61850 SCD Builder
System Configuration Tool

User guide

Prepared by Wojciech E. Kozlowski
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Contents

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INFO TECH sp.j.

- 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 May 2024, the licensed INFO TECH software is the basis for implementing IEC 61850 interfaces in the products of 55 companies and institutions from 15 countries of Europe, Asia and North America.
- INFO TECH offers also:
  - **Software development services**,
  - **Hands-on trainings** on IEC 61850 communication,
  - **Conformance testing** of the IEC 61850 interfaces,
  - **Audits and diagnostics of systems** using IEC 61850 communication.

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

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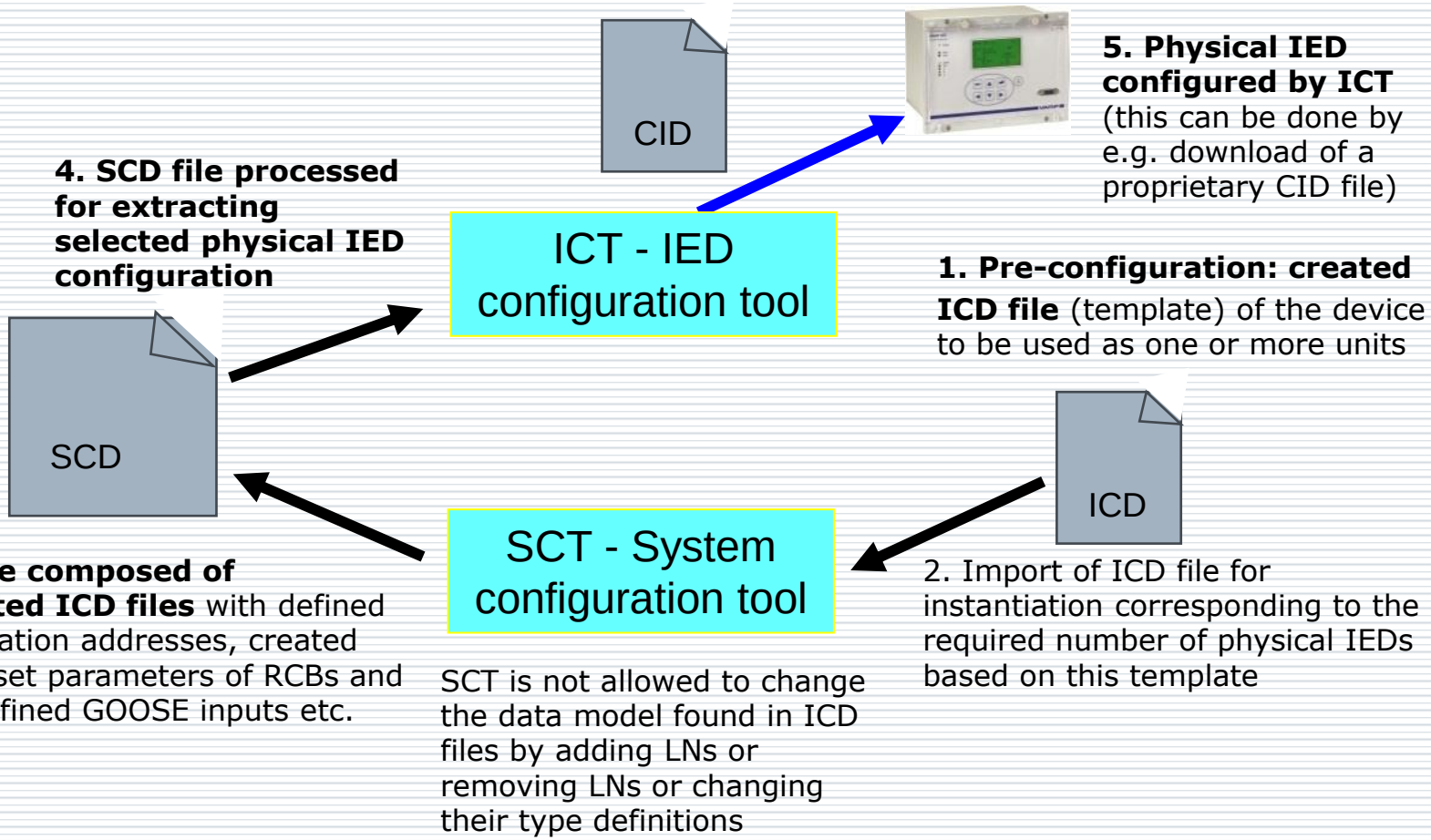
SCL files of the engineering process defined in the IEC 61850-6

- **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



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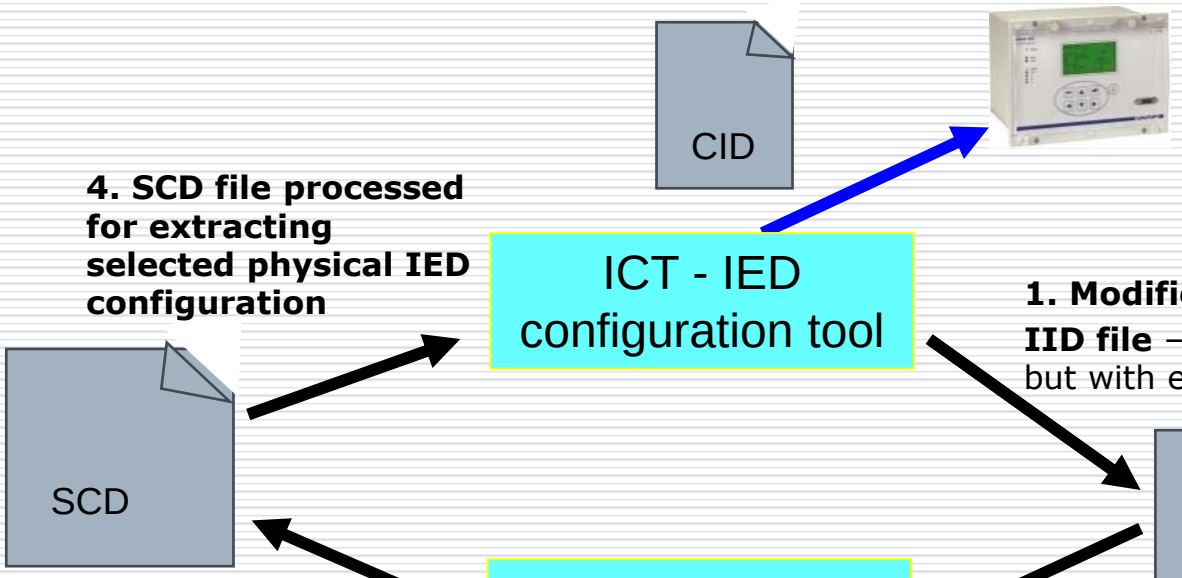
Next iteration of IED configuration (specified in Ed.2)



5. Physical IED configured by ICT (this can be done by e.g. download of a proprietary CID file)

4. SCD file processed for extracting selected physical IED configuration

1. Modified IED configuration:
IID file – derived by ICT from SCD but with e.g. later data model changes

3. SCD file composed of instantiated ICD files with defined communication addresses, created datasets, set parameters of RCBs and GoCBs, defined GOOSE inputs etc.

SCT is not allowed to change the data model found in ICD files by adding LNs or removing LNs or changing their type definitions

2. Import of IID file to replace the former SCD section of this instantiated IED

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SCD file importance

- **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.
  - 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

- **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

- 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 …
- Includes the **context help function** invokable with **F1** key.

Installation procedure

Supported platforms:

PC running

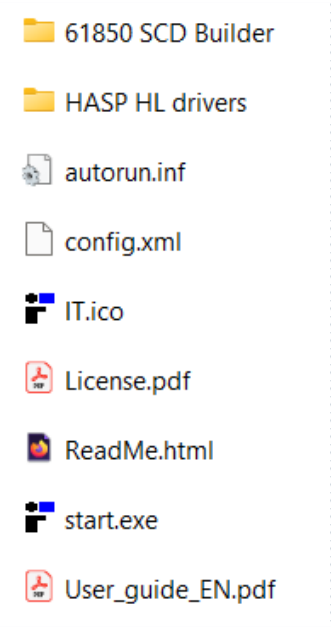
MS Windows

7, 8, 10 and 11.

To install the software

From the supplied CD: possible start in autorun mode.

Alternatively: invoke the program **start.exe** from the installation package directory



License

- **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

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

61850 SCD Builder – let's start!

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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.

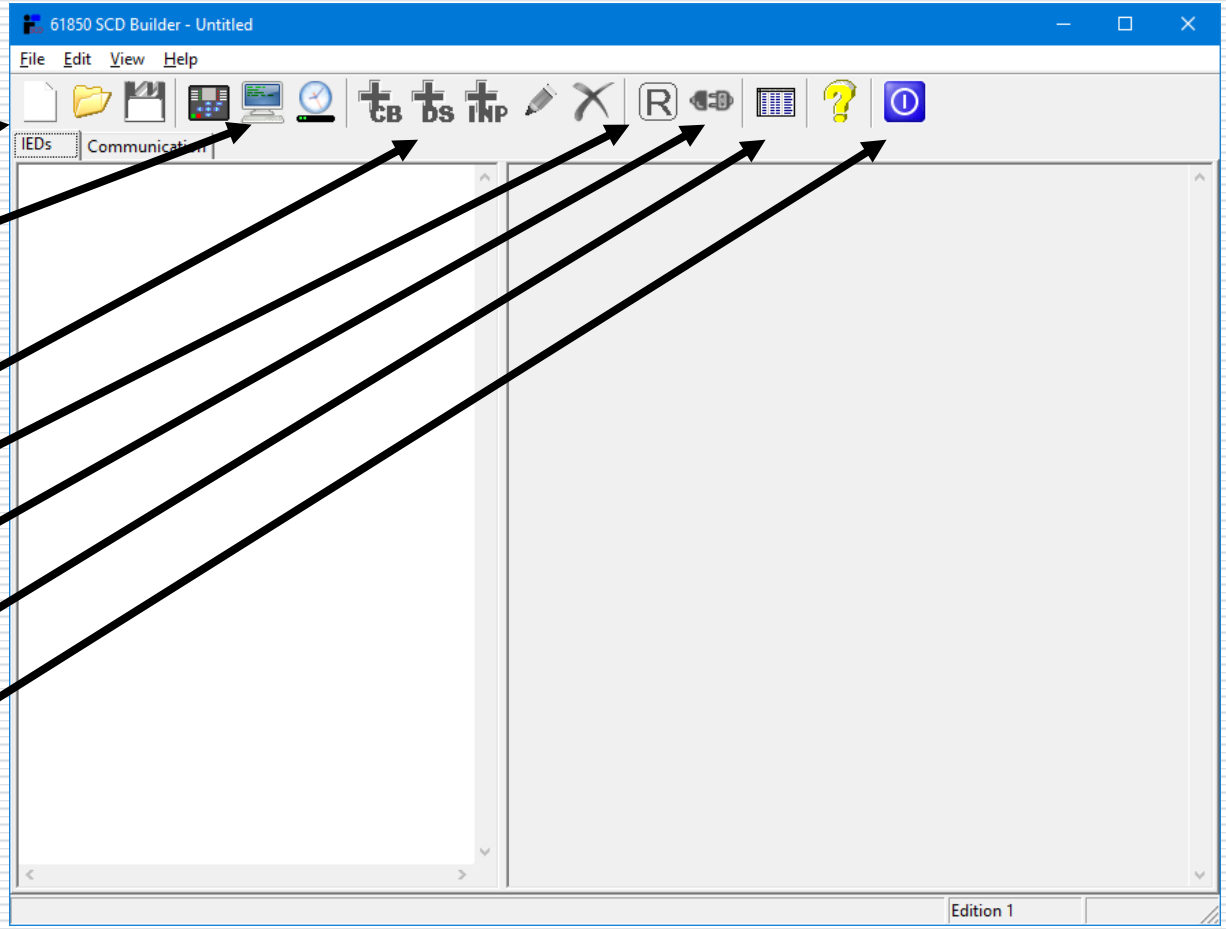
Operations on the created SCD file (adding or removing data model elements).

RCB reservation

GOOSE or SV binding

XML level editor/checker

Help and Exit



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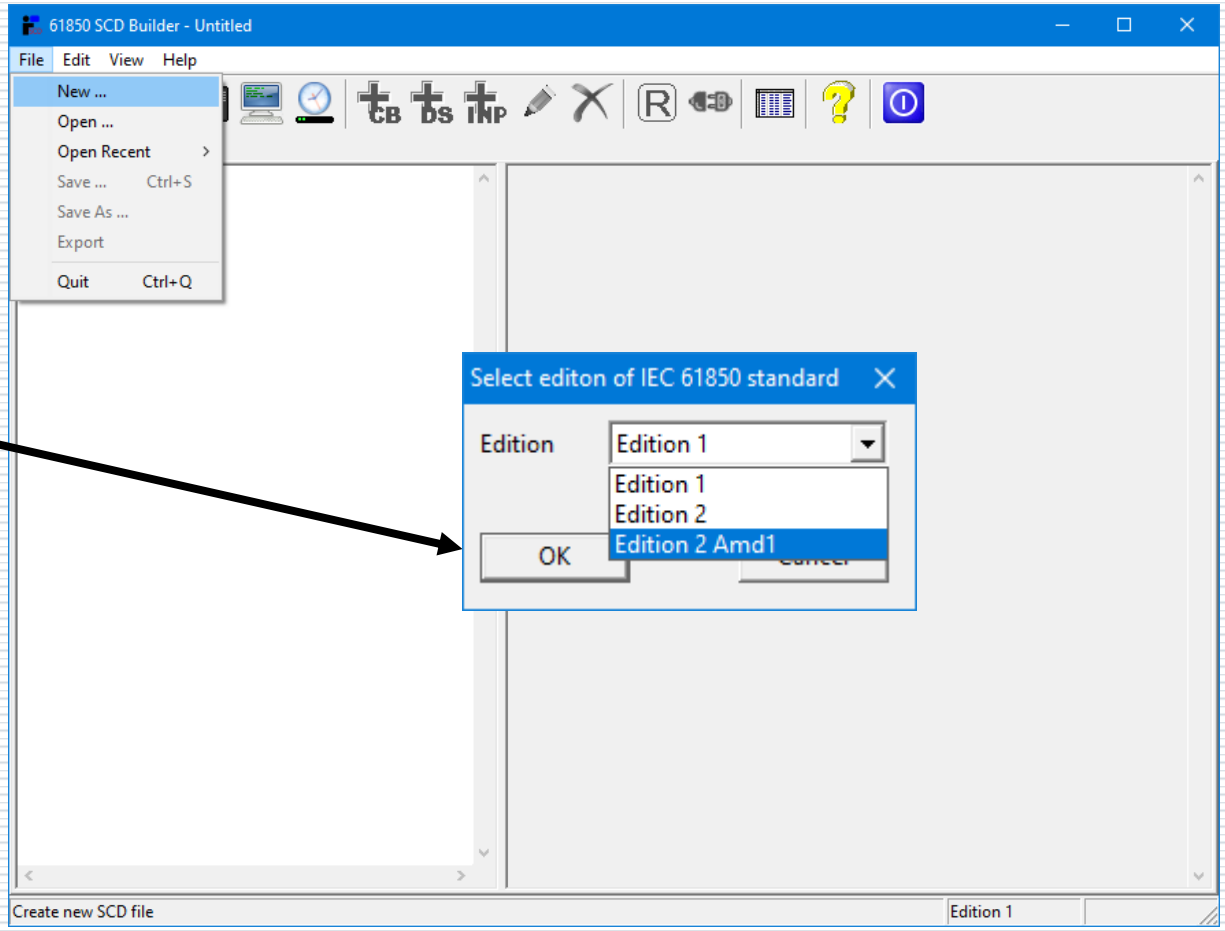
New system project

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).



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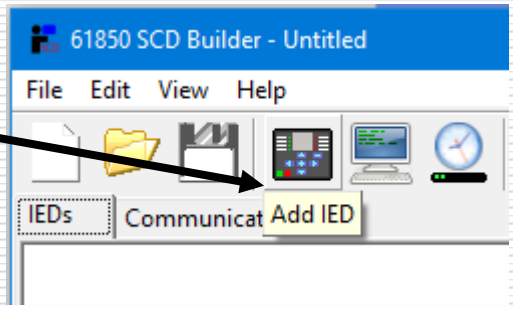
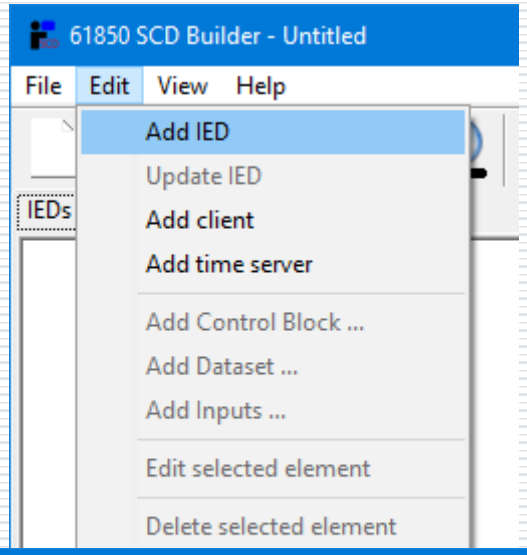
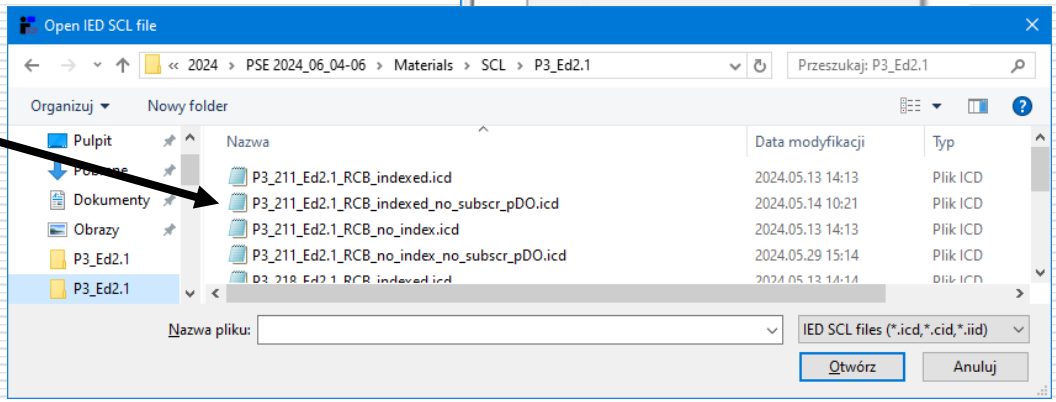
Adding IEDs based on ICD files

Use Edit menu item
or
Icon.





Then
select an appropriate ICD file
to be instantiated.



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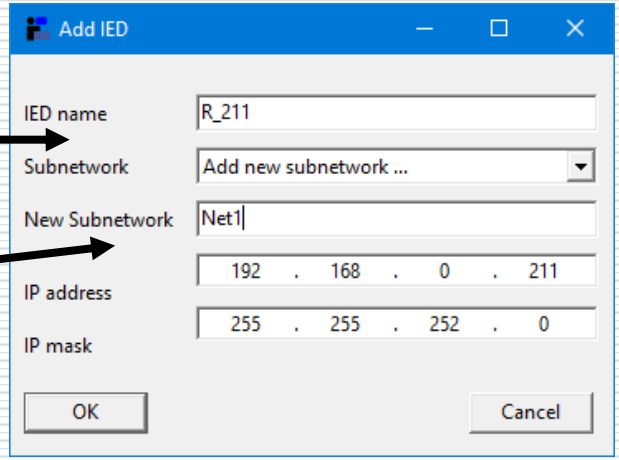
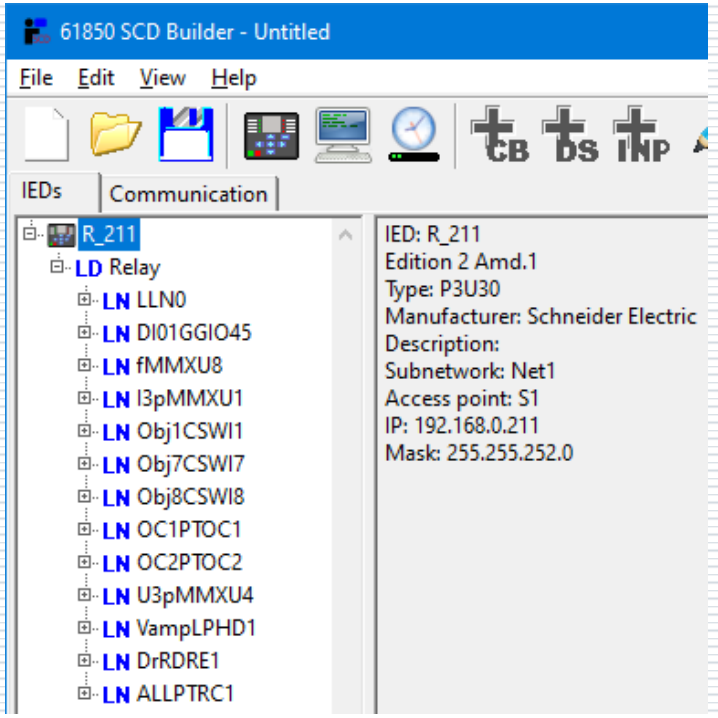
IED instantiated from an ICD file

For the instantiated ICD file (new IED of the system) set its unique IED name, unique IP address and assign to Subnetwork (for the first IED a New Subnetwork must be defined by name).



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



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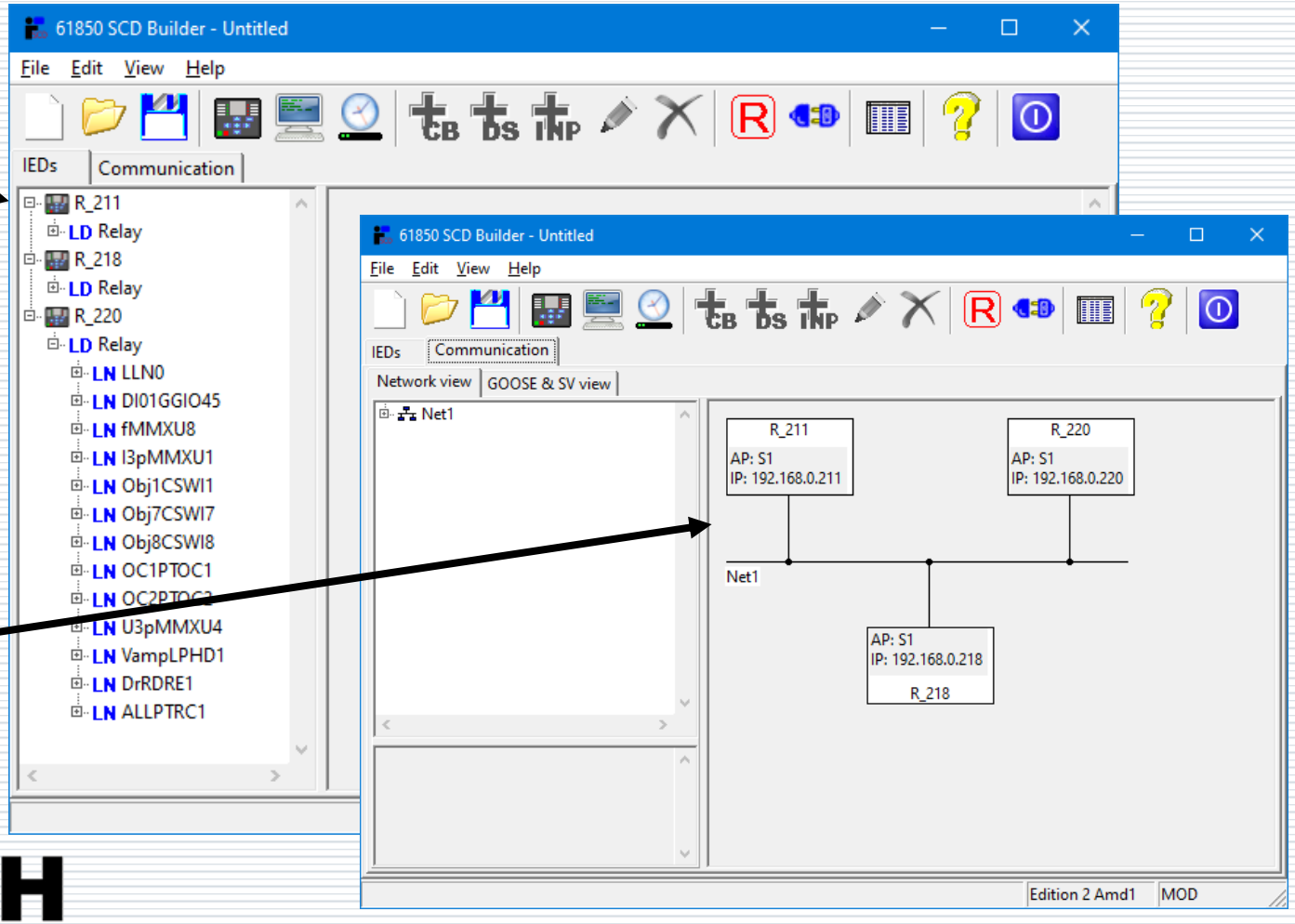
After adding further IEDs

IEDs view

Communication view



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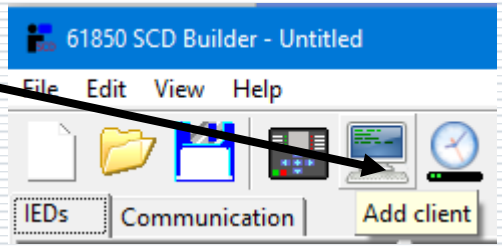
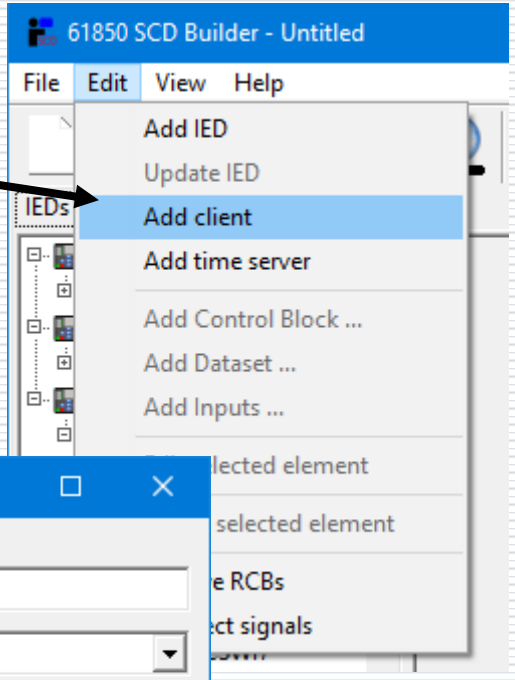
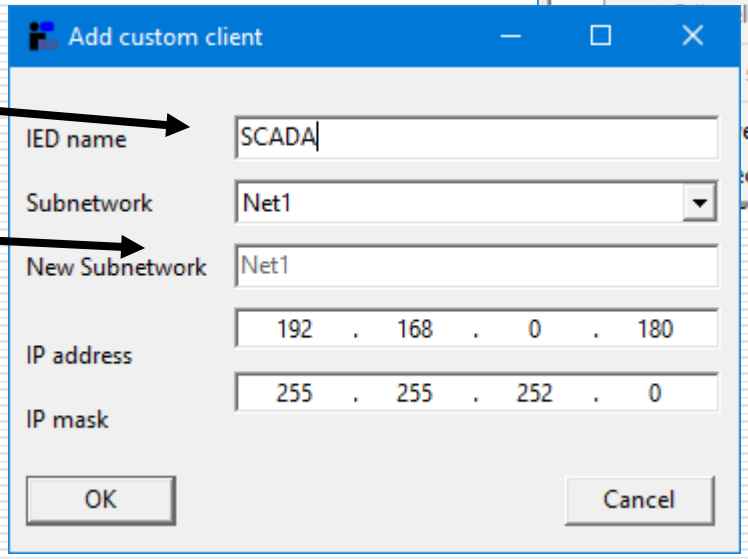
Adding client devices without ICD (default description)

Use Edit menu item or Icon.





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



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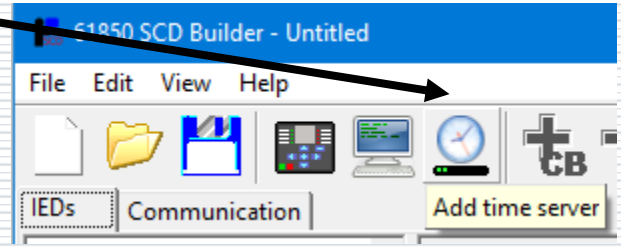
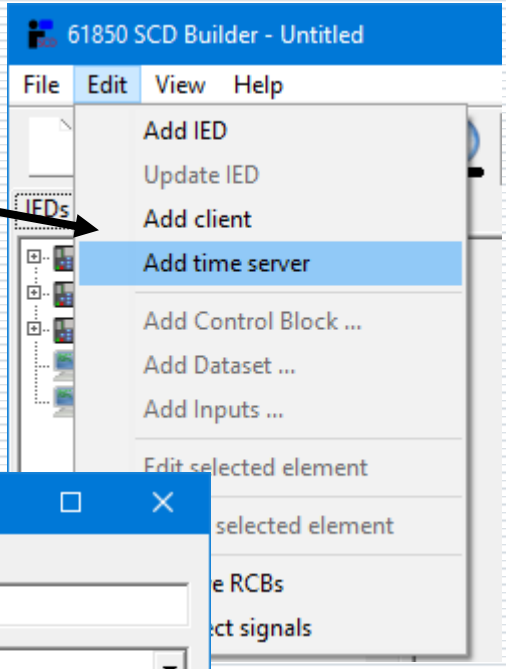
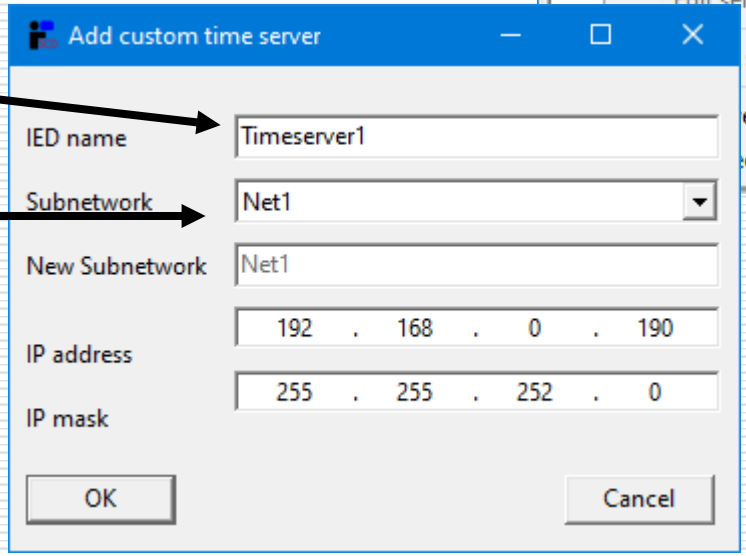
Adding time server without ICD (default description)

Use Edit menu item or Icon.





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



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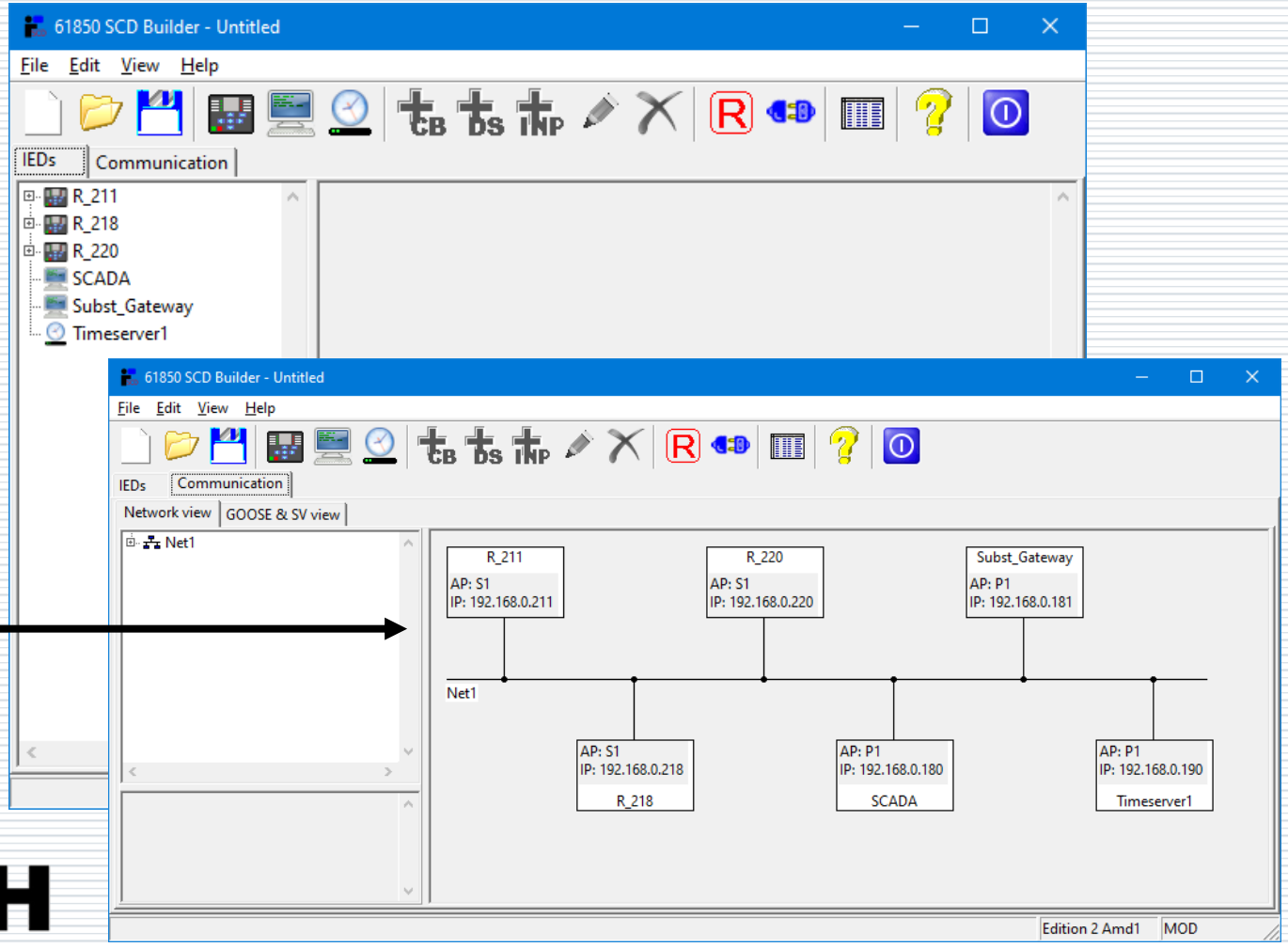
IEDs view.
Communication view: Network.

IEDs view

Communication view: Network



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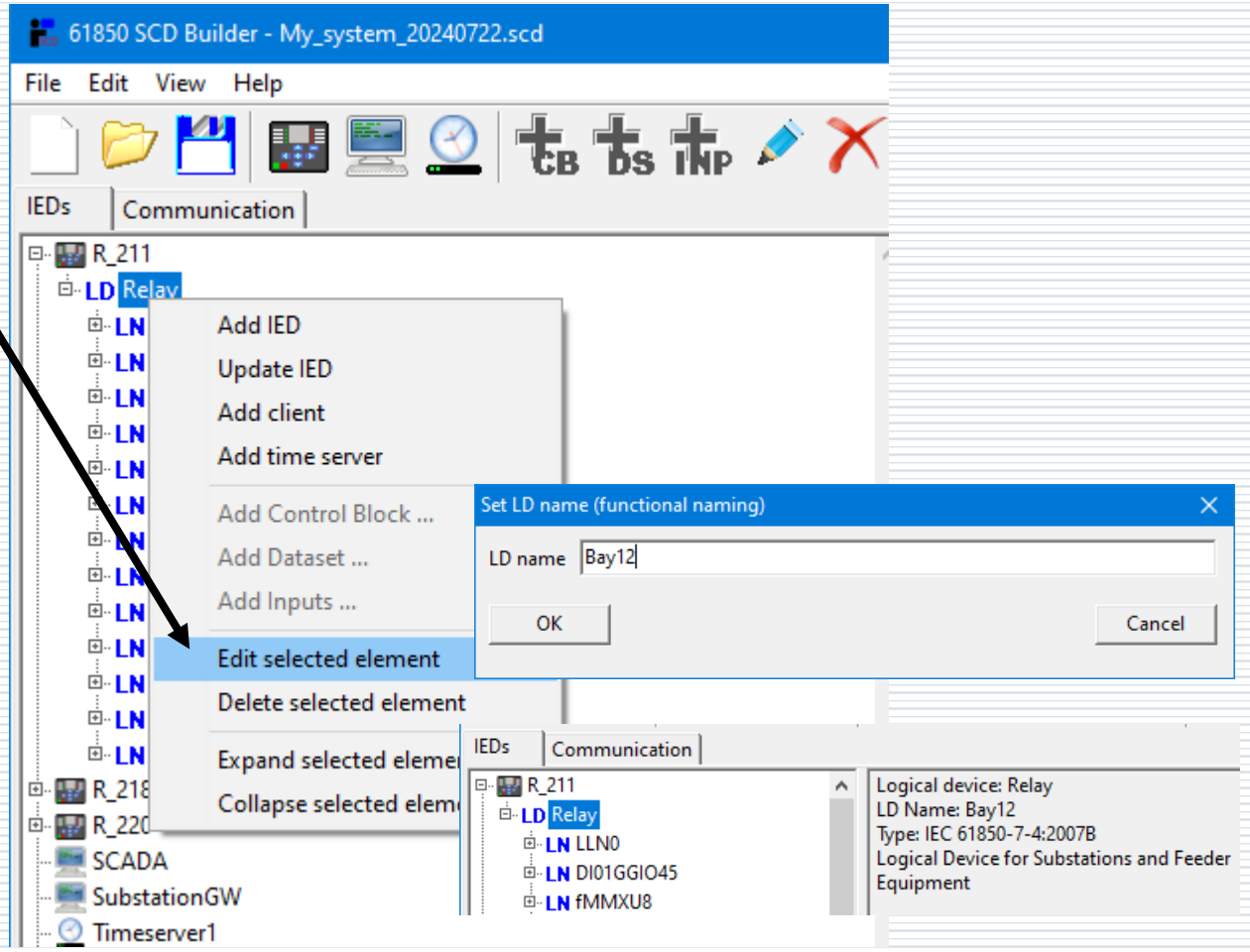
Support of functional naming: LD

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



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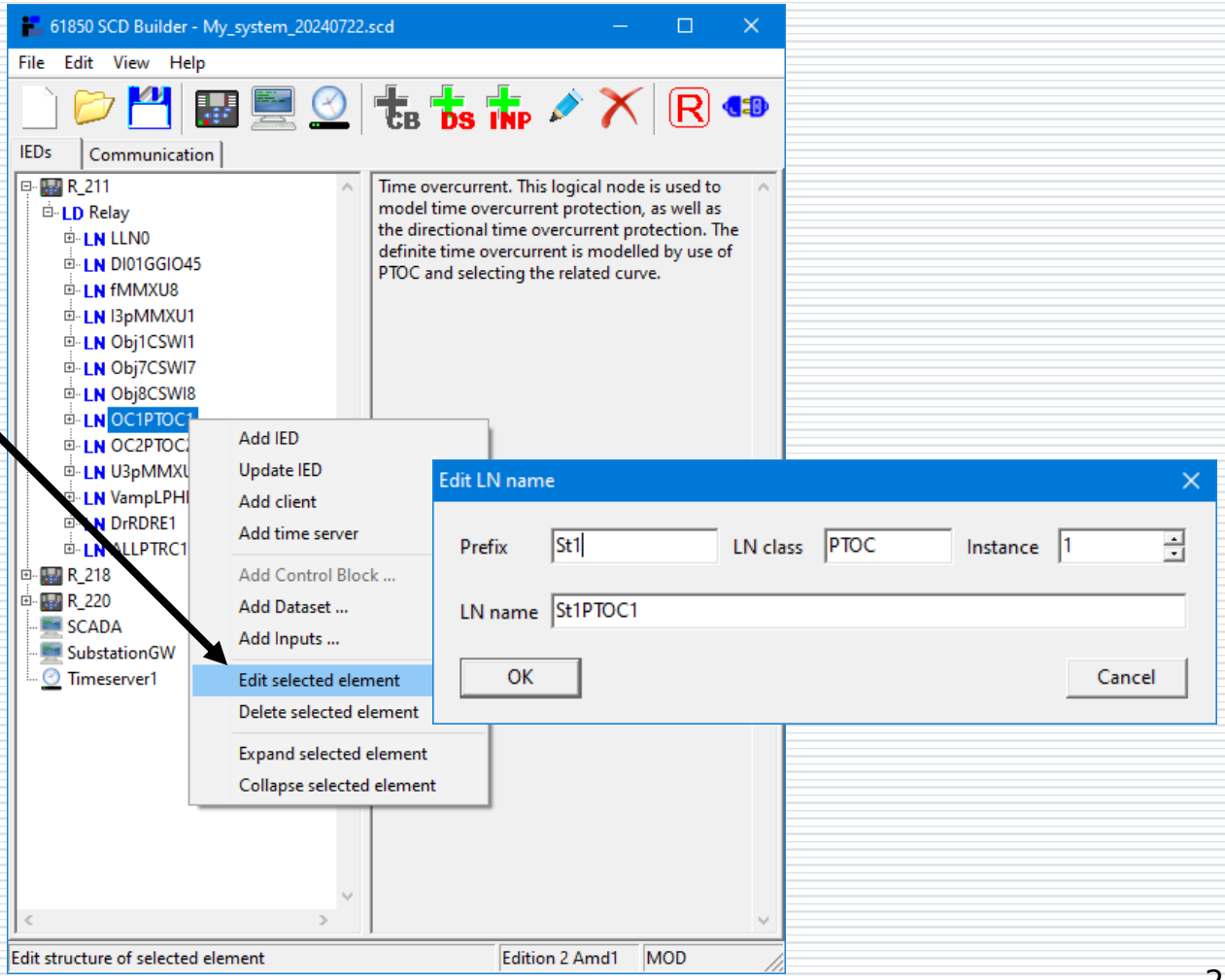
Support of functional naming: LN

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.



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Adding elements to IED data model

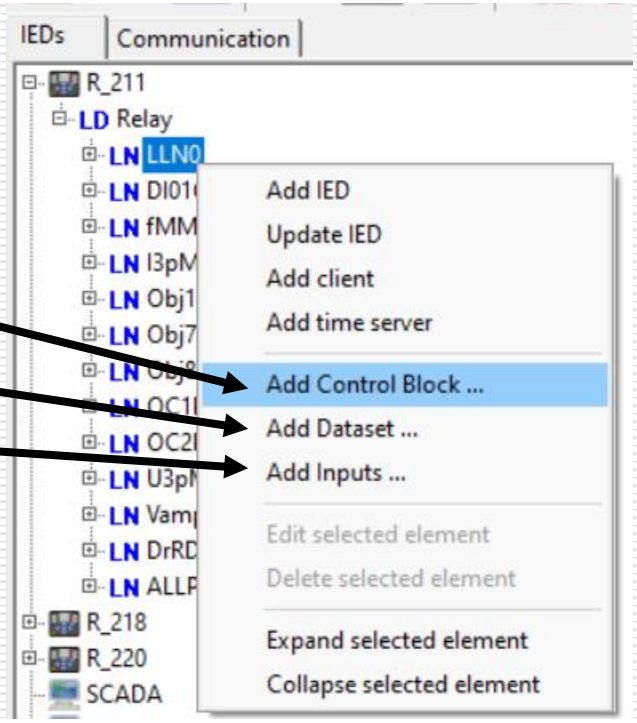
Depending on the content of Services section of the imported ICD file it may be possible to:

Add a new control block

Add a new data set

Add a new input (ExtRef in the Inputs section)

Use the context menu commands or icons.



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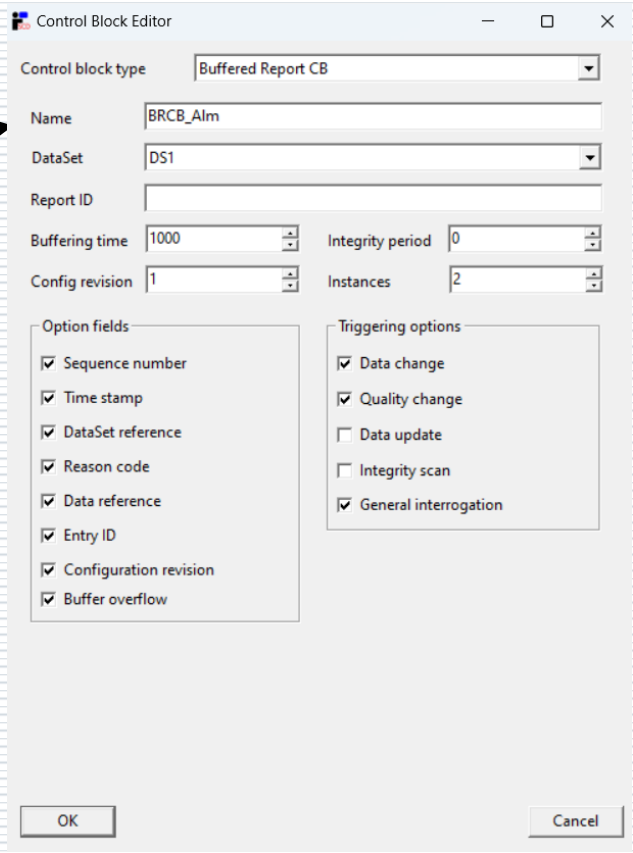
Adding a new control block

Example:

Adding Buffered RCB
name BRCB_Alm
2 instances



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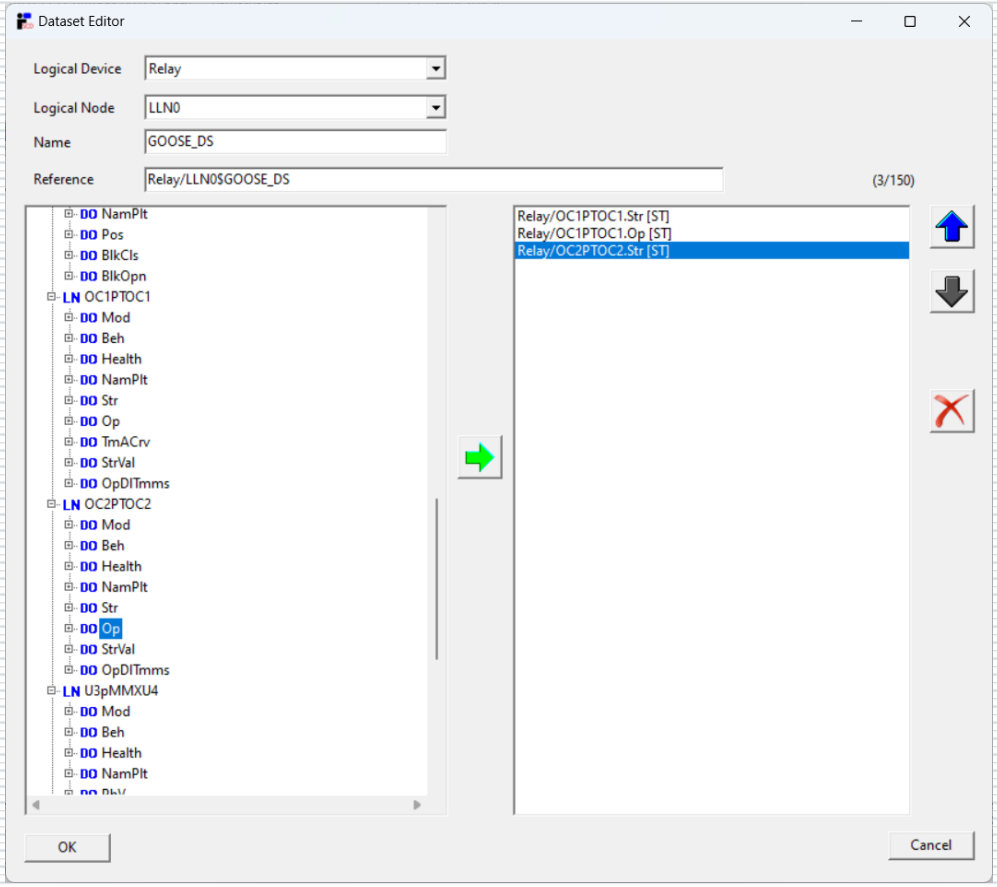
Adding a new data set

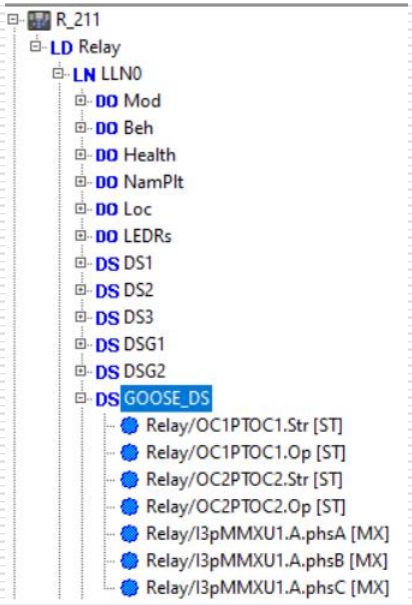
Example:

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.





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Adding a new input (ExtRef)

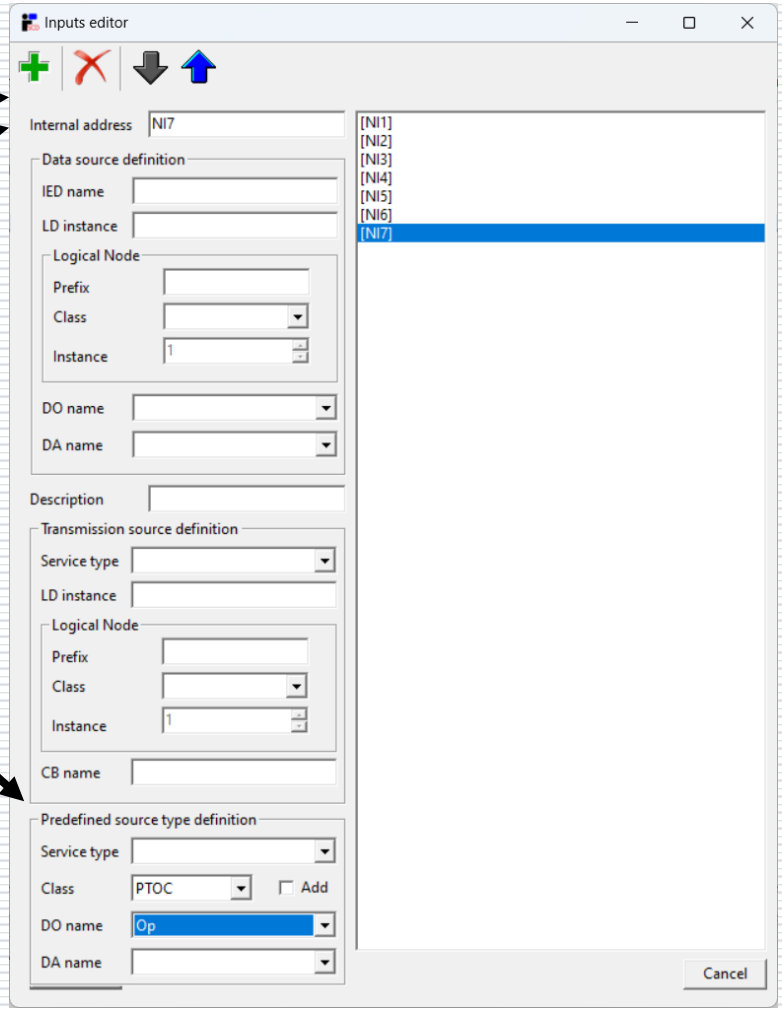
Example:

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).



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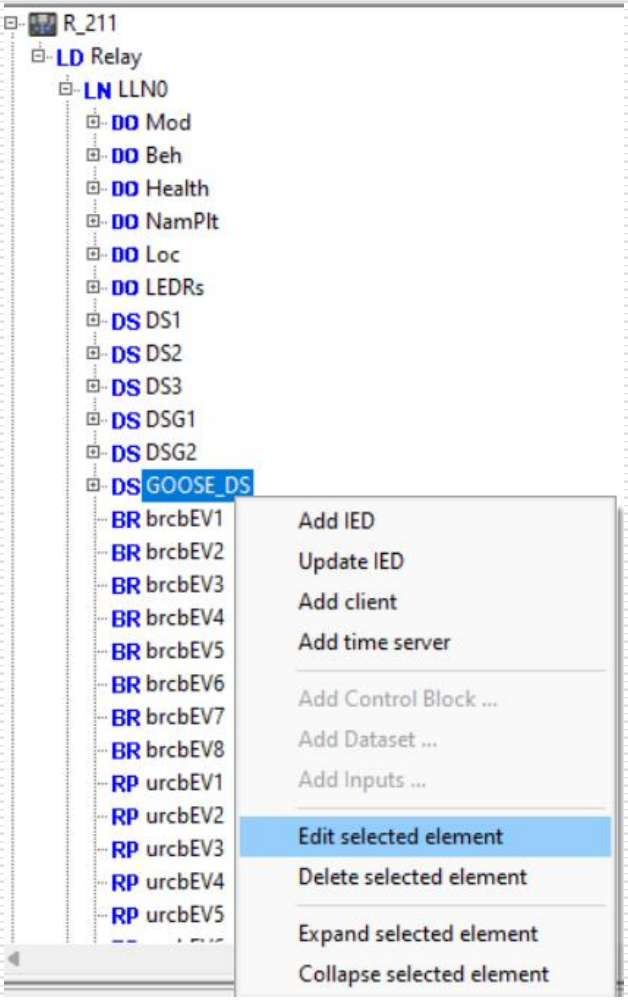
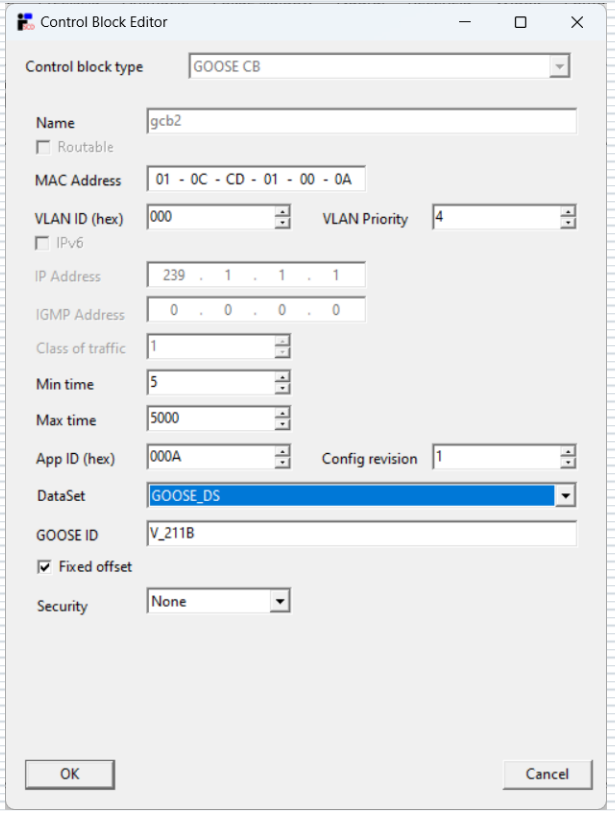
Further modifications

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.





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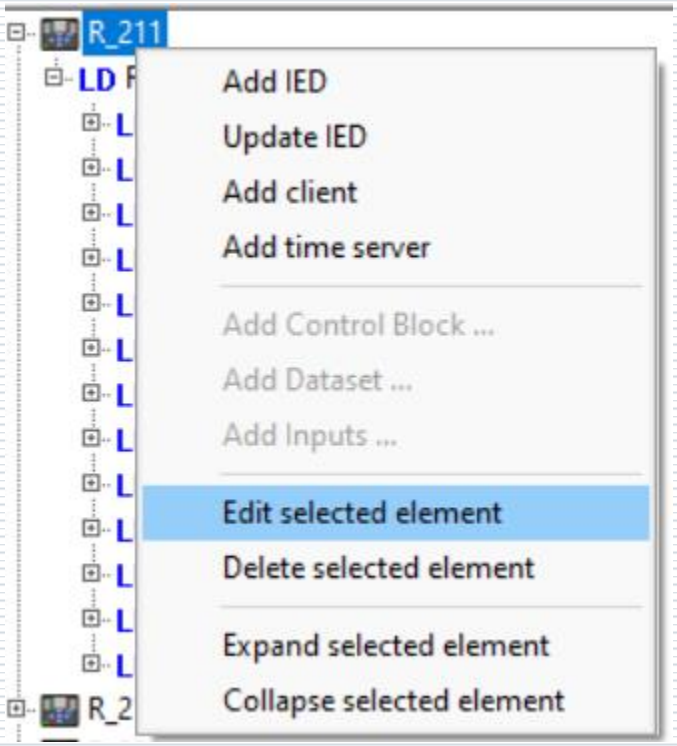
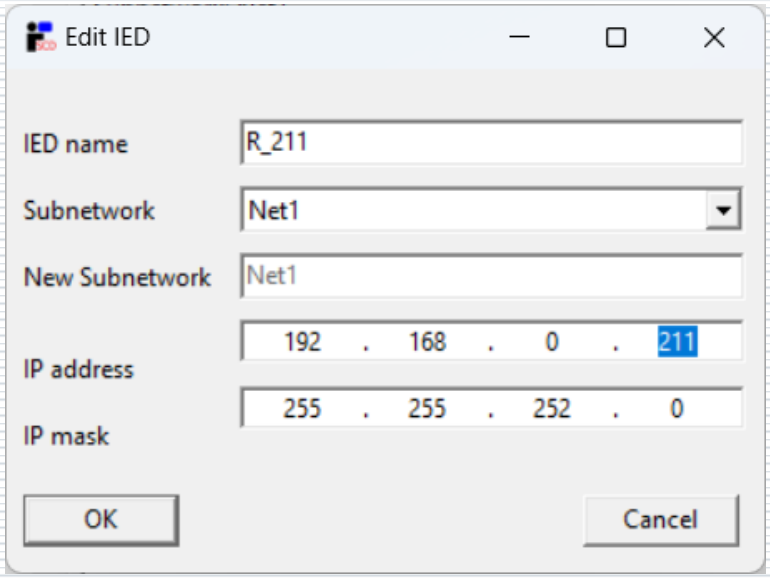
Configuration of communication addresses of IEDs





From **Server** menu select **New** command to define a new server device.

*** after** the name of the IED server device means **unsaved configuration**.

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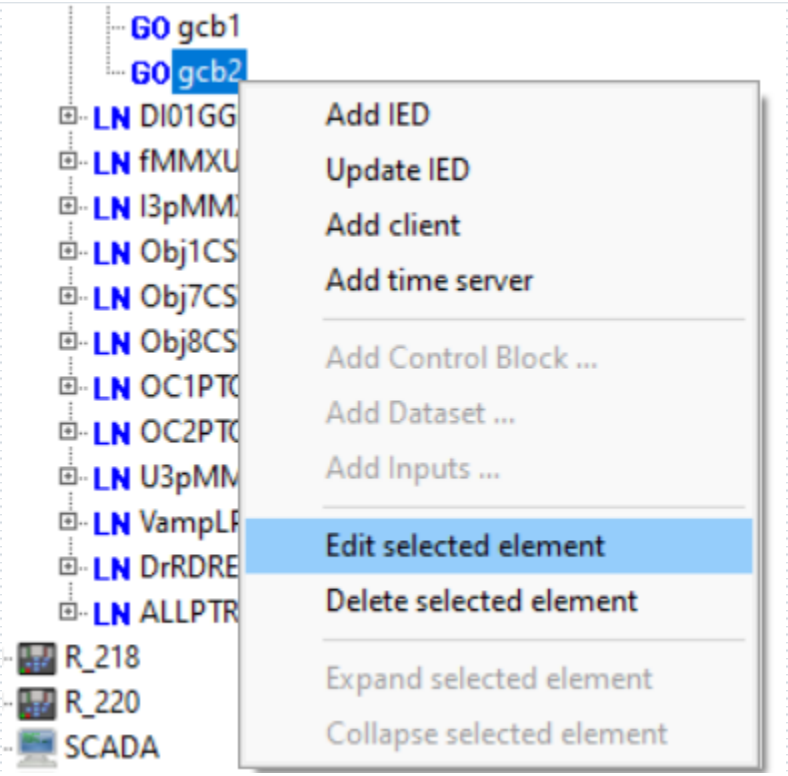
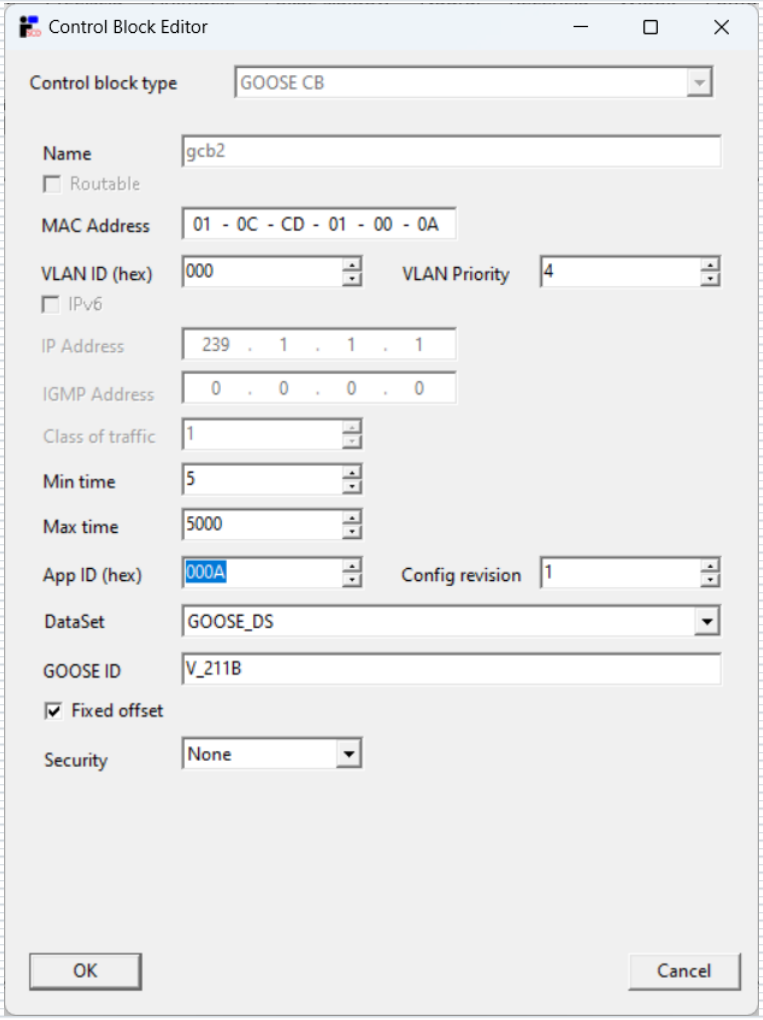
Configuration of GOOSE Control Blocks





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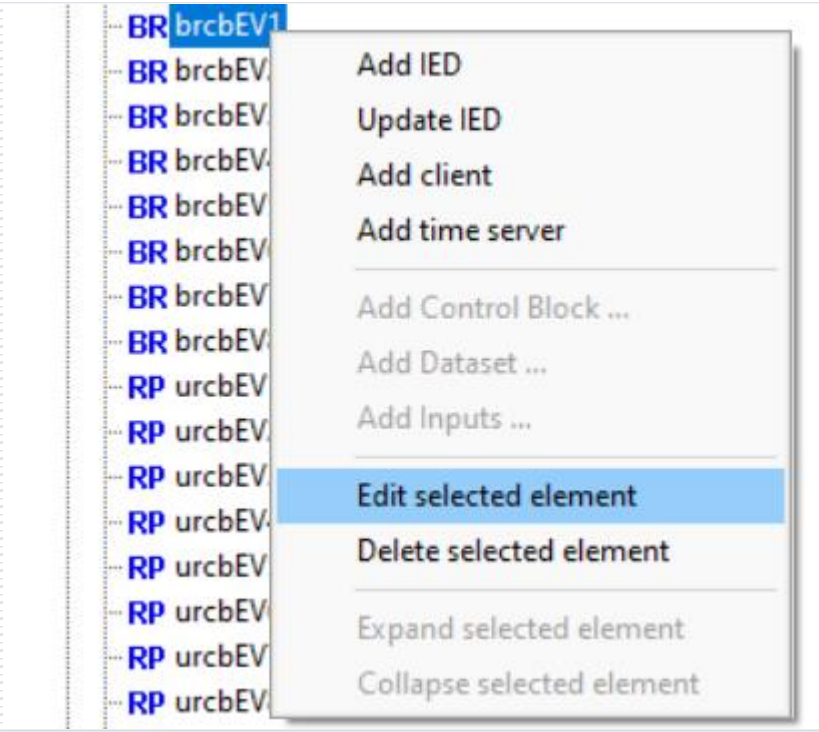
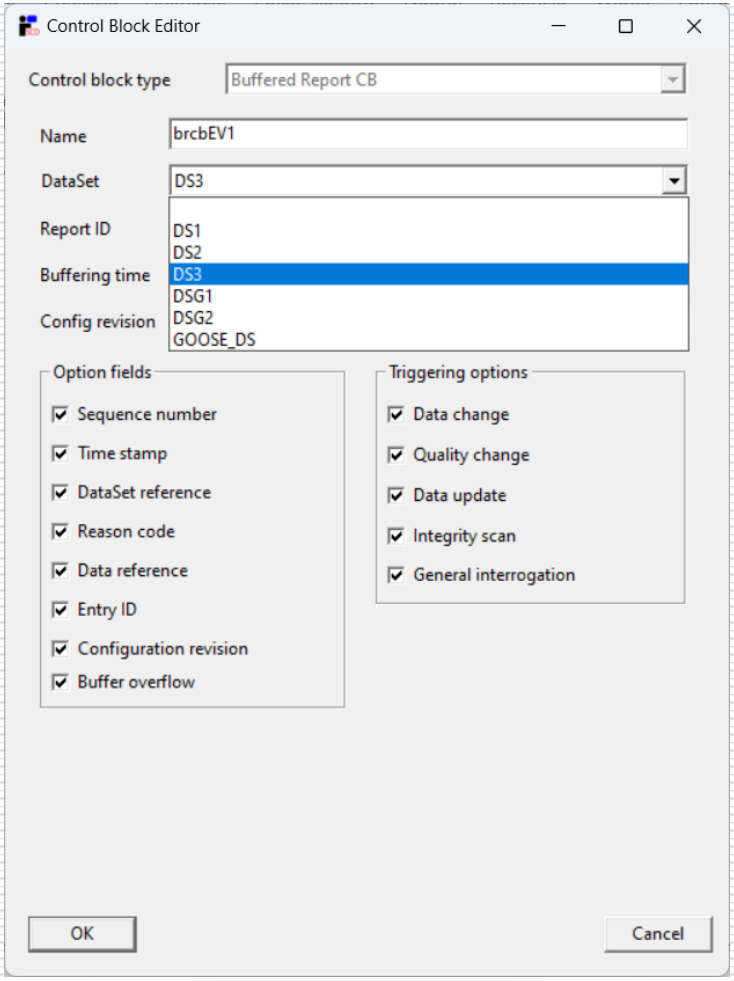
Configuration of Report Control Blocks





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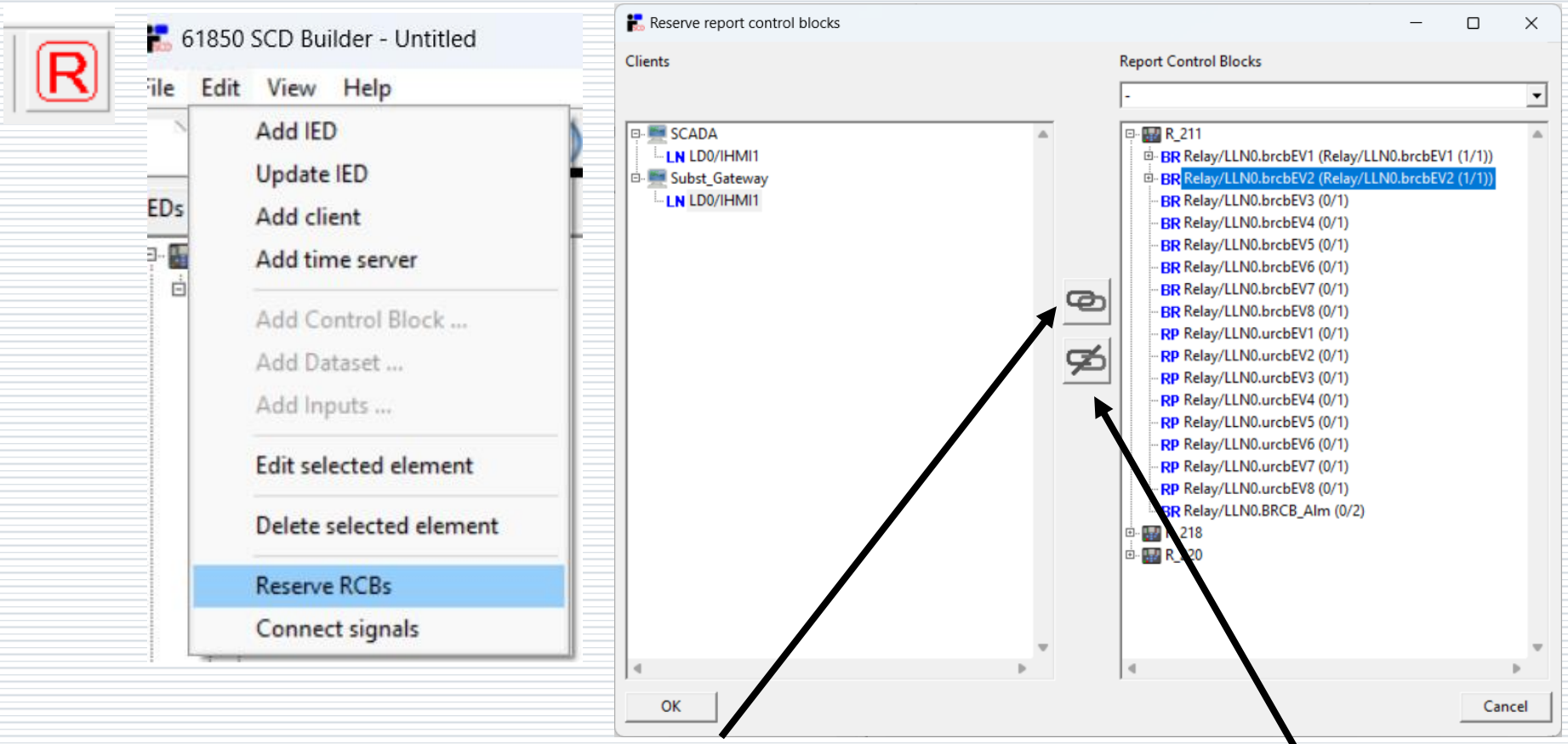
Reservation of instantiated RCBs for clients



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

This binding can also be cancelled.

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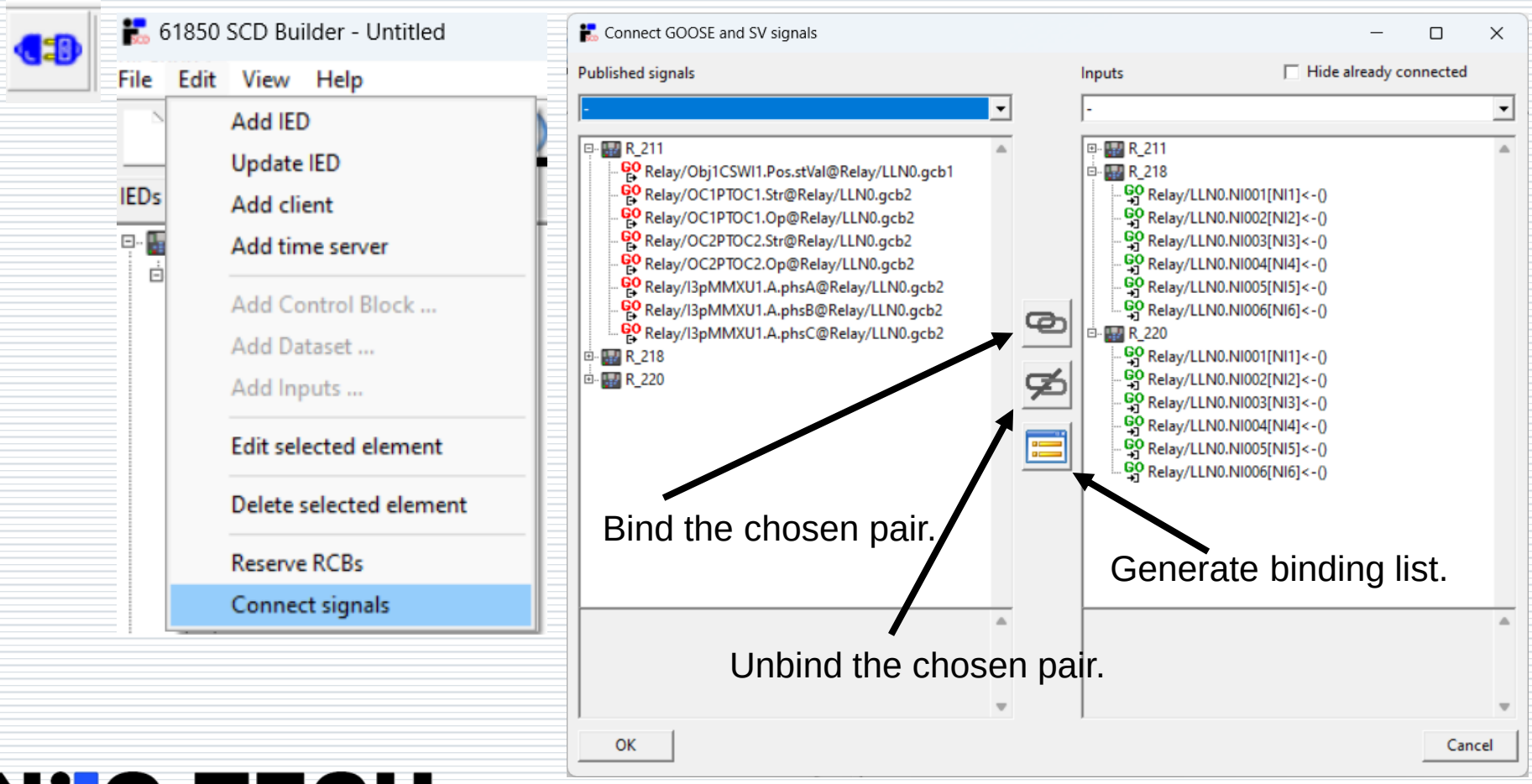
GOOSE binding



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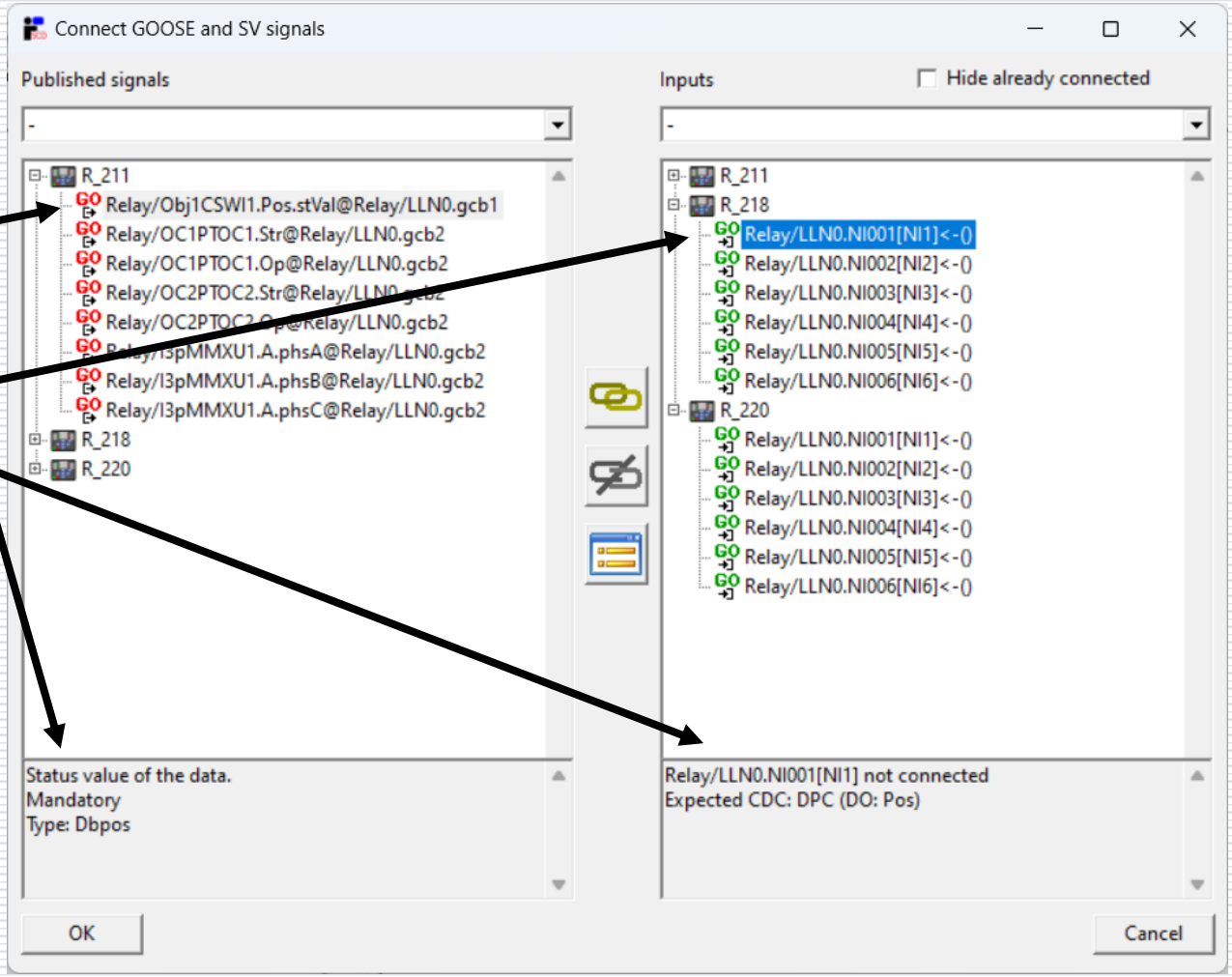
Expected source DO in GOOSE binding (Ed. 2.1)

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).



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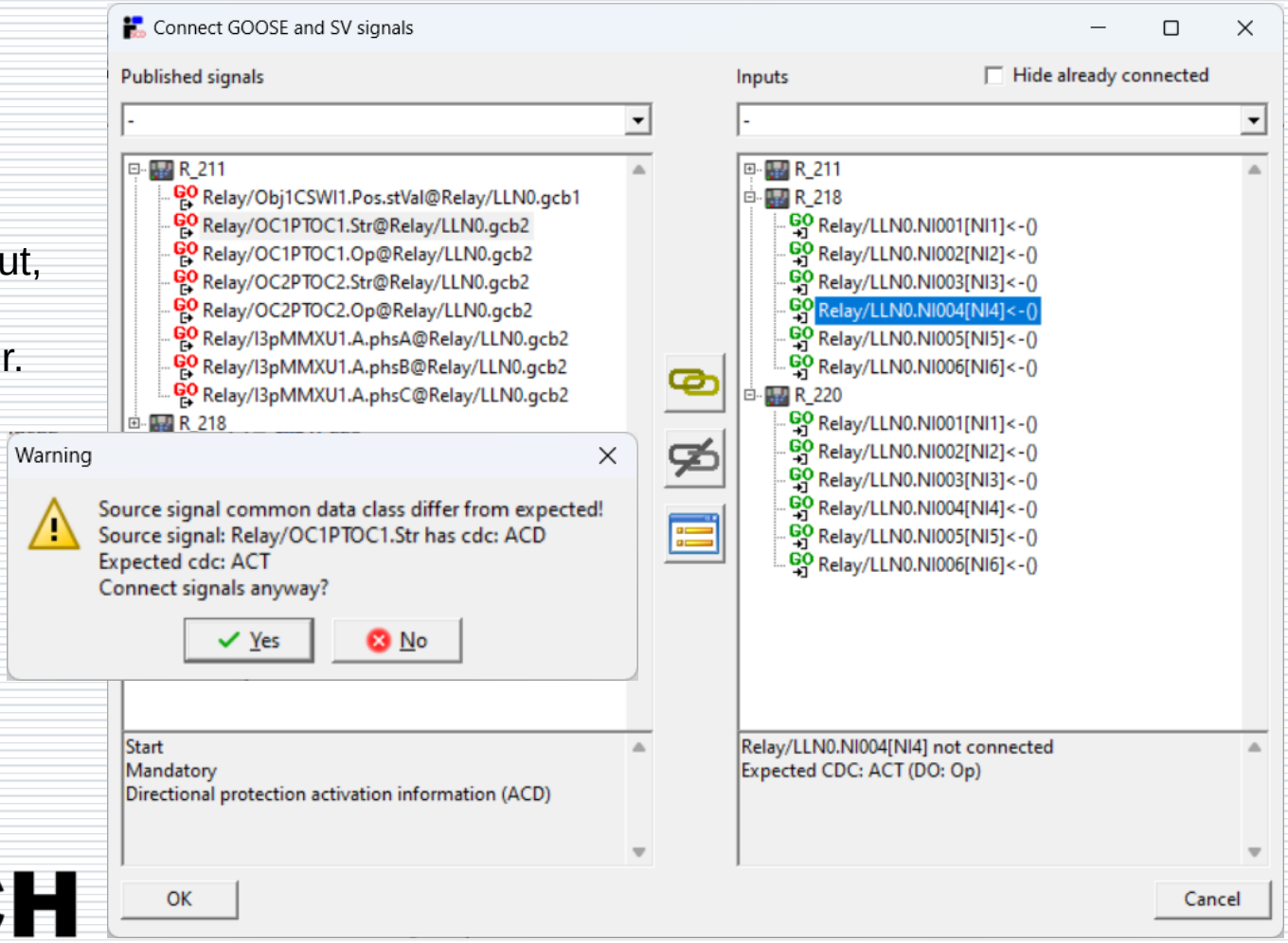
Expected source DO in GOOSE binding (Ed. 2.1)

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.



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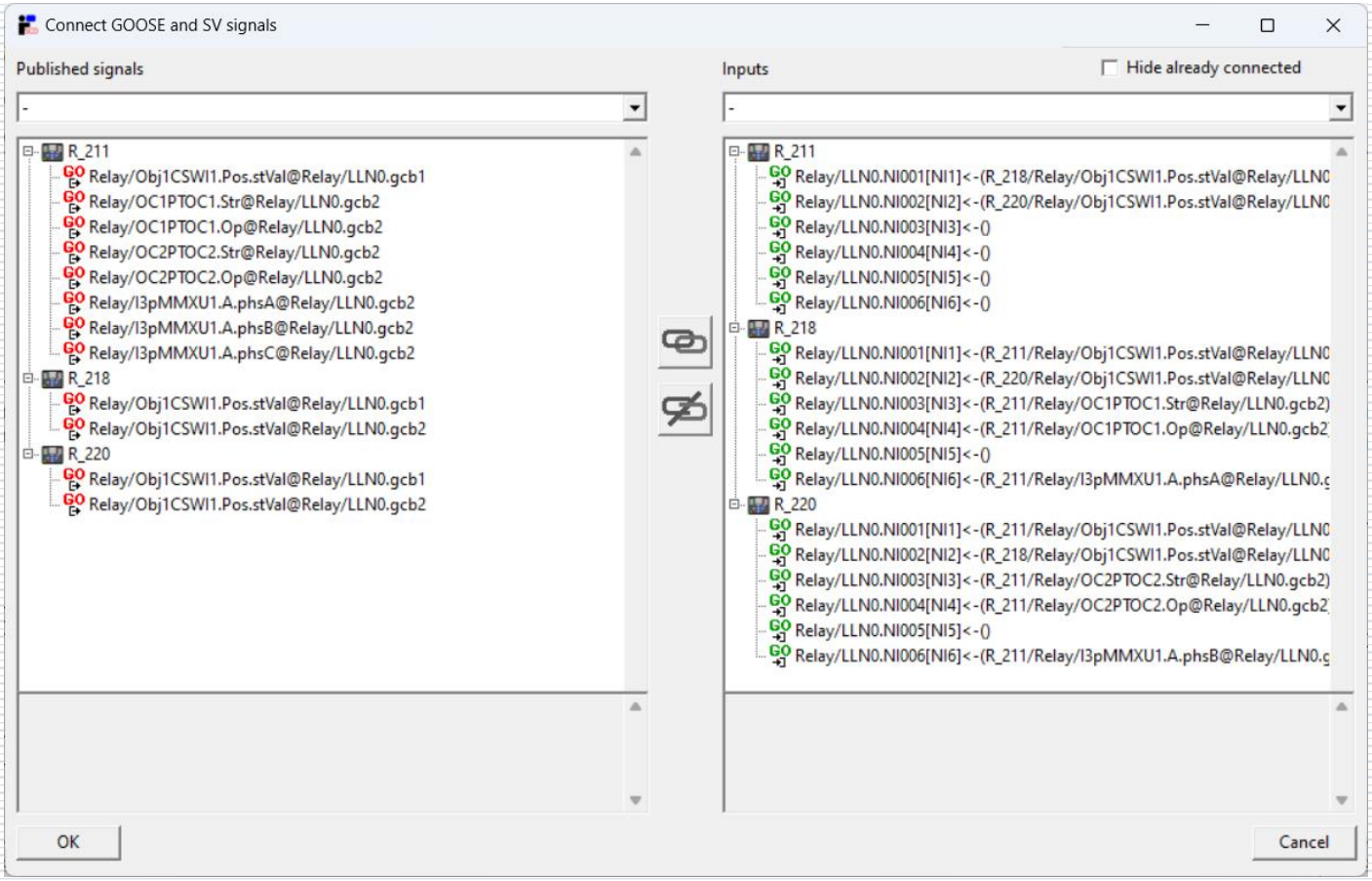
Binding creation

Data from publishing IEDs assigned to inputs of subscribing IEDs.



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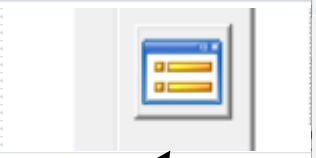
GOOSE binding list generation



Press the button „Show connections list”.

The list can be exported to a plain text document.

List of GOOSE connections

Source filter

IED -

LD

LN

Data

Destination filter

IED -

Source	Destination
R_218Relay/Obj1CSWI1.Pos.stVal	R_211Relay.NI001[NI1]
R_220Relay/Obj1CSWI1.Pos.stVal	R_211Relay.NI002[NI2]
R_211Relay/Obj1CSWI1.Pos.stVal	R_218Relay.NI001[NI1]
R_220Relay/Obj1CSWI1.Pos.stVal	R_218Relay.NI002[NI2]
R_211Relay/OC1PTOC1.Str	R_218Relay.NI003[NI3]
R_211Relay/OC1PTOC1.Op	R_218Relay.NI004[NI4]
R_211Relay/I3pMMXU1.A.phsA	R_218Relay.NI006[NI6]
R_211Relay/Obj1CSWI1.Pos.stVal	R_220Relay.NI001[NI1]
R_218Relay/Obj1CSWI1.Pos.stVal	R_220Relay.NI002[NI2]
R_211Relay/OC2PTOC2.Str	R_220Relay.NI003[NI3]
R_211Relay/OC2PTOC2.Op	R_220Relay.NI004[NI4]
R_211Relay/I3pMMXU1.A.phsB	R_220Relay.NI006[NI6]

Close

Export

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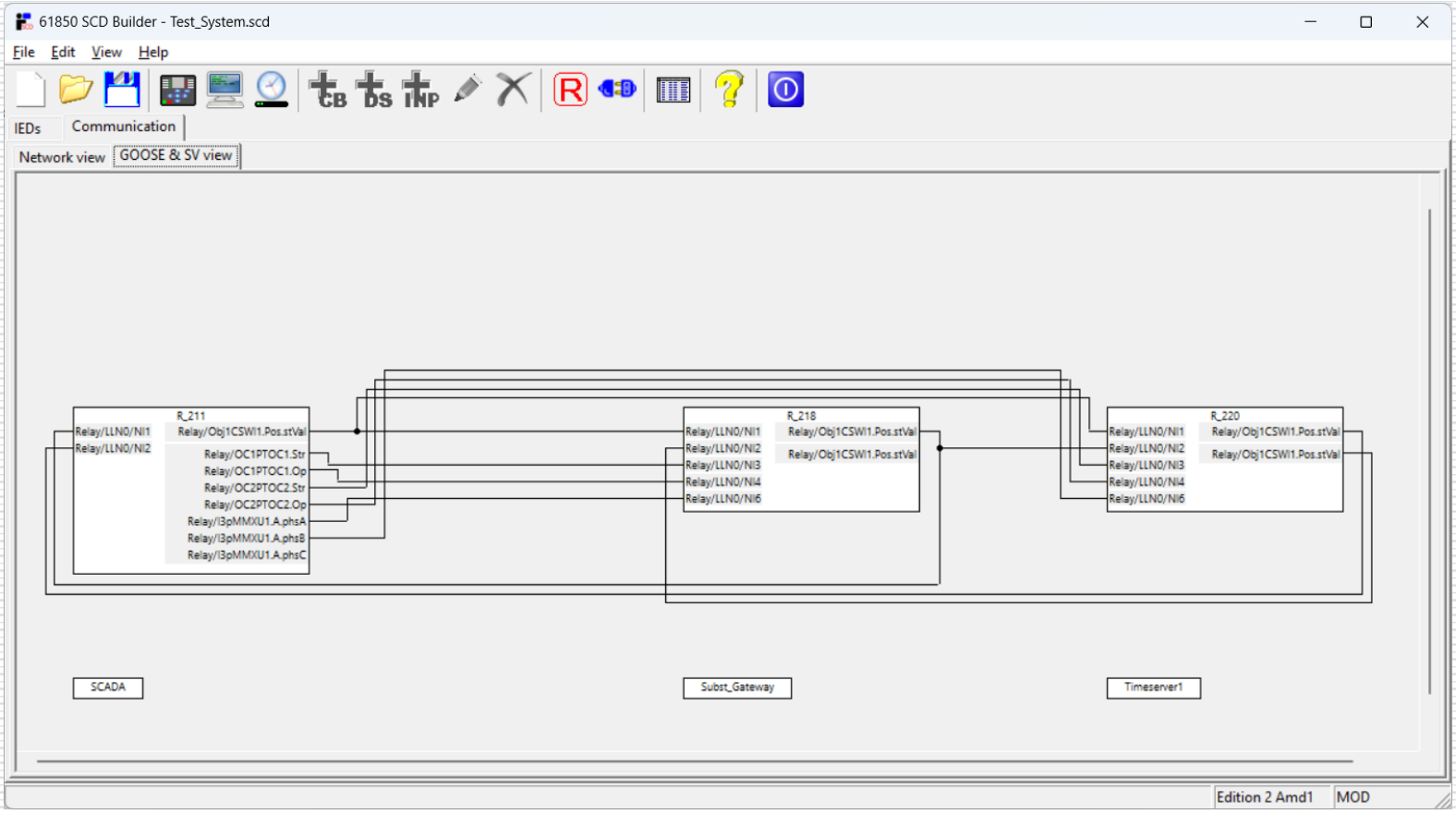
Communication view: GOOSE & SV binding

Data flow in the system.



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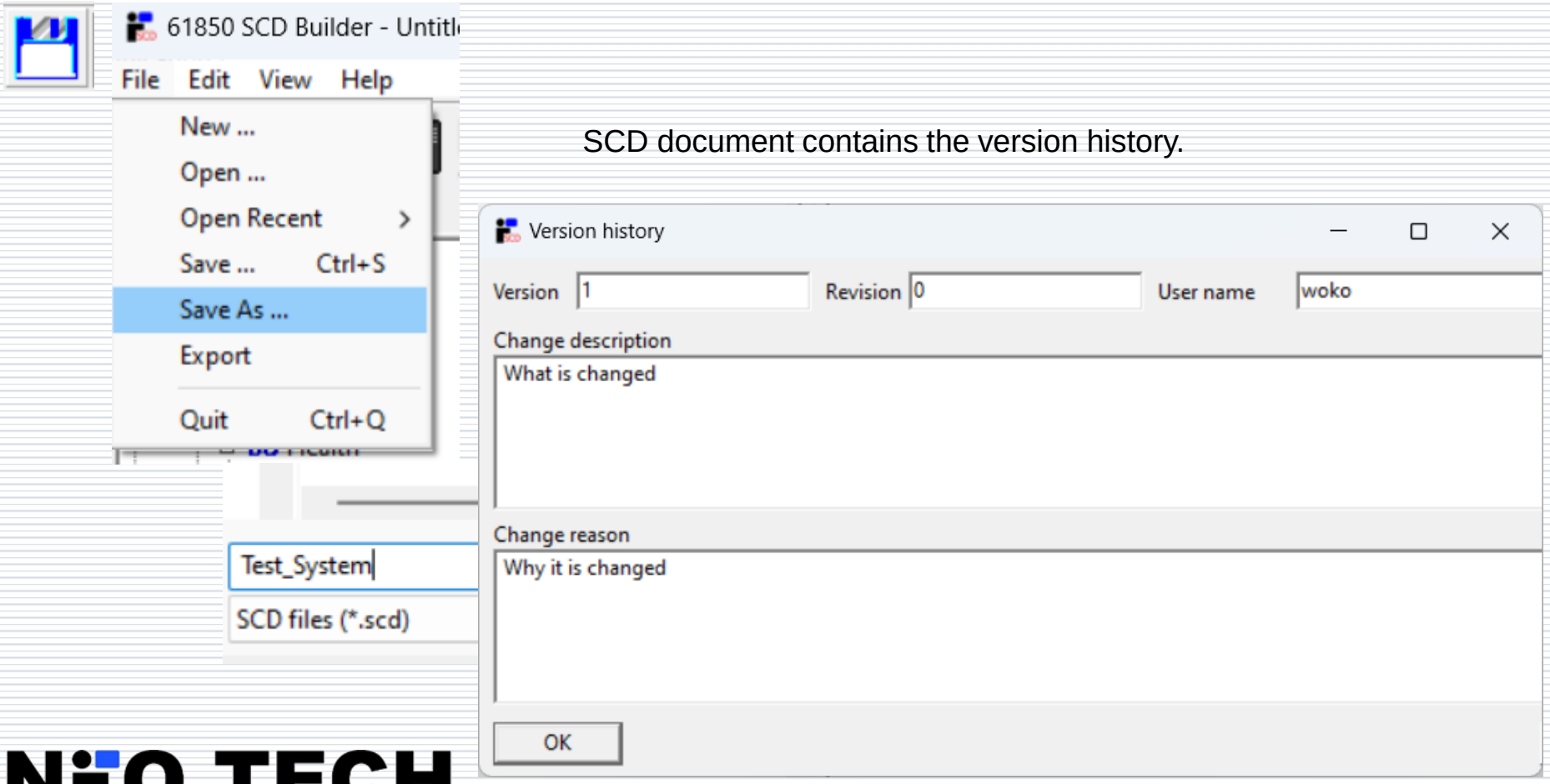
SV binding

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.

SCD file saving and version control



SCD document contains the version history.

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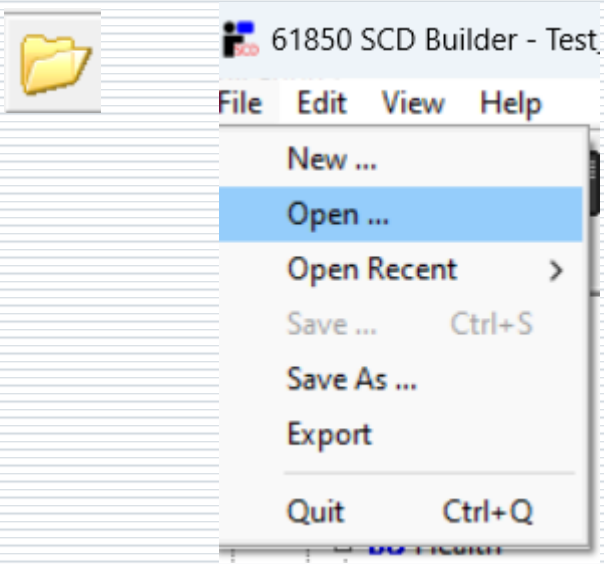
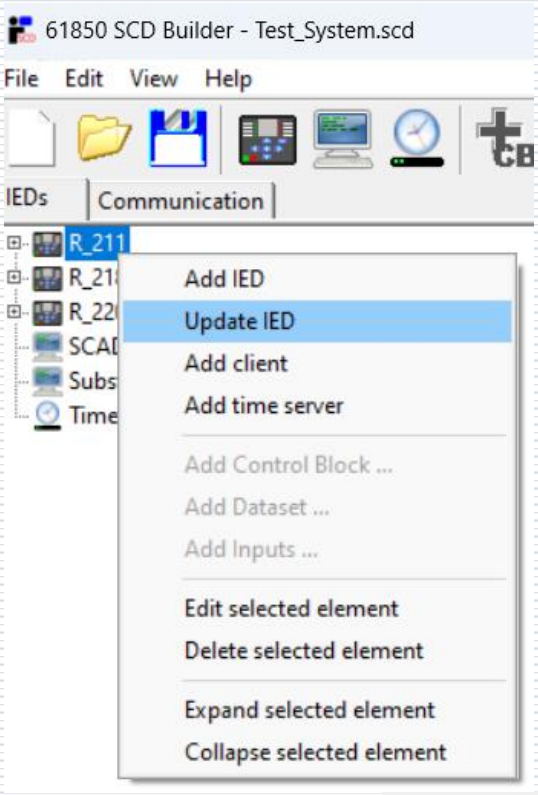
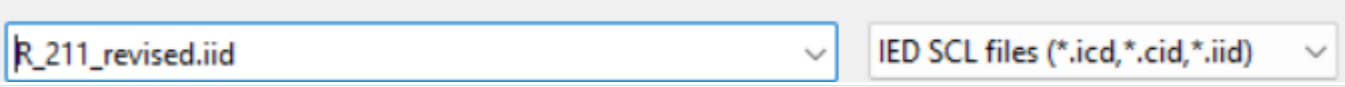
Opening an existing SCD file



IID file import for an IED section revision





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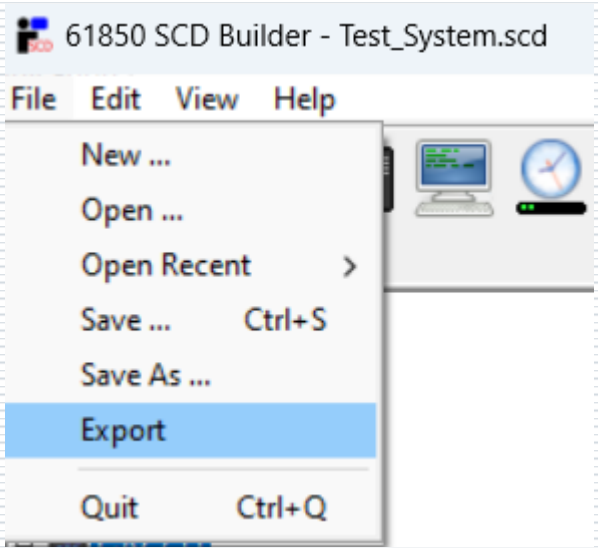
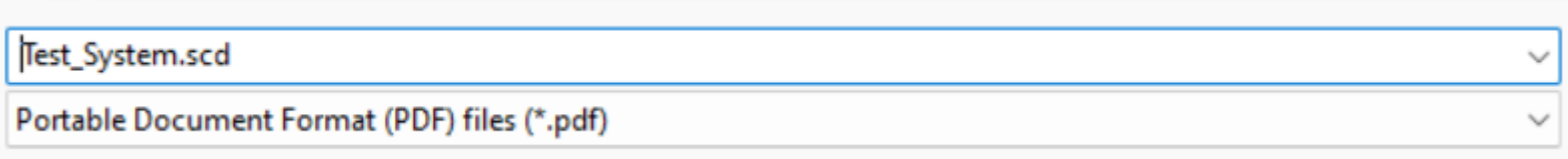
Generation of system documentation



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



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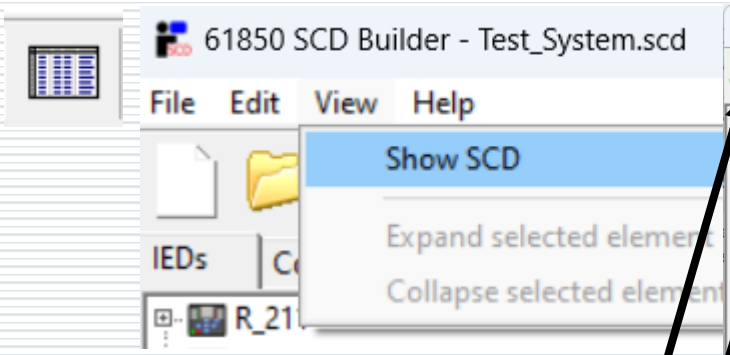
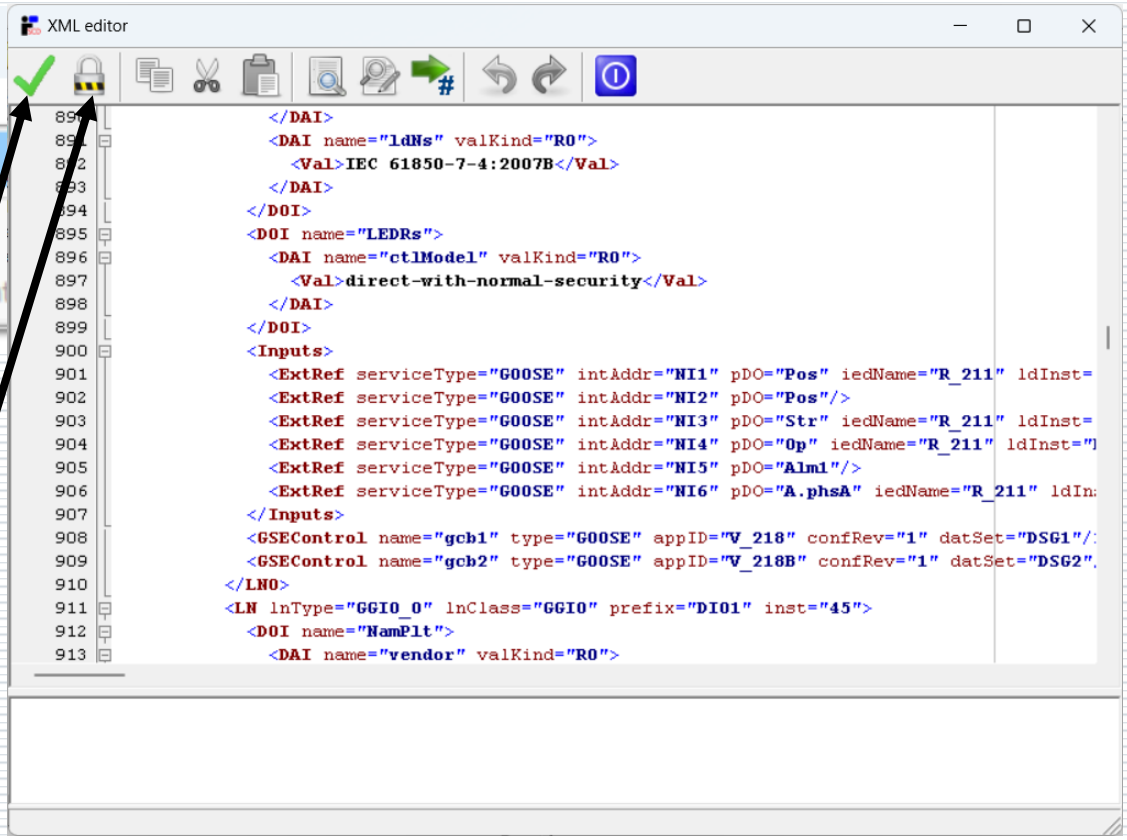
XML level editor and checker



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

Check syntax

Unlock XML editing



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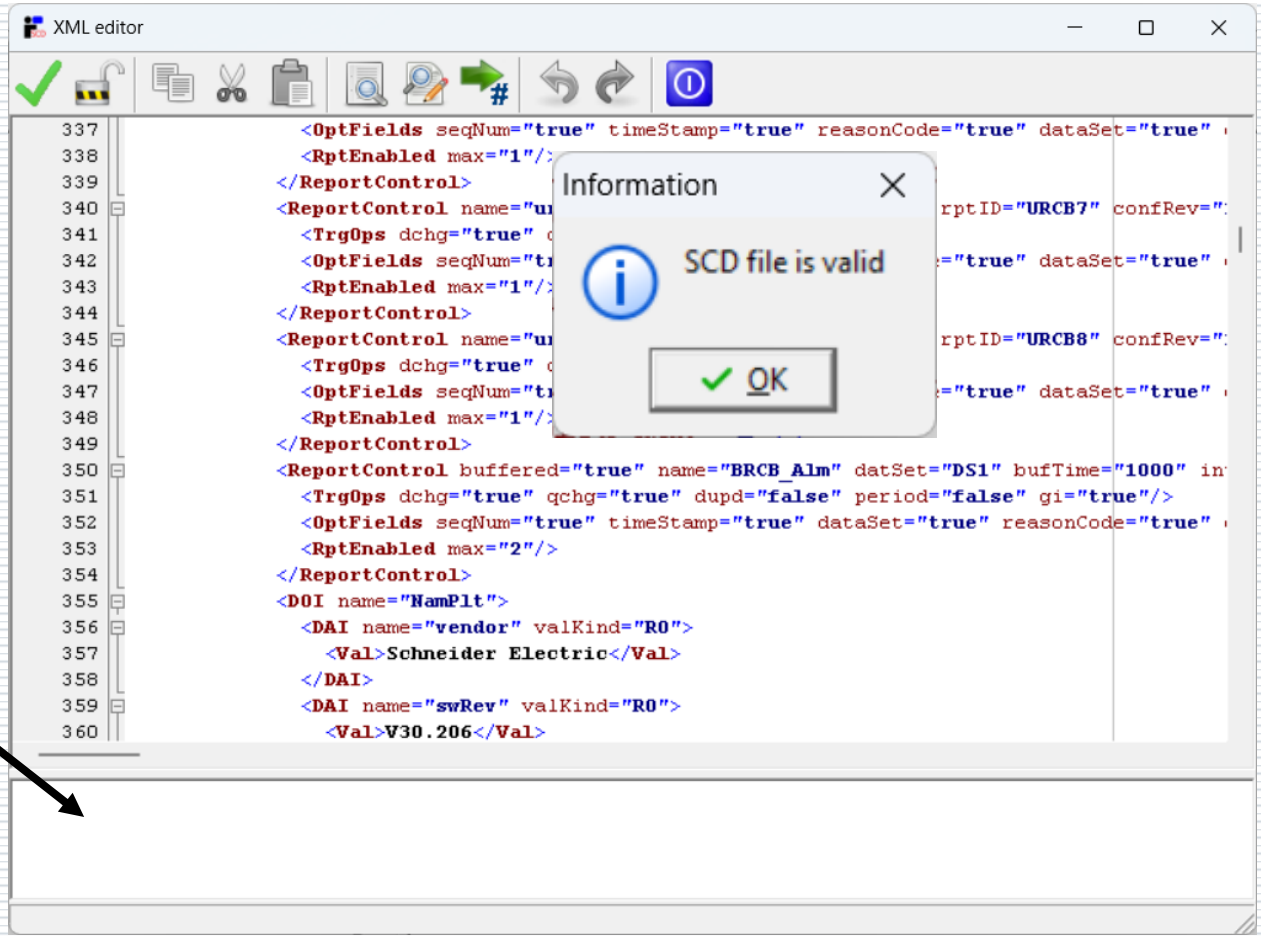
Always check after editing

Press 



Detected errors will be listed with the line information.

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Try yourself – request the trial version of 61850 SCD Builder

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

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Contact: 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

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