

Model Implementation Conformance Statement
for the IEC 61850 interface in SEL-411L

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1. Introduction

This model implementation conformance statement is applicable for SEL-411L firmware R111:

This MICS document specifies the modelling extensions compared to IEC 61850 edition 1. For the exact details on the standardized model please compare the ICD substation configuration file: "0411L 005.ICD", version R102.

Clause 2 contains the list of implemented logical nodes.
Clause 3 describes the new and extended logical nodes.
Clause 4 describes the new and extended common data classes.
Clause 5 describes enum type extensions.

2. Logical Node List

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

C: Supervisory Control
CSWI (Switch Controller)
G: Generic Function References
GGIO (Generic Process I/O)
L: System Logical Nodes
LLN0 (Logical Node Zero)
LPHD (Physical Device Information)
M: Metering and Measurement
MDST (Demand Metering Statistics)
MMDF (Differential)
MMTR (Metering)
MMXN (Non Phase Related Measurement)
MMXU (Measurement)
MSQI (Sequence and Imbalance)
MTHR (Thermal Metering)
P: Protection Functions
PDIF (Differential)
PDIS (Distance)
PDOP (Directional Overpower)
PDUP (Directional Underpower)
PHAR (Harmonic Restraint)
PIOC (Instantaneous Overcurrent)
PSCH (Protection Scheme)
PTOC (Time Overcurrent)

PTOF (Overfrequency)
PTOV (Overvoltage)
PTRC (Protection Trip Conditioning)
PTUF (Underfrequency)
PTUV (Undervoltage)
PVPH (Volts per Hz)
R: Protection Related Functions
RBRF (Breaker Failure)
RDIR (Directional Element)
RDRE (Disturbance Recorder Function)
RFLO (Fault Locator)
RPSB (Power Swing Detection/Blocking)
RSYN (Synchronism–check or synchronising)
X: Switchgear
XCBR (Circuit Breaker)
XSWI (Circuit Switch)
Z: Further (power system) Equipment
ZBAT (Battery)

3. Logical Node Extensions

The following tables use:

M: Data is mandatory in the IEC–61850–7–4.

O: Data is optional in the IEC–61850–7–4 and is used in the device.

E: Data is an extension to the IEC–61850–7–4.

3.1 New Logical Nodes

New logical nodes have the LnNs attribute in the Name plate. The value of LnNs is a reference to the MICS document.

3.1.1 MDST: Demand Metering Statistics

This LN shall be used for calculation of demand currents and energy in a three-phase system.

MDST Class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
LNName		Shall be inherited from Logical Node Class.		
Data				
Mod	INC	Mode	M	
Beh	INS	Behavior	M	
Health	INS	Health	M	
NamPlt	LPL	Name plate	M	
PosVArh	MV	Reactive energy demand (energy flow out of bus)	E	
DmdWh	MV	Real energy demand (energy flow out of bus)	E	

NegVArh	MV	Reactive energy supply (energy flow into bus)	E	
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3.1.2 MMDF: Differential

This LN shall be used to present values of the differential, local, and remote currents in per-unit values.

MMDF Class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
LNName		Shall be inherited from Logical Node Class.		
Data				
Mod	INC	Mode	M	
Beh	INS	Behavior	M	
Health	INS	Health	M	
NamPlt	LPL	Name plate	M	
Dif	DIF	Differential Currents	E	
Local	DIF	Local Currents	E	
Remote	DIF	Remote Currents	E	

3.1.3 MTHR: Thermal Metering

This LN shall be used to acquire values from RTDs and to calculate thermal capacity. This is mainly used for Thermal Monitoring.

MTHR Class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks

LNNName		Shall be inherited from Logical Node Class.		
Data				
Mod	INC	Mode	M	
Beh	INS	Behavior	M	
Health	INS	Health	M	
EEHealth	INS	External equipment health	E	
NamPlt	LPL	Name plate	M	
MaxWdgTmp	MV	Maximum winding temperature	E	
MaxBrgTmp	MV	Maximum bearing temperature	E	
MaxAmbTmp	MV	RTD percent thermal capacity used	E	
MaxOthTmp	MV	Maximum other temperature	E	
Tmp	MV	Temperature	E	

3.2 Extended Logical Nodes

The following logical nodes have been extended with extra data. All extra data has been highlighted in the tables and marked as “E” (Extended), these data contain the dataNs attribute.

3.2.1 GGIO: Generic Process I/O

For a description of this LN, see IEC 61850-5. This node shall be used to model in a generic way device processes that are not predefined by the groups S, T, X, Y, or Z.

GGIO Class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks

LNNName		Shall be inherited from Logical Node Class.		
Data				
Mod	INC	Mode	M	
Beh	INS	Behavior	M	
Health	INS	Health	M	
NamPlt	LPL	Name Plate	M	
AnIn	MV	Analogue input	O	
SPCSO	SPC	Single point control- lable status output	O	
Ind	SPS	General indication (binary input)	O	
Ra	MV	Remote Analog	E	
Rao	MV	Remote Analog Out- put	E	

3.2.2 RFLO: Fault Locator

For a description of this LN, see IEC 61850. In case of a fault, the fault location is calculated in Ohm. To convert it into km, the line parameters (settings) also have to be known.

RFLO Class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
LNNName		Shall be inherited from Logical Node Class.		
Data				
Mod	INC	Mode	M	
Beh	INS	Behavior	M	
Health	INS	Health	M	

NamPlt	LPL	Name Plate	M	
FltZ	CMV	Fault Impedance	M	
FltDiskm	MV	Fault Distance in km	M	
FltFrom	INS	Integer value that corresponds to the value in the 'From' column of the event summary. Local=0, Remote 1 = 1, Remote 2 = 2, Remote 3 = 3, TAP = 4	E	
A	WYE	Fault current magnitudes and angles	E	
FltTmns	INS	Traveling Wave peak timestamp (local), nanosecond offset from second of century	E	
FltTmS	INS	Traveling Wave peak timestamp (local), second of century	E	

4. Common Data Class Extensions

The following common data classes have been extended with extra data. All extra data has been highlighted in the tables and marked as “E” (Extended).

Comments:

M: Data is mandatory in the IEC–61850–7–3.

O: Data is optional in the IEC–61850–7–3 and is used in the device.

E: Data is an extension to the IEC–61850–7–3.

4.1 New Common Data Classes

New common data classes have the cdcNs attribute in the Name plate. These data contains “cdcNs” attribute.

4.1.1 DIF Per Unit Differential Currents

Provides per-unit magnitudes and angles of the 87L Differential Currents.

DIF Class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value Range	M/O/E	Remarks
DataName	Shall be inherited from Logical Node Class.					
Data						
phsA	CMV				E	
phsB	CMV				E	
phsC	CMV				E	
ps	CMV				E	
neg	CMV				E	
res	CMV				E	
DataAttribute						

cdcNs	VISIBLE STRING255	EX			AC_DLNDA_M	
cdcName	VISIBLE STRING255	EX			AC_DLNDA_M	
dataNs	VISIBLE STRING255	EX			AC_DLN_M	

5. Enum Types Extensions

5.1 New Enum types

5.1.1 dirGeneral

Value	Description	Remarks
0	unknown	
1	forward	
2	backward	
3	both	

5.1.2 orCat

Value	Description	Remarks
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	