Model Implementation Conformance Statement (MICS)

for the IEC 61850 Edition 2 server interface in SEL-451-6, SEL-487B-2, SEL-487E-5, SEL-421-7S, SEL-421-7P, SEL-401, SEL-411L-0, SEL-411L-1, SEL-411L-A, SEL-411L-2, SEL-400G-0, SEL-400G-1

Version 1

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MICS template for Server Test Procedures First edition and Edition 2 servers

Template version 1.2

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1. Introduction

This model implementation conformance statement is applicable for:
SEL-451-6 with firmware version R405,
SEL-487B-2 with firmware version R404,
SEL-487E-5 with firmware version R405,
SEL-421-7S with firmware version R410,
SEL-421-7P with firmware version R410,
SEL-401 with firmware version R410,
SEL-411L-0 with firmware version R130,
SEL-411L-1 with firmware version R130,
SEL-411L-A with firmware version R130,
SEL-411L-2 with firmware version R203,
SEL-400G-0 with firmware version R104 and
SEL-400G-1 with firmware version R104.

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:
“0451-6S 009 R405.ICD”, version R005,
“0487B-2S 009 R404.ICD”, version R004,
“0487E-5S 009 R405.ICD”, version R006,
“0421-7S 006 R410.ICD”, version R106,
“0421-7P 009 R410.ICD”, version R106,
“0401 009 R410.ICD”, version R007,
“0411L 009 R130.ICD", version R306,
‘‘0411L-2S 009 R203.ICD”, version R004, and
“0400G 009 R104.CID”, version R104.

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:

L: System Logical Nodes
LPHD (Physical device information) [1]
LLN0 (Logical node zero) [1]
LCCH (Physical communication channel supervision) [1]
LGOS (GOOSE subscription) [1]
LTIM (Time management) [1]
LTMS (Time master supervision) [1]
LTRK (Service tracking) [1]
LSVS (Sampled value subscription) [2] [3] [4] [5] [9]
P: Logical Nodes for protection functions
PDIF (Differential) [3] [4] [8] [9] [10]
PDIS (Distance) [5] [6] [8] [9] [10]
PDOP (Directional Overpower) [10]
PDUP (Directional underpower) [10]
PFRC (Rate of change of frequency) [10]
PHAR (Harmonic restraint) [4]
PIOC (Instantaneous overcurrent) [2] [4] [5] [6] [7] [8] [9] [10]
PPAM (Phase angle measuring) [10]
PTOC (Time overcurrent) [2] [4] [5] [6] [8] [9] [10]
PTOF (Overfrequency) [5] [6] [8] [9] [10]
PTOV (Overvoltage) [2] [4] [5] [6] [8] [9] [10]
PTRC (Protection trip conditioning) [1]
PTTR (Thermal overload) [2] [4] [5] [6] [8] [9] [10]
PTUF (Underfrequency) [5] [6] [8] [9] [10]
PTUV (Undervoltage) [2] [4] [5] [6] [7] [8] [9] [10]
PHIZ (Ground detector) [2]
PSCH (Protection scheme) [2] [5] [6] [8] [9]

PVOC (Voltage controlled time overcurrent) [5]
PVPH (Volts per Hz) [4] [10]
R: Logical nodes for protection related functions
RDIR (Directional element) [2] [5] [6] [8] [9]
RBRF (Breaker Failure) [2] [4] [5] [6] [7] [8] [9] [10]
RDRE (Disturbance recorder function) [2] [4] [5] [6] [7] [8] [9] [10]
RFLO (Fault Locator) [2] [5] [6] [8] [9]
RPSB (Power swing detection/blocking) [4] [5] [6] [8] [9]
RSYN (Synchronism-check) [5] [6] [8] [9] [10]
G: Logical Nodes for generic references
GGIO (Generic process I/O) [1]
S: Logical Nodes for supervision and monitoring
SCBR (Circuit breaker supervision) [1]
M: Logical Nodes for metering and measurement
MDST (Demand and Peak Demand metering statistics) [2] [5] [6] [8] [9]
MMDF (Differential) [8] [9]
MMTR (Metering) [5] [6] [8] [9] [10]
MMXN (Non-phase-related measurement) [3] [4]
MMXU (Measurement) [2] [4] [5] [6] [7] [8] [9] [10]
MSQI (Sequence and imbalance) [2] [4] [5] [6] [7] [8] [9] [10]
MTHR (Thermal Elements and RTD) [10]
C: Logical Nodes for control
CSWI (Switch controller) [1]
CILO (Interlocking) [2] [4] [5] [6] [7] [8] [9] [10]
CSYN (Synchronizer controller) [10]
T: Logical Nodes for Instruments
TCTR (Current transformer) [6] [7]
TVTR (Voltage transformer) [6]
X: Logical Nodes for switchgear
XCBR (Circuit breaker) [1]

XSWI (Circuit switch) [(1)]
Z: Logical Nodes for further power system equipment
ZBAT (Battery) [(1)]

(1) Supported by all SEL-4XX relays.
(2) Supported by SEL-451-6.
(3) Supported by SEL-487B-2.
(4) Supported by SEL-487E-5.
(5) Supported by SEL-421-7S.
(6) Supported by SEL-421-7P.
(7) Supported by SEL-401.
(8) Supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.
(9) Supported by SEL-411L-2.
(10) Supported by SEL-400G-0 and SEL-400G-1.

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 MDST1 Demand Metering Statistics

MDST 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.	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Measured and metered values				
A	WYE	Current	E	
W	WYE	Real power	E	
VAr	WYE	Reactive power	E	
VA	WYE	Apparent power	E	
SeqA	SEQ	Sequence currents	E	
TotW	MV	Total real power	E	
TotVAr	MV	Total reactive power	E	
TotVA	MV	Total apparent power	E	

SupWh	BCR	Real energy supply (default direction: energy flow towards busbar)	E	
DmdWh	BCR	Real energy demand (default direction: energy flow from busbar)	E	

3.1.2 MDST2 Peak Demand Metering Statistics

MDST 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.	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Measured and metered values				
A	WYE	Current	E	
W	WYE	Real power	E	
VAr	WYE	Reactive power	E	
VA	WYE	Apparent power	E	
SeqA	SEQ	Sequence currents	E	
TotW	MV	Total real power	E	
TotVAr	MV	Total reactive power	E	
TotVA	MV	Total apparent power	E	

3.1.3 MMDF Differential

MMDF 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.	M	
Data Objects				
Common Logical Node Information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Measured and metered values				
Dif	WYE	Differential Currents	E	
Anseq	CMV	Negative Sequence Current	E	
Local	DIF	Local Current	E	
LocAnseq	CMV	Local Negative Sequence Current	E	
LocApseq	CMV	Local Positive Sequence Current	E	
Remote1	DIF	Remote Terminal Current	E	
R1Anseq	CMV	Remote Terminal Negative Sequence Current	E	
R1Apseq	CMV	Remote Terminal Positive Sequence Current	E	

3.1.4 MTHR Thermal Elements and RTD

MTHR 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.	M	
Data Objects				
Common logical node information				
Beh	ENS	Behavior	M	
NamPlt	LPL	Name plate	O	
Measured and metered values				
Tmp1	MV	RTD temperature Value	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).
NOTE: If the extended data object is already used in other logic nodes in IEC 61850-7-4 Ed.2, dataNs is not mandatory, but it’s still recommended.

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	
NamPlt	LPL	Name plate	O	
Status information				
Ind1	SPS	General indication (binary input)	O	
CntVal (1)	BCR	Generic resettable counter	O	
Measured and metered values				
Anln1	MV	Analog Input	O	
Ra1	MV	Remote analog	E	
Rao1	MV	Remote analog output	E	
Controls				
SPCSO1	SPC	Single point controllable status Output	O	

(1) Data Object not supported by SEL-411L-0/1/A.

3.2.2 LCCH Physical communication channel supervision

LCCH 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	
NamPlt	LPL	Name plate	O	
Status information				
ChLiv	SPS	Physical channel status	M	
RedChLiv	SPS	Physical channel status of redundant channel	C	
FerCh	INS	Frame error rate on this channel	O	

RedFerCh	INS	Frame error rate on redundant channel	O	
FerChGo (1)	INS	Missing PRP frame rate for GOOSE packets on the primary channel	E	
RedFerChGo (1)	INS	Missing PRP frame rate for GOOSE packets on the redundant channel	E	
FerChSv (1)	INS	Missing PRP frame rate for SV packets on the primary channel	E	
RedFerChSv (1)	INS	Missing PRP frame rate for SV packets on the redundant channel	E	
Measured and metered values				
RxCnt	BCR	Number of received messages	O	
RedRxCnt	BCR	Number of received messages on redundant channel	O	
TxCnt	BCR	Number of sent messages	O	
RxCntGo (1)	BCR	Number of GOOSE frames received over the primary channel	E	
RedRxCntGo (1)	BCR	Number of GOOSE frames received over the redundant channel	E	
RxCntSv (1)	BCR	Number of SV frames received over the primary channel	E	
RedRxCntSv (1)	BCR	Number of SV frames received over the redundant channel	E	
Controls				
RsStat (1)	SPC	Reset device statistics	E	
Settings				
NetMod	ENG	Network Operating Mode	E	
NetModP (1)	ENG	Network Operating Mode of process bus	E	
NetMode (1)	ENG	Network Operating Mode of station bus	E	
BusMode (1)	ENG	Bus Operating Mode	E	
NetPorP (1)	ENG	Primary channel for process bus	E	
NetPort (1)	ENG	Primary channel for station bus	E	

ApNam (1)	VSG	Access point name to which this channel belongs	O	

(1) Data Object not supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

3.2.3 LGOS GOOSE Subscription

LGOS 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	
NamPlt	LPL	Name plate	O	
Status information				
NdsCom	SPS	Subscription needs commissioning	O	
St	SPS	Status of the subscription	M	
SimSt	SPS	Status showing really that Sim messages are received and accepted	O	
LastStNum	INS	Last state number received	O	
LastSqNum	INS	Last sequence number received	E	
LastTal	INS	Last time-allowed-to-live received	E	
ConfRevNum	INS	Expected configuration revision number	O	
RxConfRevNum	INS	Configuration revision number of the received messages	O	
ErrSt	ENS	Current error status of the subscription	E	
OosCnt	INS	Number of out-of-sequence (OOS) errors	E	
TalCnt	INS	Number of time-allowed-to-live violations	E	
DecErrCnt	INS	Number of messages that failed decoding	E	

BufOvflCnt	INS	Number of messages lost due to buffer overflow	E	
MsgLosCnt	INS	Number of messages lost due to OOS errors (estimated)	E	
MaxMsgLos	INS	Max. number of sequential messages lost due to OOS error (estimated)	E	
InvQualCnt	INS	Number of mapped incoming GOOSE data with invalid quality	E	
Measured and metered values				
TotDwnTm	MV	Total downtime in seconds	E	
MaxDwnTm	MV	Maximum continuous downtime in seconds	E	
Controls				
RsStat	SPC	Reset/clear statistics	E	
Settings				
GoCBRef	ORG	Reference to the subscribed GOOSE control block	O	
DatSet	ORG	Configured dataset reference	E	
GoID	VSG	Configured GOOSE ID	E	
Addr	VSG	Configured multicast MAC address	E	
VlanID	ING	Configured VLAN ID	E	
VlanPri	ING	Configured VLAD priority	E	
AppID	ING	Configured APPID	E	

3.2.4 LSVS Sampled value subscription

LSVS 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	
NamPlt	LPL	Name plate	O	
Status information				
NdsCom	SPS	Subscription needs commissioning	O	
St	SPS	Status of the subscription (True = active, False = not active)	O	
SimSt	SPS	Status showing that really Sim messages are received and accepted	O	
ConfRevNum	INS	Expected configuration revision number	O	
RxConfRevNum	INS	Received configuration revision number	O	
SmpSynch	INS	Synchronization state of samples	E	
ErrSt	ENS	Current error status of the subscription	E	
OosCnt	INS	Number of out-of-sequence (OOS) errors	E	
DscdCnt	INS	Number of messages that were discarded	E	
IntpCnt	INS	Number of messages interpolated	E	
Measured and metered values				
NetwDly	MV	Network delay in ms	E	
TotDwnTm	MV	Total downtime in seconds	E	
MaxDwnTm	MV	Maximum continuous downtime in seconds	E	
Controls				
RsStat	SPC	Reset/clear statistics	E	

Settings				
SvCBRef	ORG	Reference to the subscribed SV control block	O	
DatSet	ORG	Configured data set reference	E	
SvID	VSG	Configured SV ID	E	
Addr	VSG	Configured multicast MAC address	E	
VlanID	ING	Configured VLAN ID	E	
VlanPri	ING	Configured VLAN priority	E	
AppID	ING	Configured APPID	E	

3.2.5 LTMS Time master supervision

LTMS 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	
NamPlt	LPL	Name plate	O	Ed. 2 Amd. 1
Status information				
TmAcc	INS	Number of significant bits in fraction of second in the time accuracy part of the time stamp	O	
TmSrc	VSS	Current time source identity	M	
TmSrcTyp	ENS	Type of the clock source	E	Ed. 2 Amd.1
TmSyn	ENS	Actual time synchronization applied	O	
TmSynLkd	ENS	Locked status of clock synchronization	E	Ed. 2 Amd.1
Measured and metered values				

TmTosPer	MV	Duration, in milliseconds, between two consecutive top-of-second points on the synchronized time	E	

3.2.6 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 and metered 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	
Fs (1)	MV	System source frequency	E	
A	WYE	Phase currents (ILA, ILB, ILC)	O	
W	WYE	Phase active power (P)	O	
VAr	WYE	Phase reactive power (Q)	O	
VA (2)	WYE	Phase apparent power	O	
PF	WYE	Phase power factor	O	
NeutFund (1)	CMV	40 ms average filtered Generator Neutral Voltage magnitude	E	

Neut3Ha [1]	CMV	40 ms average filtered Generator Neutral Third Harmonic Voltage magnitude	E	
Term3Ha [1]	CMV	40 ms average filtered Generator Terminal Third Harmonic Voltage magnitude	E	
Tot3Ha [1]	CMV	40 ms average filtered Total Neutral Third Harmonic Voltage magnitude	E	
StatInsRis [1]	MV	64S Stator Insulation Resistance	E	
StatInsCapac [1]	MV	64S Stator Insulation Capacitance	E	
FldInsRis [1]	MV	64F Field Insulation Resistance	E	
PPV [1]	DEL	Phase to phase voltages (VL1, VL2, …)	O	
PhV [1]	WYE	Phase to ground voltages (VL1ER, …)	O	

[1] Data Object supported by SEL-400G-0 and SEL-400G-1.

[2] Data Object not supported by SEL-421-7S and SEL-421-7P.

3.2.7 PTOC Time Overcurrent

PTOC 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				
Str	ACD	Start	M	
Op	ACT	Operate	M	
Ha3VolAngAlm [1]	SPS	64G Third harmonic angle check alarm	E	

[1] Data Object supported by SEL-400G-0 and SEL-400G-1.

3.2.8 RDRE Disturbance Recorder Function

RDRE 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				
RcdMade	SPS	Battery Voltage	M	
FltNum	INS	Battery Voltage	M	
FltTyp	ENS	Fault Type	E	
FltCaus	ENS	Fault Cause	E	

3.2.9 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	
Status information				
FltTyp	ENS	Fault Type	E	

FltCaus	ENS	Fault Cause	E	
FltTwpns (1)	INS	Fault travel wave	E	
FltFrom (1)	INS	Event summary	E	
Measured and metered values				
FltZ	CMV	Fault impedance	M	
FltDiskm	MV	Fault distance	M	
A	WYE	Fault current	E	
Anseq	CMV	Fault current Sequence Value	E	

(1) Data Object supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

3.2.10 PDIF Differential

PDIF 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				
Op	ACT	Operate	M	
Str (1)	ACD		O	
Dnseq (2)	SPS	Negative Sequence	E	

(1) Data Object supported by SEL-487B-2 and SEL-487E-5.

(2) Data Object supported by SEL-411L-0, SEL-411L-1, SEL-411L-A and SEL-411L-2.

3.2.11 SCBR Circuit Breaker Supervision

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 for trip coil	M	
AbrAlm	SPS	Contact abrasion alarm	O	
MechTmAlm	SPS	Mechanical Slow Operation Alarm	E	
OpTmAlm	SPS	Switch operating time exceeded	O	
Measured and metered values				
AccAbr	MV	Cumulated abrasion	O	

3.2.12 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 operating capability	O	
TukRackPos (1)	SPS	Circuit breaker rack/truck position	E	
TukTestPos (1)	SPS	Circuit breaker rack/truck test position	E	
Controls				
Pos	DPC	Switch position	M	
BlkOpn	SPC	Block opening	M	
BlkCls	SPC	Block closing	M	

(1) Data Object supported by SEL-451-6.

3.2.13 XSWI Circuit Switch

XSWI 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	
SwTyp	ENS	Switch type	M	
SwOpCap	ENS	Switch operating capability	O	
SwBayCtlEn (1)	SPS	Disconnect switch front-panel control enable status	E	
Controls				

Pos	DPC	Switch position	M	
BlkOpn	SPC	Block opening	M	
BlkCls	SPC	Block closing	M	

(1) Data Object supported by SEL-451-6.

3.2.14 ZBAT Battery

ZBAT 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 and metered values				
Vol	MV	Battery Voltage	M	
Status information				
BatWrn	SPS	DC Channel Warning	E	
BatFail	SPS	DC Channel Failed	E	
BatGndFlt	SPS	DC Channel Ground Fault detected	E	
BatDvAlm	SPS	DC Channel Excess Ripples detected	E	

4. Enum types Extensions

4.1. New Enum types

New enum types are listed in this clause.

4.1.1 ClockSourceKind (1)

Value	Description	Remarks
1	Unkown	Ed. 2 Amd.1
2	SNTP	Ed. 2 Amd.1
3	PTP	Ed. 2 Amd.1
4	IRIG-B	Ed. 2 Amd.1
5	Substation internal	Ed. 2 Amd.1

(1) Supported by all SEL-4XX relays.

4.1.2 ClockSyncKind (1)

Value	Description	Remarks
0	InternalClock	Ed. 2 Amd.1
1	LocalAreaClock	Ed. 2 Amd.1
2	GlobalAreaClock	Ed. 2 Amd.1

(1) Supported by all SEL-4XX relays.

4.1.3 ClockSyncLockingKind (1)

Value	Description	Remarks
1	Locked	Ed. 2 Amd.1
2	Unlocked10s	Ed. 2 Amd.1
3	Unlocked100s	Ed. 2 Amd.1
4	Unlocked1000s	Ed. 2 Amd.1
5	UnlockedMoreThan1000s	Ed. 2 Amd.1

(1) Supported by all SEL-4XX relays.

4.1.4 FltTypeKind_SEL

Value	Description	Remarks
0	Undefined (1)	
1	AG (2)	
2	BG (2)	
3	CG (2)	
4	AB (2)	
5	BC (2)	
6	CA (2)	
7	ABG (2)	
8	BCG (2)	
9	CAG (2)	
10	ABC (2)	
11	BCA (3)	
12	BCB (3)	
13	BCC (3)	

(1) Supported by all SEL-4XX relays.

(2) Supported by SEL-451-6, SEL-421-7S, SEL-421-7P, SEL-411L-0, SEL-411L-1, SEL-411L-A and SEL-411L-2.

(3) Supported by SEL-411L-2.

4.1.5 FltCauseKind_SEL

Value	Description	Remarks
0	No fault summary (1)	
1	Trigger (1)	
2	Trip (1)	
3	Event Report (1)	
4	Differential Trip (2)	

5	Breaker Failure Trip [2]	
6	87 Zone 1 Differential Trip [3]	
7	87 Zone 2 Differential Trip [3]	
8	Restricted Earth Fault Trip [3]	
9	Excitation Trip [3]	
10	Primer Mover Trip [3]	
11	Auxiliary Trip [3]	

[1] Supported by all SEL-4XX relays.

[2] Supported by SEL-487B-2 and SEL-487E-5.

[3] Supported by SEL-400G-0 and SEL-400G-1.

4.1.6 SVErrSt [1]

Value	Description	Remarks
0	Ok	
1	Device Disabled	
2	Message Corrupted	
3	ASDU Error	
4	SVID Range Error	
5	SmpCnt Range Error	
6	ConfRev Mismatch	
7	SmpSynch Mismatch	
8	PDU Length Error	
9	Invalid Quality	
10	SV Stream Lost	
11	Channel Delay Exceeded	
12	Interpolated	
13	Out of sequence	
14	Test Sample (s) Received	

[1] Enum Type not supported by SEL-421-7P, SEL-401, SEL-411L-0, SEL-411L-1, SEL-411L-A, SEL-400G-0 and SEL-400G-1.

4.1.7 GOOSEErrSt [1]

Value	Description	Remarks
0	OK	
1	Device Disabled	
2	ConfRev Mismatch	
3	Needs Commissioning	
4	Message Corrupted	
5	TTL Expired	
6	Out of Sequence	
7	Invalid Data Quality	

[1] Supported by all SEL-4XX relays.

4.1.8 NetMod [1]

Value	Description	Remarks
1	Fixed	
2	Failover	
3	Switched	
4	PRP	
5	IsolateIP	

[1] Supported by all SEL-4XX relays.

4.1.9 NetModeKind_SEL [1]

Value	Description	Remarks
1	Fixed	
2	Failover	
3	Switched	

[1] Enum Type not supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

4.1.10 BusModeKind_SEL [1]

Value	Description	Remarks
1	Independent	
2	Merged	

[1] Enum Type not supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

4.1.11 NetPorPKind_SEL [1]

Value	Description	Remarks
1	Port 5A	
2	Port 5B	

[1] Enum Type not supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

4.1.12 NetPortKind_SEL [1]

Value	Description	Remarks
1	Port 5C	
2	Port 5D	

[1] Enum Type not supported by SEL-411L-0, SEL-411L-1 and SEL-411L-A.

4.1.13 ServiceNameKind_SEL [1]

Value	Description	Remarks
16	SelectActiveSG	
24	SetBRCBValues	
26	SetURCBValues	
44	SelectWithValue	
45	Cancel	
46	Operate	
47	CommandTermination	
54	InternalChange	

(1) Supported by all SEL-4XX relays.

4.1.14 ServiceStatusKind_SEL (1)

Value	Description	Remarks
0	no-error	
1	instance-not-available	
3	access-violation	
5	parameter-value-inappropriate	
6	parameter-value-inconsistent	
7	class-not-supported	
8	instance-locked-by-other-client	
10	type-conflict	
11	failed-due-to-communications-constraint	
12	failed-due-to-server-constraint	

(1) Supported by all SEL-4XX relays.

4.1.15 CtlModelKind_SEL (1)

Value	Description	Remarks
0	status-only	
1	direct-with-normal-security	
3	direct-with-enhanced-security	
4	sbo-with-enhanced-security	

(1) Supported by all SEL-4XX relays.