Model Implementation Conformance Statement
for the IEC 61850 interface in SEL-751

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Revision 1.0

UCA International Users Group

Testing Sub Committee

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1. Introduction

This model implementation conformance statement is applicable for SEL-751 Feeder Protection Relay, with firmware R111:

This MICS document specifies the modelling extensions compared to IEC 61850 edition 2. For the exact details on the standardized model please compare the ICD substation configuration file: "0751 006.ICD", version R200.

Clause 2 contains the list of implemented logical nodes.
Clause 3 describes the new and extended logical nodes (if any).
Clause 4 describes the new and extended enum types (if any).

2. **Logical Nodes List**

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

C: Logical nodes for control
CSWI (Switch Controller)
G: Logical Nodes for generic references
GGIO (Generic process I/O)
L: System logical nodes
LLN0 (Logical Node Zero)
LPHD (Physical Device Information)
M: Logical Nodes for metering and measurement
MDST (Demand Metering Statistics)
MMXU (Measurement)
MSQI (Sequence and Imbalance)
MSTA (Metering Statistics)
MTHR (Thermal Metering)
MTHE (Thermal Elements)
P: Logical Nodes for protection functions
PAFD (Arc-Flash Detection)
PDOP (Directional Overpower)
PDUP (Directional Underpower)
PFRC (Rate of Change of Frequency)
PHIZ (Ground Detector)
PIOC (Instantaneous Overcurrent)
POPF (Over Power Factor)
PTOC (Time Overcurrent)
PTOF (Overfrequency)
PTOV (Overvoltage)

PTRC (Protection Trip Conditioning)
PTUV (Undervoltage)
R: Logical nodes for protection related functions
RBRF (Breaker Failure)
RDIR (Directional Element)
RDRE (Disturbance Recorder Function)
RFLO (Fault Locator)
S: Logical Nodes for supervision and monitoring
SCBR (Circuit Breaker Supervision)
X: Logical Nodes for switchgear
XCBR (Circuit breaker)
Z: Logical Nodes for further power system equipment
ZBAT (Battery)

3. Logical Node Extensions

The following table use

- M: Data is mandatory in the IEC 61850-7-4 Ed.2.
- O: Data is optional in the IEC 61850-7-4 Ed.2 and is used in the device.
- C: Data is conditional in the IEC 61850-7-4 Ed.2 and is used in the device.
- E: Data is an extension to the IEC 61850-7-4 Ed.2.

3.1. New Logical Nodes

Newly created logical nodes are listed in this clause, with lnNs attribute in the Name plate.

3.1.1   MDST: Demand Metering Statistics

This LN shall be used for calculation of demand currents and energy in a three-phase system. This shall not be used for billing purposes.

MDST class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2)	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Measured Values				
DmdA	WYE	Demand currents	E	
PkDmdA	WYE	Peak demand currents	E	
SupWh	BCR	Real energy supply (default direction: energy flow towards busbar)	E	

SupVArh	BCR	Reactive energy supply (default direction: energy flow towards busbar)	E	
DmdWh	BCR	Real energy demand (default direction: energy flow from busbar)	E	
DmdVArh	BCR	Reactive energy demand (default direction: energy flow from busbar)	E	
DmdAnseq	MV	Negative sequence demand current	E	
PkDmdAnseq	MV	Negative sequence peak demand current	E	

3.1.2   MSTA: Metering Statistics

This LN shall be used for power system metering statistics.

MSTA class				
Data object name	Common data class	Explanation	M/O/C/E	Remarks
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2).	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Metered Values				
AvAmps	MV	Average current	E	
AvVolts	MV	Average voltage	E	
MaxVA	MV	Maximum apparent power	E	
MinVA	MV	Minimum apparent power	E	
MaxW	MV	Maximum real power	E	
MinW	MV	Minimum real power	E	

MaxVAr	MV	Maximum reactive power	E	
MinVAr	MV	Minimum reactive power	E	
Measured Values				
MaxA	WYE	Maximum current	E	
MinA	WYE	Minimum current	E	
MaxPhV	WYE	Maximum phase voltage	E	
MinPhV	WYE	Minimum phase voltage	E	
MaxP2PV	DEL	Maximum Phase to Phase Voltages	E	
MinP2PV	DEL	Minimum Phase to Phase Voltages	E	
MaxVs	MV	Maximum synchronism check voltage	E	
MinVs	MV	Minimum synchronism check voltage	E	

3.1.3   MTHR: Thermal Measurements

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

MTHR class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2).	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
EEHealth	INS	External equipment health (RTD Communications Status)	O	
NamPlt	LPL	Name plate	O	

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Status Information				
EEHealth	INS	External equipment health	E	
Measured Values				
MaxWdgTmp	MV	Maximum winding temperature	E	
MaxBrgTmp	MV	Maximum bearing temperature	E	
MaxAmbTmp	MV	Maximum ambient temperature	E	
MaxOthTmp	MV	Maximum other temperature	E	
Tmp	MV	Temperature	E	

3.1.4   MTHE: Thermal Metering

This LN shall be used to represent IEC Thermal Element Metering values.

MTHE class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2).	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Metered Values				
THRL1	MV	Level 1 Operating quantity thermal level	E	
THRL2	MV	Level 2 Operating quantity thermal level	E	
THRL3	MV	Level 3 Operating quantity thermal level	E	
THIEQ1	MV	Level 1 Operating quantity equivalent current	E	

THIEQ2	MV	Level 2 Operating quantity equivalent current	E	
THIEQ3	MV	Level 3 Operating quantity equivalent current	E	
THTCU1	MV	Level 1 thermal capacity used	E	
THTCU2	MV	Level 2 thermal capacity used	E	
THTCU3	MV	Level 3 thermal capacity used	E	
THTRIP1	MV	Level 1 time before thermal element trip	E	
THTRIP2	MV	Level 2 time before thermal element trip	E	
THTRIP3	MV	Level 3 time before thermal element trip	E	
THRLS1	MV	Level 1 time before thermal element release	E	
THRLS2	MV	Level 2 time before thermal element release	E	
THRLS3	MV	Level 3 time before thermal element release	E	

3.1.5   PAFD: Arc Flash Detection

This LN shall be used to represent Arc Flash Detection status.

PAFD class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		Shall be inherited from Logical-Node Class (see IEC 61850-7-2).	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	

Status Information				
Str	ACD	Start	E	
OpEx	ACD	Breaker failure trip ("external trip")	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).

3.2.1   GGIO: Generic Process I/O

GGIO class				
Data object name	Common data class	Explanation	M/O/C/E	Remarks
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
Measured Values				
AnIn	MV	Analog Input	O	
Ra	MV	Remote analog	E	
Controls				
SPCSO	SPC	Single point controllable status output	O	
Status Information				
Ind	SPS	General indication	O	

3.2.2 MMXU: Measurement

MMXU class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
Measured Values				
TotW	MV	Total Active Power (Total P)	O	
TotVAr	MV	Total Reactive Power (Total Q)	O	
TotVA	MV	Total Apparent Power (Total S)	O	
TotPF	MV	Average Power Factor (Total PF)	O	
Hz	MV	Frequency	O	
PPV	DEL	Phase to phase voltages (VL1VL2,...)	O	
PhV	WYE	Phase to ground voltages (VL1ER, ...)	O	
A	WYE	Phase currents (IL1,IL2, IL3)	O	
W	WYE	Phase active power (P)	O	
VAr	WYE	Phase reactive power (Q)	O	
VA	WYE	Phase apparent power (S)	O	
PF	WYE	Phase power factor	O	
VSyn	CMV	Synchronism check voltage	E	
Fs	MV	Synchronism check frequency	E	

3.2.3   MMXU: Measurement

MMXU class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
Measured Values				
PPV	DEL	Phase to phase voltages (VL1VL2,...)	O	
PhV	WYE	Phase to ground voltages (VL1ER, ...)	O	
A	WYE	Phase currents (IL1,IL2, IL3)	O	
VSyn	CMV	Synchronism check voltage	E	

3.2.4   RFLO: Fault Locator

RFLO class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	

Measured Values					
FltZ	CMV	Fault Impedance	M	
FltDiskm	MV	Fault Distance	O	
FltA	WYE	Fault Current	E	

3.2.5   SCBR: Circuit Breaker Wear Supervisor

SCBR class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		The name shall be composed of the class name, the LN-Prefix and LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
Status Information				
ColOpn	SPS	Open command of trip coil	M	
AbrPrt	MV	Calculated or measured wear (e.g. of main contact), expressed in % where 0 % corresponds to new condition	E	

3.2.6   XCBR: Circuit Breaker

XCBR class				
Data object name	**Common data class**	**Explanation**	**M/O/C/E**	**Remarks**
LNName		The name shall be composed of the class name, the LN-Prefix and		

		LN-Instance-ID according to IEC 61850-7-2, Clause 22.		
Data objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
Status Information				
Loc	SPS	Local Control Behavior	M	
OpCnt	INS	Operation counter	M	
CBOpCap	ENS	Circuit breaker operation capacity	O	
OpCntEx	INS	Operation counter - external	E	
Measured and Metered Values				
Pos	DPC	Switch position	M	
BlkOpn	SPC	Block opening	M	
BlkCls	SPC	Block closing	M	

4. Enum types Extensions

4.1. New Enum types

New enum types are listed in this clause.

4.1.1   Check

Value	Description	Remarks
0	no-check	
1	synchrocheck	
2	interlocking-check	
3	both	

4.1.2   Dbpos

Value	Description	Remarks
0	intermediate	
1	off	
2	on	
3	bad	