FLOAT	--		Measurement values for the residual system current	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.59 COMMON DATA CLASS: WYE_SEG_D

Description: Phase to Ground Measurements for a 3-Phase System (w.r.t Phase Segregation + Description)

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	
d	VISIBLE_STRING255	DC		Description of the status element	

1.5.60 COMMON DATA CLASS: WYE_SEG_D_PRIV

Description: Phase to Ground Measurements for a 3-Phase System (w.r.t Phase Segregation + Description, Use for Private Data)

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	
d	VISIBLE_STRING255	DC		Description of the status element	
dataNs	VISIBLE_STRING255	EX		Data name space	

1.5.61 COMMON DATA CLASS: WYE_SEG_PRIV

Description: Phase to Ground Measurements for a 3-Phase System (Used for Extended 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	

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

1.5.62 COMMON DATA CLASS: WYE_SEG_RES_D_PRIV

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	
phsB	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase B	
phsC	CMV_MAG_ANG_FLOAT	--		Measurement values for Phase C	
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	

1.6 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.

1.6.1 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	

1.6.2 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
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)	
orIdent	OCTET_STRING64		Originator identification (Null value indicates unknown or not reported)	

1.6.3 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	
hhLim	AnalogueValue_Float		High High range limit	
hLim	AnalogueValue_Float		High range limit	

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

1.6.4 COMPONENT: UNIT

Comment: SI Unit Definitions

Parent Type:

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED8 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED8 (MMS Type: INT8)	SIUnit	SI Unit	

1.6.5 COMPONENT: UNIT_MULTIPLIER

Comment: SI Unit Definitions

Parent Type: Unit

Attribute	Type	Enumeration	Comment	X
multiplier	ENUMERATED8 (MMS Type: INT8)	multiplier	Multiplier value, the default of which is 0 (i.e. multiplier = 1)	
SIUnit	ENUMERATED8 (MMS Type: INT8)	SIUnit	SI Unit	

1.6.6 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	

1.6.7 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)	

1.7 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.

1.7.1 ENUMERATED TYPE: ADDCAUSE

Description: AddCause

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
19	Object-already-selected
20	No-access-authority
21	Ended-with-overshoot
22	Abortion-due-to-deviation
23	Abortion-by-communication-loss
24	Blocked-by-command
25	None
26	Inconsistent-parameters
27	Locked-by-other-client

1.7.2 ENUMERATED TYPE: AUTORECST

Description: Auto-Reclose Status

Ordinal	Semantic
1	Ready
2	InProgress
3	Successful
4	WaitingForTrip
5	TripFromProtection
6	FaultDisappeared
7	WaitToComplete
8	CBclosed
9	CycleUnsuccessful

Ordinal	Semantic
10	Unsuccessful
11	Aborted

1.7.3 ENUMERATED TYPE: BEH_3

Description: Behaviour Including 3 States

Ordinal	Semantic
1	on
3	test
4	test/blocked

1.7.4 ENUMERATED TYPE: BEH_4

Description: Behaviour Including 4 States

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

1.7.5 ENUMERATED TYPE: CBOPCAP

Description: CB Operating Capability

Ordinal	Semantic
1	None
2	Open
4	Open-Close-Open
5	Close-Open-Close-Open
6	Open-Close-Open-Close-Open
7	more

1.7.6 ENUMERATED TYPE: CLCINTVTYP

Description: Calculation Interval Type

Ordinal	Semantic
1	MS
2	PER_CYCLE
3	CYCLE
4	DAY
5	WEEK
6	MONTH
7	YEAR
8	EXTERNAL

1.7.7 ENUMERATED TYPE: CLCMOD

Description: Calculation Mode

Ordinal	Semantic
1	TOTAL
2	PERIOD
3	SLIDING

1.7.8 ENUMERATED TYPE: CLCMTH

Description: Calculation Method of Statistical Data Objects

Ordinal	Semantic
1	UNSPECIFIED
2	TRUE_RMS
3	PEAK_FUNDAMENTAL
4	RMS_FUNDAMENTAL
5	MIN
6	MAX
7	AVG
8	SDV
9	PREDICTION
10	RATE

1.7.9 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

1.7.10 ENUMERATED TYPE: DBPOS

Description: Switch Positions

Ordinal	Semantic
0	intermediate
1	off
2	on
3	bad

1.7.11 ENUMERATED TYPE: DIR

Description: Direction

Ordinal	Semantic
0	unknown
1	forward
2	backward
3	both

1.7.12 ENUMERATED TYPE: HEALTH

Description: Health

Ordinal	Semantic
1	Ok
2	Warning
3	Alarm

1.7.13 ENUMERATED TYPE: MOD_2

Description: Mode Including 2 States

Ordinal	Semantic
1	on
5	off

1.7.14 ENUMERATED TYPE: MOD_3

Description: Mode Including 3 States

Ordinal	Semantic
1	on
3	test
4	test/blocked

1.7.15 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
21	Z
24	Y

1.7.16 ENUMERATED TYPE: ORCATEGORY

Description: orCategory

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

1.7.17 ENUMERATED TYPE: SEQT

Description: Sequence Measurement Type

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

1.7.18 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	
2	m
3	kg
4	s
5	A
6	K
7	mol
8	cd
9	deg
10	rad
11	sr

Ordinal	Semantic
21	Gy
22	Bq
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
55	W/m^2
56	J/m^2
57	S/m
58	K/s
59	Pa/s
60	J/kg K
61	VA
62	Watts
63	VAr
64	phi
65	cos(phi)
66	Vs
67	V^2
68	As
69	A^2
70	A^2t
71	VAh

Ordinal	Semantic
72	Wh
73	VArh
74	V/Hz
75	Hz/s
76	char
77	char/s
78	kgm²
79	dB
80	J/Wh
81	W/s
82	l/s
83	dBm
84	h
85	min

1.8 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 bits
BVstring13	BVstring13	Variable bit string (up to 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
ENUMERATED32	Long	32 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
INT64	Int64	64 bit signed integer value
INT8	Byte	8 bit signed integer value
INT8U	Ubyte	8 bit unsigned integer value
ObjectReference	Vstring129	Object Reference (129 character string)
(129 character string) 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	IEC61850 Quality
TimeStamp	Utctime	IEC61850 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_STRING129	Vstring129	129 character string
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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