

# 61850 SCD Builder

## System Configuration Tool

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### User guide

Prepared by Wojciech E. Kozłowski  
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# Contents

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<input type="checkbox"/>	Information on the supplier and the product	3
<input type="checkbox"/>	SCD file in the IEC 61850 engineering process	5
<input type="checkbox"/>	Installation procedure	12
<input type="checkbox"/>	61850 SCD Builder – creation of system configuration description	16
<input type="checkbox"/>	Supplier contact information	53

# INFO TECH sp.j.

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- Experts in the field of communication solutions for power automation and industrial automation.
- Renowned supplier of protocol software libraries and tools for communication testing and device simulation.
- As of December 2025, the licensed INFO TECH software is the basis for implementing IEC 61850 interfaces in the products of 58 companies and institutions from 16 countries of Europe, Asia and North America.
- INFO TECH offers also:
  - **Software development services,**
  - **Tool applications** for testing, simulation and configuration,
  - **Hands-on trainings** on IEC 61850 communication,
  - **Conformance testing** of the IEC 61850 interfaces,
  - **Audits and diagnostics of systems** using IEC 61850 communication.

# Product from the renowned supplier of communication software libraries and testing tools for automation systems

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Widely used INFO TECH products from this area:

- ❑ **IEC 61850 Software Library (source code)**
- ❑ **61850 CCC** – IEC 61850 client DLL for PC/MS Windows
- ❑ **61850 SCC** – IEC 61850 server DLL for PC/MS Windows
- ❑ **61850 Avenue** – toolset including IEC 61850 client, relay simulator, GOOSE tools, SV tools, file transfer tool, ICD editor
- ❑ **61850 SCL Runner** – simulator of IEC 61850 server devices based on their description in SCL files
- ❑ **61850 GOOSE System Viewer** – visualization and monitoring of GOOSE communication based on SCD file
- ❑ **ProTester** – simulation tools for master and slave stations of protocols operating on serial and TCP/IP based networks (DNP3, IEC-104, IEC-101, IEC-103, Modbus, SPA-bus)

# System engineering in accordance with IEC 61850

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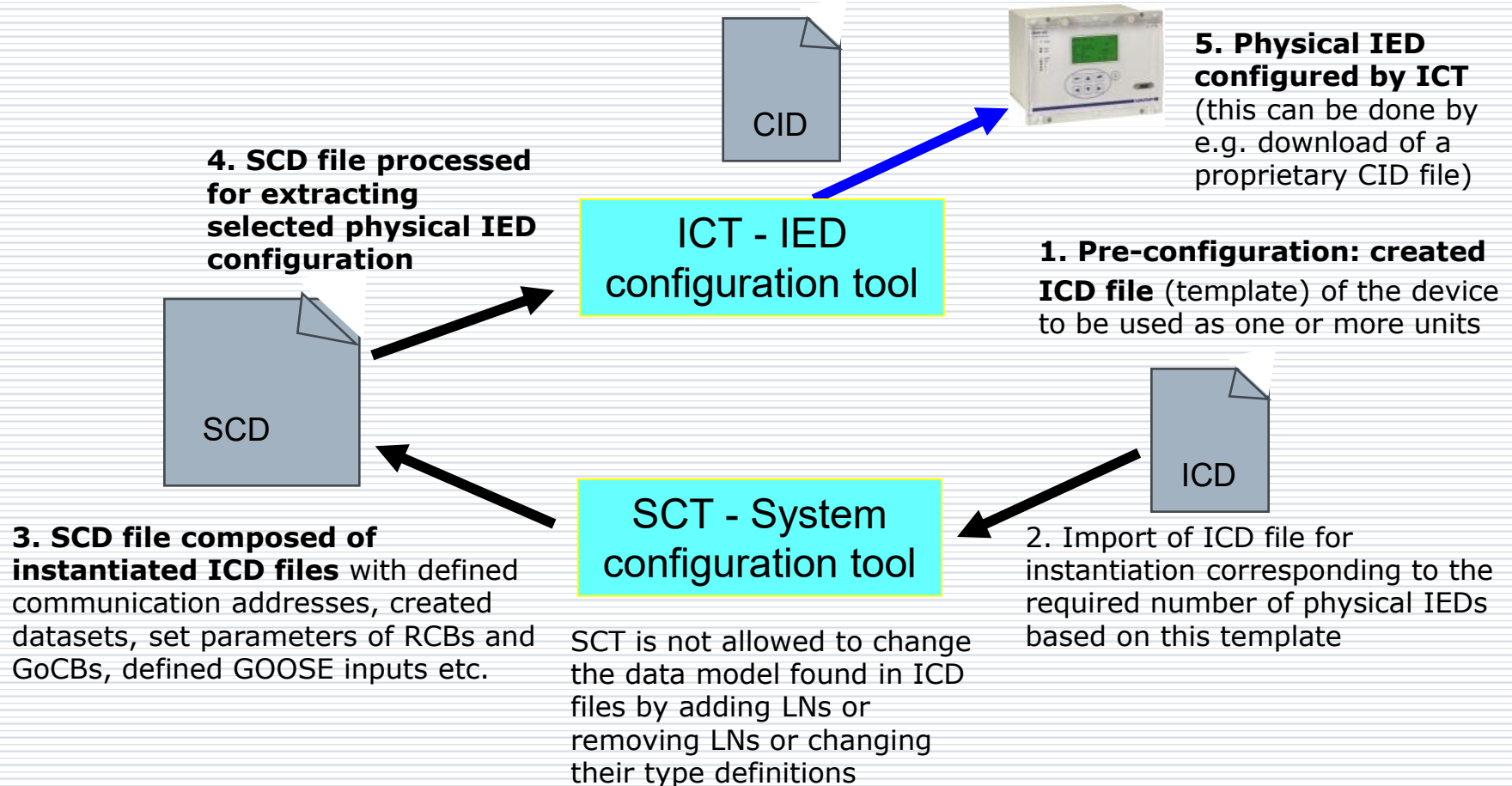


# SCL files of the engineering process defined in the IEC 61850-6

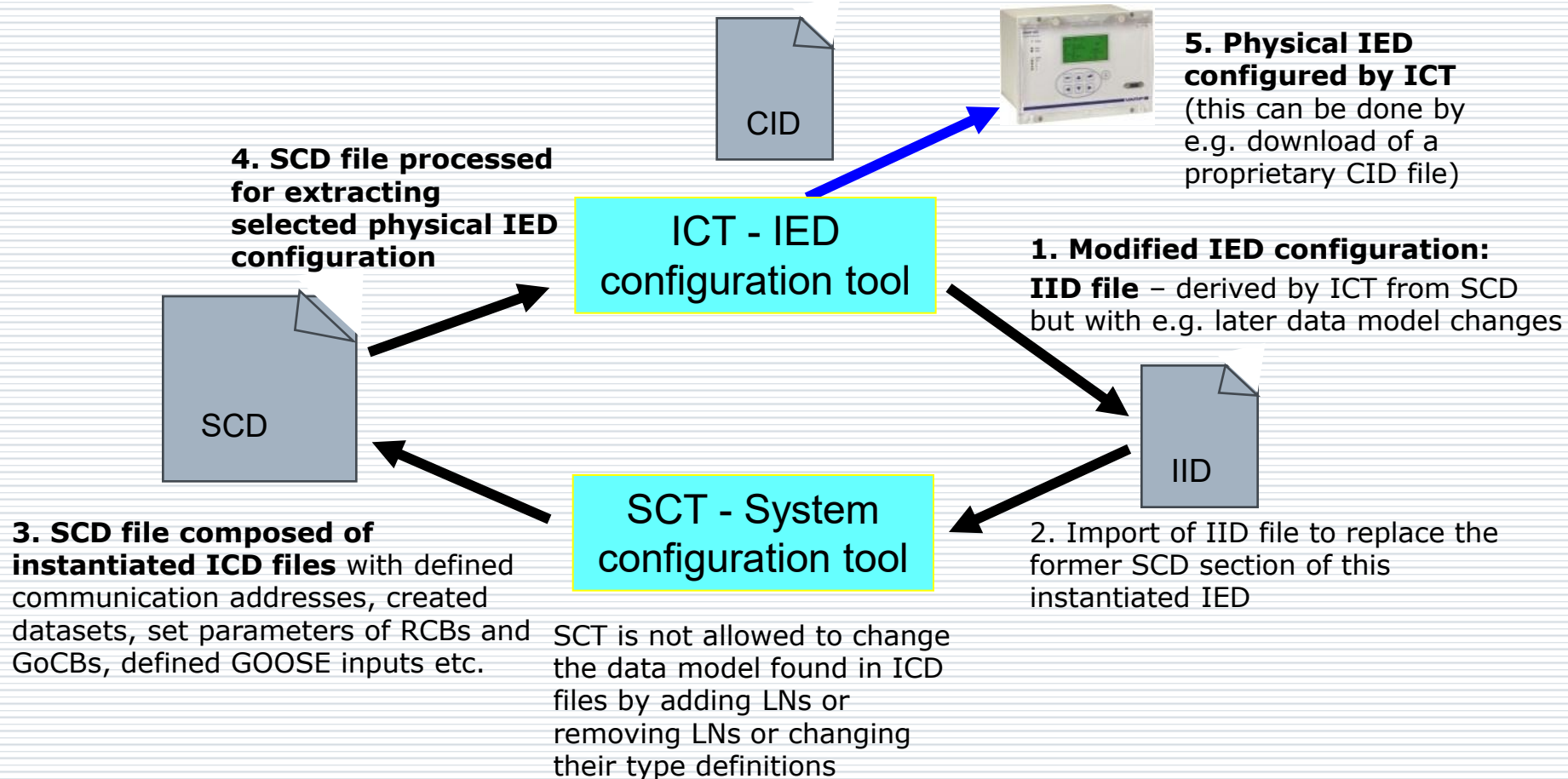
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- **S**ystem **s**pecification: defining Single Line Diagram and functions required on it
  - **SSD** document
- IED specification: what **I**ED **c**apabilities are needed to fulfill the requirements
  - **ICD** document
- **S**ystem **c**onfiguration: how IEDs will interact over the network
  - **SCD** document (filled in with imported and instantiated ICD files)
- IED configuration: **c**onfiguration of **I**EDs to perform in accordance with the system configuration
  - **CID** / **IID** document

# IED configuration in accordance with system requirements



# Next iteration of IED configuration (specified in Ed.2)



# SCD file importance

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- **System Configuration Description** file created by SCT is the most essential document of the IEC 61850 based installation. It is the only document providing:
  - Descriptions of all components (IEDs).
  - Descriptions of all interactions between components (reporting to clients, GOOSE data flow, SV data flow).
  - All communication addresses assigned to components.
  - System visualization (network, GOOSE & SV data flow, also a single line diagram if a substation section from an SSD file is included).
  - History of system configuration changes.
- SCD maintenance is mandatory for consistency of any future changes and extensions to the deployed system installation.
- The set of component descriptions (ICD/CID/IID files) can not replace the SCD file. Individually created (by different vendor specific ICTs) component descriptions will not provide a complete system-level view and will not assure consistency of later system changes and extensions.
- Investors shall demand SCD files among deliverables.

# 61850 SCD Builder

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- ❑ **System Configuration Tool** allowing to create SCD files (System Configuration Description) from ICD files (IED Capability Description) of components using the bottom-up approach of system engineering in accordance with the IEC 61850-6 standard.
- ❑ 61850 SCD Builder tool supports the SCD creation process in accordance with **Edition 1, Edition 2 and Amendment 1 to Edition 2 (Ed. 2.1)** of the IEC 61850 standard.
- ❑ The produced SCD file is fully conformant with SCL scheme of the chosen standard edition.
- ❑ 61850 SCD Builder is IED vendor independent. The IEC 61850 standard is the reference and the common denominator for interoperability.

# Applicability of the tool

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- 61850 SCD Builder is suitable for:
  - Building SCD files required for the complete system configuration and documentation in the system engineering process defined by the IEC 61850 standard.
  - Creating preliminary versions of SCD files that can be used for the simulation of the target installation using such toolsets like INFO TECH 61850 SCL Runner.
  - Modifying SCD files in accordance with the required changes in the installed system.
  - Learning the IEC 61850 engineering process.
- Truly easy to learn and apply ...
- **Context help function** invokable with **F1** key.

# Installation procedure

Supported platforms:

PC running

**MS Windows**

**10 or 11.**

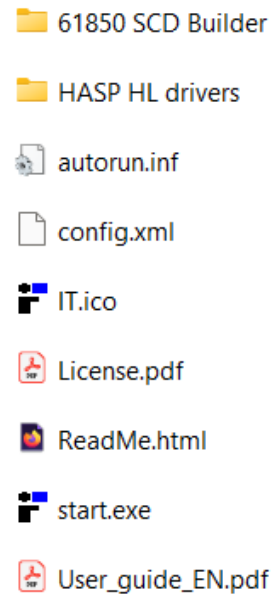


# To install the software

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The package for download is prepared as a zip file containing a CD image.

Invoke the program **start.exe** from the main installation package directory.



# License

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- **Before installing the software please learn and accept the licensing terms described in the paper note attached or in the file `License.pdf`**
- Please acknowledge the following notice concerning the USB license key:
  - The supplied license key represents the value you have purchased. Please take care of it and protect it from losing or damaging like any other object of value. Please understand that we cannot replace lost, corrupted or physically damaged keys.

# Third party components

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- **HASP HL drivers** – to manage the USB license key

# 61850 SCD Builder – let's start!



# Initial view after the start-up of 61850 SCD Builder tool

Program icons:

Project: New, Open, Save.

Add to system: IED based on ICD, Client IED based on name and IP address, Time Server.

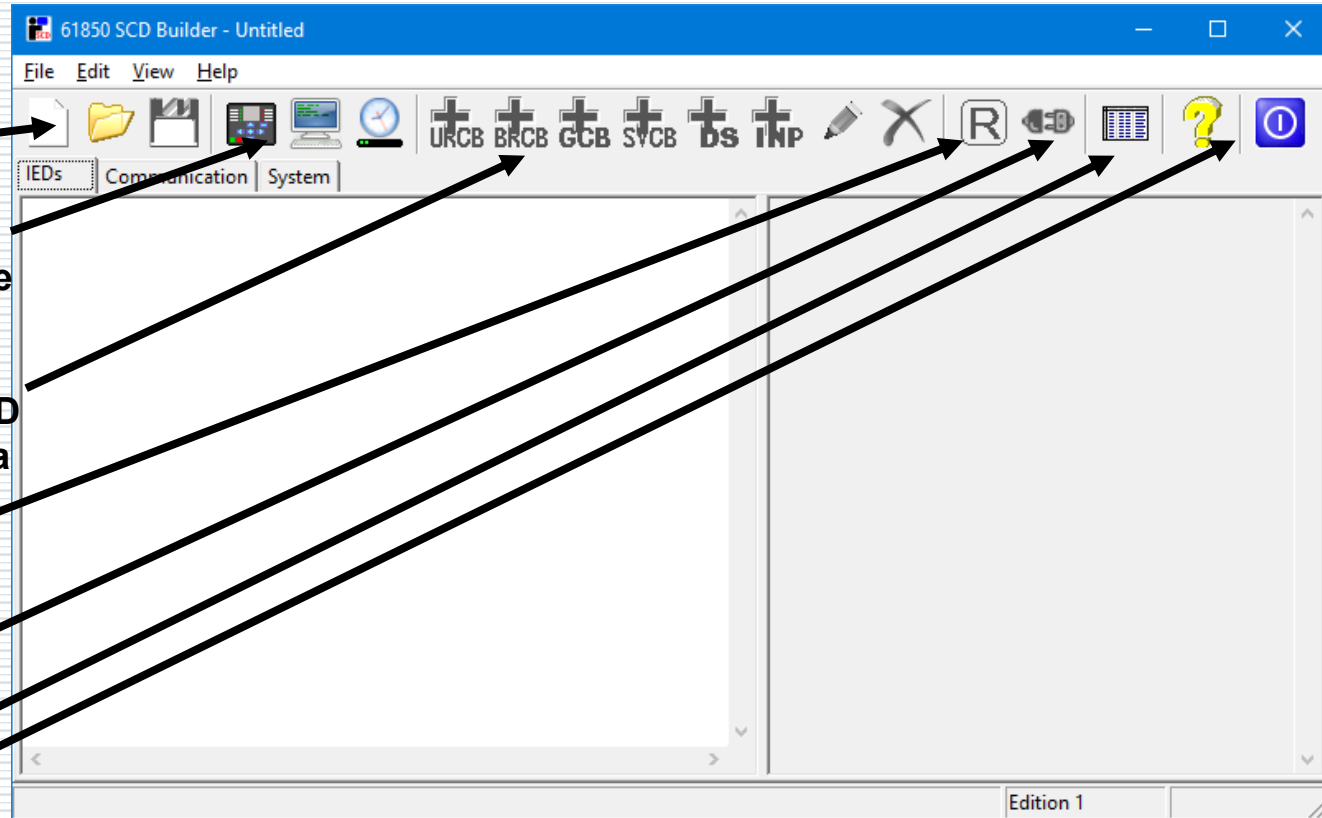
Operations on the created SCD file (adding and removing data model elements).

RCB reservation

GOOSE or SV binding

XML level editor/checker

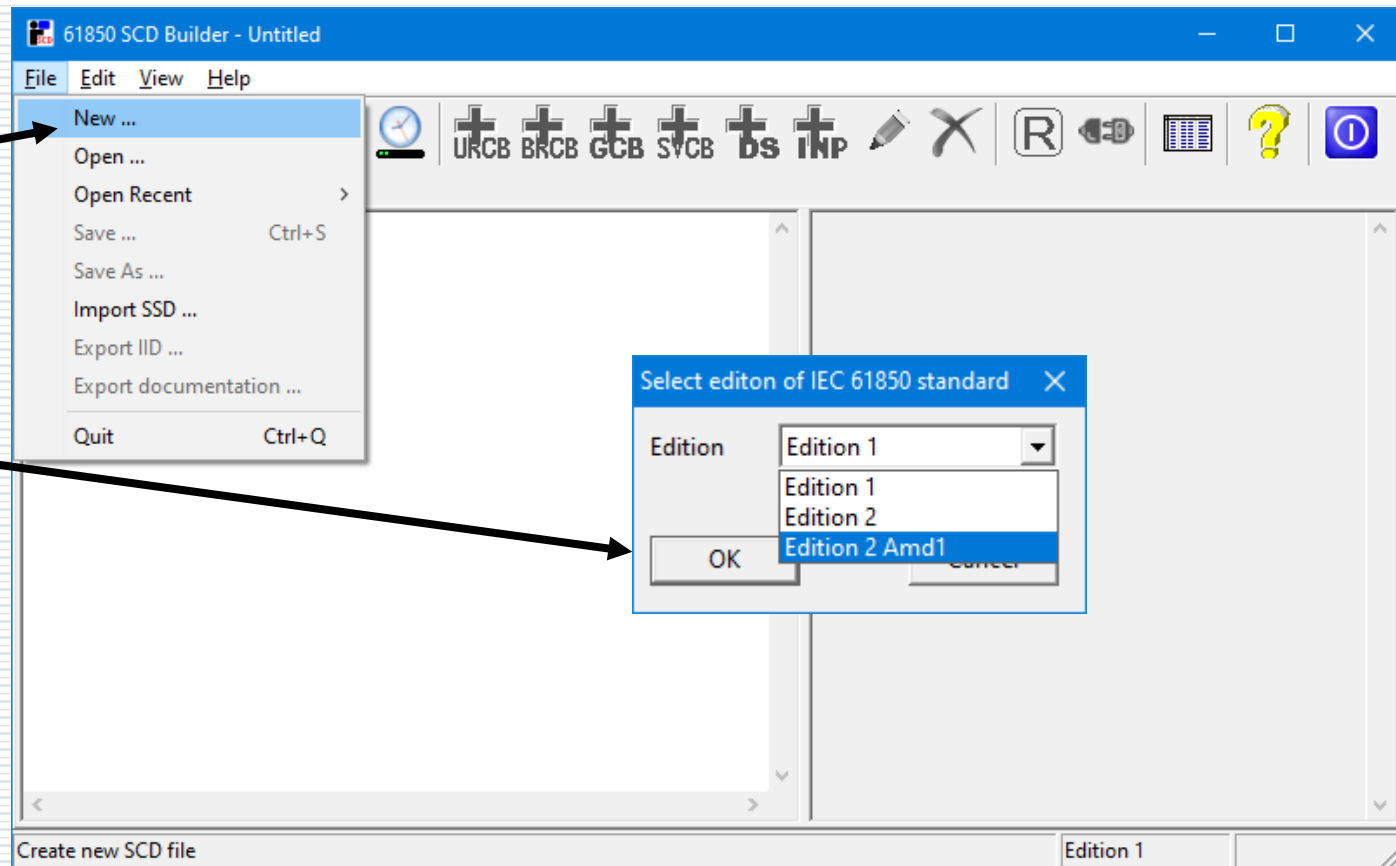
Help and Exit



# New system project

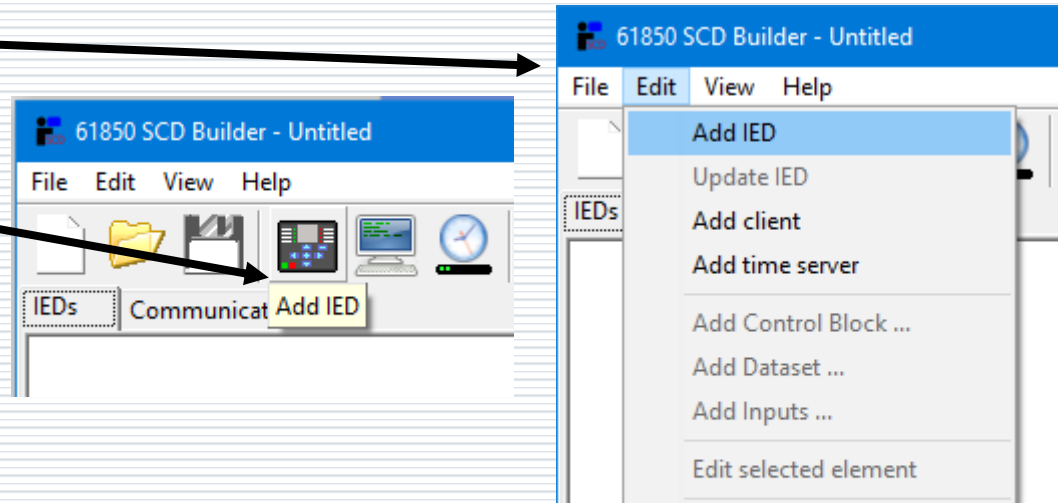
Project: New

Selection of the standard edition to be applied (the created SCD file and the input ICD files shall be of the same edition).

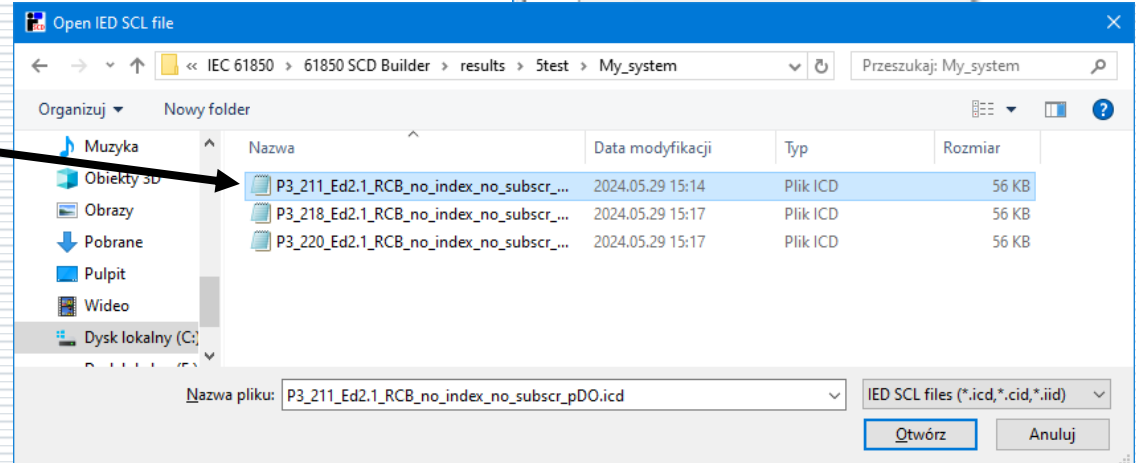


# Adding IEDs based on ICD files

Use Edit menu item  
or  
Icon.



Then  
select an appropriate ICD file  
to be instantiated.



# IED instantiated from an ICD file

For the instantiated ICD file (new IED of the system) set its unique IED name, unique IP address and assign to Subnetwork.

IED name: P3U\_211  
Access Point: S1  
Subnetwork: S1  
IP address: 192 . 168 . 0 . 211  
IP mask: 255 . 255 . 252 . 0

An instantiated IED will appear in the IEDs view of the system under construction. Its data model can be expanded and later also configured.

61850 SCD Builder - Untitled

File Edit View Help

IEDs | Communication | System

P3U\_211

- LD Relay
  - LN LLN0
  - LN DI01GGIO45
  - LN fMMXU8
  - LN I3pMMXU1
  - LN Obj1CSWI1
  - LN Obj7CSWI7
  - LN Obj8CSWI8
  - LN OC1PTOC1
  - LN OC2PTOC2
  - LN U3pMMXU4
  - LN VampLPHD1
  - LN DrRDRE1
  - LN ALLPTRC1

IED: P3U\_211  
Edition 2 Amd.1  
Type: P3U30  
Manufacturer: Schneider Electric  
Description: Subnetwork: S1  
Access point: S1  
IP: 192.168.0.211  
Mask: 255.255.252.0

# After adding further IEDs

IEDs view

The screenshot displays the 61850 SCD Builder software interface. The top window shows the 'IEDs' view, which is a tree structure of IEDs. The bottom window shows the 'Communication view', which is a network diagram. An arrow points from the 'Communication view' label to the network diagram.

**IEDs view (Left Panel):**

- P3U\_211
  - LD Relay
- P3U\_218
  - LD Relay
- P3U\_220
  - LD Relay
  - LN LLN0
  - LN DI01GGIO45
  - LN fMMXU8
  - LN I3pMMXU1
  - LN Obj1CSWI1
  - LN Obj7CSWI7
  - LN Obj8CSWI8
  - LN OC1PTOC1
  - LN OC2PTOC2
  - LN U3pMMXU4
  - LN VampLPHD1
  - LN DrRDRE1
  - LN ALLPTRC1

**Communication view (Right Panel):**

Network view | GOOSE & SV view

S1

P3U\_211  
AP: S1  
IP: 192.168.0.211

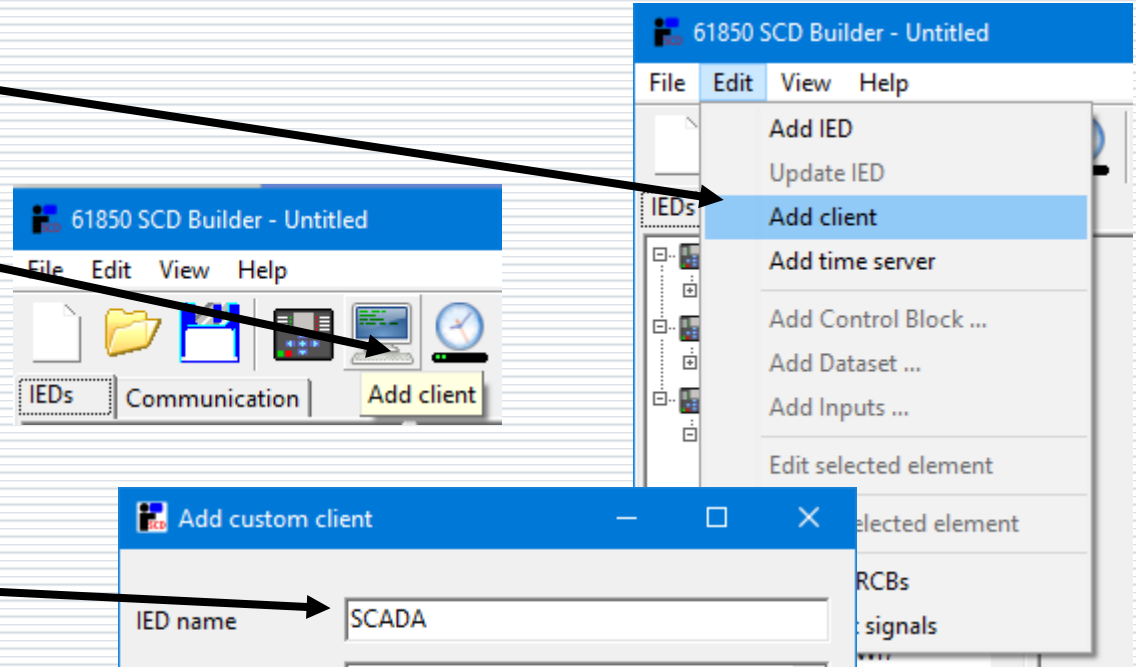
P3U\_220  
AP: S1  
IP: 192.168.0.220

AP: S1  
IP: 192.168.0.218  
P3U\_218

Communication view

# Adding client devices without ICD (default description)

Use Edit menu item or Icon.



For the added client IED set its unique IED name, unique IP address and assign to Subnetwork

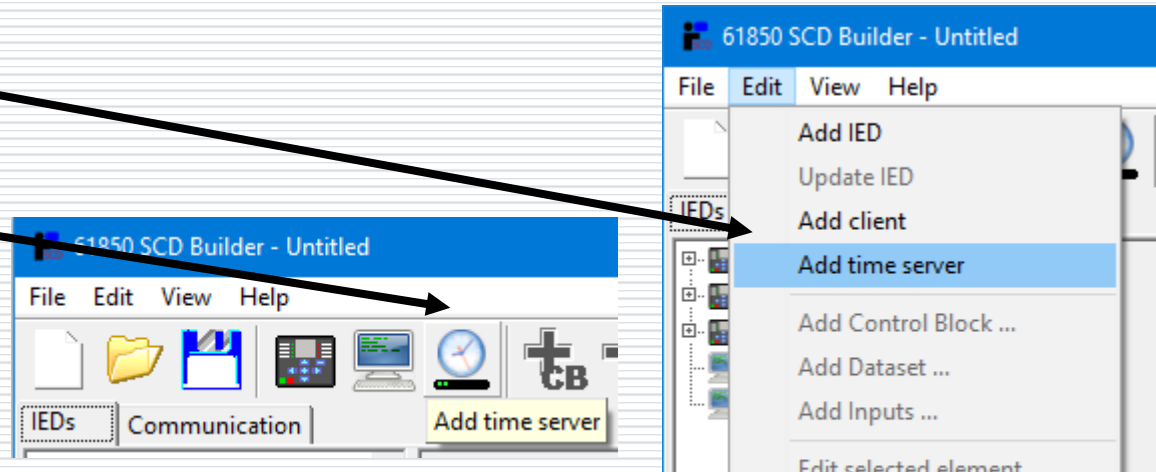
The 'Add custom client' dialog box contains the following fields and values:

Field	Value
IED name	SCADA
Access Point	P1
Subnetwork	S1
IP address	192 . 168 . 0 . 180
IP mask	255 . 255 . 255 . 0

Buttons: OK, Cancel

# Adding time server without ICD (default description)

Use Edit menu item  
or  
Icon.



For the added time server IED  
set its unique IED name,  
unique IP address  
and assign to Subnetwork

The 'Add custom time server' dialog box is shown with the following fields and values:

Field	Value
IED name	Timeserver1
Access Point	P1
Subnetwork	S1
IP address	192 . 168 . 0 . 190
IP mask	255 . 255 . 255 . 0

Buttons: OK, Cancel

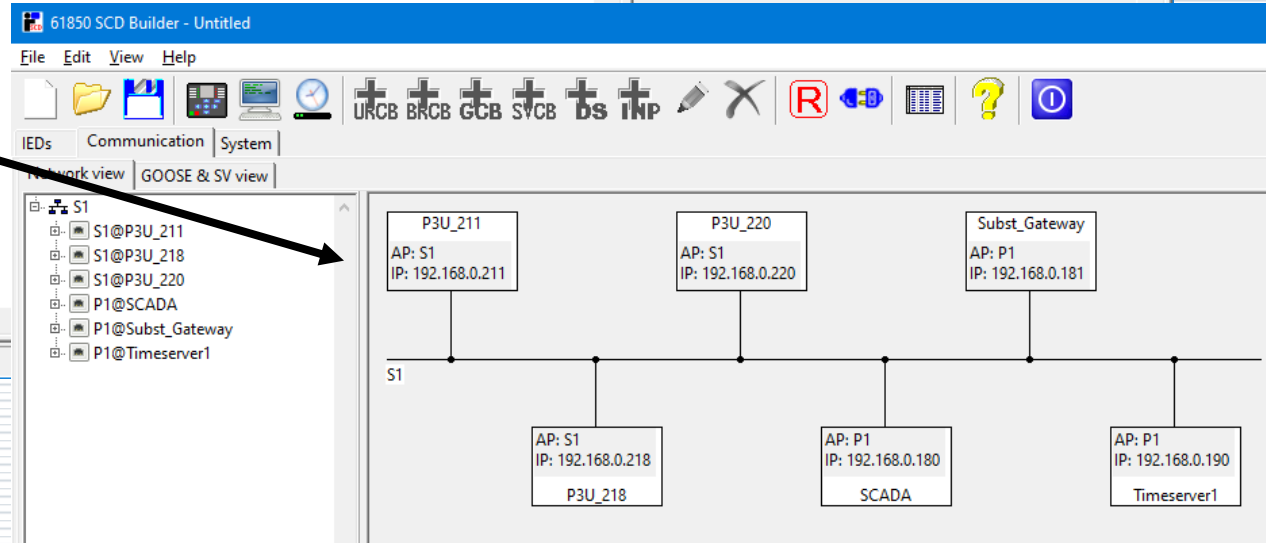
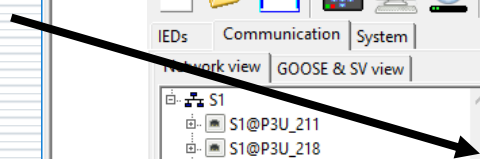
# IEDs view.

## Communication view: Network.

IEDs view



Communication view:  
Network



(if you follow so far,  
now save the project  
in an SCD file)

# Support of functional naming: LD

If the content of Services section allows (ConfLdName present), then the LD name can be changed in accordance with the system requirements.

The screenshot illustrates the process of changing the Logical Device (LD) name in the 61850 SCD Builder software. The main window shows a project tree with the following structure:

- P3U\_211
  - LD Relay
  - LN LLN0
  - LN DI01GGIO45
  - LN fMMXU8
- P3U\_218
- P3U\_220
- SCADA
- Subst\_Gateway
- Timeserver1

A context menu is open over the 'LD Relay' element, with 'Edit selected element' selected. This action opens the 'Set LD name (functional naming)' dialog box, where the 'LD name' field is set to 'Bay12'. The 'OK' button is pressed, and the software updates the project tree and the Properties window. The updated project tree shows:

- P3U\_211
  - LD Bay12
  - LN LLN0
  - LN DI01GGIO45
  - LN fMMXU8

The Properties window for the selected 'LD Bay12' shows the following details:

- Logical device: Relay
- LD Name: Bay12
- Type: IEC 61850-7-4:2007B
- Logical Device for Substations and Feeder Equipment

# Support of functional naming: LN

If the content of Services section allows (ConfLNs fixPrefix="false" fixLnInst="false"), then the prefix and instance number of logical nodes can be changed in accordance with system requirements.

The screenshot displays the 61850 SCD Builder interface. The main window shows a tree view of the project structure under 'P3U\_211'. A context menu is open over the 'LN OC1PTOC1' element, with 'Edit selected element' selected. An 'Edit LN name' dialog box is open, showing the 'Prefix' field set to 'St1', 'LN class' set to 'PTOC', and 'Instance' set to '1'. The 'LN name' field is populated with 'St1PTOC1'. A second screenshot on the right shows the same tree view after the edit, with 'LN St1PTOC1' highlighted. Arrows indicate the flow from the context menu to the dialog box and then to the updated tree view.

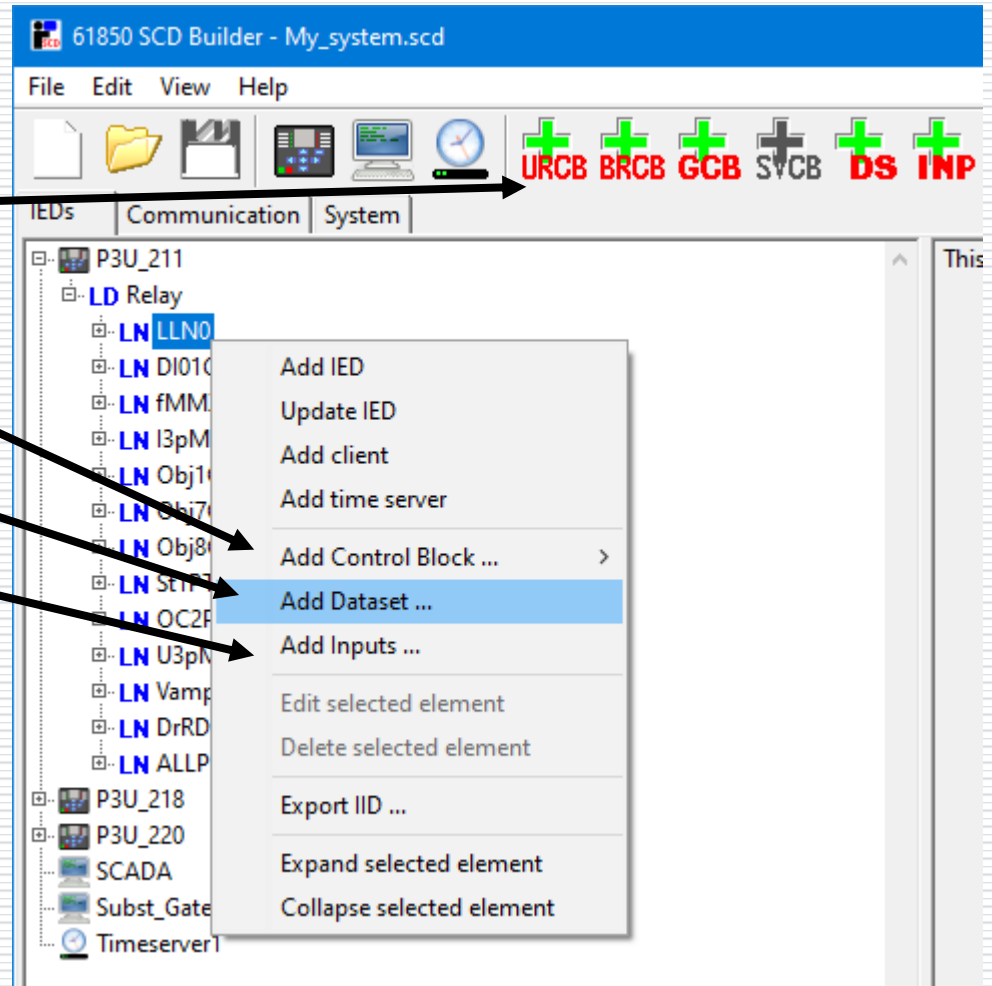
# Adding elements to IED data model

Depending on the content of Services section of the imported ICD file it may be possible to use the LN context menu commands or icons for:

Adding a new control block

Adding a new data set

Add a new input  
(ExtRef in the Inputs section)



# Adding a new buffered report control block

Example:

Adding a new Buffered RCB with name BRCB\_Alm, 2 instances

The screenshot shows the 'Control Block Editor' dialog box with the following configuration:

- Control block type: Buffered Report CB
- Name: BRCB\_Alm
- DataSet: DS1
- Report ID: (empty)
- Buffering time: 1000
- Integrity period: 0
- Config revision: 1
- Instances: 2

**Option fields:**

- Sequence number
- Time stamp
- DataSet reference
- Reason code
- Data reference
- Entry ID
- Configuration revision
- Buffer overflow

**Triggering options:**

- Data change
- Quality change
- Data update
- Integrity scan
- General interrogation

Buttons: OK, Cancel

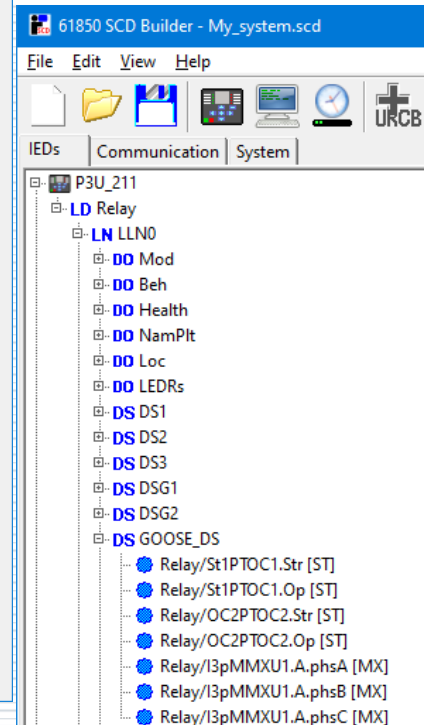
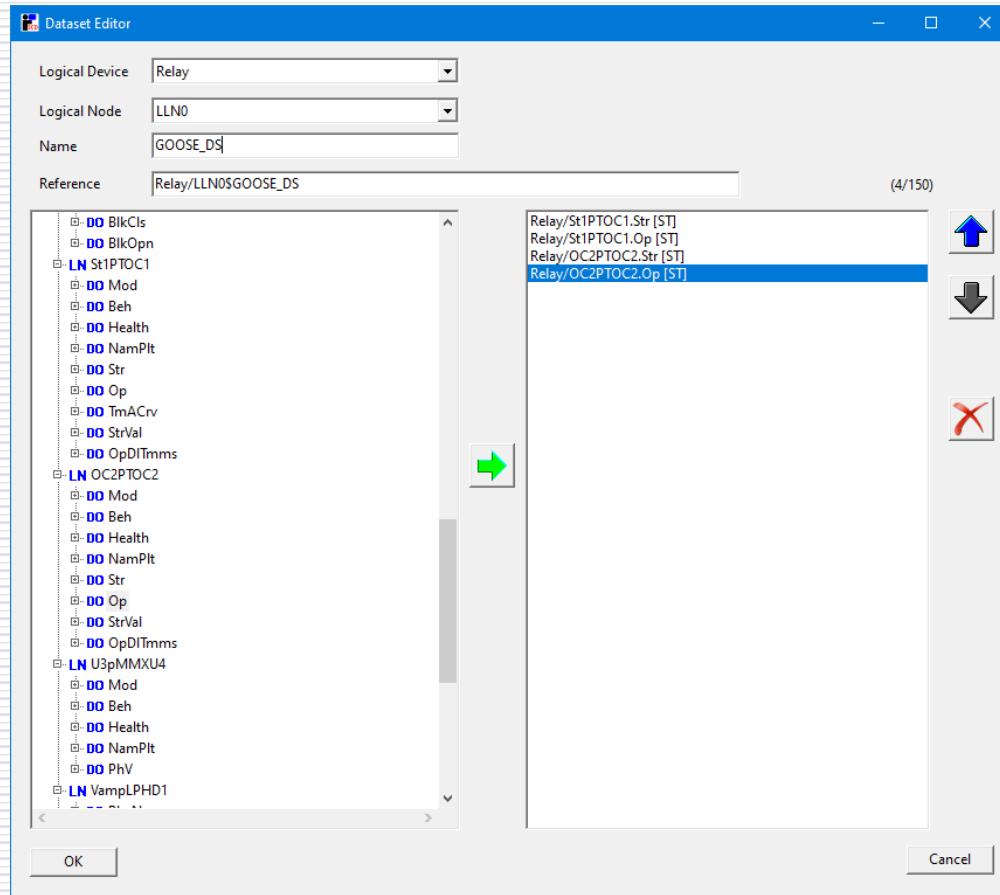
# Adding a new data set

**Example:**

**New data set  
Name GOOSE\_DS**

**Data set elements can  
be selected from the  
data model tree.  
Elements order can be  
changed.  
Data set elements can  
be also deleted.**

**Note: Take care on  
allowed FC (ST and MX)  
when the created data  
set shall be used by  
GoCB.**



# Adding a new input (ExtRef)

Example:

Added ExtRef

intAddr set to NI7

and

expected source data determined by the CDC of DO Op from LN PTOC (expected source data defined by pDO attribute is mandatory in Ed. 2.1).

The screenshot shows the 'Inputs editor' window with the following configuration:

- Internal address: NI7
- Data source definition:
  - IED name: (empty)
  - LD instance: (empty)
  - Logical Node:
    - Prefix: (empty)
    - Class: (dropdown)
    - Instance: 1
  - DO name: (dropdown)
  - DA name: (dropdown)
- Description: (empty)
- Transmission source definition:
  - Service type: (dropdown)
  - LD instance: (empty)
  - Logical Node:
    - Prefix: (empty)
    - Class: (dropdown)
    - Instance: 1
  - CB name: (empty)
- Predefined source type definition:
  - Service type: GOOSE
  - Class: PTOC (with an 'Add' checkbox)
  - DO name: Op
  - DA name: (dropdown)

On the right side, a list of internal addresses is shown: [NI1], [NI2], [NI3], [NI4], [NI5], [NI6], and [NI7]. The [NI7] entry is highlighted in blue.

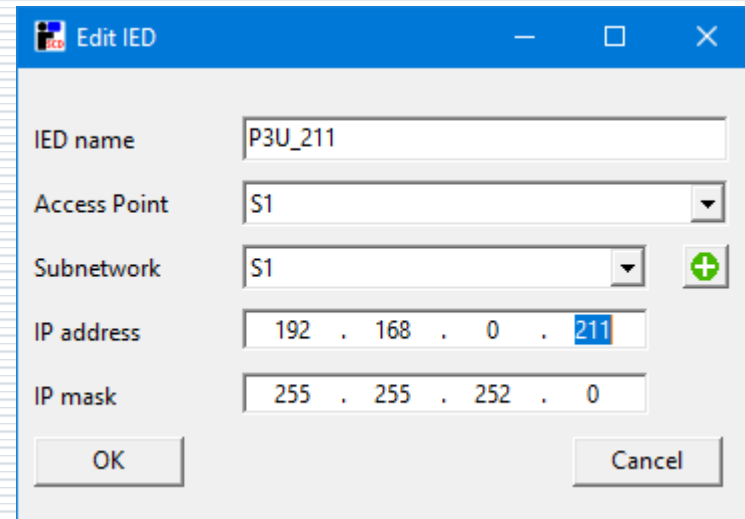
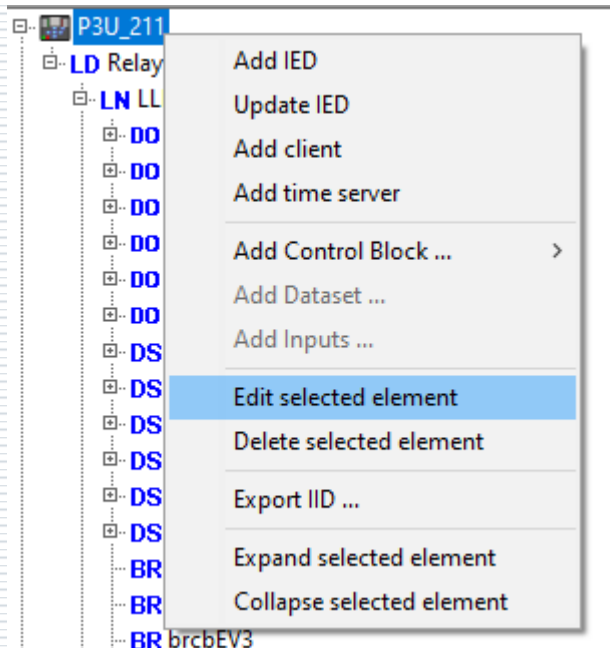
# Changes of configuration

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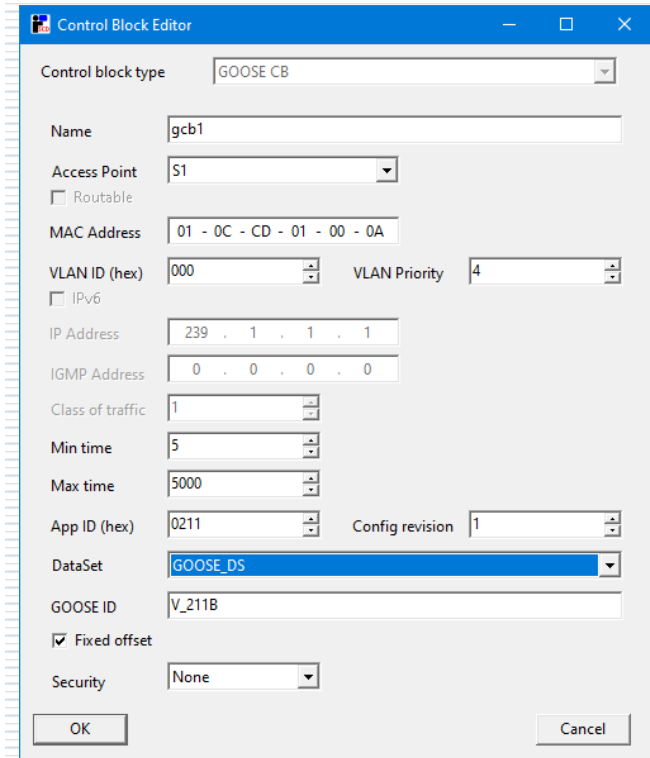
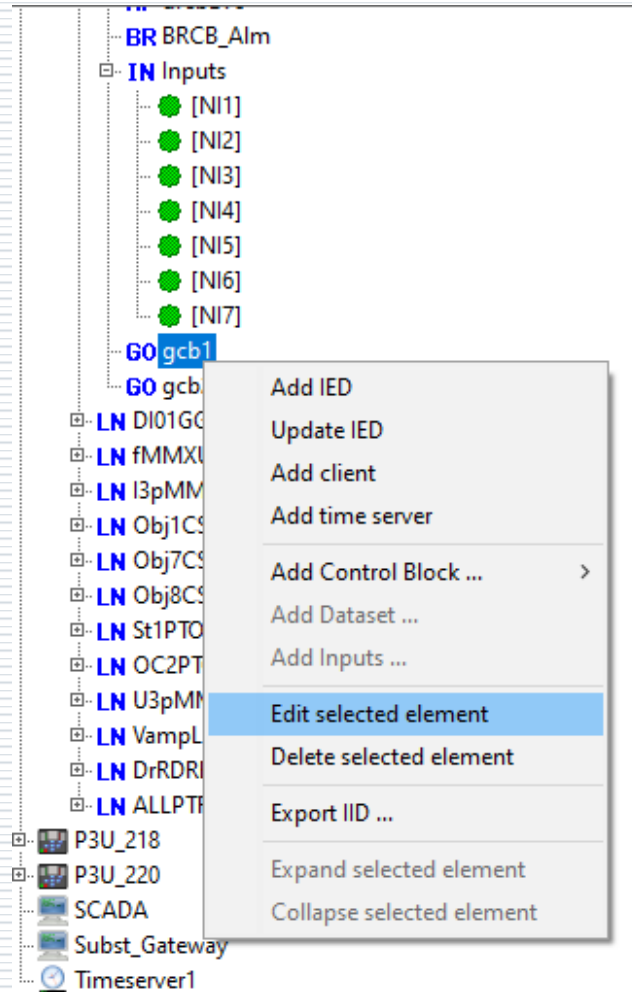
**IED communication addresses can be configured using Edit command of the IED context menu.**

**Depending on the content of Services section of the imported ICD, such elements like control blocks, data sets, inputs can be also edited or deleted.**

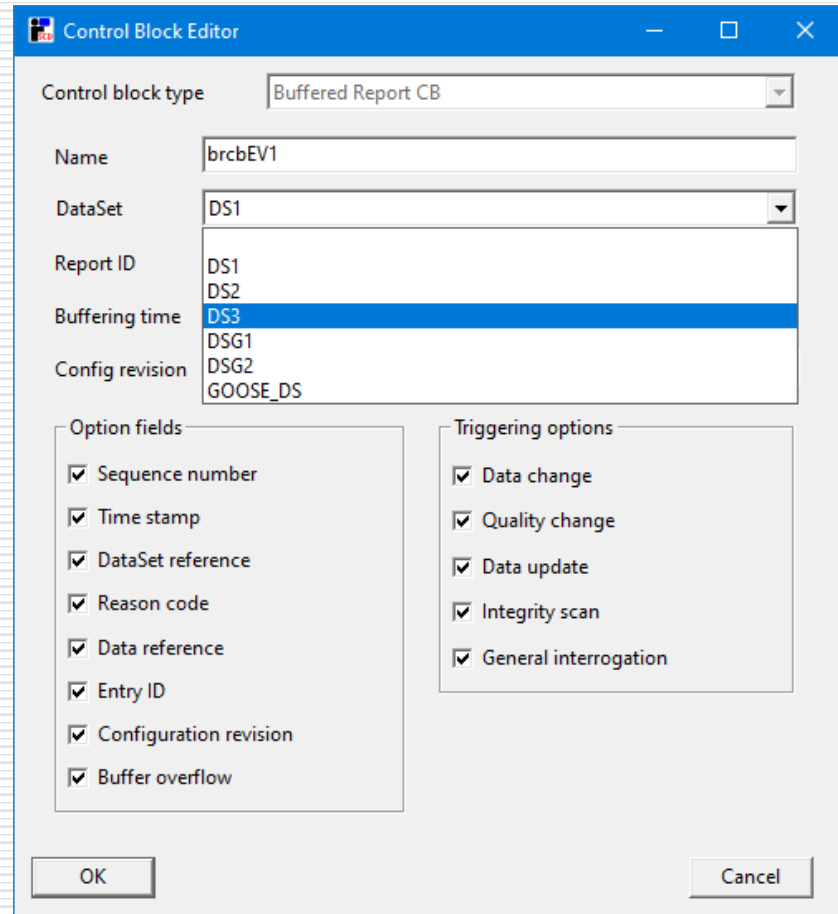
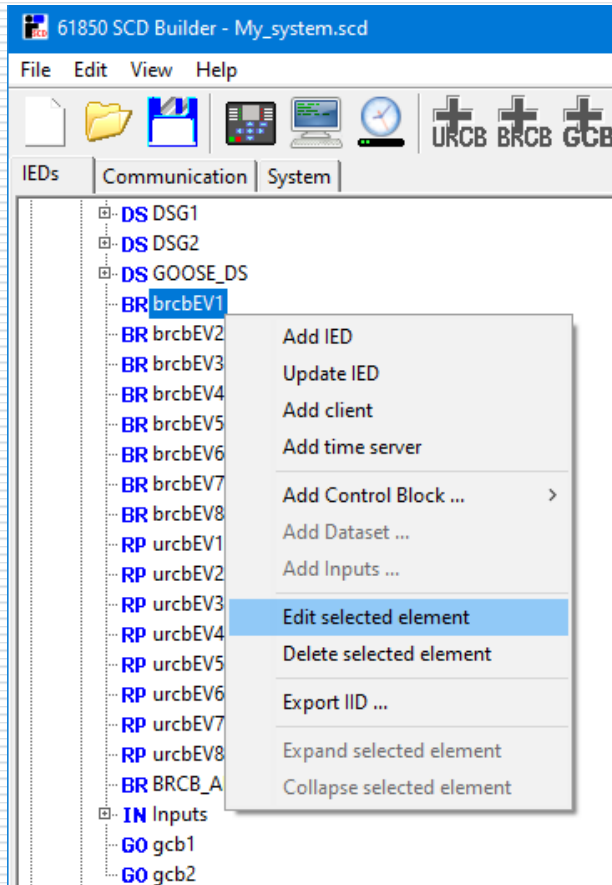
# Configuration of communication addresses of IEDs



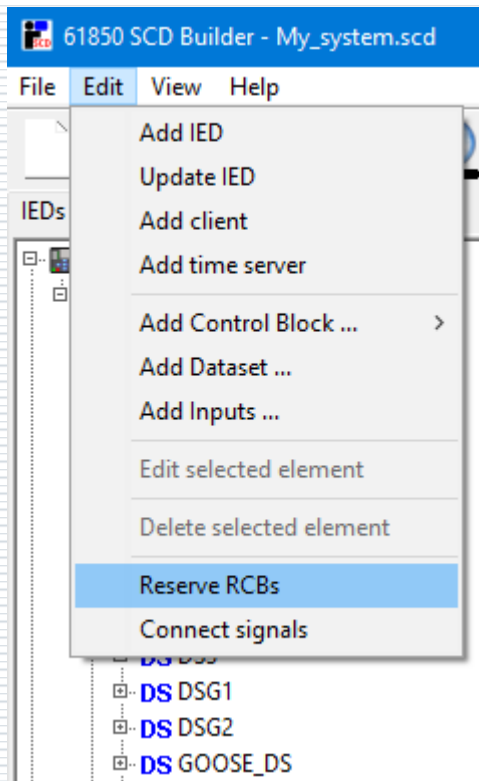
# Configuration of GOOSE Control Blocks



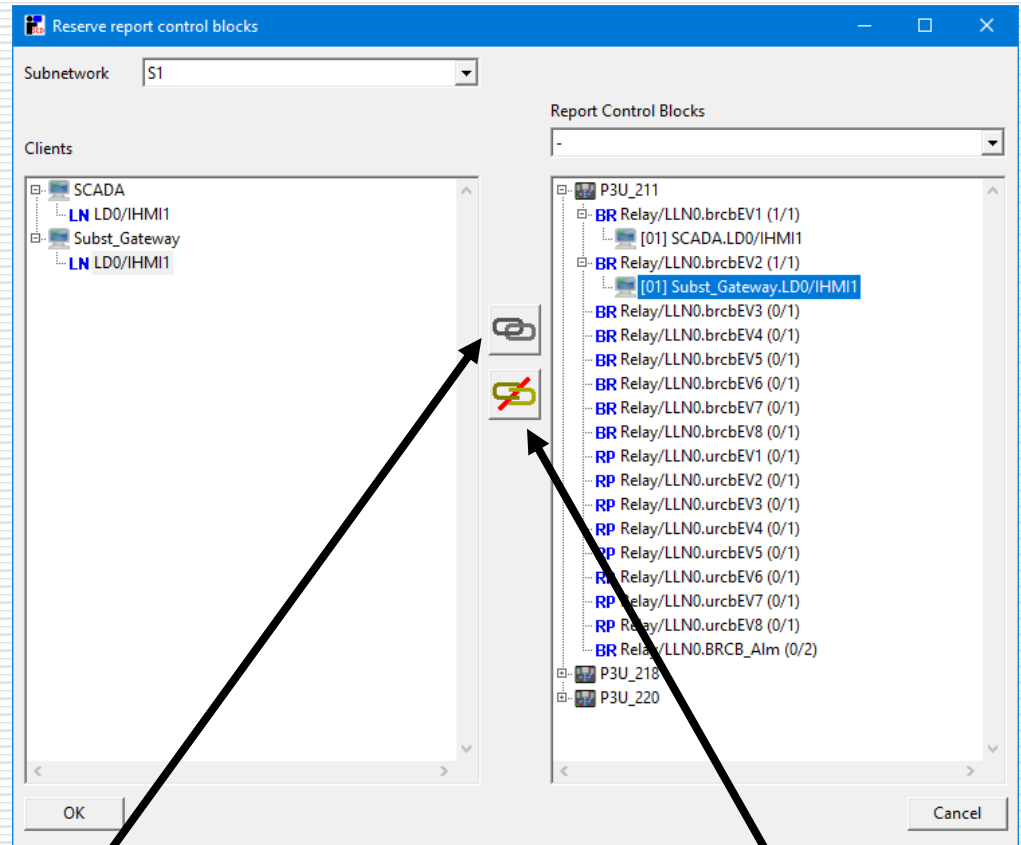
# Configuration of Report Control Blocks



# Reservation of instantiated RCBs for clients



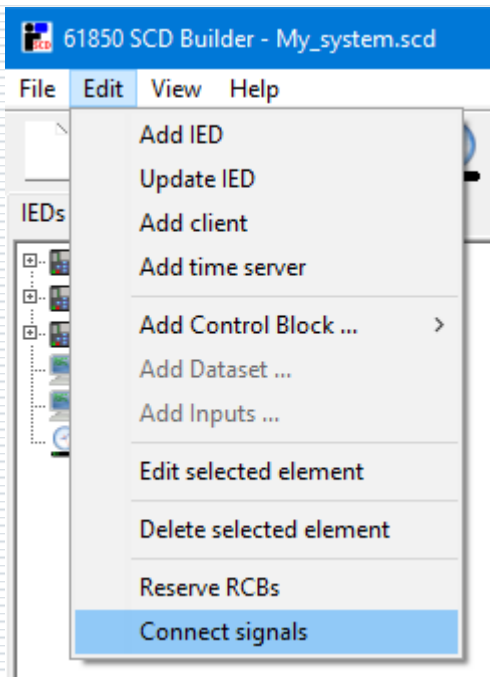
command or icon



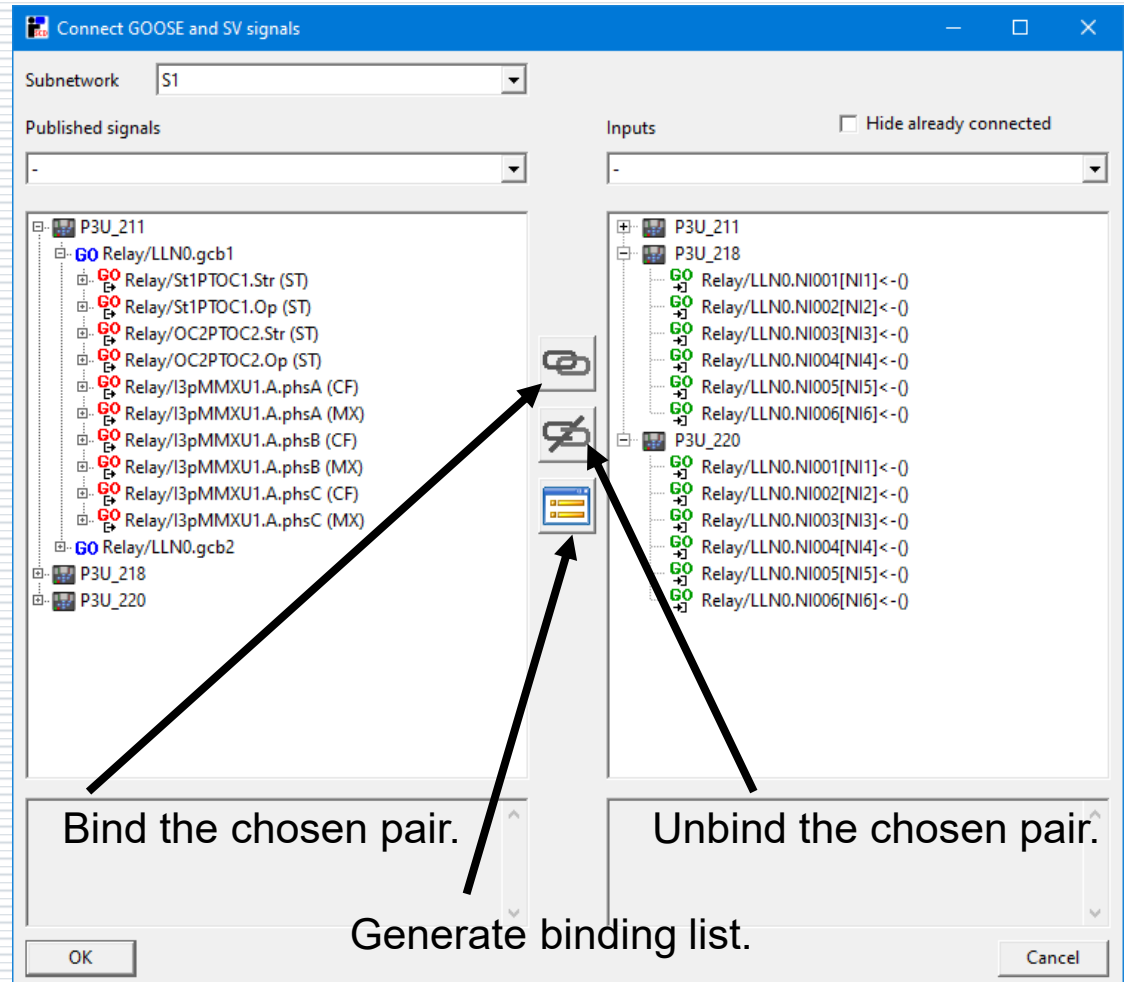
Bind the LN of the client IED with the RCB instance of the server IED.

This binding can also be cancelled.

# GOOSE binding



command or icon



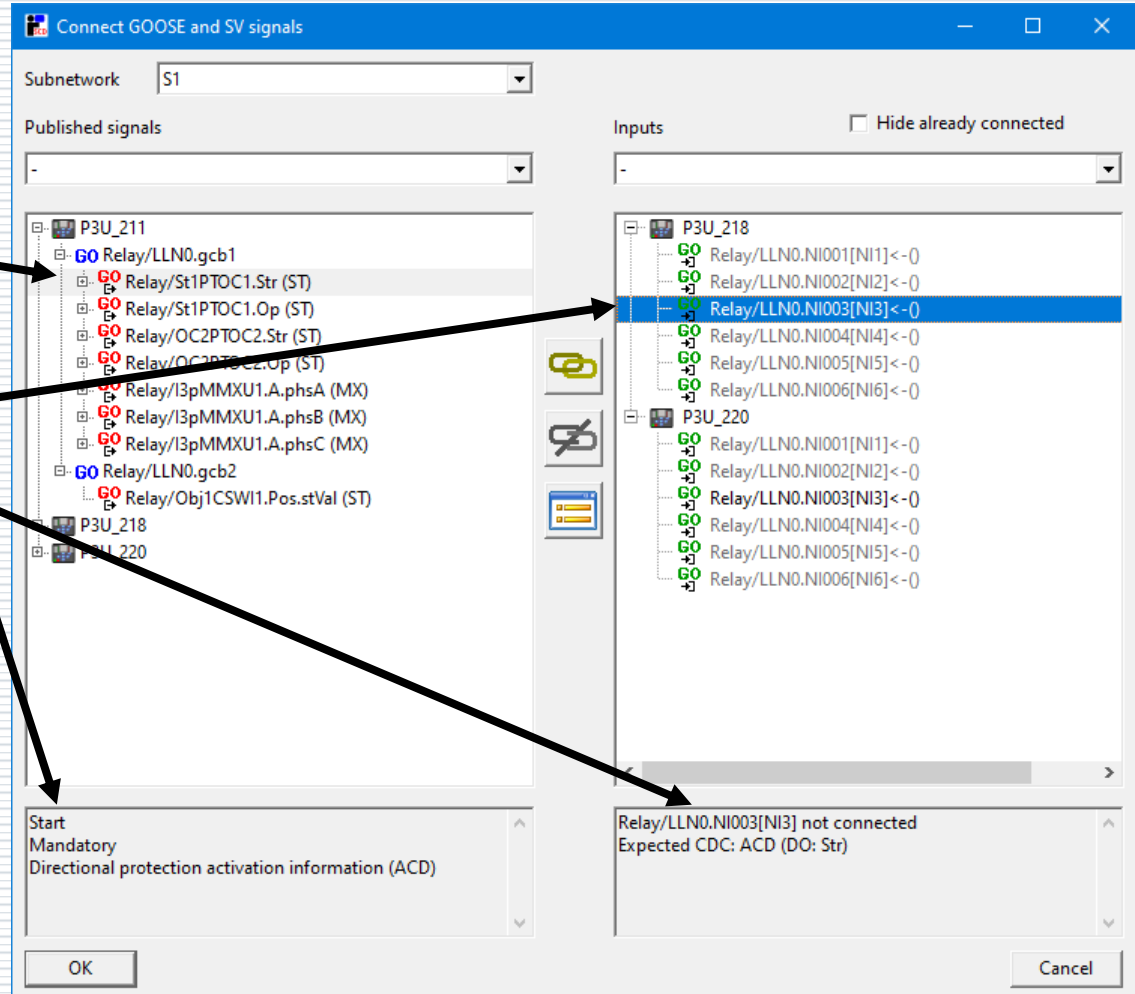
Bind the chosen pair.

Unbind the chosen pair.

Generate binding list.

# Expected source DO in GOOSE binding (Ed. 2.1)

The program presents and checks the match between the published data type and the expected data type on the chosen input (pDO attribute of ExtRef). The matching inputs for the selected published data are highlighted.



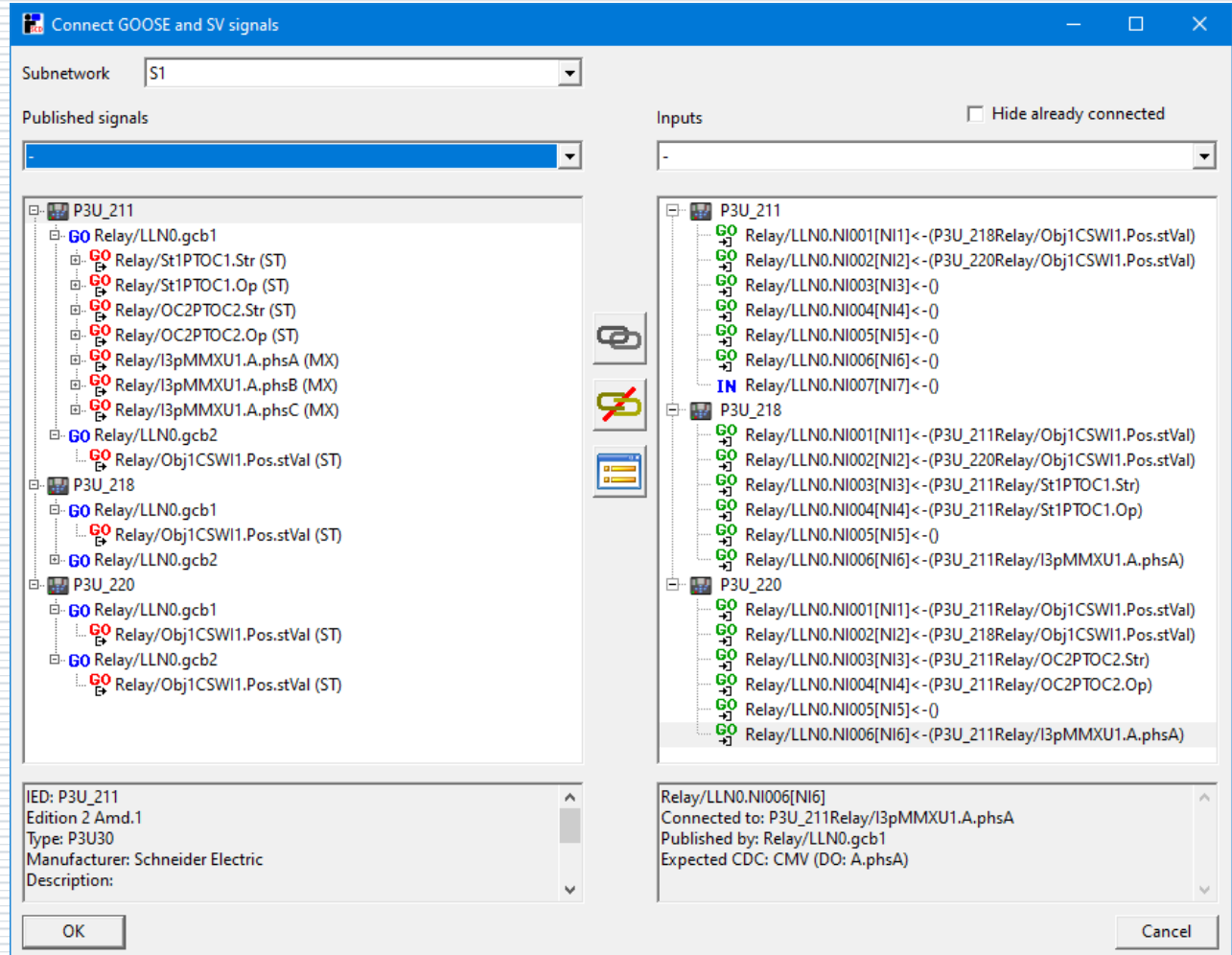
# Expected source DO in GOOSE binding (Ed. 2.1)

A warning is issued in case of unmatching published data type and the expected data type on the chosen input, but the binding can still be enforced by the user.

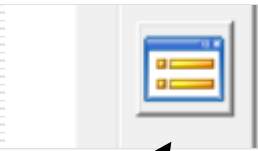
The screenshot shows the 'Connect GOOSE and SV signals' dialog box. The 'Subnetwork' is set to 'S1'. The 'Published signals' list includes 'Relay/St1PTOC1.Str (ST)'. The 'Inputs' list includes 'Relay/LLN0.NI004[NI4]<-0'. A warning dialog box is displayed in the foreground, stating: 'Warning: Source signal common data class differ from expected! Source signal: Relay/St1PTOC1.Str has cdc: ACD Expected cdc: ACT Connect signals anyway?'. The 'Start' field contains 'Mandatory Directional protection activation information (ACD)'. The 'Relay/LLN0.NI004[NI4] not connected Expected CDC: ACT (DO: Op)' is shown in the bottom right. The 'OK' and 'Cancel' buttons are visible at the bottom.

# Binding creation

Data from publishing IEDs assigned to inputs of subscribing IEDs.



# GOOSE binding list generation



Press the button „Show connections list”.

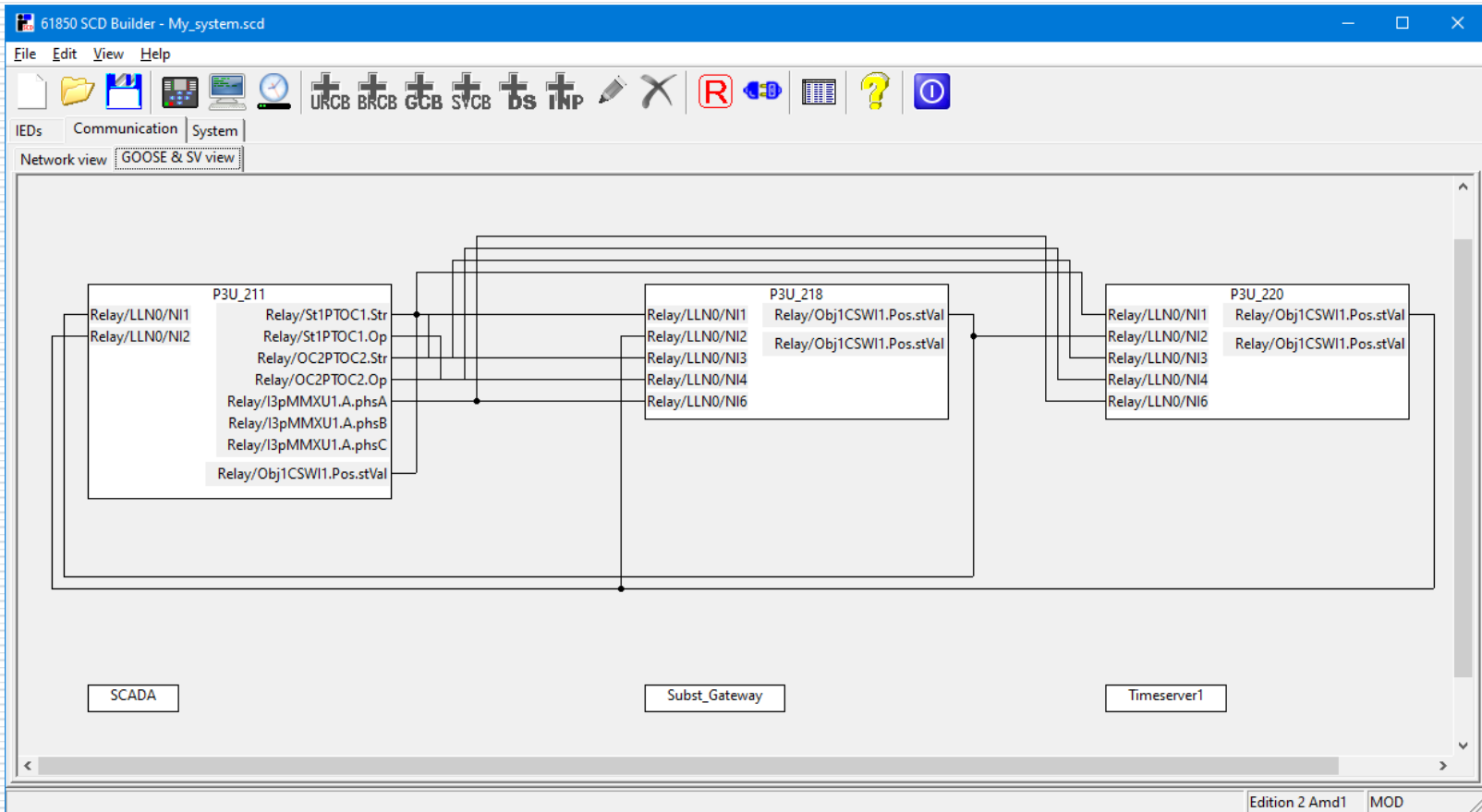
The list can be exported to a plain text document.

The dialog box 'List of GOOSE connections' contains the following data in its table:

Source	Destination
P3U_218Relay/Obj1CSWI1.Pos.stVal	P3U_211Relay/LLNO.NI000[NI1]
P3U_220Relay/Obj1CSWI1.Pos.stVal	P3U_211Relay/LLNO.NI001[NI2]
P3U_211Relay/Obj1CSWI1.Pos.stVal	P3U_218Relay/LLNO.NI000[NI1]
P3U_220Relay/Obj1CSWI1.Pos.stVal	P3U_218Relay/LLNO.NI001[NI2]
P3U_211Relay/St1PTOC1.Str	P3U_218Relay/LLNO.NI002[NI3]
P3U_211Relay/St1PTOC1.Op	P3U_218Relay/LLNO.NI003[NI4]
P3U_211Relay/I3pMMXU1.A.phsA	P3U_218Relay/LLNO.NI005[NI6]
P3U_211Relay/Obj1CSWI1.Pos.stVal	P3U_220Relay/LLNO.NI000[NI1]
P3U_218Relay/Obj1CSWI1.Pos.stVal	P3U_220Relay/LLNO.NI001[NI2]
P3U_211Relay/OC2PTOC2.Str	P3U_220Relay/LLNO.NI002[NI3]
P3U_211Relay/OC2PTOC2.Op	P3U_220Relay/LLNO.NI003[NI4]
P3U_211Relay/I3pMMXU1.A.phsA	P3U_220Relay/LLNO.NI005[NI6]

# Communication view: GOOSE & SV binding

Data flow  
in the  
system.



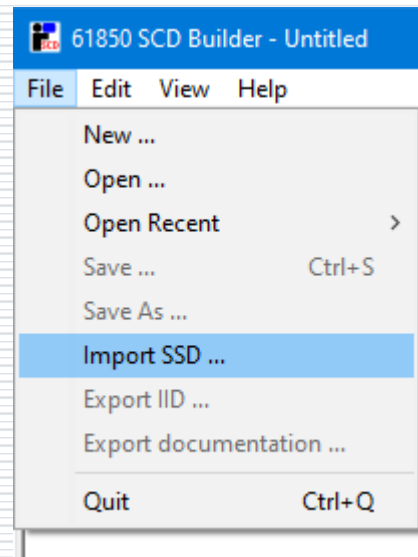
# SV binding

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The binding between published Sampled Values (elements of data sets of MSVCB in Merging Units) and Inputs of the receiving IEDs can be done in the same way as GOOSE binding.

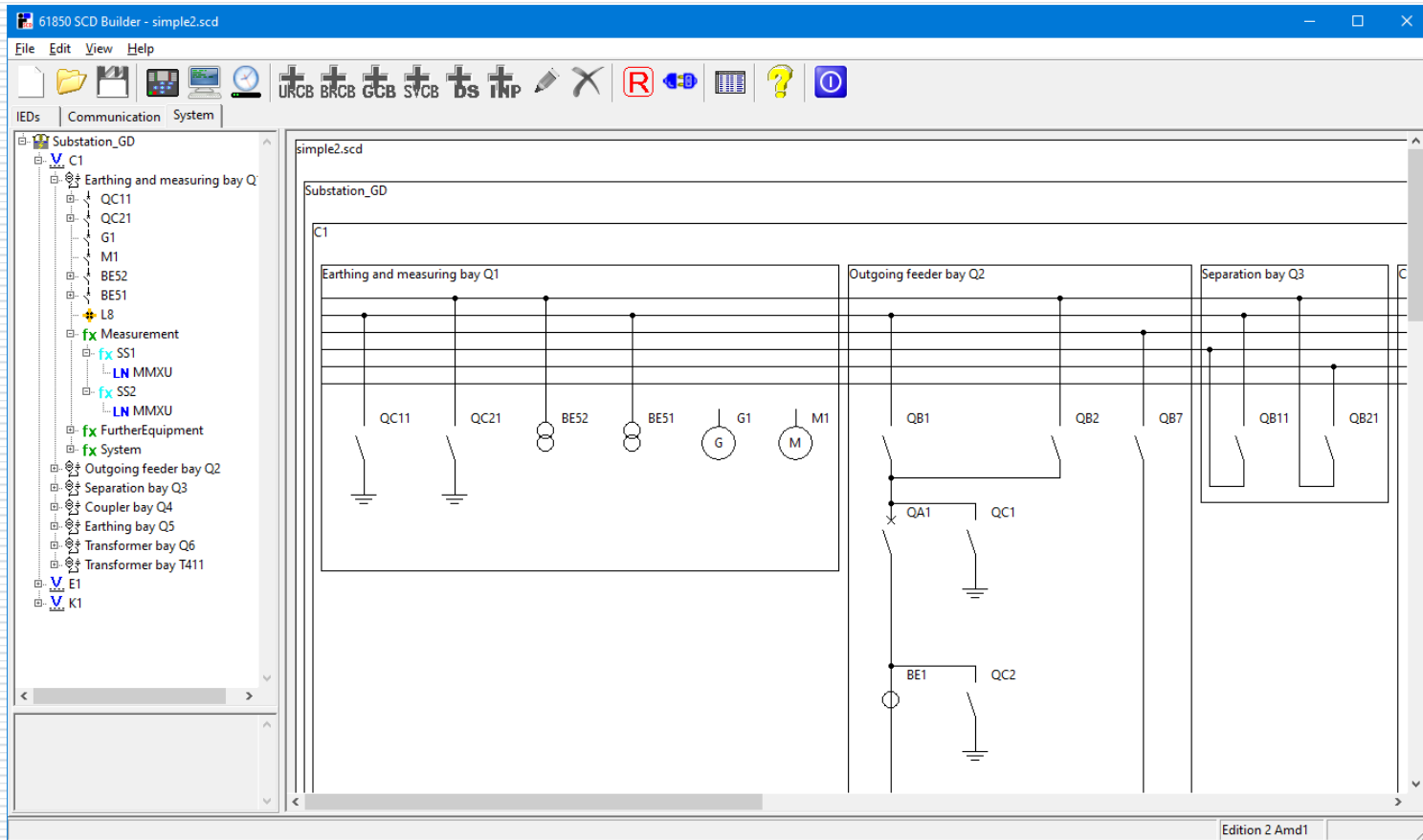
# SSD file import

The system specification document (SSD file) can be imported to 61850 SCD Builder before building the system configuration. The content of SSD file will create a Substation section of the SCD file.

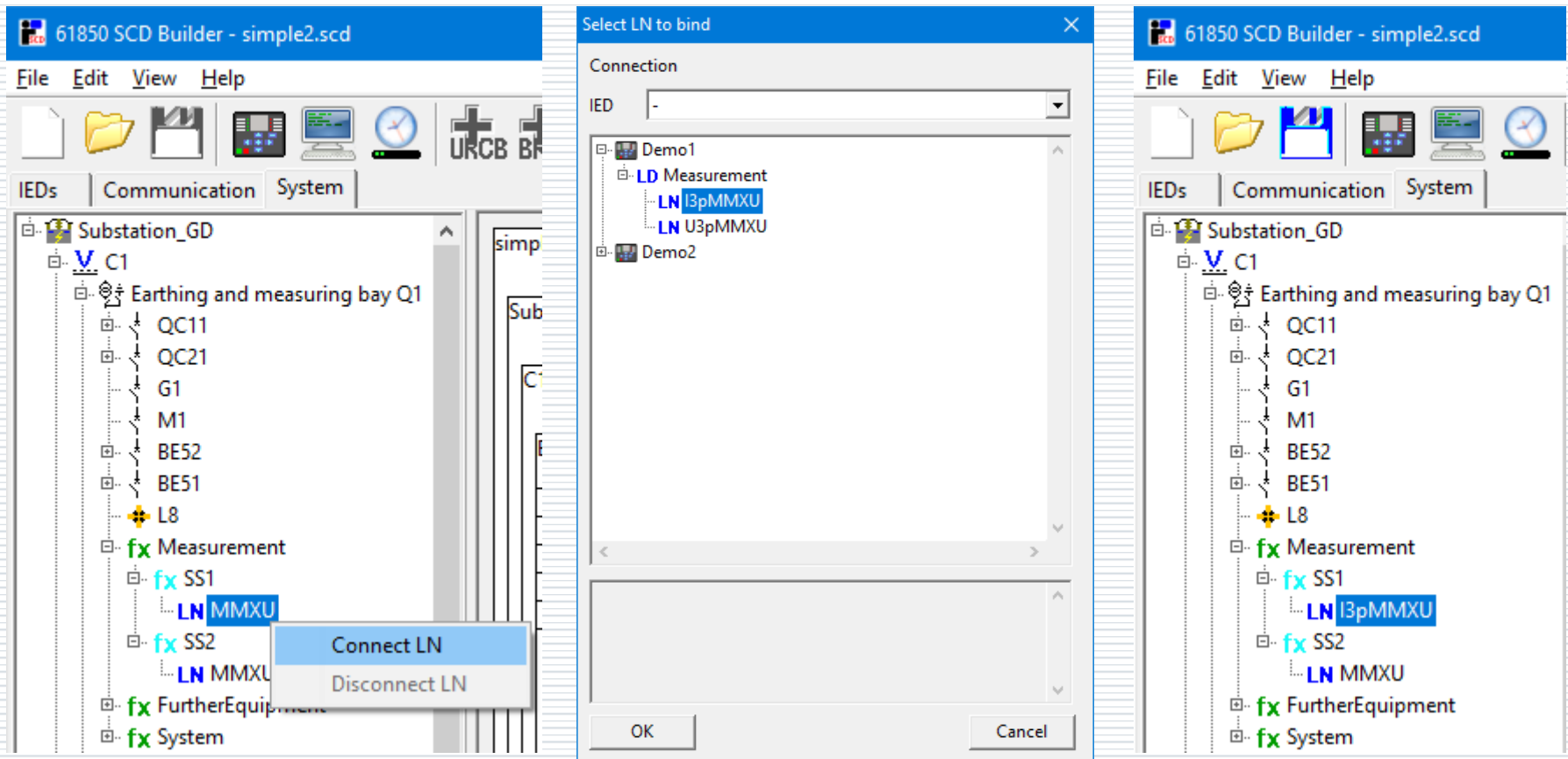


# System view: Substation section

Example of the system specification: SCL encoded single line diagram with logical nodes representing primary equipment and required functions.

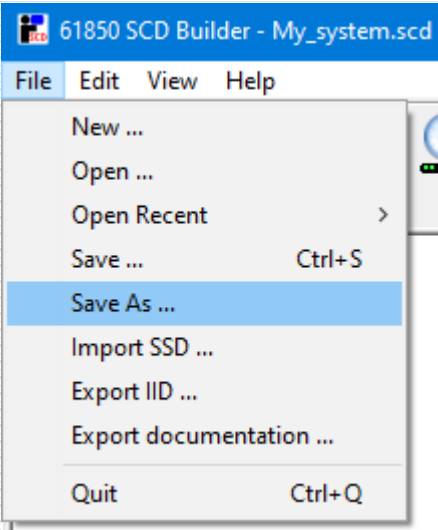


# Mapping LNs from System view (SSD) to LNs of chosen IEDs



LN from the chosen IED implements the LN from the system specification.

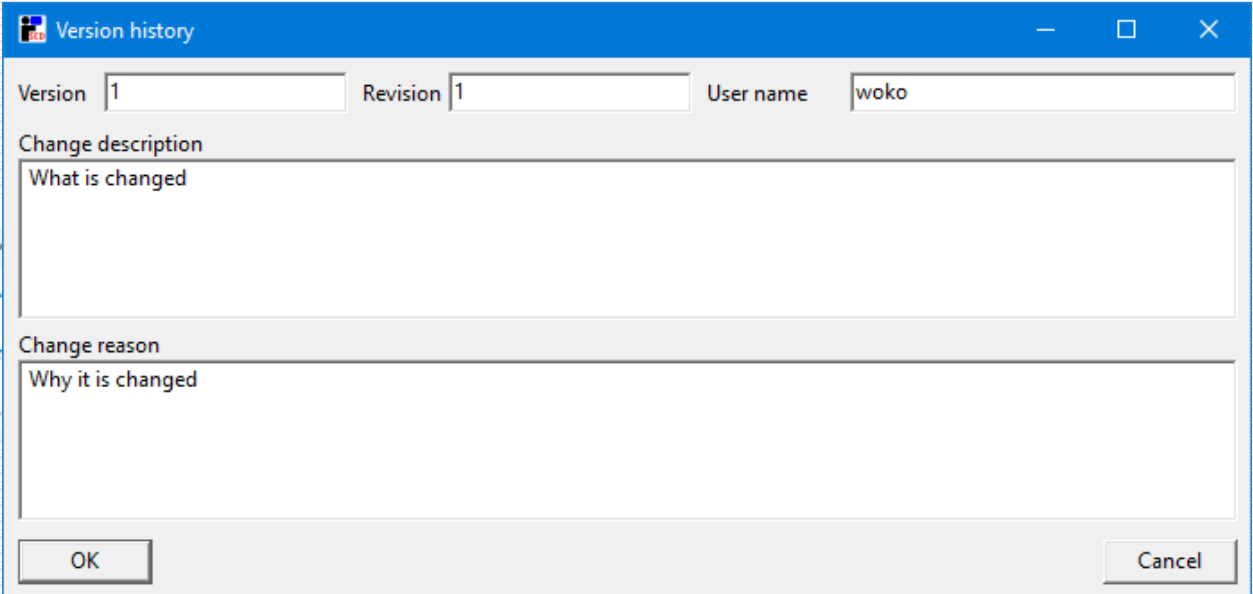
# SCD file saving and version control



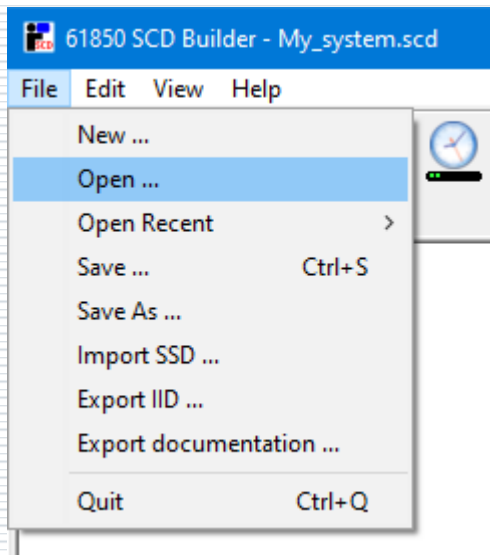
command or icon



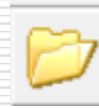
SCD document contains the version history.



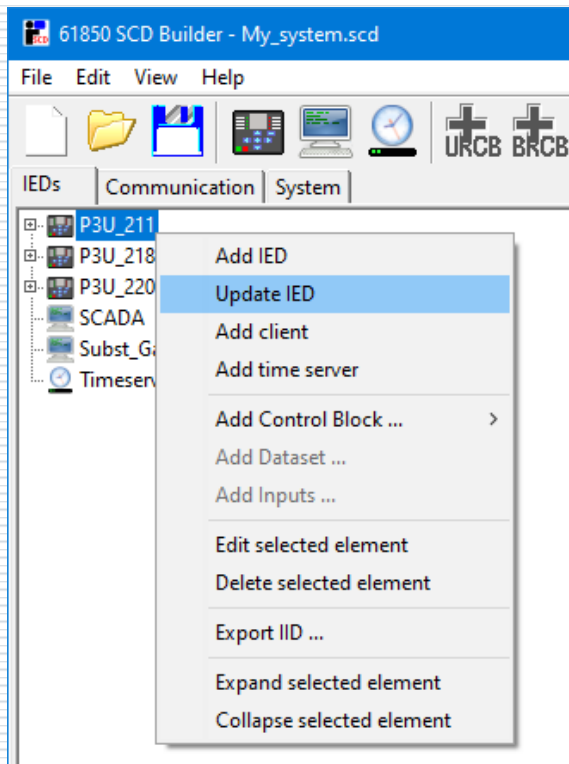
# Opening an existing SCD file



command or icon



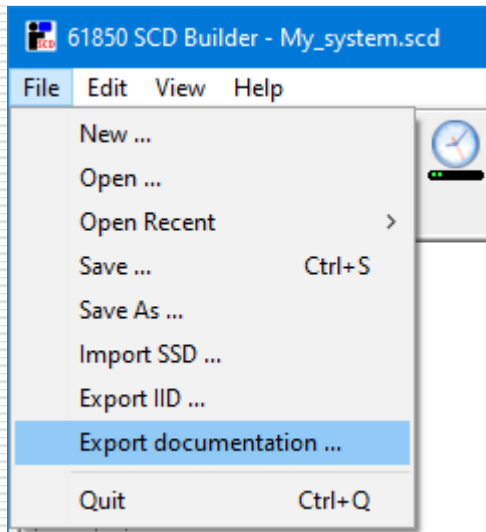
# IID file import for an IED section revision



R\_211\_revised.iid

IED SCL files (\*.icd,\*.cid,\*.iid)

# Generation of system documentation

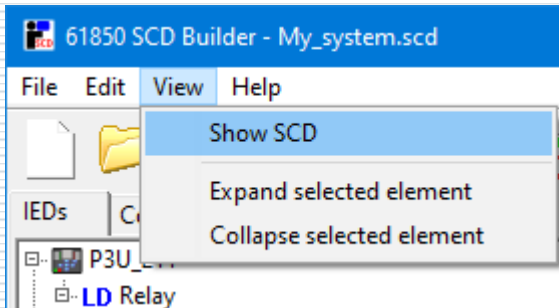


The program can produce the documentation of the created system configuration.

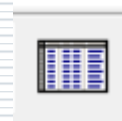
Test\_System.scd

Portable Document Format (PDF) files (\*.pdf)

# XML level editor and checker



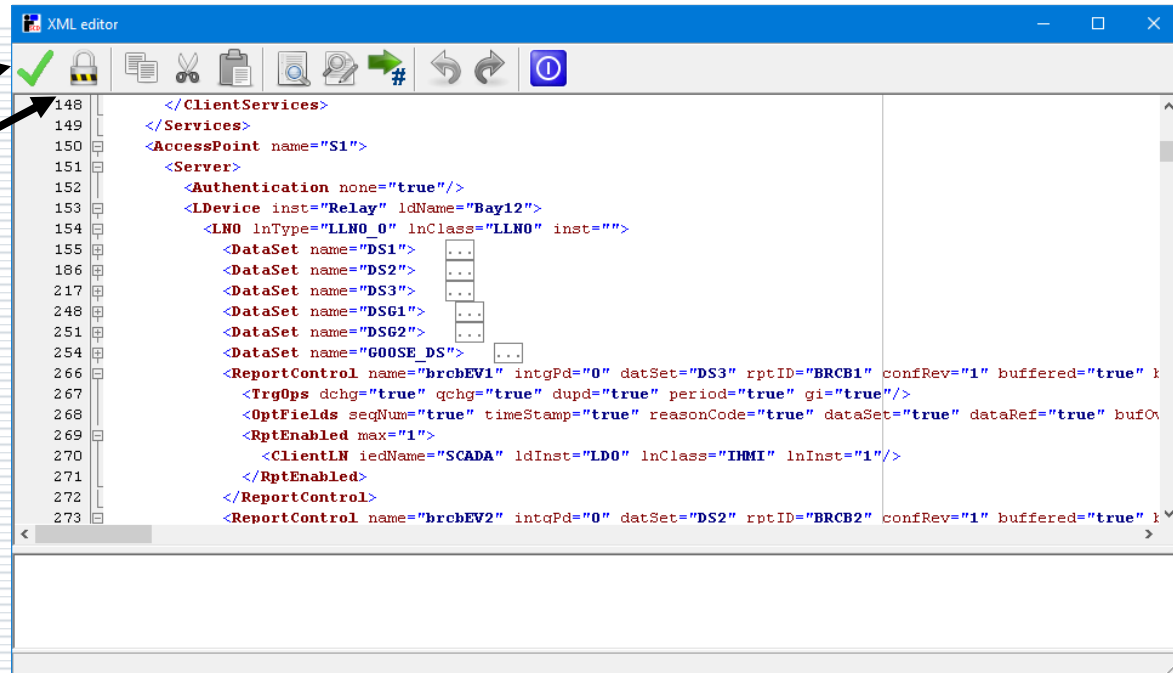
command or icon



This program may be already known from other INFO TECH tools, as it is available in 61850 ICD Editor.

Check syntax

Unlock XML editing



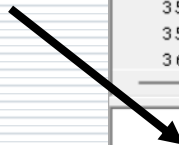
# Always check after editing

Press



The screenshot shows an XML editor window titled "XML editor". The main area displays XML code with line numbers on the left (337-360). A dialog box titled "Information" is overlaid on the code, displaying a blue information icon, the text "SCD file is valid", and a green checkmark icon next to an "OK" button. The XML code includes elements like <OptFields>, <ReportControl>, <TrgOps>, <DAI>, and <Val>.

Detected errors will be listed with the line information.



# Try yourself – request the trial version of 61850 SCD Builder

... and, if satisfied, ask a quote for the licensed version.



Contact: [www.infotech.pl](http://www.infotech.pl)

INFO TECH sp.j.  
Edisona 14  
PL 80-172 Gdansk  
Poland

office@infotech.pl

Tel. (+48) 58 3018527  
Mob. (+48) 602 799756

