

61850 SCL Runner

The tool capable of simulating a network of IEC 61850 server devices using SCL files.
Overview.

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From the recognized supplier of IEC 61850 software libraries and testing tools

- **IEC 61850 Software Library (source code)**
 - Client part
 - Server part
 - GOOSE part
 - SV part
- **61850 CCC and 61850 SCC – client and server communication DLLs for MS Windows**
- **61850 Avenue - testing toolset**
 - IEC 61850 client tool
 - 61850 Relay Simulator
 - GOOSE toolset
 - Sampled Values toolset
 - 61850 ICD Editor
- **61850 GOOSE System Viewer - testing & monitoring tool**

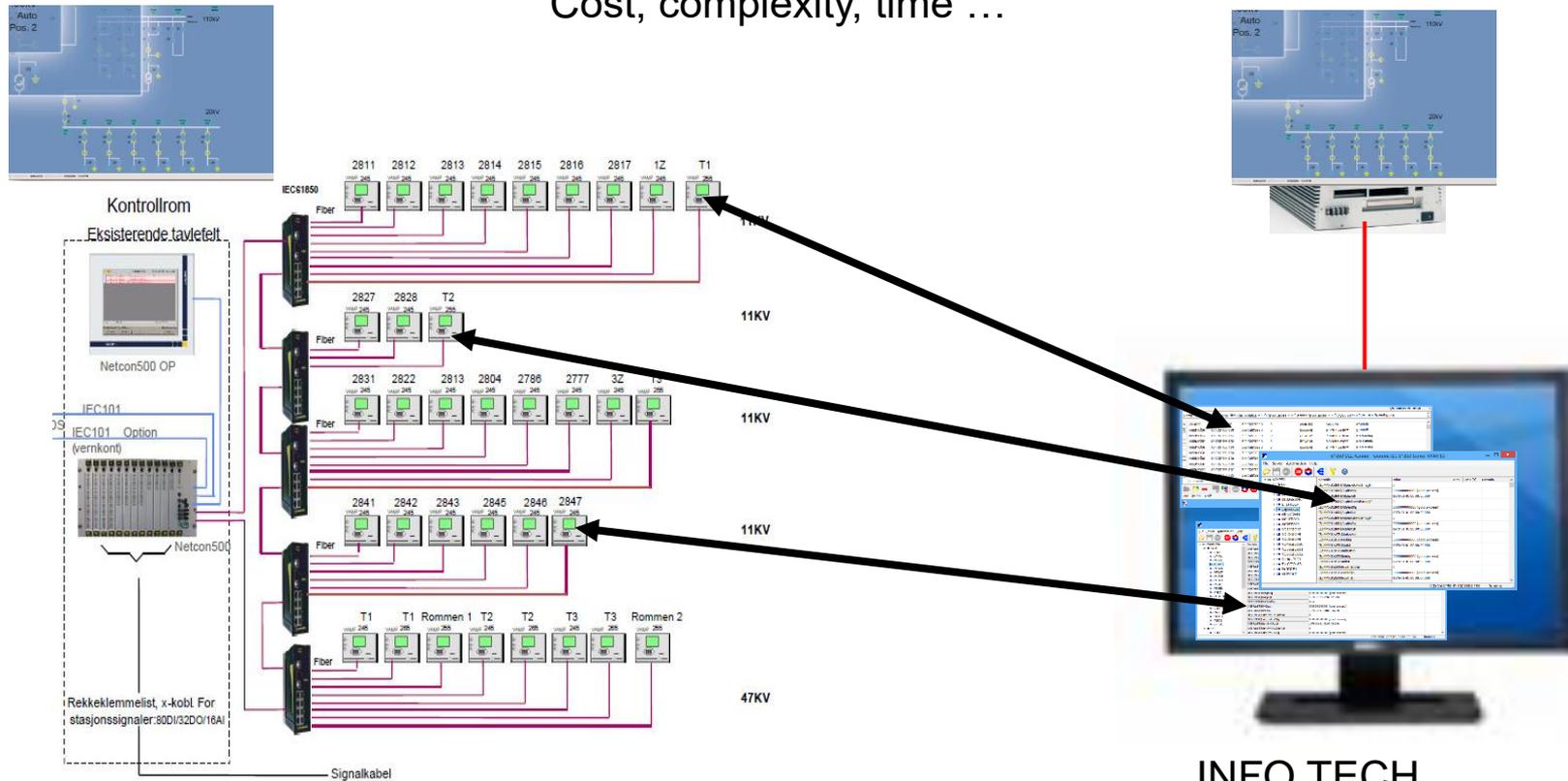
Problem to solve: How to prepare and verify the configuration of the control system?

- One possible approach for the test lab:
 - Acquire all devices to be installed in the target place.
 - Find and implement the way how process data changes and parameter data changes can be stimulated and how controls can be traced.
 - Build a test network together with the control system to be configured.
 - Configure/reconfigure the devices and the control system and test all configured communication exchanges (can be thousands of signals and data points).
 - Iterate the previous step until all obtained test results are correct.

- Is there any more economic and less laborious approach?

Which way of testing is easier? Real system vs simulated system

Cost, complexity, time ...



61850 SCL Runner – for whom

- ❑ Configuration of IEC 61850 based control systems is complex due to thousands of data points in tens of intelligent electronic devices (IEDs).
- ❑ Configuration engineers begin with offline configuration of the control system based on collected SCL files (communication capabilities of IEDs are described in standard based **S**ubstation **C**onfiguration description **L**anguage, called SCL).
- ❑ It would be ideal to verify the control system configuration still before being able to build the target installation with real communication network and tens of devices.
- ❑ Here comes the support ...

61850 SCL Runner – how

- ❑ Collected ICD/CID/SCD files can be used to setup an IEC 61850 server device simulator running on MS Windows PC.
- ❑ One or more server devices (IEDs) can be simulated using different IP addresses.
- ❑ Data models exactly as in real IEDs.
- ❑ Data changes can be defined by the user using formulas: either as fixed values or variable and time dependent.
- ❑ The simulator supports data sets and the reporting function with BRCBs and URCBs: data and quality changes, integrity period and GI trigger reports.
- ❑ All subscribed data flows can be tested by one click.
- ❑ The simulator supports control functions with proper behavior dependent on the control model.
- ❑ The simulator supports GOOSE publishing (GoCB) and GOOSE subscription (Inputs).
- ❑ IED start, stop and communication break-down situations can be easily tested by one click.

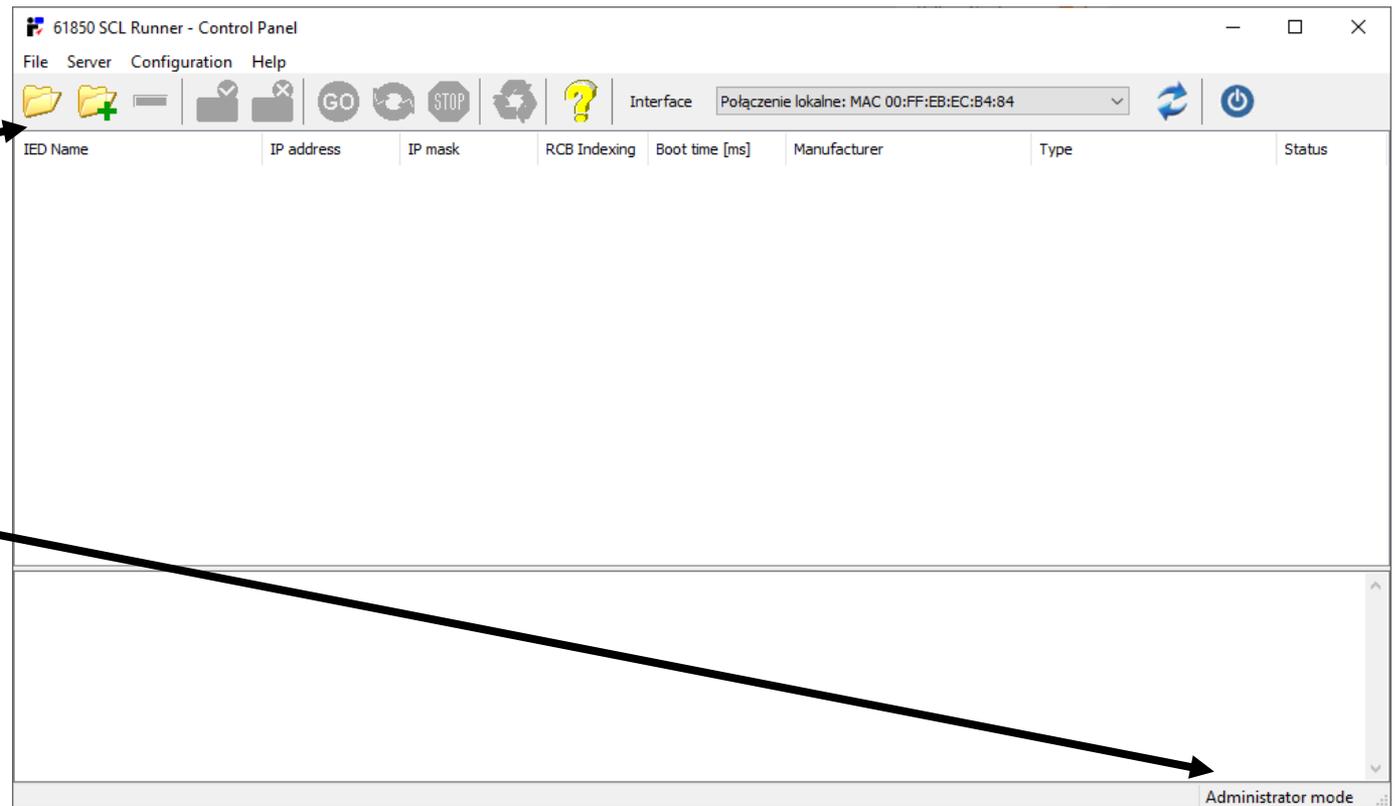
61850 SCL Runner – why

- ❑ Test the control system under configuration (IEC 61850 client end) for proper data access from simulated target devices – using real SCL files.
- ❑ Save money by reducing purchases of various devices from different vendors to your test lab.
- ❑ Save time by avoiding creation of the target system replica in your lab.
- ❑ Focus on most critical parts of the project before going to the installation site instead of being distracted with lots of device vendor specific details.

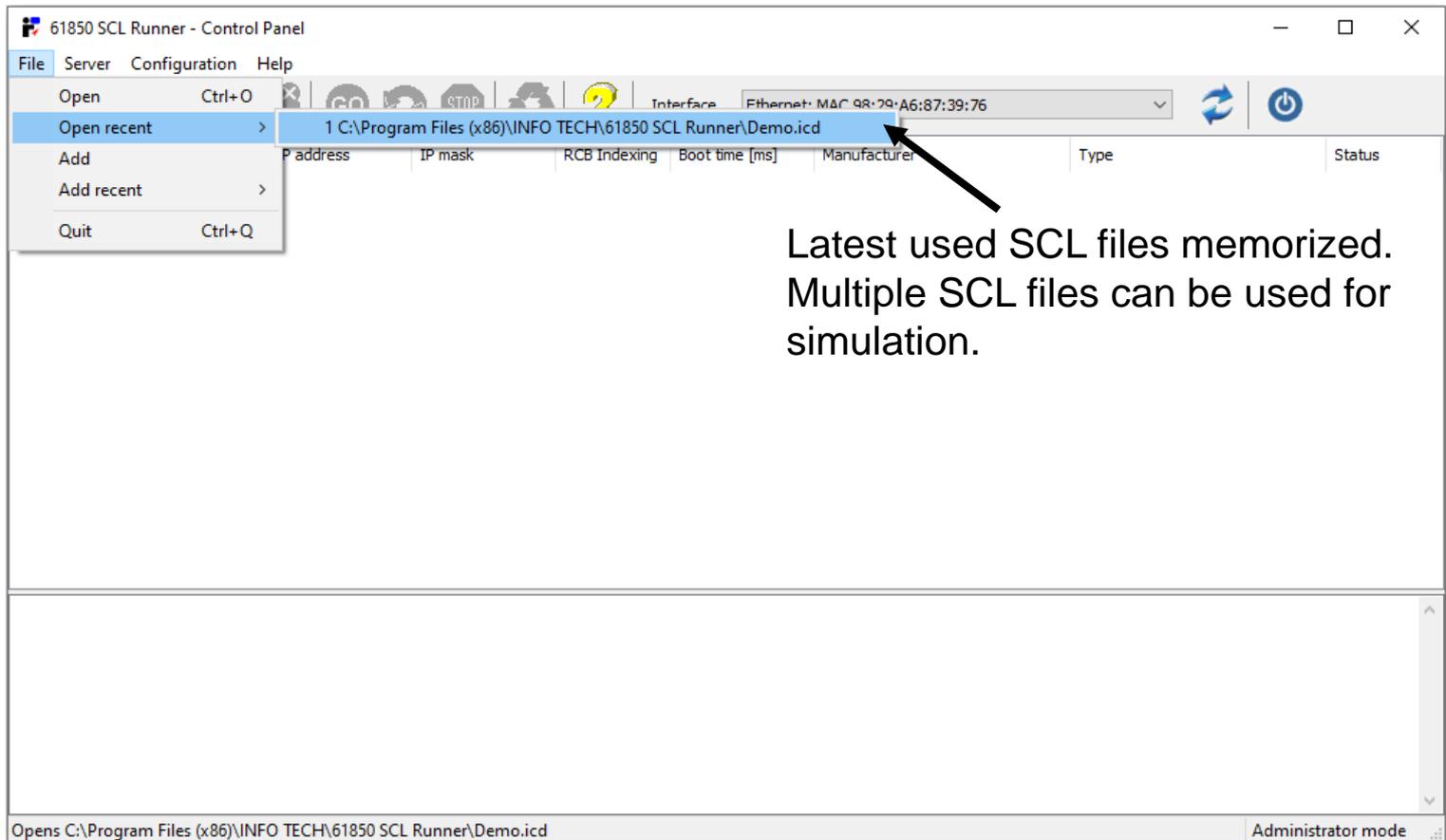
Initial view after the start-up

Simple, intuitive GUI to begin with opening an SCL file.

Remember to run the program in administrator mode – if target IP addresses shall be used.



Selection of ICD, CID or SCD file



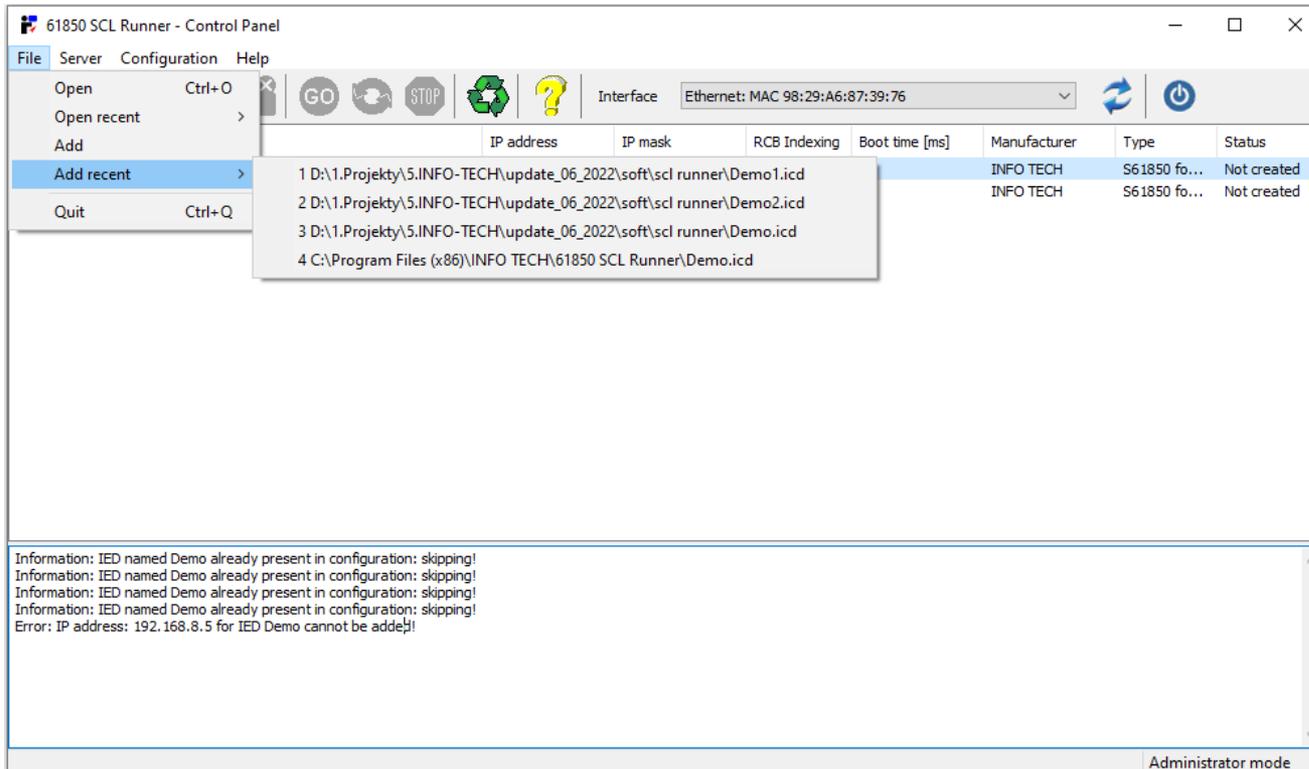
SCL file parsed

IED Name	IP address	IP mask	RCB Indexing	Boot time [ms]	Manufacturer	Type	Status
<input checked="" type="checkbox"/> Demo	192.168.8.5	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input type="checkbox"/> Demo1	192.168.8.21	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created

Information: IED named Demo already present in configuration: skipping!
Information: IED named Demo already present in configuration: skipping!
Information: IED named Demo already present in configuration: skipping!
Information: IED named Demo already present in configuration: skipping!
Error: IP address: 192.168.8.5 for IED Demo cannot be added!

Extracted from SCL file: IED name, IP address, IP mask, IED vendor, IED type description.

Multiple SCL files can be used



As it is possible that the control system configuration and the simulation will be based on multiple SCL files (ICD/CID) instead of using one SCD file.

IED properties can be modified

The screenshot shows the '61850 SCL Runner - Control Panel' interface. On the left, a table lists IEDs with their properties. The 'Demo' IED is selected. On the right, the 'Edit IED properties' dialog box is open, showing configuration options for the selected IED.

IED Name	IP address	IP mask	RCB Indexing
<input checked="" type="checkbox"/> Demo	192.168.8.5	255.255.255.0	Default
<input type="checkbox"/> Demo1	192.168.8.21	255.255.255.0	Default
<input type="checkbox"/> P139	192.168.8.105	255.255.255.0	Default
<input type="checkbox"/> P642	192.168.0.220	255.255.255.0	Default

Opened by double click. Simulated device IP address, mask, initialization time (boot time), RCB indexing rule, TLS and ACSE authentication settings can be set as required in the test.

Edit IED properties

Set parameters for Demo

IP: 192 . 168 . 8 . 5 (Change...)

Mask: 255 . 255 . 255 . 0

Boot time [ms]: 0

RCB indexing: Default

Use TLS

Use ACSE authentication

Server cybersecurity configuration

Certificate: [Browse] [OK]

Private key: [Browse] [OK]

Client cybersecurity configuration

CA file: [Browse] [OK]

CRL file: [Browse] [OK]

Certificate: [Browse] [OK]

Allowed IPs: [List] [Add] [Remove]

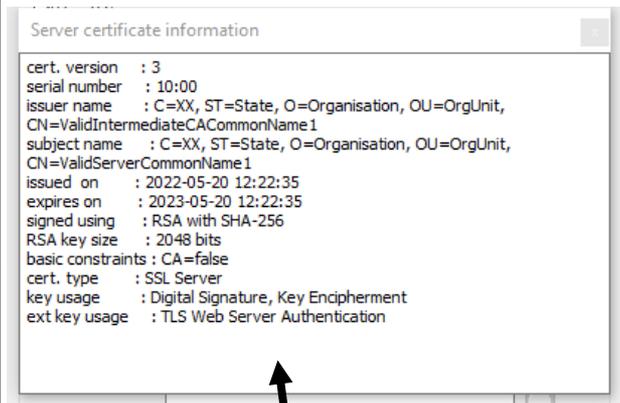
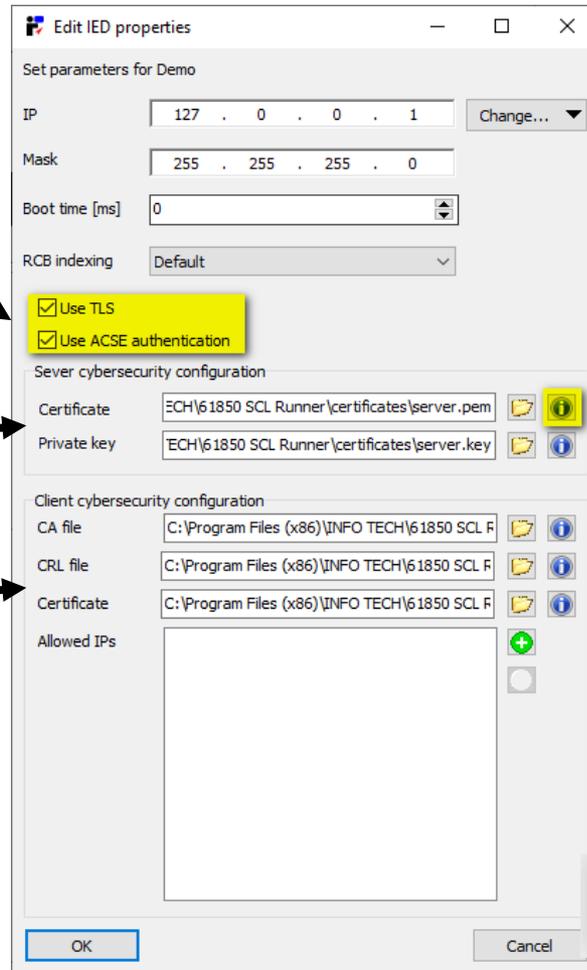
OK Cancel

Using secure communication: TLS encryption and ACSE authentication

Enabling / Disabling encryption and authentication.

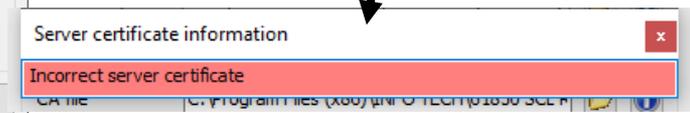
Server cybersecurity configuration section.

Client cybersecurity configuration section



Selected file validation is listed in pop-up window.

Problems detected during validation are listed in window.



Selected IEDs can be deleted from the simulation set

The screenshot shows the '61850 SCL Runner - Control Panel' window. The interface includes a menu bar (File, Server, Configuration, Help), a toolbar with various icons (including a red minus icon for deletion), and a table of IEDs. The table has columns for IED Name, IP address, IP mask, RCB Indexing, Boot time [ms], Manufacturer, Type, and Status. The 'P139' row is selected, and an arrow points to the red minus icon in the toolbar, indicating that unwanted IEDs can be eliminated from the list.

IED Name	IP address	IP mask	RCB Indexing	Boot time [ms]	Manufacturer	Type	Status
<input type="checkbox"/> Demo	192.168.8.5	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input type="checkbox"/> Demo1	192.168.8.21	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input checked="" type="checkbox"/> P139	192.168.8.105	255.255.255.0	Default	0	Schneider Elect..	P139	Not created
<input type="checkbox"/> P642	192.168.0.220	255.255.255.0	Default	0	ALSTOM	P642	Not created

Unwanted IEDs can be eliminated from the list.

To start the simulation

IED Name	IP address	IP mask	RCB Indexing	Boot time [ms]	Manufacturer	Type	Status
<input type="checkbox"/> Demo	192.168.8.5	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input type="checkbox"/> Demo1	192.168.8.21	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input checked="" type="checkbox"/> P139	192.168.8.105	255.255.255.0	Default	0	Schneider Elect...	P139	Not created
<input checked="" type="checkbox"/> P642	192.168.0.220	255.255.255.0	Default	0	ALSTOM	P642	Not created

Check-in the devices that should be simulated.

Before starting each simulation it is possible to choose the network adapter (if multiple) to be used by the given instance of the simulation program.

To start the simulation press Create button (or select Server / Create from menu).

Simulation started

IED Name	IP address	IP mask	RCB Indexing	Boot time [ms]	Manufacturer	Type	Status
<input type="checkbox"/> Demo	192.168.8.5	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input type="checkbox"/> Demo1	192.168.8.21	255.255.255.0	Default	0	INFO TECH	S61850 fo...	Not created
<input checked="" type="checkbox"/> P139	192.168.8.105	255.255.255.0	Default	0	Schneider Elect...	P139	Running
<input checked="" type="checkbox"/> P642	192.168.0.220	255.255.255.0	Default	0	ALSTOM	P642	Running

Checked-in IEDs are now simulated – Status changed to Running.

Each simulated IED in a separate window

IP address as in the SCL file

IED: P642 IP: 192.168.0.220 Running

IED data model tree allows viewing and driving all data

IED data values can be driven by the user

61850 SCL Runner - Generic IEC 61850 Server P139

File Server Automation Help

P139

- LD Control
 - LN LLN0
 - FC ST
 - FC CF
 - FC DC
 - FC EX
 - LN LPHD1
 - LN CILO1
 - LN CILO10
 - LN CILO2
 - LN CILO3
 - LN CILO4
 - LN CILO5
 - LN CILO6
 - LN CILO7
 - LN CILO8
 - LN CILO9
 - LN CSWI1
 - FC ST
 - FC CO
 - FC CF
 - FC DC
 - LN CSWI10
 - LN CSWI2
 - FC ST
 - FC CO
 - FC CF
 - FC DC
 - LN CSWI3
 - LN CSWI4
 - LN CSWI5
 - LN CSWI6

Variable	Value	Auto	Cycle [s]	Formula
ST\$Mod\$stVal	on			
ST\$Mod\$q	on			
ST\$Mod\$t	blocked			
ST\$Beh\$stVal	test			
ST\$Beh\$q	test/blocked			
ST\$Beh\$t	off			
ST\$Beh\$q	000000000000000000 {good.process}			
ST\$Beh\$t	2022-06-23 09:02:00.942			
ST\$Health\$stVal	Ok			
ST\$Health\$q	000000000000000000 {good.process}			
ST\$Health\$t	2022-06-23 09:02:00.942			
ST\$Loc\$stVal	false			
ST\$Loc\$q	000000000000000000 {good.process}			
ST\$Loc\$t	2022-06-23 09:02:00.942			
ST\$Pos\$origin\$orCat	not-supported			
ST\$Pos\$origin\$orIdent				
ST\$Pos\$stVal	middle			
ST\$Pos\$q	000000000000000000 {good.process}			
ST\$Pos\$t	2022-06-23 09:02:00.942			
ST\$Pos\$tSeld	false			

IED: P139 IP: 192.168.8.105 Running

E.g. CB position can be manually set or chosen from drop down list.

IED data values can be driven by user defined formulas

The screenshot shows the '61850 SCL Runner - Generic IEC 61850 Server P139' application. The left pane displays a tree view of the IED structure, including 'LD Control', 'LN LLND', and various functional components like 'FC ST', 'FC CF', 'FC DC', 'FC EX', and 'LN LPHD1' through 'LN CIL09', 'LN CSWI11' through 'LN CSWI12', and 'LN CSWI3' through 'LN CSWI6'. The right pane shows a table of variable values for the selected component.

Variable	Value	Auto	Cycle [s]	Formula
ST\$Mod\$stVal	on			
ST\$Mod\$q	00000000000000 {good.process}			
ST\$Mod\$t	2022-06-23 09:02:00.942			
ST\$Beh\$stVal	on			
ST\$Beh\$q	00000000000000 {good.process}			
ST\$Beh\$t	2022-06-23 09:02:00.942			
ST\$Health\$stVal	Ok			
ST\$Health\$q	00000000000000 {good.process}			
ST\$Health\$t	2022-06-23 09:02:00.942			
ST\$Loc\$stVal	false			
ST\$Loc\$q	00000000000000 {good.process}			
ST\$Loc\$t	2022-06-23 09:02:00.942			
ST\$Pos\$origin\$orCat	not-supported			
ST\$Pos\$origin\$orIdent				
ST\$Pos\$stVal	middle			
ST\$Pos\$q	00000000000000 {good.process}			
ST\$Pos\$t	2022-06-23 09:02:00.942			
ST\$Pos\$stSeld	false			

IED: P139 IP: 192.168.8.105 Running

E.g. time dependent formulas. The formula can be enabled or disabled for automatic execution, the formula execution cycle in seconds can be defined (0 – as fast as possible).

Examples of simulation formulas

Data attribute	Formula
GGIO1\$ST\$Ind1\$stVal	T mod 2
<i>Digital input value changing every second between on and off (true and false)</i>	
MMXU1\$MX\$phsA\$cVal\$mag\$f	2000+100*sin(T)
<i>Phase A current amplitude value oscillates around 2000 with ±100</i>	
CSWI\$ST\$Pos\$stVal	if(T>300,1,2)
<i>CB position closed and changes to open after 300 seconds</i>	

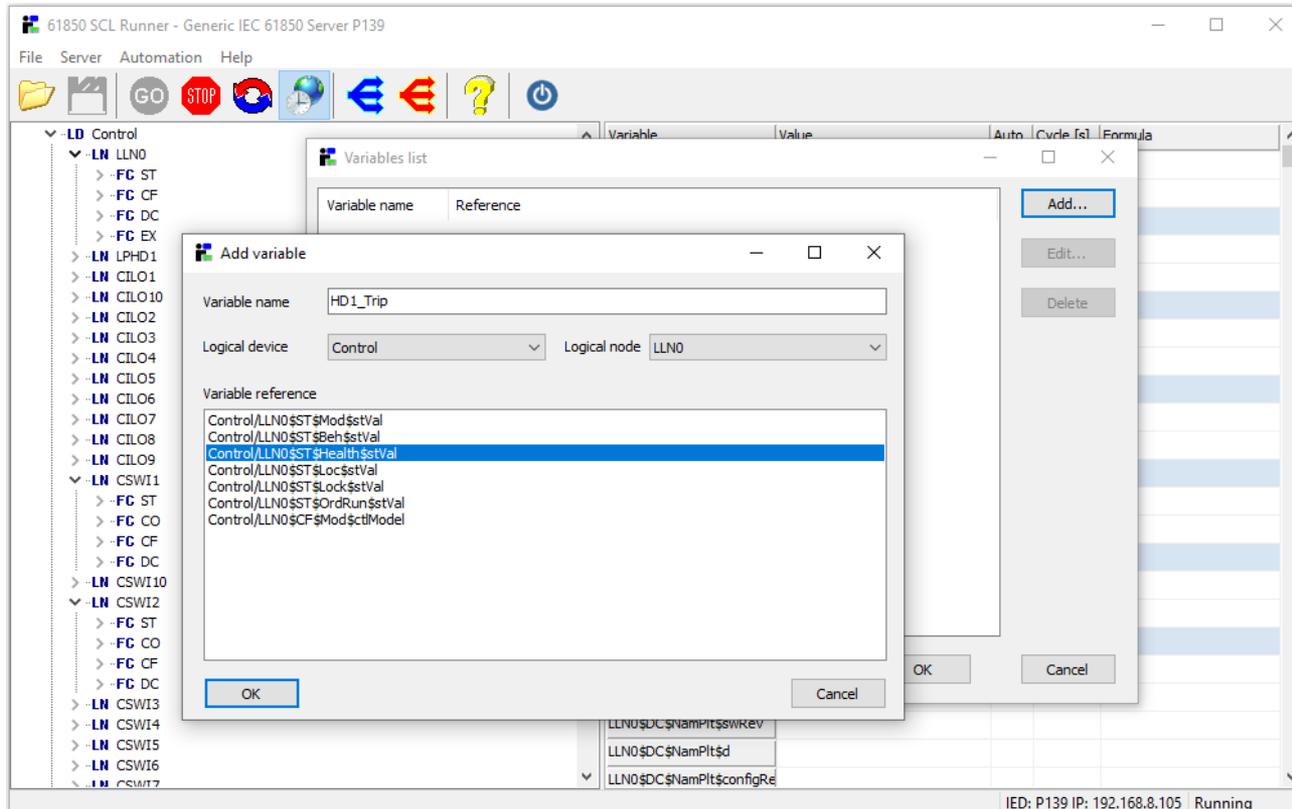
Operators and functions in formulas

User defined variables and time can be used with variety of operators and functions to create simulation formulas, e.g. analog signal waveforms, trip conditions with start level, CB position dependent on trip status etc.

Symbol	Explanation
!	Factorial i.e. !5 gives $1*2*3*4*5 = 120$
%	Percentage i.e. 10% gives 0.1
-	Negate i.e. -10 gives -10 and --10 gives 10
+	Positive value i.e. +10 gives 10
^	Power i.e. 3^2 gives 9
*	Multiplication i.e. $2*2$ gives 4
/	Division i.e. $4/2$ gives 2
div	Integer division (result and operands are treated as integers)
mod	Remainder i.e. $3 \text{ mod } 2$ gives 1 (result and operands are treated as integers)
+	Sum i.e. $2+2$ gives 4
-	Subtract i.e. $4-2$ gives 2
-	Subtract i.e. $4-2$ gives 2
-	Subtract i.e. $4-2$ gives 2
<	Less than i.e. $3 < 2$ gives 0 (false)
<=	Less than or equal to i.e. $1 <= 2$ gives 1 (true)
>=	Greater than or equal to i.e. $4 >= 2$ gives 1 (true)
>	Greater than i.e. $4-2$ gives 2
=	Equal to i.e. $4 = 2$ gives 0 (false)
<>	Not equal to i.e. $4 <> 2$ gives 1 (true)
not	Logical negation i.e. not 0 gives 1 and not 1 gives 0
or	Bitwise or i.e. 1 or 4 gives 5
and	Bitwise and i.e. 3 and 6 gives 2
xor	Bitwise xor i.e. 7 xor 5 gives 2

if	Conditional result: if argument 1 evaluates to true (is not 0) result is equal to argument 2 otherwise result is equal to argument 3
intpower	IntPower raises argument 1 to the power specified by argument 2 (both arguments are treated as integers)
ln	Natural logarithm ($\ln(e) = 1$) of the argument
log10	Logarithm of base 10 of the argument
logN	Logarithm base N of X
max	Maximum of 2 arguments
min	Minimum of 2 arguments
pi	The ratio of a circle's circumference to its diameter. Pi is approximated as 3.1415926535897932385
pow	Power raises argument 1 (base) to power given by argument 2 (exponent). For fractional exponents or exponents greater than 2147483647, base must be greater than 0
radtodeg	Converts angles measured in radians to degrees
randG	Produces random numbers with Gaussian distribution parametrized by argument 2 (standard deviation) about the argument 1 (mean).
random	Produces random number within the range $0 \leq X < 1$
round	Rounds a real-type value to an integer-type value
sin	Sine of the argument
sinh	Hyperbolic sine of the argument
sqr	Square of the argument
sqr	Square root of the argument
tan	Tangent of X
tanh	Hyperbolic tangent of X
trunc	Truncates a real-type value to an integer-type value (value of X rounded toward zero)

User defined variables in formulas



Formulas can be based on user defined variables, referencing selected IED data attributes. If required, the formulas can be simultaneously enabled and disabled.

Examples of simulation formulas with user-defined variables

Data attribute	Formula	User variable
MMXU1\$MX\$phsA\$cVal\$mag\$f	= if(CB_pos = 2,2+1*sin(2*T),0)	→ IphsA
<i>Phase A current amplitude value defined by time dependent formula if CB position closed, and value 0 if CB position not closed</i>		
PTOC1\$ST\$Op\$general	= if(IphsA>2.85,1,0)	→ OC1_trip
<i>Overcurrent protection trip if IphsA (value of phase A current) exceeds the given limit</i>		
PTRC1\$ST\$Tr\$general	= OC1_trip or OC2_trip or EF1_trip	→ Trip
<i>Common trip signal active if any of the trip signals from 3 protection functions is active</i>		
CSWI\$ST\$Pos\$stVal	= if(Trip,1,2)	→ CB_pos
<i>CB position open if Trip active, and CB position closed if Trip not active</i>		

Quality attribute values can be driven by the user

Quality attribute values can be enforced by the user directly, by a formula or set in the dialog window.

The screenshot shows the '61850 SCL Runner - Generic IEC 61850 Server P139' application. A 'Set data quality' dialog box is open, allowing a user to set the quality of a variable. The dialog has two main sections: 'Validity' and 'Source'. In the 'Validity' section, 'Good' is selected with a radio button. In the 'Source' section, 'Process' is selected with a radio button. Below these are several checkboxes for other quality attributes: Overflow, Out of range, Bad reference, Oscillatory, Failure, Old, Inconsistent, Inaccurate, Test, and Blocked. 'OK' and 'Cancel' buttons are at the bottom of the dialog.

In the background, a table lists various variables and their current values. The variable 'ST\$Health\$q' is highlighted in yellow, and its value '00000000000000 {good.process}' is also highlighted. A blue arrow points from the 'Process' radio button in the dialog to this value in the table.

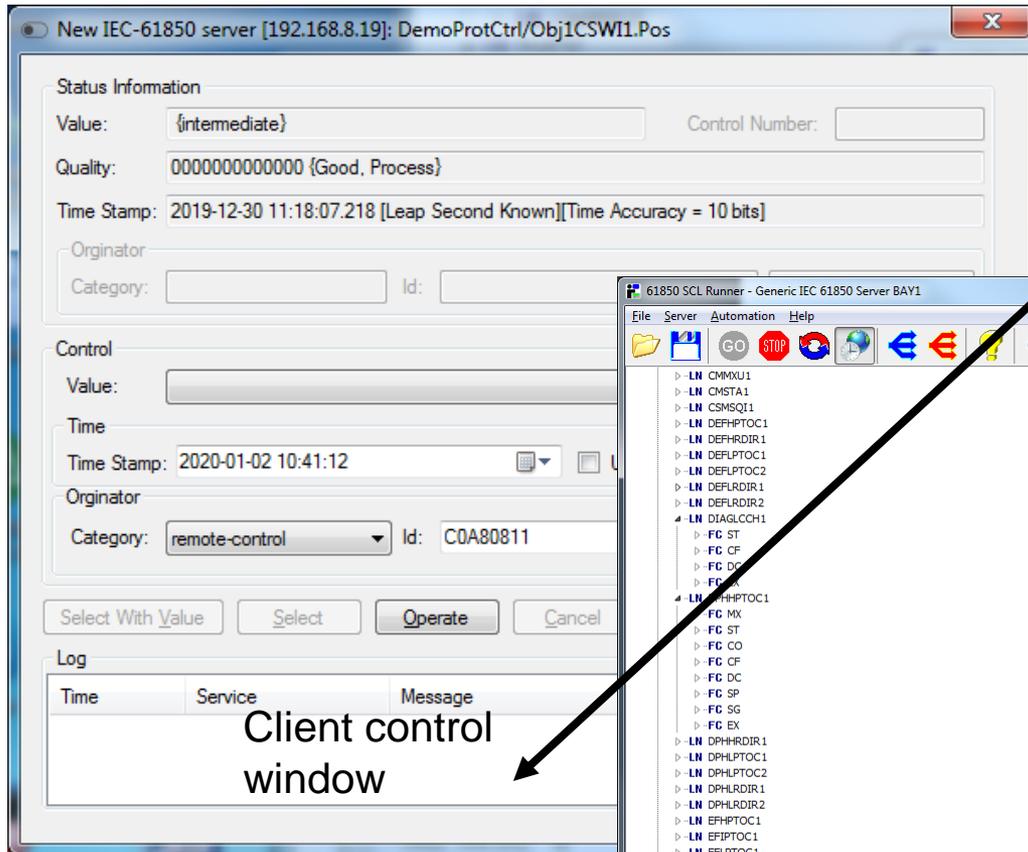
Variable	Value	Auto	Cycle [s]	Formula
ST\$Mod\$stVal	on			
ST\$Mod\$q	00000000000000 {good.process}			
ST\$Mod\$t	2022-06-23 09:02:00.940			
ST\$Beh\$stVal	on			
ST\$Beh\$q	00000000000000 {good.process}			
ST\$Beh\$t	2022-06-23 09:02:00.940			
ST\$Health\$stVal	Ok			
ST\$Health\$q	00000000000000 {good.process}			
ST\$Health\$t	2022-06-23 09:02:00.940			
ST\$Loc\$stVal	false			
ST\$Loc\$q	00000000000000 {good.process}			
ST\$Loc\$t	2022-06-23 09:02:00.940			
ST\$Lock\$stVal	false			
ST\$Lock\$q	00000000000000 {good.process}			
ST\$Lock\$t	2022-06-23 09:02:00.940			
ST\$OrdRun\$stVal	false			
ST\$OrdRun\$q	00000000000000 {good.process}			
ST\$OrdRun\$t	2022-06-23 09:02:00.940			
CF\$Mod\$ctlModel	status-only			
DC\$NamPit\$vendor				
DC\$NamPit\$swRev				
LLN0\$DC\$NamPit\$d				
LLN0\$DC\$NamPit\$configRe				

Control system / client can connect to simulated IEDs and act

The screenshot displays three windows from the IEC 61850 software suite. The leftmost window, titled '*61850 Avenue 2.1.9 - New IEC-61850 server [192.168.8.19]', shows a 'Servers' list with three entries: 'New IEC-61850 server [192.168.0.222]', 'New IEC-61850 server [192.168.8.19]', and 'New IEC-61850 server [192.168.8.19]'. The 'Main' section shows configuration for the selected server: Name 'New IEC-61850 se', Address '192.168.8.19', Port '102', and Remote OSI Parameters including AE Qualifier '12', Application ID '1.1.1.999.1', and OSI Session Select '0001'. The middle window, '61850 SCL Runner - Generic IEC 61850 Server P3U_220', shows a tree view of the SCL model with nodes like LN CMMXU1, LN CMSTA1, LN CSMSQ11, LN DEFHPTOC1, LN DEFHRDIR1, LN DEFLOPTOC1, LN DEFLOPTOC2, LN DEFRLDIR1, LN DEFRLDIR2, LN DIAGLCCH1, LN DPHHPTOC1, LN DPHHPTOC2, LN DPHLPTOC1, LN DPHLPTOC2, LN DPHLRDIR1, LN DPHLRDIR2, LN EFHPTOC1, LN EFHPTOC2, LN EFLPTOC1, LN EFLPTOC2, LN EFPADM1, LN EFPADM2, LN EFPADM3, LN FLTSTA1, LN FMMXU1, LN FRPFC1, and LN ENNER2. The rightmost window, '61850 SCL Runner - Generic IEC 61850 Server BAY1', displays a table of variables with columns for Variable, Value, Auto, Cycle [s], and Formula. The table contains 20 rows of data, including variables like DEFLRDIR1\$MX\$OpAEF\$mag\$f, DEFLRDIR1\$MX\$OpAEF\$g, DEFLRDIR1\$MX\$OpAEF\$t, DEFLRDIR1\$MX\$OpPolAng\$mag\$f, DEFLRDIR1\$MX\$OpPolAng\$g, DEFLRDIR1\$MX\$OpPolAng\$t, DEFLRDIR1\$MX\$OpChrAng\$mag\$f, DEFLRDIR1\$MX\$OpChrAng\$g, DEFLRDIR1\$MX\$OpChrAng\$t, DEFLRDIR1\$ST\$Mod\$setVal, DEFLRDIR1\$ST\$Mod\$g, DEFLRDIR1\$ST\$Mod\$t, DEFLRDIR1\$ST\$Beh\$setVal, DEFLRDIR1\$ST\$Beh\$g, DEFLRDIR1\$ST\$Beh\$t, DEFLRDIR1\$ST\$Health\$setVal, DEFLRDIR1\$ST\$Health\$g, DEFLRDIR1\$ST\$Health\$t, DEFLRDIR1\$ST\$Dir\$general, DEFLRDIR1\$ST\$Dir\$general, DEFLRDIR1\$ST\$Dir\$g, DEFLRDIR1\$ST\$Dir\$t, DEFLRDIR1\$ST\$InRcaCt\$setVal, DEFLRDIR1\$ST\$InRcaCt\$g, DEFLRDIR1\$ST\$InRcaCt\$t, DEFLRDIR1\$CF\$Mod\$ctlModel, and DEFLRDIR1\$CF\$ChrAng\$units\$SIUnit.

Variable	Value	Auto	Cycle [s]	Formula
DEFLRDIR1\$MX\$OpAEF\$mag\$f	0			
DEFLRDIR1\$MX\$OpAEF\$g	0000000000000 (good.process)			
DEFLRDIR1\$MX\$OpAEF\$t	2020-01-08 15:02:31.854			
DEFLRDIR1\$MX\$OpPolAng\$mag\$f	0			
DEFLRDIR1\$MX\$OpPolAng\$g	0000000000000 (good.process)			
DEFLRDIR1\$MX\$OpPolAng\$t	2020-01-08 15:02:31.854			
DEFLRDIR1\$MX\$OpChrAng\$mag\$f	0			
DEFLRDIR1\$MX\$OpChrAng\$g	0000000000000 (good.process)			
DEFLRDIR1\$MX\$OpChrAng\$t	2020-01-08 15:02:31.854			
DEFLRDIR1\$ST\$Mod\$setVal	on			
DEFLRDIR1\$ST\$Mod\$g	0000000000000 (good.process)			
DEFLRDIR1\$ST\$Mod\$t	2020-01-08 15:02:31.854			
DEFLRDIR1\$ST\$Beh\$setVal	on			
DEFLRDIR1\$ST\$Beh\$g	0000000000000 (good.process)			
DEFLRDIR1\$ST\$Beh\$t	2020-01-08 15:02:31.855			
DEFLRDIR1\$ST\$Health\$setVal	0	No	0	if(OC1_Trip or OC2_Trip, 1,2)
DEFLRDIR1\$ST\$Health\$g	0000000000000 (good.process)			
DEFLRDIR1\$ST\$Health\$t	2020-01-08 15:02:31.855			
DEFLRDIR1\$ST\$Dir\$general	false			
DEFLRDIR1\$ST\$Dir\$general	unknown			
DEFLRDIR1\$ST\$Dir\$g	0000000000000 (good.process)			
DEFLRDIR1\$ST\$Dir\$t	2020-01-08 15:02:31.856			
DEFLRDIR1\$ST\$InRcaCt\$setVal	false			
DEFLRDIR1\$ST\$InRcaCt\$g	0000000000000 (good.process)			
DEFLRDIR1\$ST\$InRcaCt\$t	2020-01-08 15:02:31.856			
DEFLRDIR1\$CF\$Mod\$ctlModel	status-only			
DEFLRDIR1\$CF\$ChrAng\$units\$SIUnit	0			

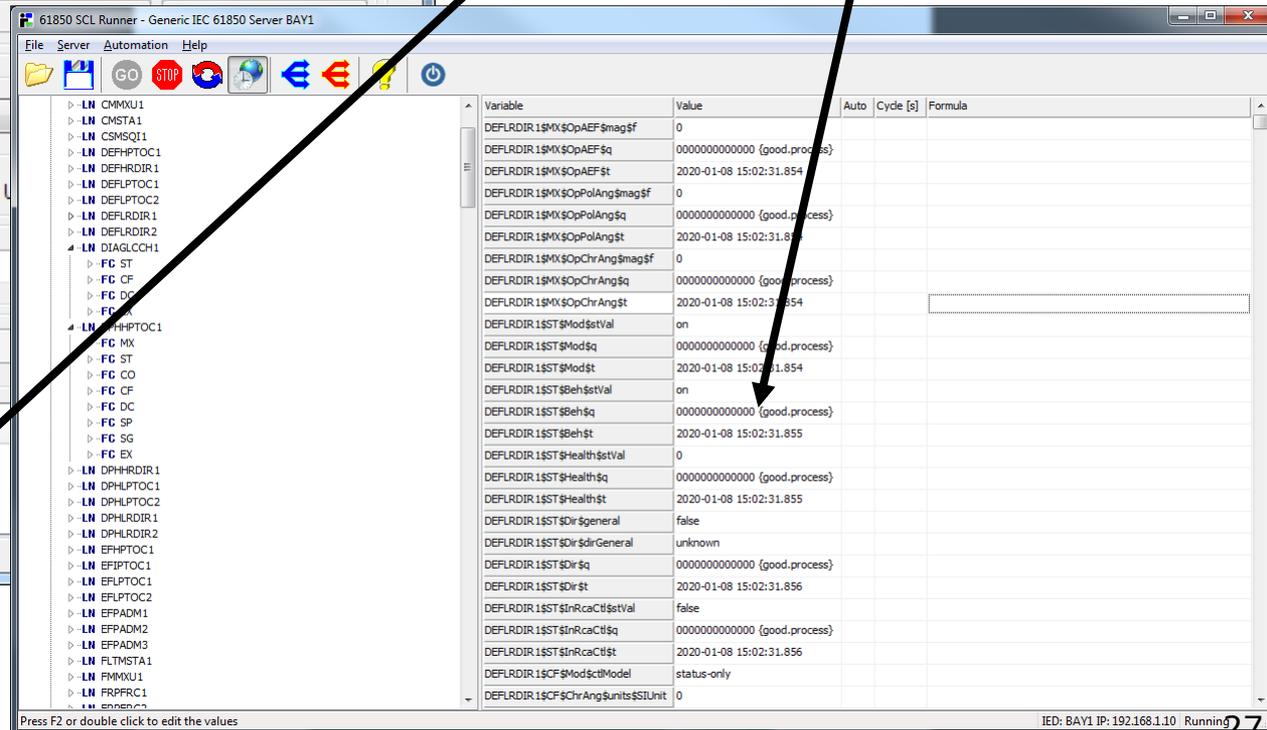
Control command testing



Client control window

Control accepted and executed with generated Command Termination.

IED data view



Reporting function testing

Data changes driven by user are reported by enabled RCB.

The screenshot displays the configuration and execution of reporting functions in an IEC 61850 server environment. It includes a configuration window for a Data Set Reference, a list of SCL objects, and a table of test results.

Configuration Window: DemoProtCtrlLLNO_DS1_Disconnector

Name	FC	Value
RptID	BR	
RptEna	BR	true
DstSet	BR	DemoProtCtrlLLNO_DS1_Disconnector
ConfRev	BR	1
ObjFids	BR	0111110110 (sequence-number, report-time-stamp, reason-for-inclusion, data-set-name, data-reference, entryID, conf-rev)
BufTm	BR	1000
SqlNum	BR	1
TrigOps	BR	011111 (data-change, quality-change, data-update, integrity, general-interrogation)
IntPrs	BR	0
GI	BR	false
PurgeBuf	BR	false
EntryID	BR	0000000000000001
TimeOfEntry	BR	2020-01-02 09:55:46.898

Configuration Parameters:

- Report Identifier: DemoProtCtrlLLNO_DS1_Disconnector
- Data Set Reference: DemoProtCtrlLLNO_DS1_Disconnector
- Configuration Revision: 1
- Integrity Period [ms]: 0
- Buffer Time [ms]: 1000
- Entry Identifier: 0000000000000001
- Sequence Number: 1
- Time Of Entry: 2020-01-02 09:55:46.898

SCL Runner - Generic IEC 61850 Server BAY1

Variable Value Auto Cycle [s] Formula

CO#Mod\$Oper\$ctVal	0		
CO#Mod\$Oper\$origin\$orCat	not-supported		
CO#Mod\$Oper\$origin\$orIdent			
CO#Mod\$Oper\$ctNum	0		
CO#Mod\$Oper\$T	1970-01-01 00:00:00.000		
CO#Mod\$Oper\$Tst	false		
CO#Mod\$Oper\$Check	no-check		
CO#stOutCmd\$Oper\$ctVal	0		
CO#stOutCmd\$oper\$origin\$orCat	not-supported		
CO#stOutCmd\$oper\$origin\$orIdent			
CO#stOutCmd\$oper\$ctNum	0		
CO#stOutCmd\$Oper\$T	1970-01-01 00:00:00.000		
CO#stOutCmd\$Oper\$Tst	false		
CO#stOutCmd\$Oper\$Check	no-check		

Reporting Function Test Results:

#	Report ID	Reason code	Received	SN	Bovf	Data Set
0	DemoProtCtrlLLNO\$R\$brdb1	gi	2020-01-02 9:55:47.030	0		DemoProtCtrlLLNO\$DS1_Disconnector

General data change button

The screenshot shows the '61850 SCL Runner - Generic IEC 61850 Server P139' window. The interface includes a menu bar (File, Server, Automation, Help) and a toolbar with various icons. A black arrow points to the 'General data change' button, which is represented by a blue double-headed arrow icon. Below the toolbar is a tree view on the left showing a hierarchy of control elements under 'LD Control', including LLN0 and CSWI22. On the right, a table displays the following data:

Variable	Value	Auto	Cycle [s]	Formula
LLN0\$ST\$Mod\$stVal	on			
LLN0\$ST\$Mod\$q	00000000000000 {good.process}			
LLN0\$ST\$Mod\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Beh\$stVal	on			
LLN0\$ST\$Beh\$q	00000000000000 {good.process}			
LLN0\$ST\$Beh\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Health\$stVal	Ok			
LLN0\$ST\$Health\$q	00000000000000 {good.process}			
LLN0\$ST\$Health\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Loc\$stVal	false			
LLN0\$ST\$Loc\$q	00000000000000 {good.process}			
LLN0\$ST\$Loc\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Lock\$stVal	false			
LLN0\$ST\$Lock\$q	00000000000000 {good.process}			
LLN0\$ST\$Lock\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$OrdRun\$stVal	false			
LLN0\$ST\$OrdRun\$q	00000000000000 {good.process}			
LLN0\$ST\$OrdRun\$t	2022-06-23 09:02:00.940			
LLN0\$CF\$Mod\$ctlModel	status-only			
LLN0\$DC\$NamPlt\$vendor				
LLN0\$DC\$NamPlt\$swRev				
LLN0\$DC\$NamPlt\$d				
LLN0\$DC\$NamPlt\$configRe				

At the bottom of the window, a status bar indicates 'Enforce data change of all monitored values' and 'IED: P139 IP: 192.168.8.105 Running'.

Allows to enforce automatic value change for **ALL** data subscribed by clients (from all enabled RCBs) – test of all subscribed data flows to the clients!

Dataset data change button

The screenshot shows the '61850 SCL Runner - Generic IEC 61850 Server P139' window. The left pane displays a tree view of the control system, including components like LLN0, LPHD1, CILO1-9, and CSWI11-17. The right pane shows a table of variables with columns for Variable, Value, Auto, Cycle [s], and Formula. A black arrow points from the 'Dataset data change' button in the toolbar to the table.

Variable	Value	Auto	Cycle [s]	Formula
LLN0\$ST\$Mod\$stVal	on			
LLN0\$ST\$Mod\$stq	0000000000000 {good,process}			
LLN0\$ST\$Mod\$st	2022-06-23 09:02:00.940			
LLN0\$ST\$Beh\$stVal	on			
LLN0\$ST\$Beh\$stq	0000000000000 {good,process}			
LLN0\$ST\$Beh\$st	2022-06-23 09:02:00.940			
LLN0\$ST\$Health\$stVal	Ok			
LLN0\$ST\$Health\$stq	0000000000000 {good,process}			
LLN0\$ST\$Health\$st	2022-06-23 09:02:00.940			
LLN0\$ST\$Loc\$stVal	false			
LLN0\$ST\$Loc\$stq	0000000000000 {good,process}			
LLN0\$ST\$Loc\$st	2022-06-23 09:02:00.940			
LLN0\$ST\$Lock\$stVal	false			
LLN0\$ST\$Lock\$stq	0000000000000 {good,process}			
LLN0\$ST\$Lock\$st	2022-06-23 09:02:00.940			
LLN0\$ST\$OrdRun\$stVal	false			
LLN0\$ST\$OrdRun\$stq	0000000000000 {good,process}			
LLN0\$ST\$OrdRun\$st	2022-06-23 09:02:00.940			
LLN0\$CF\$Mod\$ctlModel	status-only			
LLN0\$DC\$NamPit\$vendor				
LLN0\$DC\$NamPit\$swRev				
LLN0\$DC\$NamPit\$sd				
LLN0\$DC\$NamPit\$configRe				

Allows to enforce automatic value change for **ALL data** assigned to data sets – for testing data flows to the clients!

Remember to save created data change formulas for the next test

The screenshot shows the '61850 SCL Runner - Generic IEC 61850 Server P139' application. The 'File' menu is open, showing options: Open... (Ctrl+O), Save... (Ctrl+S), Export secrets, and Quit (Ctrl+Q). The main window displays a tree view on the left with nodes like FC DC, LN LPHD1, LN CILO1, LN CILO2, LN CILO3, LN CILO4, LN CILO5, LN CILO6, LN CILO7, LN CILO8, LN CILO9, LN CSWI1, LN CSWI10, LN CSWI12, LN CSWI13, LN CSWI14, LN CSWI15, LN CSWI16, LN CSWI17, LN CSWI2, LN CSWI3, LN CSWI4, LN CSWI5, LN CSWI6, LN CSWI7, LN CSWI8, LN CSWI9, LN CSWI11, LN CSWI12, LN CSWI13, LN CSWI14, LN CSWI15, LN CSWI16, LN CSWI17, LN CSWI18, LN CSWI19, LN CSWI20, LN CSWI21, LN CSWI22, LN CSWI23, LN CSWI24, LN CSWI25, LN CSWI26, LN CSWI27, LN CSWI28, LN CSWI29, LN CSWI30, LN CSWI31, LN CSWI32, LN CSWI33, LN CSWI34, LN CSWI35, LN CSWI36, LN CSWI37, LN CSWI38, LN CSWI39, LN CSWI40, LN CSWI41, LN CSWI42, LN CSWI43, LN CSWI44, LN CSWI45, LN CSWI46, LN CSWI47, LN CSWI48, LN CSWI49, LN CSWI50, LN CSWI51, LN CSWI52, LN CSWI53, LN CSWI54, LN CSWI55, LN CSWI56, LN CSWI57, LN CSWI58, LN CSWI59, LN CSWI60, LN CSWI61, LN CSWI62, LN CSWI63, LN CSWI64, LN CSWI65, LN CSWI66, LN CSWI67, LN CSWI68, LN CSWI69, LN CSWI70, LN CSWI71, LN CSWI72, LN CSWI73, LN CSWI74, LN CSWI75, LN CSWI76, LN CSWI77, LN CSWI78, LN CSWI79, LN CSWI80, LN CSWI81, LN CSWI82, LN CSWI83, LN CSWI84, LN CSWI85, LN CSWI86, LN CSWI87, LN CSWI88, LN CSWI89, LN CSWI90, LN CSWI91, LN CSWI92, LN CSWI93, LN CSWI94, LN CSWI95, LN CSWI96, LN CSWI97, LN CSWI98, LN CSWI99, LN CSWI100. The right pane shows a table of variables:

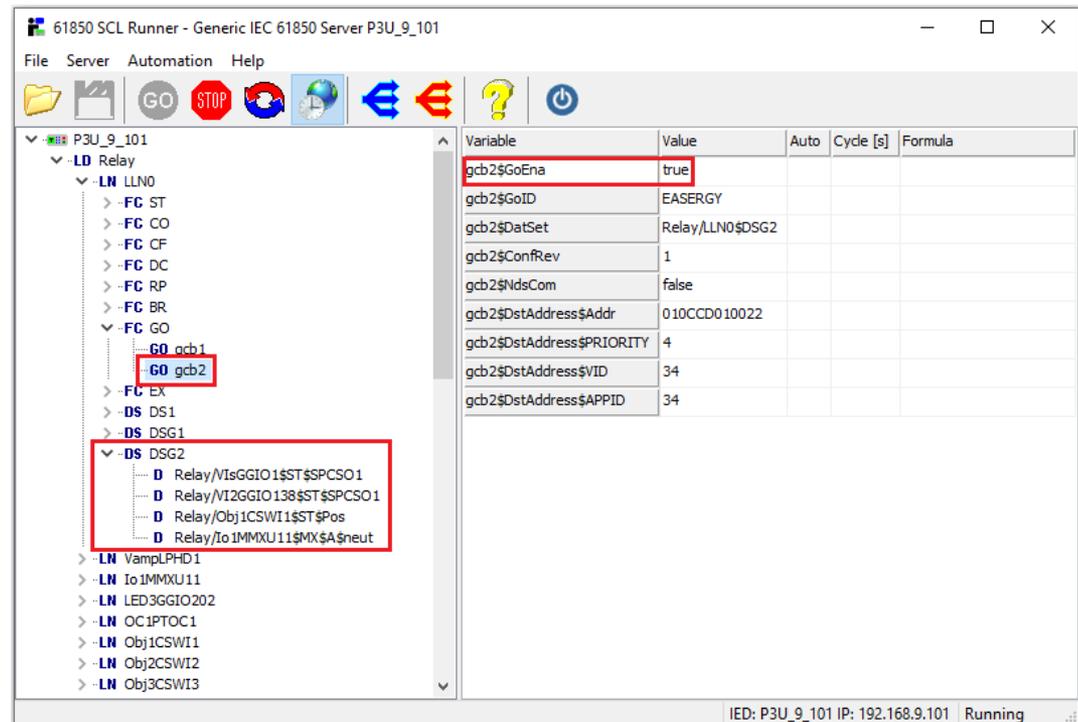
Variable	Value	Auto	Cycle [s]	Formula
LLN0\$ST\$Mod\$stVal	on			
LLN0\$ST\$Mod\$q	0000000000000000 {good.process}			
LLN0\$ST\$Mod\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Beh\$stVal	on			
LLN0\$ST\$Beh\$q	0000000000000000 {good.process}			
LLN0\$ST\$Beh\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Health\$stVal	Ok			
LLN0\$ST\$Health\$q	0000000000000000 {good.process}			
LLN0\$ST\$Health\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Loc\$stVal	false			
LLN0\$ST\$Loc\$q	0000000000000000 {good.process}			
LLN0\$ST\$Loc\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$Lock\$stVal	false			
LLN0\$ST\$Lock\$q	0000000000000000 {good.process}			
LLN0\$ST\$Lock\$t	2022-06-23 09:02:00.940			
LLN0\$ST\$OrdRun\$stVal	false			
LLN0\$ST\$OrdRun\$q	0000000000000000 {good.process}			
LLN0\$ST\$OrdRun\$t	2022-06-23 09:02:00.940			
LLN0\$CF\$Mod\$ctlModel	status-only			
LLN0\$DC\$NamPit\$vendor				
LLN0\$DC\$NamPit\$swRev				
LLN0\$DC\$NamPit\$d				
LLN0\$DC\$NamPit\$configRe				

Save simulation setup to file | IED: P139 IP: 192.168.8.105 Running

SCL Runner as GOOSE Publisher

Using SCL Runner it is possible to simulate GOOSE Publisher function by the definition of GoCB object included in the imported SCL file. Transmission parameters and the dataset will be configured as specified in the chosen control block of the selected device.

In this way SCL Runner can simulate GOOSE transmission performed by another device. It allows to test how GOOSE messages will be received and processed by devices with GOOSE Subscriber function.



The screenshot shows the SCL Runner interface for a Generic IEC 61850 Server P3U_9_101. The left pane displays a tree view of the device configuration, with the following structure:

- P3U_9_101
 - LD Relay
 - LN LLNO
 - FG ST
 - FG CO
 - FG CF
 - FG DC
 - FG RP
 - FG BR
 - FG GO
 - GO gcb1
 - GO gcb2
 - FG EX
 - DS DS1
 - DS DSG1
 - DSG2
 - D Relay/VIsgGIO1\$ST\$SPCSO1
 - D Relay/VI2GGIO138\$ST\$SPCSO1
 - D Relay/Obj1CSWI1\$ST\$Pos
 - D Relay/To1MMXU11\$MX\$A\$neut
 - LN VampLPHD1
 - LN Io1MMXU11
 - LN LED3GGIO202
 - LN OC1PTOC1
 - LN Obj1CSWI1
 - LN Obj2CSWI2
 - LN Obj3CSWI3

The right pane displays a table of GOOSE object parameters:

Variable	Value	Auto	Cycle [s]	Formula
gcb2\$GoEna	true			
gcb2\$GoID	EASERGY			
gcb2\$DatSet	Relay/LLN0\$DSG2			
gcb2\$ConfRev	1			
gcb2\$NdsCom	false			
gcb2\$DstAddress\$Addr	010CCD010022			
gcb2\$DstAddress\$PRIORITY	4			
gcb2\$DstAddress\$VID	34			
gcb2\$DstAddress\$APPID	34			

The status bar at the bottom indicates: IED: P3U_9_101 IP: 192.168.9.101 Running

SCL Runner as GOOSE Publisher

The screenshot displays the SCL Runner interface for a generic IEC 61850 server. The project tree on the left shows a hierarchy of objects, with 'Relay/VisGGIO1\$ST\$SPCSO1' selected. A variable table in the center lists 'SPCSO1\$stVal' as 'true', 'SPCSO1\$q' as '00000000000000 (good.process)', and 'SPCSO1\$t' as '2020-01-20 09:53:31.007'. The parser window shows a log of a GOOSE message being received, including Ethernet and GOOSE headers and data values. The GOOSE Receiver configuration window is also visible, showing settings for source and destination MAC addresses, VLAN, and GOOSE parameters like App ID, TTL, and CIGRev.

The selected GoCB can be monitored to test the performance of transmitting device (e.g. detect data changes, interruptions of transmissions, etc.).

Idx	Type	Value	Data reference
0	STRUCT	3 element(s)	P3U_9_101Relay/VisGGIO1.SPCSO1 [ST]
0.0	BOOL	TRUE	
0.1	QUALITY	00000000000000	
0.2	TIME	2020-01-20 09:53:31.007	
1	STRUCT	3 element(s)	P3U_9_101Relay/VI2GGIO138.SPCSO1 [ST]
1.0	BOOL	FALSE	
1.1	QUALITY	00000000000000	
1.2	TIME	2020-01-20 09:25:00.171	
2	STRUCT	3 element(s)	P3U_9_101Relay/Obj1CSW1.Pos [ST]
2.0	BS2	00	

SCL Runner as GOOSE Subscriber

The screenshot displays the SCL Runner interface for a Generic IEC 61850 Server P3U_211. The left pane shows a tree view of the LD Relay, with the INP Inputs folder expanded to show Relay/LLN0.NI1 and Relay/LLN0.NI3. The main pane shows the GOOSE Sender configuration for App ID 218, with a table of data items:

Idx	Type	Value
0	BS2	01

Two GOOSE Sender configuration windows are overlaid. The top window shows App ID 218 with a TTL of 4000 and a destination of 01:0C:CD:01:00:01. The bottom window shows App ID 220 with a TTL of 4000 and a destination of 01:0C:CD:01:00:02. A black arrow points from the '01' value in the data item table to the 'open' value in the Relay/LLN0.NI1 variable table, and another arrow points from the '10' value in the data item table to the 'closed' value in the Relay/LLN0.NI3 variable table.

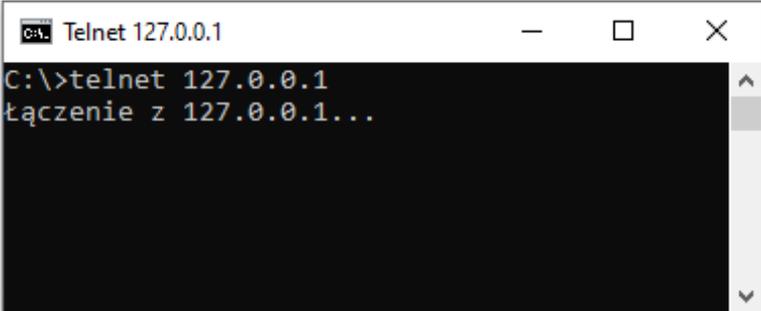
Data incoming via GOOSE Subscriber interface are exposed as Inputs and can be used in formulas that determine other data values.

Access to data of simulated devices (IEDs) via telnet

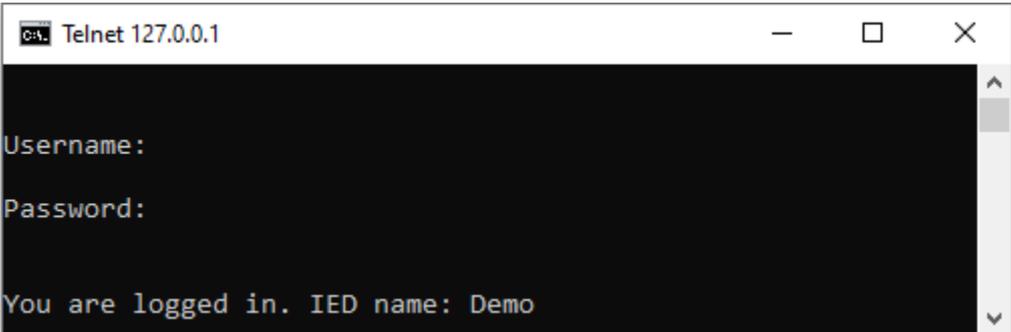
61850 SCL Runner allows for simulation control and read/write access to data attribute values of the simulated server devices (IEDs) via telnet protocol. This enables external programs to define scenarios of data changes in the simulated devices. The toolset package includes an example of such a program in Python.

To connect to simulated server device the user needs to open connection via telnet with IP address of the simulated server device.

Username and password needed for telnet connection are not checked.



```
C:\>telnet 127.0.0.1
łączenie z 127.0.0.1...
```



```
C:\>telnet 127.0.0.1
Username:
Password:
You are logged in. IED name: Demo
```

Access to data of simulated devices (IEDs) via telnet – list of commands

Telnet connection allows to perform the following commands on the simulated server device.

```
Telnet 127.0.0.1
>HELP
Available commands:
START - start IEC 61850 server
STOP - stop IEC 61850 server
RESTART - restart IEC 61850 server
TIMESYNCON - set time quality flag to SYNCHRONIZED
TIMESYNCOFF - set time quality flag to NOT SYNCHRONIZED
GENERALDCHG - enforce a change of all data points currently
subscribed for reporting by clients
ALLDSDCHG - enforce a change of all data points assigned to
datasets
MMSVARName - read value of simple MMS variable
MMSVARName=Val - write Val to simple MMS variable
HELP - show list of available commands
>Error: variable not found
>
```

Seven of these commands correspond to the buttons on the application GUI:



START



STOP



RESTART



GENERALDCHG



ALLDSDCHG

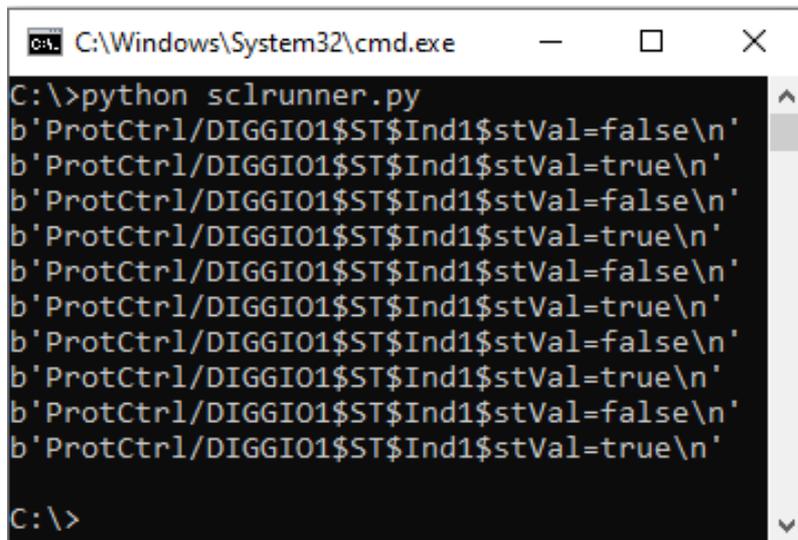


TIMESYNCON

TIMESYNCOFF

Example of automation via telnet

An example of Python program code (*sclrunner.py* - part of the installation package): connects to the simulated server device (*Demo.icd* - part of the installation package) and then performs 10 control commands on the selected object (ProtCtrl/DIGGIO1\$ST\$Ind1\$stVal):



```
C:\Windows\System32\cmd.exe
C:\>python sclrunner.py
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n'
b'ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n'
C:\>
```

```
#IP address of the simulated server device
HOST = "127.0.0.1"

#Establish telnet connection using default port (23)
tn = telnetlib.Telnet(HOST,23)

#Username and password is not checked
tn.read_until(b"Username: ",2)
tn.write(b"\n")
tn.read_until(b"Password: ",2)
tn.write(b"\n")

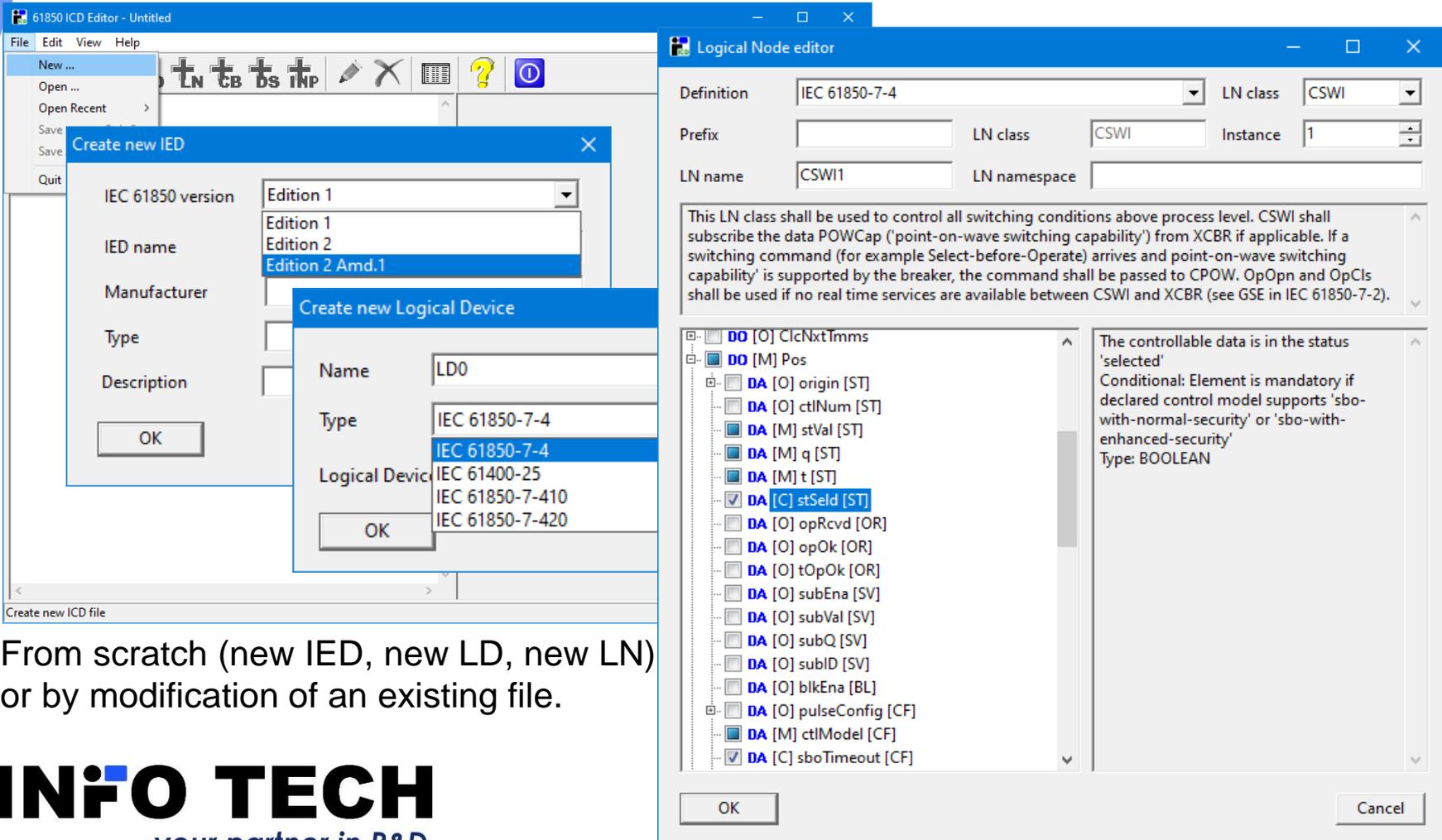
#Cycle of ten control commands on selected object
tn.read_until(b">")
for i in range(0,10):
    if( i%2 != 0 ):
        line=b"ProtCtrl/DIGGIO1$ST$Ind1$stVal=true\n"
        print(line)
        tn.write(line)
        tn.read_until(b">")
    else:
        line=b"ProtCtrl/DIGGIO1$ST$Ind1$stVal=false\n"
        print(line)
        tn.write(line)
        tn.read_until(b">")
    time.sleep( 1 )
```

61850 ICD Editor

Supplementary tool to create and modify ICD/IID/CID files used for simulation.



61850 ICD Editor allows to build an ICD file of the server device



The screenshot displays the 61850 ICD Editor software interface. The main window is titled "61850 ICD Editor - Untitled" and shows a menu bar (File, Edit, View, Help) and a toolbar with icons for creating and editing Logical Nodes (LN), Logical Devices (LD), and Logical Elements (LE). Two dialog boxes are open:

- Create new IED:** This dialog allows creating a new IED. It has fields for "IEC 61850 version" (Edition 1), "IED name" (Edition 1, Edition 2, Edition 2 Amd.1), "Manufacturer", "Type", and "Description". An "OK" button is at the bottom.
- Create new Logical Device:** This dialog allows creating a new LD. It has fields for "Name" (LD0), "Type" (IEC 61850-7-4), and "Logical Device" (IEC 61400-25, IEC 61850-7-410, IEC 61850-7-420). An "OK" button is at the bottom.

The **Logical Node editor** window is also open, showing the configuration for a Logical Node (LN). The "Definition" is set to "IEC 61850-7-4", the "LN class" is "CSWI", and the "Instance" is "1". The "LN name" is "CSWI1" and the "LN namespace" is empty. A text box provides a description: "This LN class shall be used to control all switching conditions above process level. CSWI shall subscribe the data POWCap ('point-on-wave switching capability') from XCBR if applicable. If a switching command (for example Select-before-Operate) arrives and point-on-wave switching capability' is supported by the breaker, the command shall be passed to CPOW. OpOpn and OpCls shall be used if no real time services are available between CSWI and XCBR (see GSE in IEC 61850-7-2)."

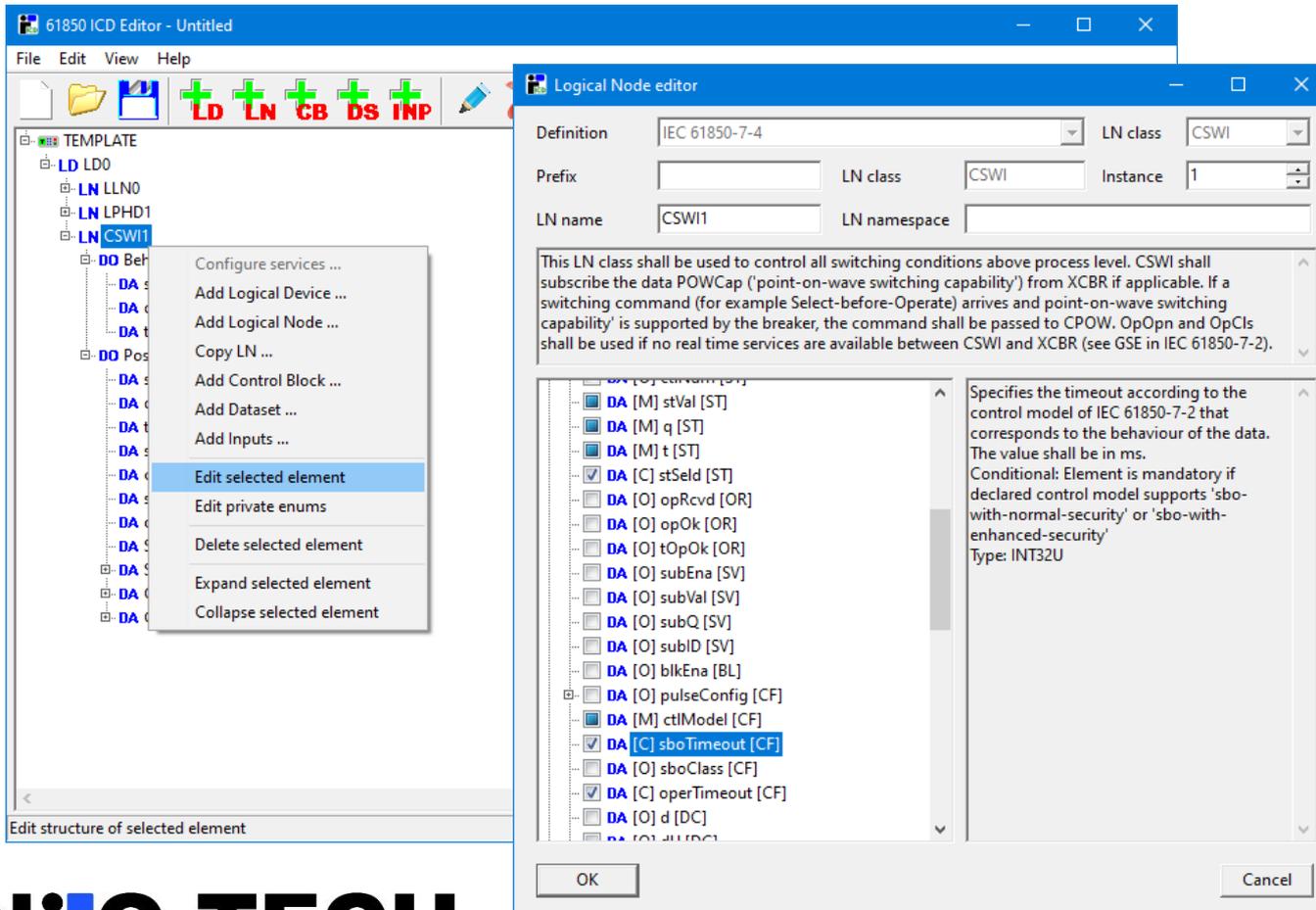
The "Logical Node editor" also shows a tree view of the Logical Node's data objects (DOs) and data attributes (DAs). The tree structure is as follows:

- DO [O] ClcNxtImms
- DO [M] Pos
 - DA [O] origin [ST]
 - DA [O] ctiNum [ST]
 - DA [M] stVal [ST]
 - DA [M] q [ST]
 - DA [M] t [ST]
 - DA [C] stSeld [ST]
 - DA [O] opRcvd [OR]
 - DA [O] opOk [OR]
 - DA [O] tOpOk [OR]
 - DA [O] subEna [SV]
 - DA [O] subVal [SV]
 - DA [O] subQ [SV]
 - DA [O] subID [SV]
 - DA [O] blkEna [BL]
 - DA [O] pulseConfig [CF]
 - DA [M] ctiModel [CF]
 - DA [C] sboTimeout [CF]

The "Logical Node editor" also has a text box on the right that says: "The controllable data is in the status 'selected' Conditional: Element is mandatory if declared control model supports 'sbo-with-normal-security' or 'sbo-with-enhanced-security' Type: BOOLEAN".

From scratch (new IED, new LD, new LN)
or by modification of an existing file.

Editing data model



Any added LN can be later modified by adding/deleting optional DOs and DAs.

Presetting DA values

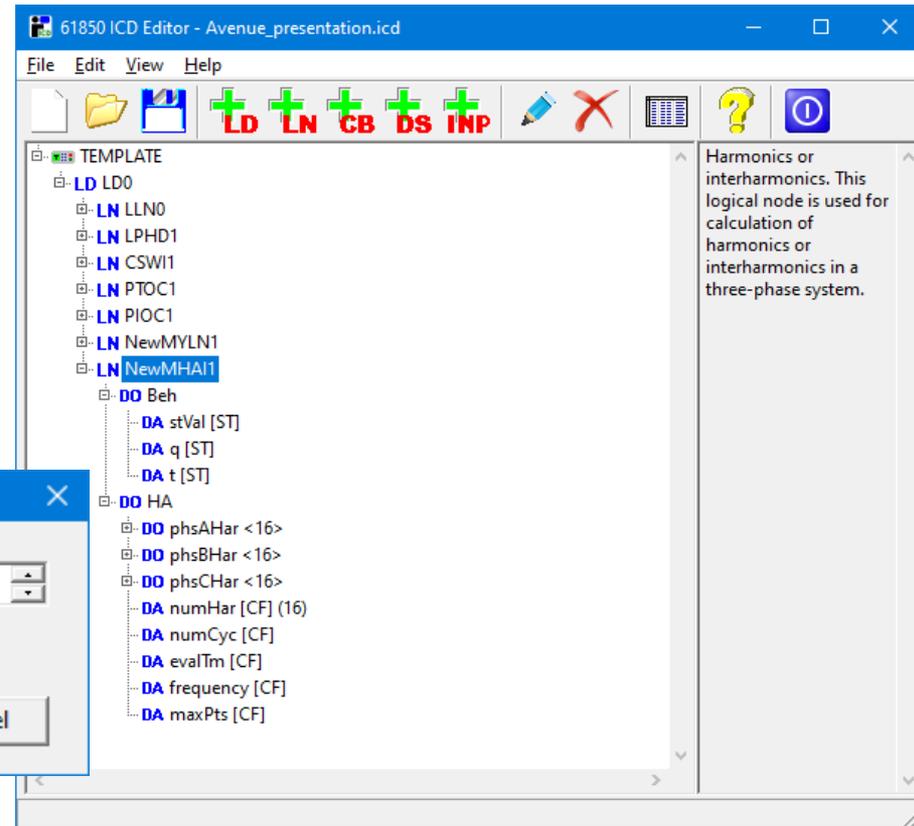
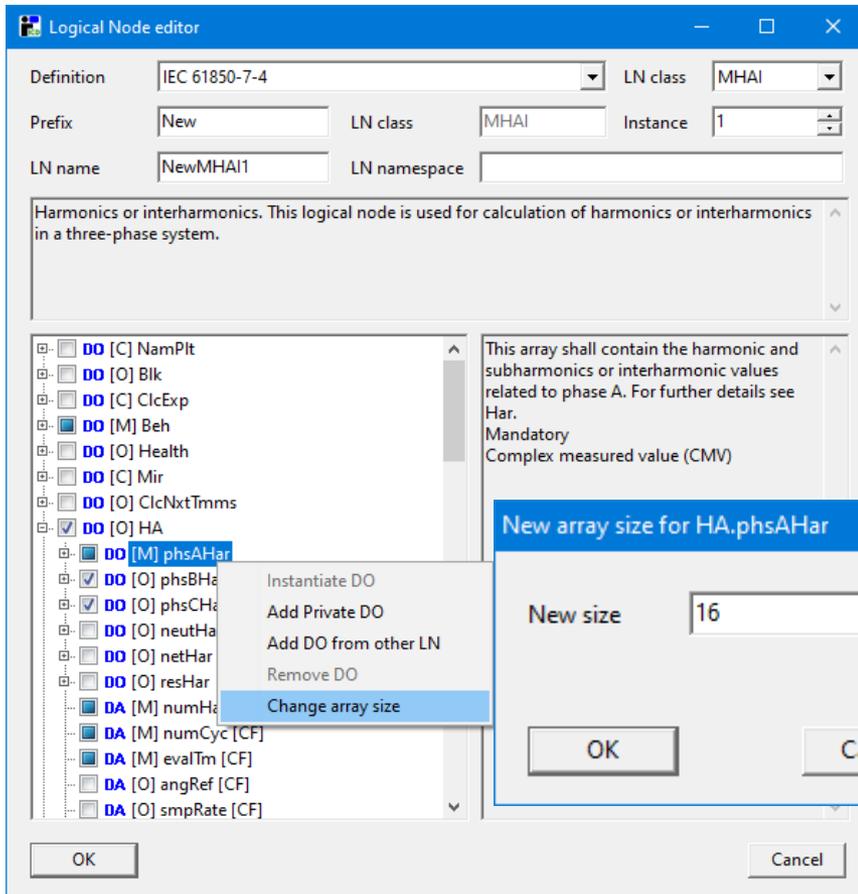
The screenshot shows the 61850 ICD Editor interface. On the left, a tree view displays the structure of a control model. The selected element is `LD0/CSWI1.Pos.ctlModel`. A context menu is open over this element, with the 'Edit selected element' option highlighted. An 'Edit value' dialog box is displayed in the foreground, showing the name of the selected element and a list of available values for the attribute. The value 'sbo-with-normal-security' is currently selected in the dropdown menu.

Specifies the control model of IEC 61850-7-2 that corresponds to the behaviour of the data. NOTE 2 If a data instance of a control class has no status information associated, then the attribute stVal does not exist. In that case, the value range for ctlModel is restricted to direct-with-normal-security and sbo-with-normal-security.
Mandatory
Type: Enum

Name: LD0/CSWI1.Pos.ctlModel
Value: sbo-with-normal-security
status-only
direct-with-normal-security
sbo-with-normal-security

Data attribute values can be preset if needed. Standard defined enums are supported.

LN with DOs containing array types



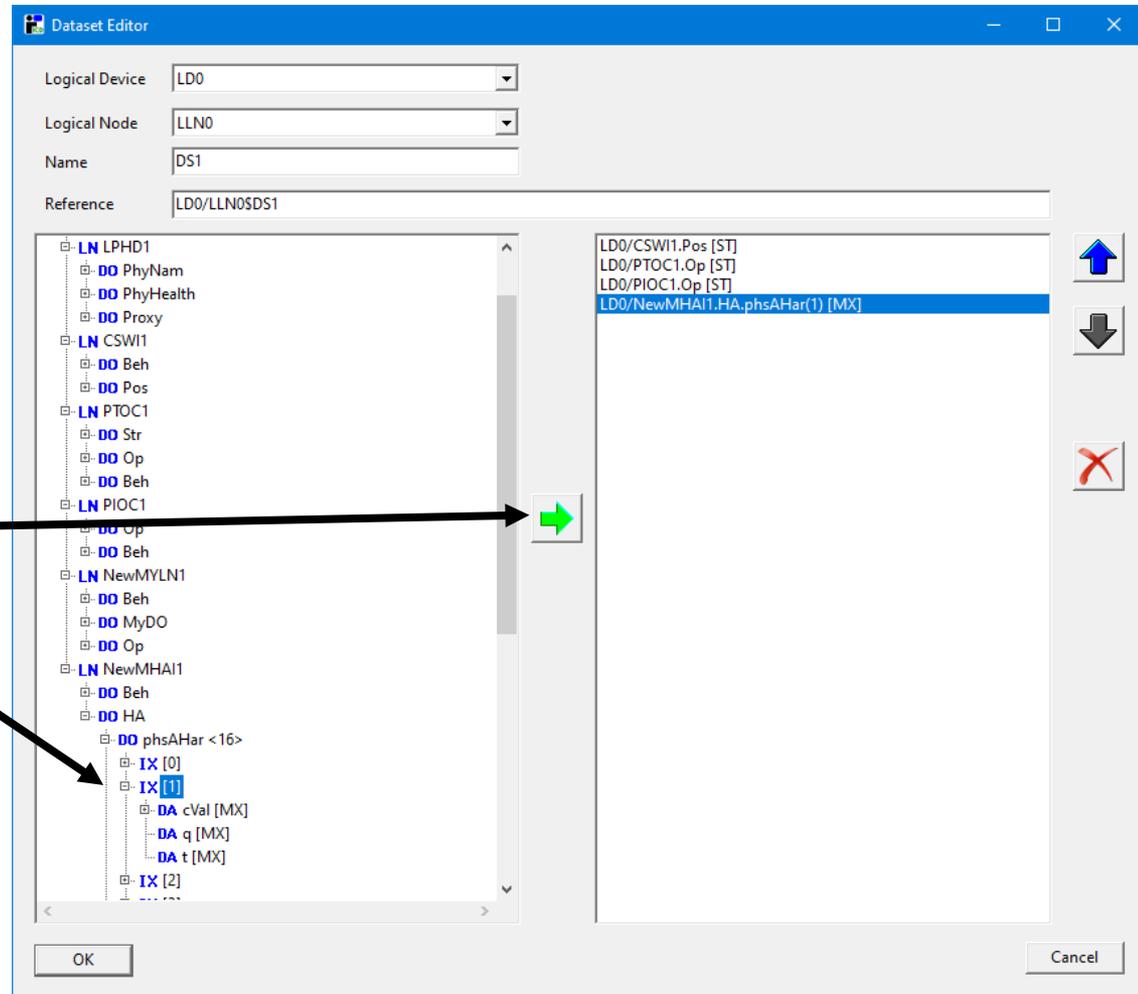
Array size can be set (default is 32).

Dataset creation by selection of elements from the data model

Any defined dataset can be later re-edited if needed.

Button for adding a selected element of data model to dataset.

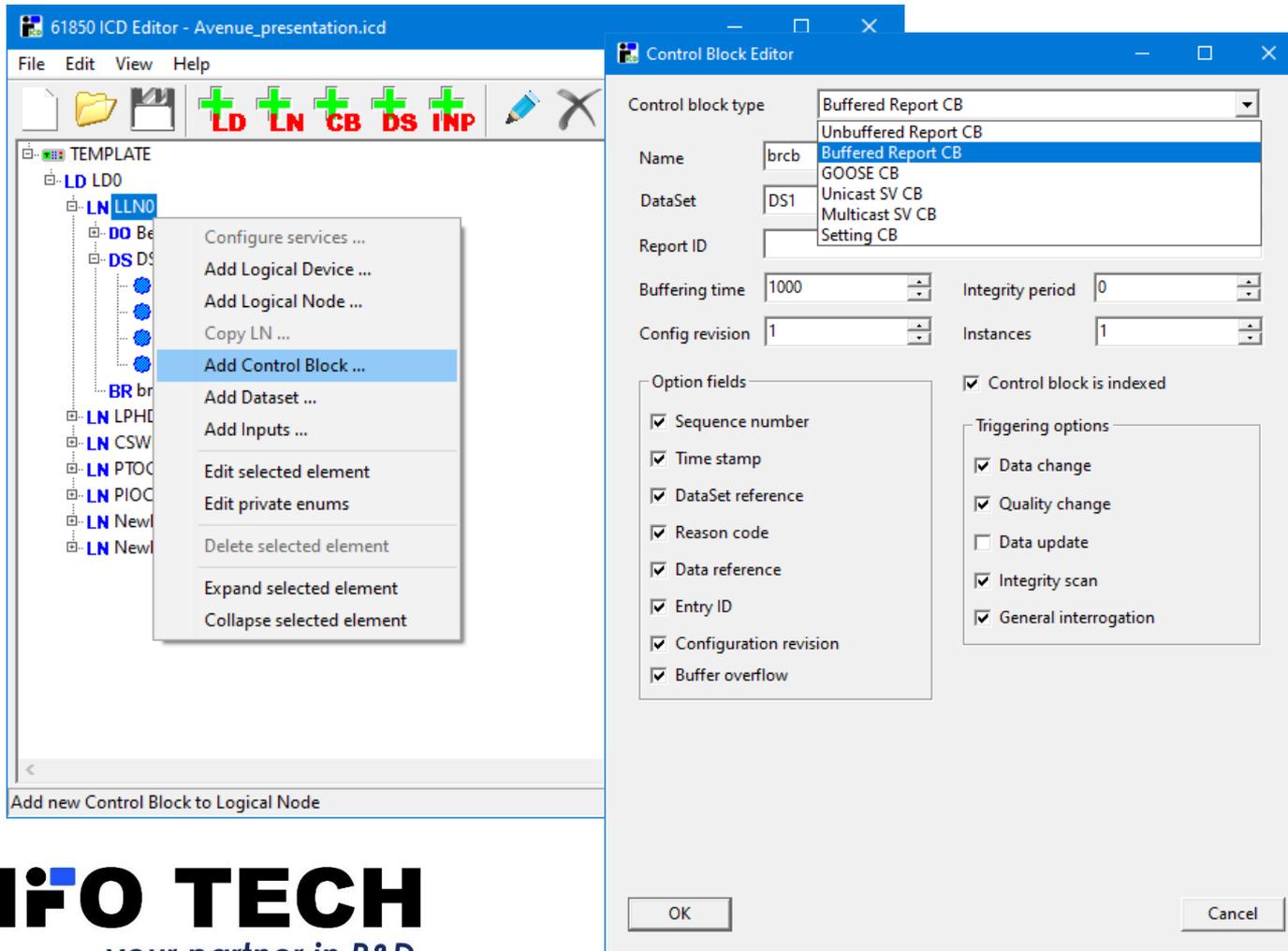
Note that in Ed.2.1 also indexed data can be elements of datasets.



Buttons for changing order of elements in dataset.

Button for removing element of dataset.

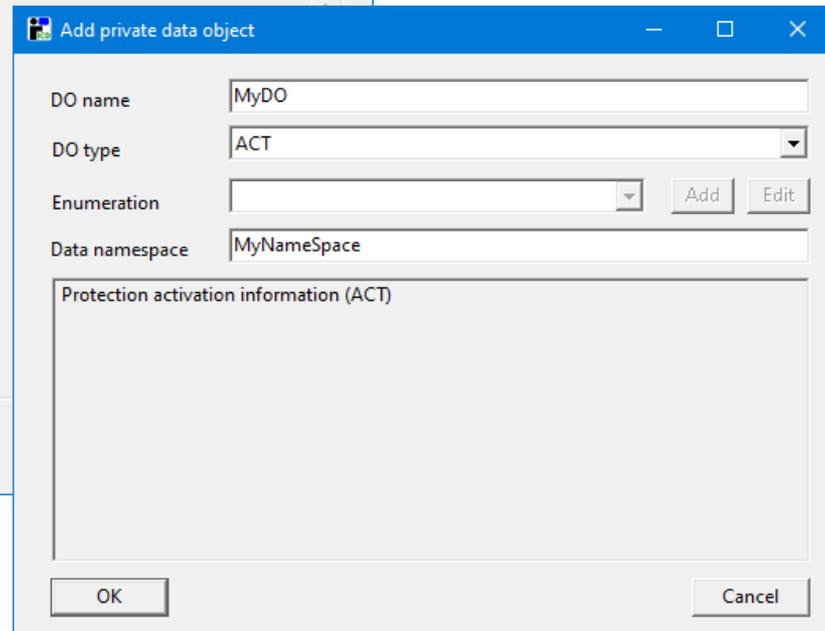
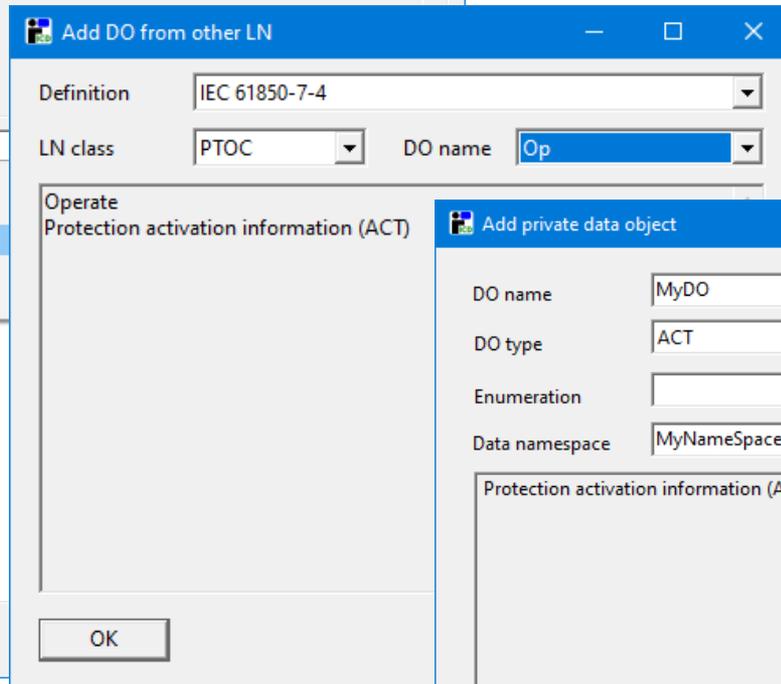
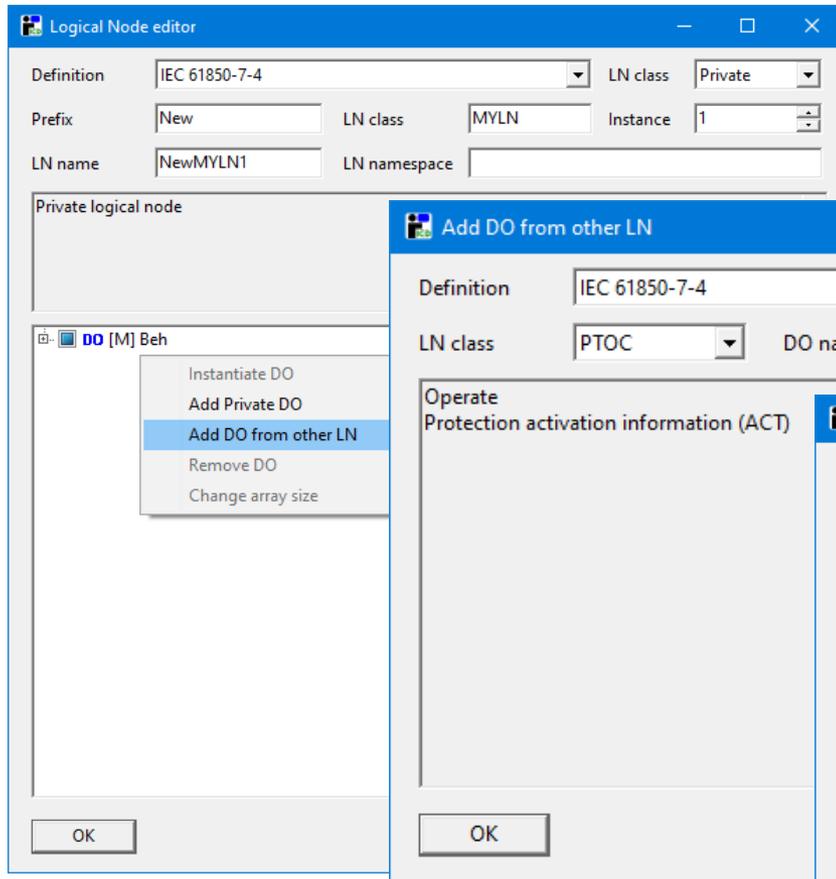
Control blocks



URCB, BRCB, GoCB, USVCB, MSVCB and SGCB can be added to the data model and initially preset.

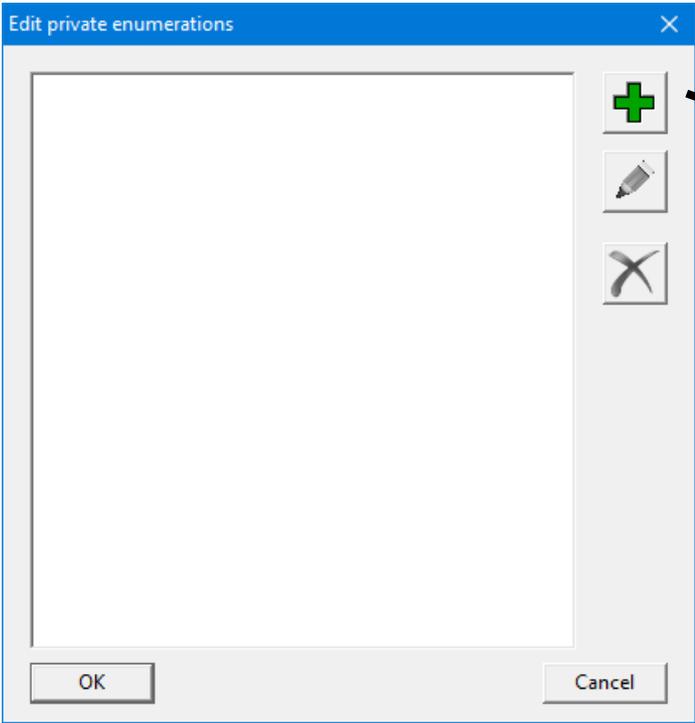
Any defined control block can be later re-edited if needed.

Private Logical Nodes

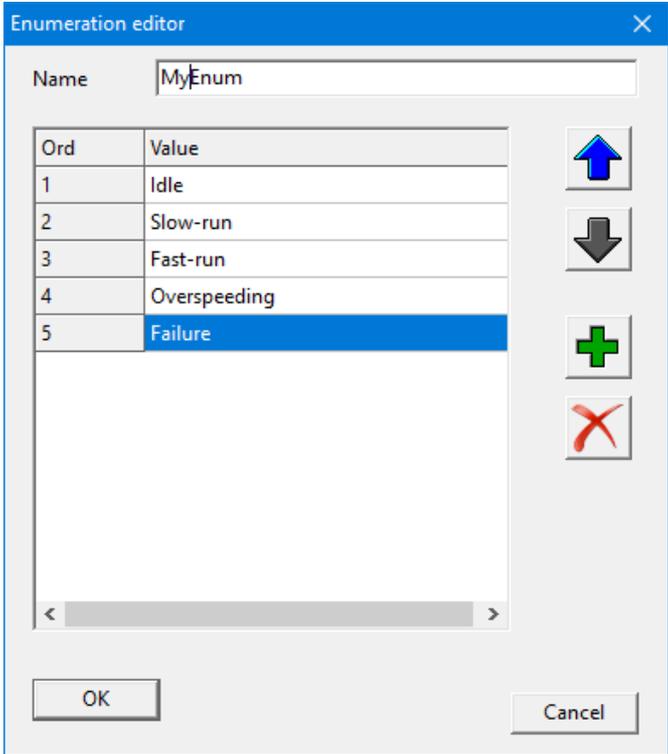


Private LN class and instance can be defined with the use of DOs from other LN classes or using defined private DOs.

Private enums



Continuous range of integer values with assigned user-defined names.



Data model parameters setup

Necessary !!

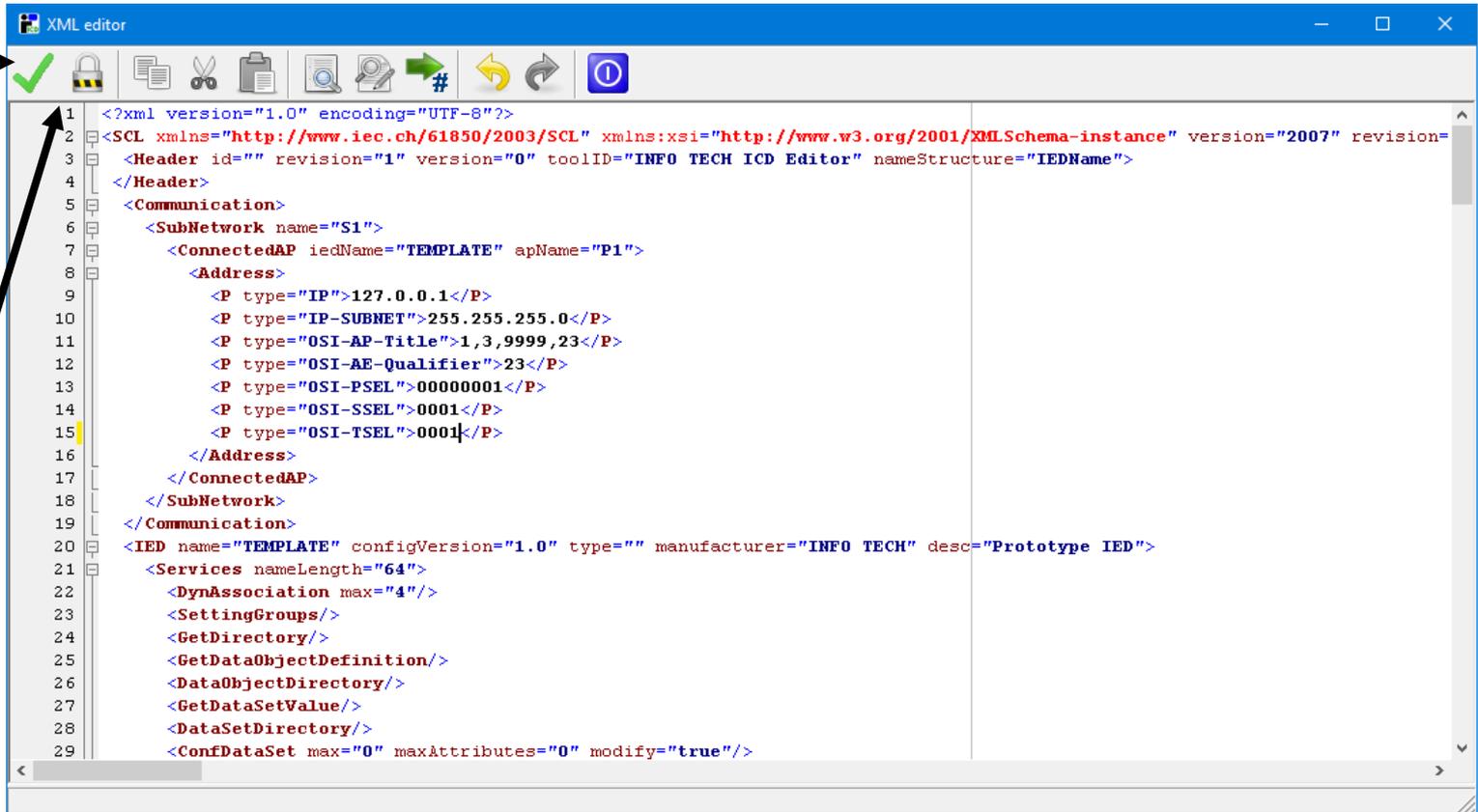
The screenshot shows the '61850 ICD Editor - Untitled' application. On the left, a tree view shows a project structure with nodes like LD LDO, LN LLN, LN LPH, LN CSW, LN PTO, LN PIO, LN New, DO B, DO M, DO Op, DA general [ST], DA q [ST], and DA t [ST]. A context menu is open over the 'LD LDO' node, with 'Configure services ...' selected. The 'Edit server services' dialog box is open in the foreground, displaying a list of services and their parameters:

Service Name	Service Class
ClientServices	(TClientServicesEd2_1)
CommProt	(TCommProt)
ConfDataSet	(TServiceForConfDataSet)
ConfLdName	(TServiceYesNo)
ConfLNs	(TConfLNs)
ConfLogCont	(TServiceWithMaxNonZero)
ConfReportCc	(TServiceConfReportControlEd2_1)
ConfSigRef	(TServiceWithMaxNonZero)
DataObjectDir	(TServiceYesNo)
DataSetDirect	(TServiceYesNo)
DynAssociatio	(TServiceWithOptionalMax)
Available	<input checked="" type="checkbox"/> (True)
Max	4
DynDataSet	(TServiceWithMaxAndMaxAttributes)
Available	<input checked="" type="checkbox"/> (True)
max	10
MaxAttribl	30
FileHandling	(TServiceYesNo)
GetCBValues	(TServiceYesNo)
GetDataObjec	(TServiceYesNo)
GetDataSetVal	(TServiceYesNo)
GetDirectory	(TServiceYesNo)
GOOSE	(TServiceWithMax)

The dialog has 'OK' and 'Cancel' buttons at the bottom.

XML Editor and ICD file validation

Validation check button



Unlock/lock button for manual editing.

Possible applications of 61850 ICD Editor program

- ❑ Creation and modification of ICD/IID/CID file for the device under configuration.
- ❑ Processing of an ICD file into a IID/CID file (addresses, datasets, parameters of control blocks).
- ❑ Creation and modification of ICD/IID/CID file to be used for server device simulation (e.g. with the use of INFO TECH 61850 SCL Runner tool).
- ❑ Modification of ICD/IID/CID file for the IEC 61850 client program (e.g. 61850 Avenue client), for example to enable execution of negative test cases on the server device.

61850 SCL Runner – and what?

Comments of our customers (system integrators):

„Wow ... This simulation seems so easy! We have to try it!”

„Overall, I would just like to say that the SCL Runner is fantastic!”

Order 61850 SCL Runner with 61850 Avenue

- Good luck on your safe and easy road to learn and use the IEC 61850 standard



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