

Model Implementation Conformance Statement
for the IEC 61850 interface in ENIP-2

08/07/2015, 2.0.0.6

UCA International Users Group
Testing Sub Committee

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1. Introduction

This model implementation conformance statement is applicable for <ENIP-2>, with firmware 2.0.0.6:

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: "ENIP-2.icd", version 2.0.0.6.

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 (if any).

Clause 5 describes the new and extended enum types.

Clause 6 describes any other extensions.

<note - remove the non-applicable clauses>

2. Logical Nodes List

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

L: System Logical Nodes
LPHD (Physical device information)
LLN0 (Logical node zero)
C: Logical Nodes for control
CSWI (Switch Controller)
CILO (Interlocking)
G: Logical Nodes for generic references
GGIO (Generic process I/O)
M: Logical Nodes for metering and measurement
MMTR (Metering)
MMXU (Measurement)
MSQI (Sequence and Imbalance)
X: Logical Nodes for switchgear
XCBR (Circuit breaker)
XSWI (Switch)

3. Logical Node Extensions

The following table 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.

1.1. New Logical Nodes

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

1.1.1. LN: Logical node zero Name: LLN0

LLN0 class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
LLN0		Logical node zero		
Data				
Mod	INC_1_Mod_LLN0	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_2_NamPlt	Name plate	M	

1.1.2. LN: Physical device information Name: LPHD1

LPHD class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
LPHD		Physical device information		
Data				
PhyNam	DPL_1_PhysNam	Physical device name plate	M	
PhyHealth	INS_1_PhysHealth	Physical device health	M	
Proxy	SPS_1_Proxy	Indicates if this LN is a proxy	M	

1.1.3. LN: Interlocking Name: CILO1

CILO class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
CILO		Interlocking		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
EnaOpn	SPS_1_CILO_Ena	Enable Open	M	
EnaCls	SPS_1_CILO_Ena	Enable Close	M	

1.1.4. LN: Switch controller Name: CSWI1

CSWI class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
CSWI		Switch controller		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
Pos	DPC_2_Pos	Switch, general	M	

1.1.5. LN: Generic process I/O Name: GGIO1

GGIO class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
GGIO		Generic process I/O		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	

NamPlt	LPL_1_NamPlt	Name plate	M	
Ind1	SPS_1_Ind	General indication (binary input 1)	O	
Ind2	SPS_1_Ind	General indication (binary input 2)	O	
Ind3	SPS_1_Ind	General indication (binary input 3)	O	
Ind4	SPS_1_Ind	General indication (binary input 4)	O	
Ind5	SPS_1_Ind	General indication (binary input 5)	O	
Ind6	SPS_1_Ind	General indication (binary input 6)	O	
Ind7	SPS_1_Ind	General indication (binary input 7)	O	
Ind8	SPS_1_Ind	General indication (binary input 8)	O	
Ind9	SPS_1_Ind	General indication (binary input 9)	O	
Ind10	SPS_1_Ind	General indication (binary input 10)	O	
Ind11	SPS_1_Ind	General indication (binary input 11)	O	
Ind12	SPS_1_Ind	General indication (binary input 12)	O	
Ind13	SPS_1_Ind	General indication (binary input 13)	O	
Ind14	SPS_1_Ind	General indication (binary input 14)	O	
Ind15	SPS_1_Ind	General indication (binary input 15)	O	
Ind16	SPS_1_Ind	General indication (binary input 16)	O	
Ind17	SPS_1_Ind	General indication (binary input 17)	O	
Ind18	SPS_1_Ind	General indication (binary input 18)	O	
Ind19	SPS_1_Ind	General indication (binary input 19)	O	
Ind20	SPS_1_Ind	General indication (binary input 20)	O	
Ind21	SPS_1_Ind	General indication (binary input 21)	O	

Ind22	SPS_1_Ind	General indication (binary input 22)	O	
Ind23	SPS_1_Ind	General indication (binary input 23)	O	
Ind24	SPS_1_Ind	General indication (binary input 24)	O	
Ind25	SPS_1_Ind	General indication (binary input 25)	O	
Ind26	SPS_1_Ind	General indication (binary input 26)	O	
Ind27	SPS_1_Ind	General indication (binary input 27)	O	
Ind28	SPS_1_Ind	General indication (binary input 28)	O	
Ind29	SPS_1_Ind	General indication (binary input 29)	O	
Ind30	SPS_1_Ind	General indication (binary input 30)	O	
Ind31	SPS_1_Ind	General indication (binary input 31)	O	
Ind32	SPS_1_Ind	General indication (binary input 32)	O	

1.1.6. LN: Metering Name: MMTR1

MMTR class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
MMTR		Metering		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	

SupWh	BCR_1_Energy	Real energy supply (default supply direction: energy flow towards busbar)	O	
SupVArh	BCR_1_Energy	Reactive energy supply (default supply direction: energy flow towards busbar)	O	
DmdWh	BCR_1_Energy	Real energy demand (default demand direction: energy flow from busbar away)	O	
DmdVArh	BCR_1_Energy	Reactive energy demand (default demand direction: energy flow from busbar away)	O	

1.1.7. LN: Measurement Name: MMXU1

MMXU class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
MMXU		Measurement		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
TotW	MV_1	Total Active Power (Total P)	O	
TotVAr	MV_1	Total Reactive Power (Total Q)	O	
TotVA	MV_1	Total Apparent Power (Total S)	O	
TotPF	MV_1	Average Power factor (Total PF)	O	

Hz	MV_1	Frequency	O	
PPV	DEL_1	Phase to phase voltages (VL1VL2, ...)	O	
PhV	WYE_1_ABCN	Phase to ground voltages (VL1ER, ...)	O	
A	WYE_1_ABCN	Phase currents (IL1, IL2, IL3)	O	
W	WYE_1_ABC	Phase active power (P)	O	
VAr	WYE_1_ABC	Phase reactive power (Q)	O	
VA	WYE_1_ABC	Phase apparent power (S)	O	
PF	WYE_1_ABC	Phase power factor	O	

1.1.8. LN: Sequence and imbalance Name: MSQI1

MSQI class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
MSQI		Sequence and imbalance		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
SeqA	SEQ_1	Positive, Negative and Zero Sequence Current	O	
SeqV	SEQ_1	Positive, Negative and Zero Sequence Voltage	O	

ImbNgA	MV_1	Imbalance negative sequence current	O	
ImbNgV	MV_1	Imbalance negative sequence voltage	O	

1.1.9. LN: Circuit breaker Name: XCBR1

XCBR class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
XCBR		Circuit breaker		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
Loc	SPS_1_Loc	Local operation (local means without substation automation communication, hardwired direct control)	M	
OpCnt	INS_OpCnt	Operation counter	M	
Pos	DPC_1_Pos	Switch position	M	
BlkOpn	SPC_BlK	Block opening	M	
BlkCls	SPC_BlK	Block closing	M	
CBOpCap	INS_CBO	Circuit breaker operating capability	M	

1.1.10. LN: Circuit switch Name: XSWI1

XSWI class				
Attribute Name	Attribute Type	Explanation	M/O/E	Remarks
XSWI		Circuit switch		
Data				
Mod	INC_1_Mod	Mode	M	
Beh	INS_1_Beh	Behaviour	M	
Health	INS_1_Health	Health	M	
NamPlt	LPL_1_NamPlt	Name plate	M	
Loc	SPS_1_Loc	Local operation (local means without substation automation communication, hardwired direct control)	M	
OpCnt	INS_OpCnt	Operation counter	M	
Pos	DPC_1_Pos	Switch position	M	
BlkOpn	SPC_Blk	Block opening	M	
BlkCls	SPC_Blk	Block closing	M	
SwTyp	INS_1_SwTyp	Switch type	M	
SwOpCap	INS_1_SwOpCap	Switch operating capability	M	

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.

1.1. New common data classes

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

1.1.1. INC_1_Mod - Controllable integer status (INC)

INC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	Mod (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
ctlModel	ctlModels (MMS Type: INT8)	CF			M	

1.1.2. INC_1_Mod_LLNO - Controllable integer status (INC)

INC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
ctlVal	Mod (MMS Type: INT8)	CO			O	
stVal	Mod (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
ctlModel	ctlModels (MMS Type: INT8)	CF			M	

1.1.3. INS_1_Beh - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	Beh (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.4. INS_1_Health - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
Health	Beh (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.5. INS_1_PhyHealth - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
Health	MMS Type: INT32	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.6. INS_OpCnt - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
Health	MMS Type: INT32	ST	dchg		M	

q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.7. INS_CBO - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	CBOpCap (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.8. INS_1_SwTyp - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	SwTyp (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.9. INS_1_SwOpCap - Integer status (INS)

INS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	SwOpCap (MMS Type: INT8)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.10. LPL_1_NamPlt - Logical node name plate (LPL)

LPL class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
vendor	VisString255	DC			M	
swRev	VisString255	DC			M	
d	VisString255	DC			M	

1.1.11. LPL_2_NamPlt - Logical node name plate (LPL)

LPL class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
vendor	VisString255	DC			M	

swRev	VisString255	DC			M	
d	VisString255	DC			M	
configRev	VisString255	DC			AC_LN 0_M	
IdNs	VisString255	EX			AC_LN 0_EX	

1.1.12. DPL_1_PhyNam - Device name plate (DPL)

DPLclass						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
vendor	VisString255	DC			M	

1.1.13. SPS_1_Proxy - Single point status (SPS)

SPS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	BOOLEAN	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.14. SPS_1_CILO_Ena - Single point status (SPS)

SPS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	BOOLEAN	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.15. SPS_1_Ind - Single point status (SPS)

SPS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	BOOLEAN	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.16. SPS_1_Loc - Single point status (SPS)

SPS class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
stVal	BOOLEAN	ST	dchg		M	

q	Quality	ST	qchg		M	
t	Timestamp	ST			M	

1.1.17. SPC_Blk - Controllable single point (SPC)

SPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
ctlVal	BOOLEAN	CO			AC_CO_M	
stVal	BOOLEAN	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
ctlModel	ctlModels (MMS Type: INT8)	CF			M	

1.1.18. DPC_1_Pos - Controllable double point (DPC)

DPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
ctlVal	BOOLEAN	CO			AC_CO_M	
stVal	Dbpos (MMS Type: _BSTR2)	ST	dchg		M	
q	Quality	ST	qchg		M	

t	Timestamp	ST			M	
ctlModel	ctlModels (MMS Type: INT8)	CF			M	

1.1.19. DPC_2_Pos - Controllable double point (DPC)

DPC class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
ctlVal	BOOLEAN	CO			AC_CO_M	
stVal	Dbpos (MMS Type: _BSTR2)	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
ctlModel	ctlModels (MMS Type: INT8)	CF			M	

1.1.20. BCR_1_Energy - Binary counter reading (BCR)

BCR class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
actVal	MMS Type: INT32	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
pulsQty	FLOAT32	CF			M	

1.1.21. MV_1 - Measured value (MV)

MV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
mag	AnalogueValue_1	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
db	INT32U	CF			M	

1.1.22. CMV_1 - Complex measured value (CMV)

CMV class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
cVal	Vector_1	ST	dchg		M	
q	Quality	ST	qchg		M	
t	Timestamp	ST			M	
db	INT32U	CF			M	

1.1.23. DEL_1 - Phase to phase related measured values of a three phase system (DEL)

DEL class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
phsAB	CMV_1					
phsBC	CMV_1					
phsCA	CMV_1					

1.1.24. WYE_1_ABCN - Phase to ground related measured values of a three phase system (WYE)

WYE class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
phsA	CMV_1					
phsB	CMV_1					
phsC	CMV_1					
net	CMV_1					

1.1.25. WYE_1_ABC - Phase to ground related measured values of a three phase system (WYE)

WYE class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
phsA	CMV_1					
phsB	CMV_1					
phsC	CMV_1					

1.1.26. SEQ_1 - Sequence (SEQ)

SEQ class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
c1	CMV_1					
c2	CMV_1					
c3	CMV_1					
seqT	seqT (MMS Type: INT8)					

1.1.27. AnalogueValue_1

AnalogueValue_1 class						
Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
f	FLOAT32					

1.1.28. **Vector_1**

Attribute Name	Attribute Type	FC	TrgOp	Value/Value range	M/O/E	Remarks
mag	AnalogueValue_1					

5. Enum types Extensions

1.1. New Enum types

1.1.1. <New Enum type>

Value	Description	Remarks
0		
1		
2		
3		
4		
5		

1.2. Extended Enum types

1.1.1. <Extended Enum type>

Value	Description	Remarks
-4		
-3		
-2		
-1		

6. Control Block Extensions

<Describe control block extensions and related functionality, for example in a report control block>

Control block extensions should not impact interoperability. As such the extended attributes should have the functional constraint “EX” unless specified otherwise in the TISSUES database.