Working with IEDScout 5.00

Practical Example of Use

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Content

1 Safety

This application example was written for professional specialists in electronics and electrical engineering. Its purpose is to familiarize you with the *IEDScout* software and its various application fields. It contains helpful instructions on how to use *IEDScout* safely, properly, and efficiently.

Supplements: Help of *IEDScout* 5.00. Click the **Show Help** symbol in the upper right corner of the application window. This launches the *IEDScout* Help showing its introduction topic.

Requirements: *IEDScout* 5.00 or later; optional *Test Universe* GOOSE configuration module

WARNING

The OMICRON *IEDScout* software controls electrical equipment that can output life-hazardous voltages and currents.

- ► Before operating any such electrical equipment, carefully read the **Safety Instructions** section in the manual that was provided with the equipment.
- ► Do not use (or even turn on) any electrical equipment without understanding the information in its manual.
- ► Existing national safety standards for accident prevention and environmental protection may supplement the equipment's manual.
- ► Only trained personnel should work with the OMICRON *IEDScout* software.
- ► Changing settings of IEDs may have an impact on the IED's behavior and the protection functionality.
- ► Simulating IEDs and GOOSE may have an impact on both substation equipment and other IEDs.

FOR YOUR OWN SAFETY

Always observe the five basic safety rules:

1. Disconnect completely.
2. Secure to prevent reconnecting.
3. Verify that the installation is dead.
4. Carry out grounding and short-circuiting.
5. Provide protection against adjacent live parts.

2 Application example and glossary

Figure 1 below shows a typical test setup for several test specifications as defined by IEC 61850.

IEDs of different vendors communicate with each other and share functionality. A SCADA system (SCADA = supervisory control and data acquisition) is connected to the substation network. In addition, a breaker control device and a merging unit are connected. For data exchange in-between SCADA system IEDs (Control, Report), client/server communication is used; that is point-to-point connection utilizing TCP/IP. For testing purposes *IEDScout* takes over the client's functionality. For IED communication GOOSE is utilized. GOOSE are distributed as multicast (one-to-many) and will be received by both *IEDScout* and connected OMICRON test sets. This also applies to Sampled Values, which are measuring values published as multicast (not covered by *IEDScout*).

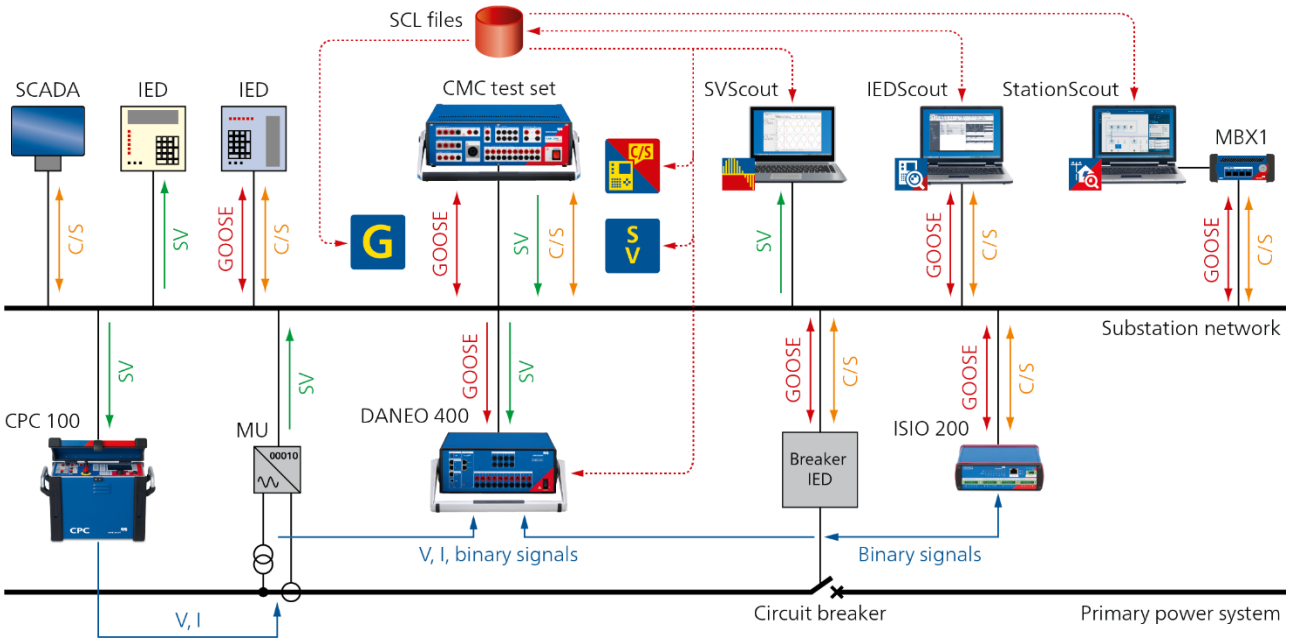

Figure 1: Typical IEC 61850 setup

Element	Abbreviation	Notes
Intelligent Electronic Device	IED	Different vendors (interoperability)
Supervisory, Control and Data Acquisition	SCADA	For example, a local Human Machine Interface (HMI).
Generic Object Oriented Substation Event	GOOSE	Multicast (one-to-many) published by an IED.
Sampled Values	SV	Measurement values published on the network (multicast).
Client/Server communication	C/S	Point-to-point communication
Logical Device	LD	An element of a data model collecting logical nodes.
Logical Node	LN	An element of a data model representing a function. Contains Data Objects and their attributes.
DataSet	DS	Reference to information (LN) to be used by different services.

Table 1: The setup elements

3 Introduction

IEC 61850 in brief

IEC 61850 is the standard describing communication networks and systems in substations (edition 1) or, more general, for power utility automation (edition 2). As illustrated in Figure 1, IEDs communicate with each other on a substation network. They operate as servers sending out data unsolicited. Connected SCADA systems are the clients and receive event information in form of Reports. Reports are, for example, triggered by a data change. For testing purposes *IEDScout* takes over the client's functionality receiving the Report. In the other direction, *IEDScout* can issue control services. For device-device communication in real time GOOSE is used. Since GOOSEs are multicast, every member of the multicast, that is all IEDs, will definitely receive them. *IEDScout* can simulate IEDs with their functionality as described.

The entire engineering is described in SCL files (SCL = Substation Configuration Language) that comply with IEC 61850-6. Each IED contains a data model consisting of logical devices (LD). In these logical devices logical nodes are stored. They are representing the IED's functionality, such as the circuit breaker's position, distance protection, and so on. The data model is accessed by different services, such as Report, GOOSE, and so on. This does not happen directly; a reference (DataSet) is used for the special service.

IEDScout 5.00

System requirements

- A computer with x86 or x64 architecture (a physical computer; not a virtual machine)
- Windows 7 (32 bit/x86 and 64 bit), any SP
- Windows 10 (64 bit)
- Administrator or Power User rights for the installation
- RAM: 1 GB or more (recommended 4 GB or more)
- Available hard disk space: 2 GB
- An Ethernet adapter with TCP/IP protocol bound to it
  (Note: Wireless adapters typically do not work with GOOSE)
- A screen resolution of 1280 x 768 or higher

Prerequisites

Network Settings
Before starting to work with *IEDScout*, properly configure the network settings on your computer. Make sure you have administrator or power user rights to be able to change the network settings. Enable the network adapter in your computer's settings, and make sure it has a valid IP address.

User interface screens

You find detailed descriptions about the *IEDScout* screens, windows and commands in the Help. Click the **Show Help** symbol in the upper right corner of the application window or press the <F1> key on your keyboard). This chapter describes the user interface's concept.

- **Start screen**
  The **Start** screen provides quick access to the most frequently used commands. Furthermore, it provides an overview of the recently opened SCL files and discovered IEDs.

- **Browser and Simulator screens**
  The **Browser** and **Simulator** tabs represent your most common working environment and provide the most frequently used commands in several groups. **Browser and Simulator** screen groups:
  - Application
  - IED (**Browser** only)
  - Data
  - Services
  - Show

- **Sniffer screen**
  The **Sniffer** allows the observing of different kind of network traffic and capturing it. Sniffing network traffic means intercepting and recording data traffic passing over a digital network (or part of a network) to help diagnose network issues. Use the *IEDScout* Sniffer to capture and visualize IEC 61850 network traffic. Sniffed messages can be any ingoing or outgoing GOOSE, Reports, or client/server (C/S) messages that are not Reports. C/S messages between *IEDScout* (client) and an IED (server) can be sniffed any time. Sniffing messages sent between other participants on the network can only be achieved by port mirroring or a network tap on the switch. Any other network traffic, such as MMS messages (Manufacturing Message Specification) or Ethernet packages, is captured but not visualized in the Sniffer. You can, however, visualize it using PCAP Export to Wireshark. Use the Protocol Error filter to visualize issues in network traffic.

Browser screen

- **IED pane**
  The **IED** pane shows the opened IEDs and allows accessing them.

- **Details pane**
  The **Details** pane shows the details of items selected in the **IED** pane.

- **Activity Monitor**
  The Activity Monitor allows for collecting different information, such as Data Objects, Data Attributes, DataSets, GOOSE, Reports, in one common view.

Simulate screen

- **IED pane**
  The **IED** pane shows the IED opened by an SCL file, and allows accessing a single IED.

- **Details pane**
  The **Details** pane shows the details of items selected in the **IED** pane. New values can be set.

- **Activity Monitor**
  The Activity Monitor allows for collecting different information, such as Data Objects, Data Attributes, DataSets, GOOSE, Reports, in one common view.

4 Applications

Connecting to a network, discovering and browsing

Configuration

Before starting to work with IEDs, properly configure your system. Click **Start ► Configuration** to open the **Configuration** window.

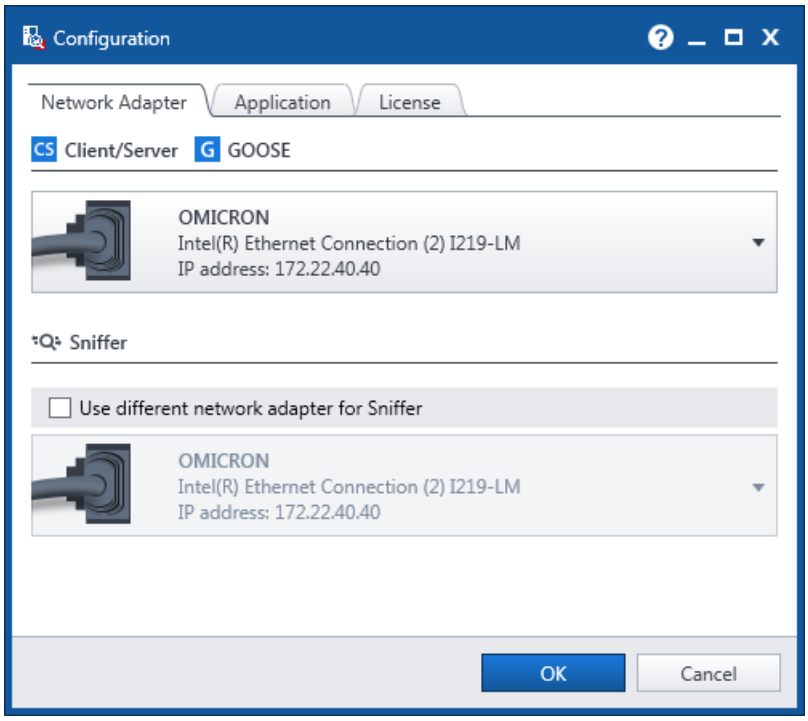

Figure 2: Configuration **Network Adapter** – Define the LAN connection

At **Network Adapter** define the LAN connection your computer should use for receiving and sending GOOSE (→ Figure 2).

Note: If you want to use another port for sniffing data, select the corresponding network adapter here.

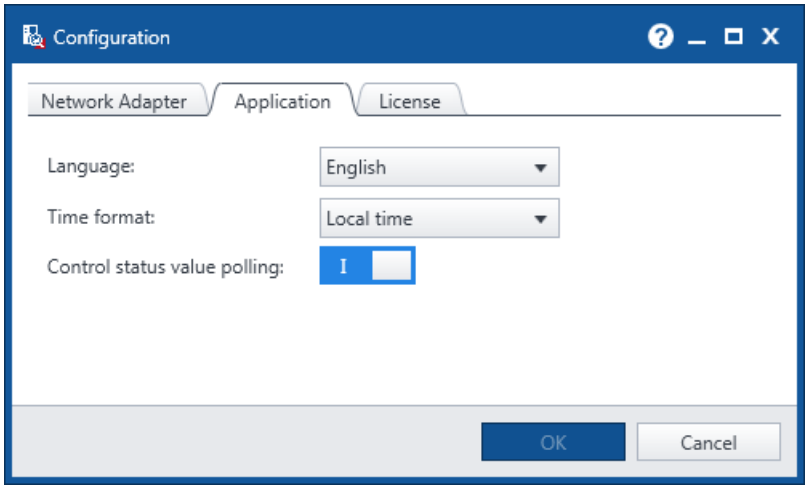

Figure 3: Configuration **Application** – Set the user interface language

At **Application ► Language** set the user interface language of *IEDScout*.

Click the **Apply and restart** button to confirm your selection and to restart *IEDScout* with the user interface in the new language.

Discovering and browsing the IED

Once the network is defined, discover the IEDs of your choice on the network. In most cases, the selection of the corresponding IP-address will be sufficient (→ Figure 4).

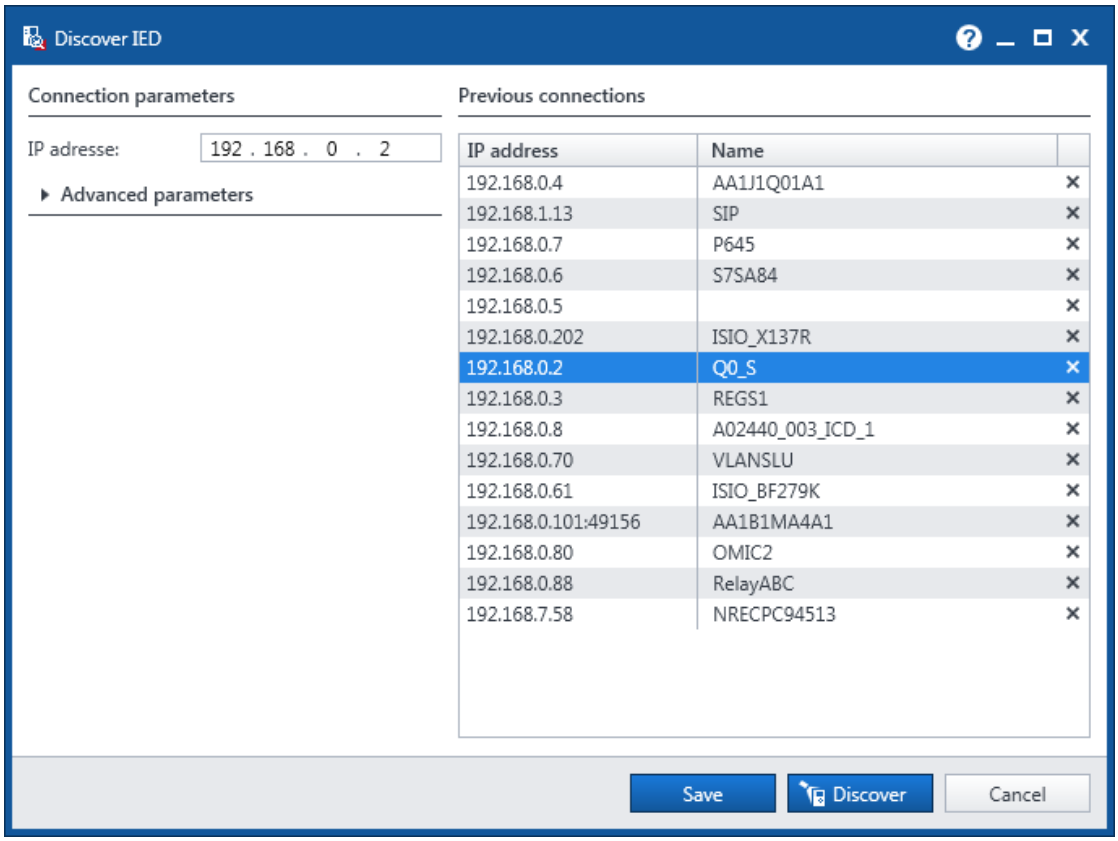

Figure 4: Discover the selected IED

Note: Since an IP address is unique within a network, only one IED at a time can be discovered. An IED being online does not automatically publish GOOSE or Reports.

- In the **Discover IED** window, either enter the IP address of the device you would like to discover, or select a device of your choice from the list of previous connections.
- Click the **Discover** button. A window named **Discover IED** pops up, showing the progress of the discover operation. While the progress window is shown, you can terminate the discover operation by clicking **Cancel**, or by hitting your keyboard's <ESC> key, if you want to. Note that this does not immediately cancel the discover operation, but at the earliest point in time when it is safe for *IEDScout* to cancel this operation.
- Once the IED is discovered, *IEDScout* switches to the **Browser** tab. The IEDs symbol at the **Navigation** pane indicates that this IED has successfully been discovered.
  At the same time, the discovered IED is set "online" by default, as indicated by the **Online** symbol on the **Browser** tab. The IED symbol changes to .

In general, the IED's IP address is the only information you need to connect to such an IEC 61850-compliant device. If the IP address is a valid address within the network your computer is connected to, *IEDScout* will find the device. In rare cases, when *IEDScout* is not able to discover a connected, fully functioning IED - for example, if the IED is set up with special connection parameters (see your corresponding IED configuration tool) -, you may want to check the **Advanced Parameters** (→ Figure 4). Change the advanced parameters with caution, though, and refer to the IED's user manual or its setup software before doing so.

The **Navigation** pane now shows an overview of the IED's data model (→ Figure 5):

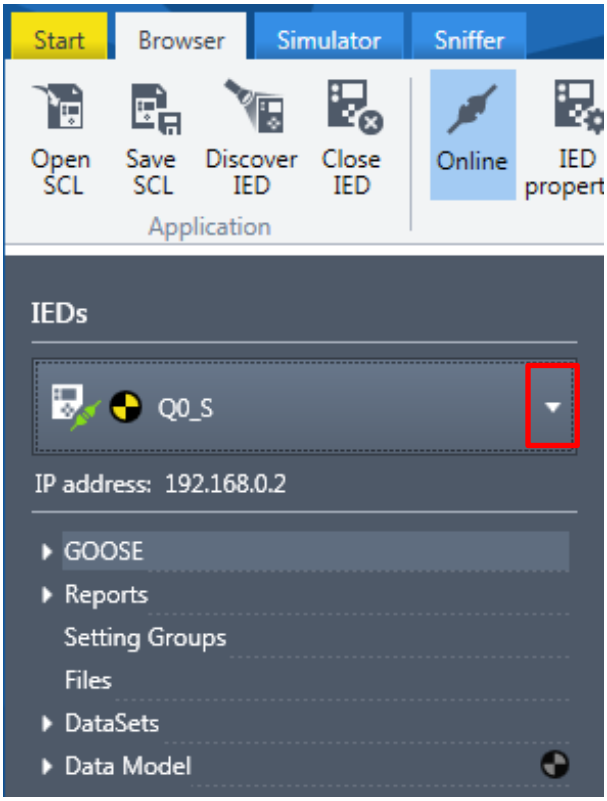

Figure 5: **Navigation** pane

The symbol shows that the discovered IED is online. The symbol denotes that at least one IED or one of its Logical Devices is in a test- or simulation-related mode. The equivalents symbol in the **Details** pane is .

Depending on IED's configuration, the following elements can by selected by clicking the according triangle symbol (see red box above):

- GOOSE
- Report control blocks (buffered and not buffered)
- DataSets
- Data Model

In the **Details** pane (at the right of the **Navigation** pane), the defined GOOSE control blocks are shown by default (→ Figure 6):

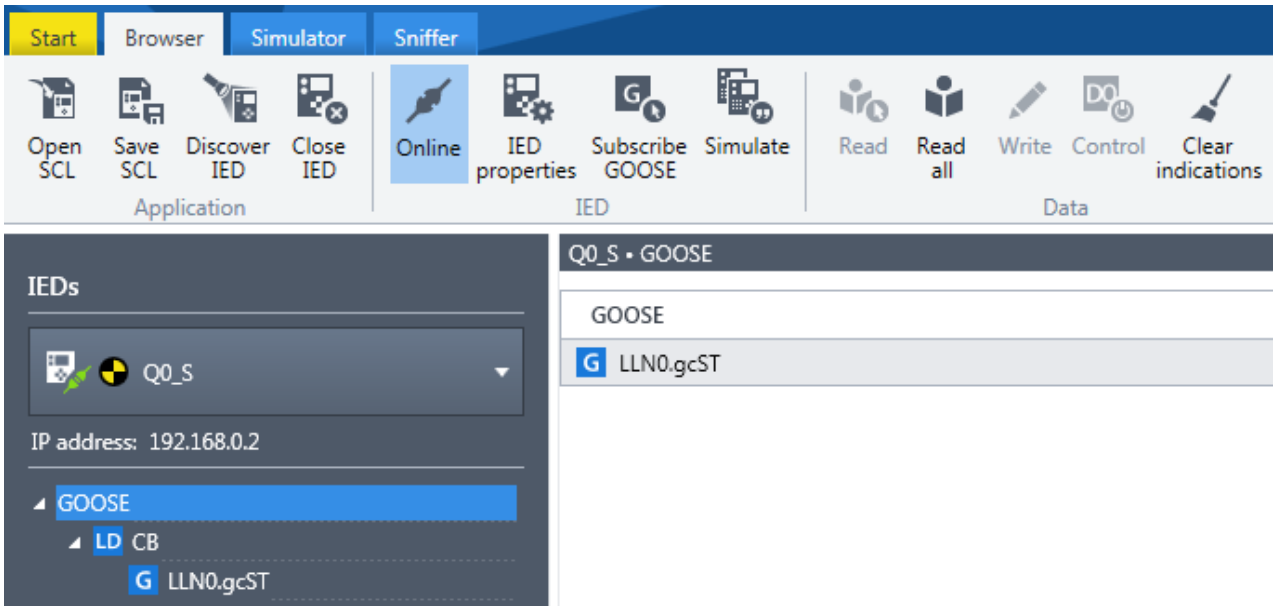

Figure 6: GOOSE in **Details** pane

Opening the different elements allows viewing their Data Objects and Data Attributes (→ Figure 7).

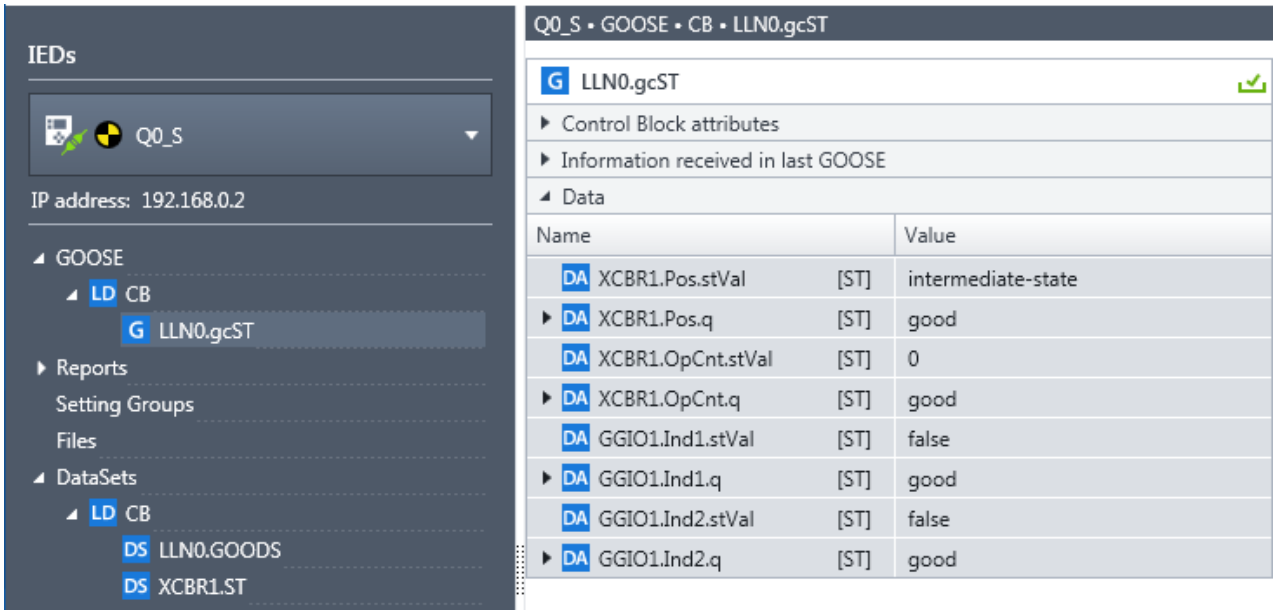

Figure 7: Data Model

Click **Descriptions** to toggle an extra column holding descriptions of GOOSE, Reports, DataSets and Logical Nodes based on the IEC 61850 descriptions (→ Figure 8).

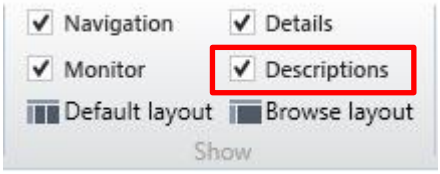

Figure 8: **Descriptions** option

Descriptions "on":

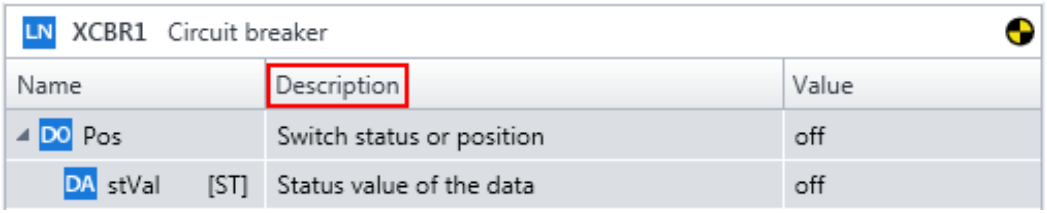

Figure 9: Descriptions selected

The browser layout (→ Figure 8) is the recommended layout when working with descriptions.

DataSets can also be shown:

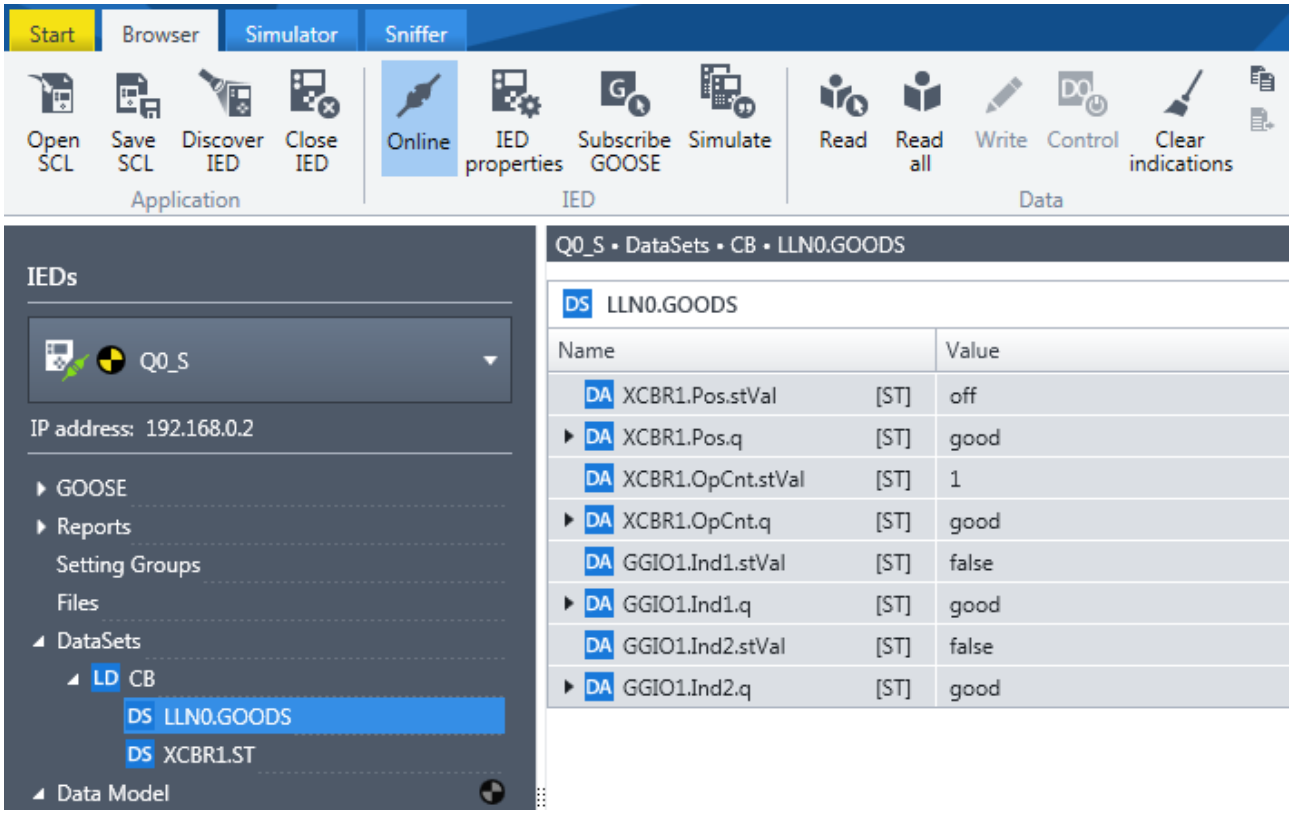

Figure 10: DataSet

As you can see in Figure 10 above, the Data Attribute **quality** (q) is shown as summarized "overview" information.

For details, click its expander symbol to extend it (→ Figure 11).

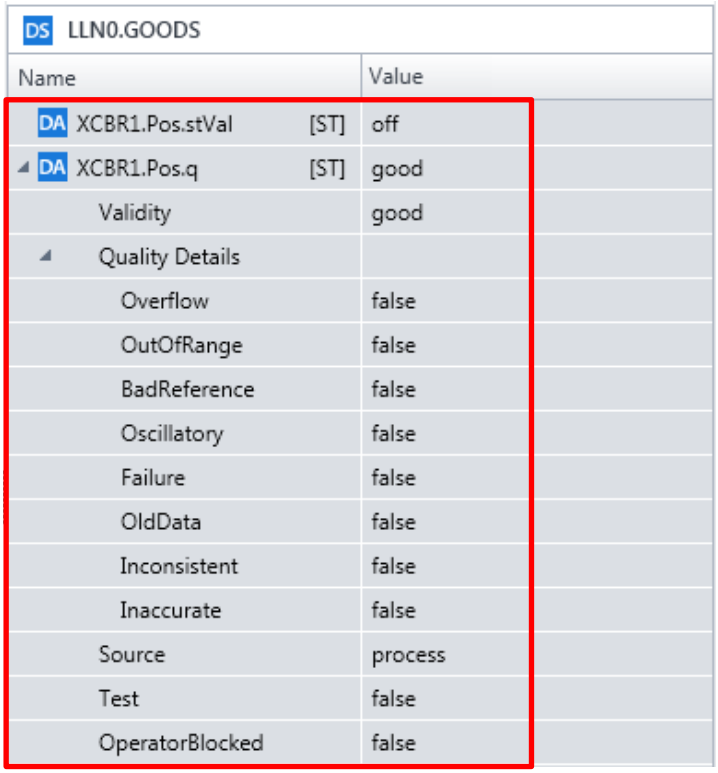

Figure 11: Quality details

All tasks described here can be done online and offline. Toggling the statuses is possible by clicking **Online** (→ Figure 12)

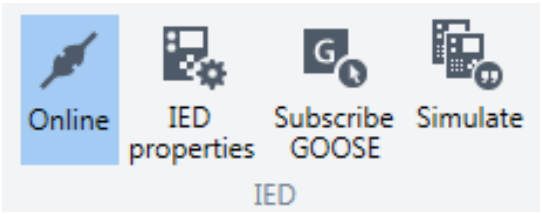

Figure 12: IED Online

Observing items- working with Data View and Activity Monitor

To observe particular items of your choice (Data Object, GOOSE, DataSet, Report), use the **Activity Monitor** (→ Figure 16). At the **Activity Monitor**, information and data can be visualized, grouped and observed.
The **Details** pane provides both a content overview and detailed information (→ Figure 13 & Figure 14).

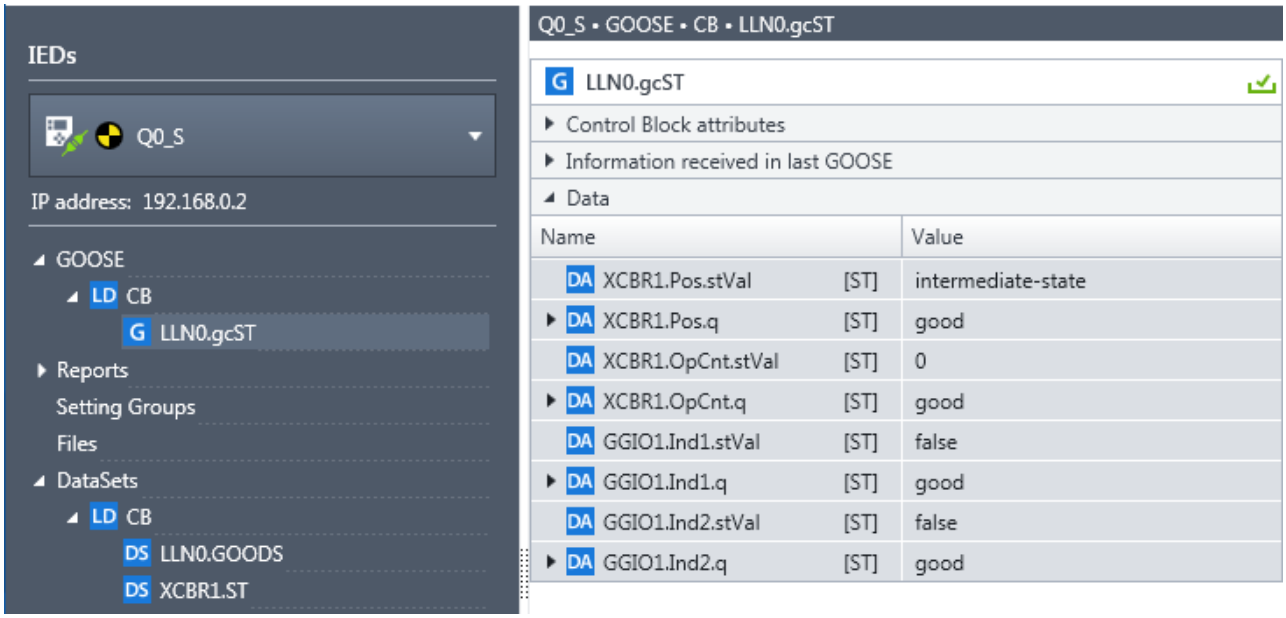

Figure 13: GOOSE data

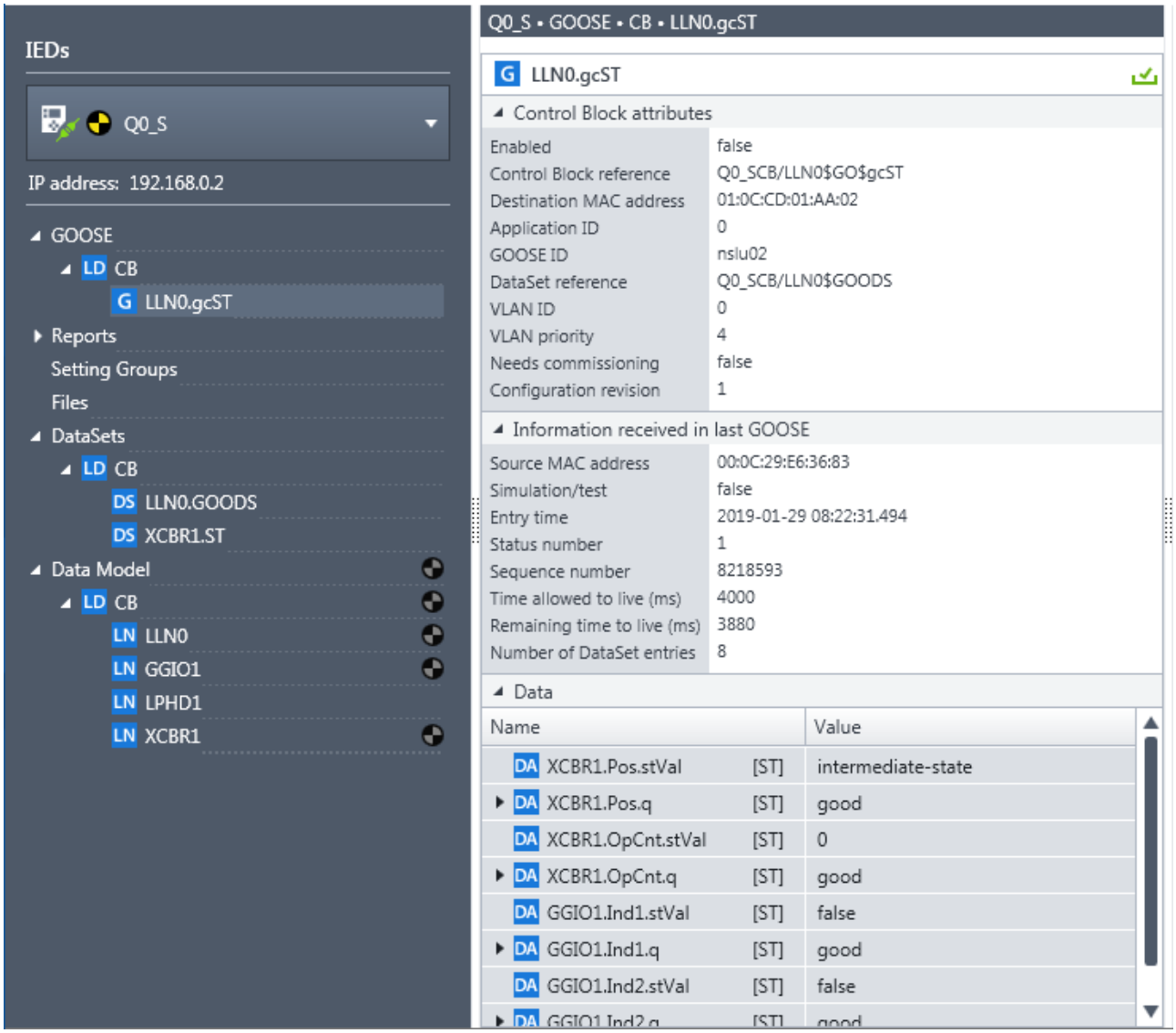

Figure 14: GOOSE details

To automatically update the values, subscribe the GOOSE:

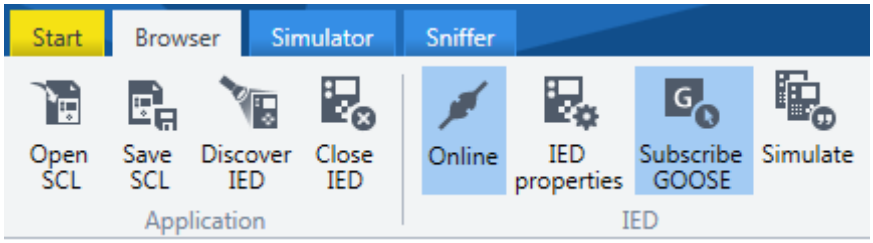

Figure 15: Subscribe GOOSE

To monitor more than one piece of information, we recommend using the **Activity Monitor**. To do so, just drag and drop the item of interest to the **Activity Monitor** (→ Figure 16).

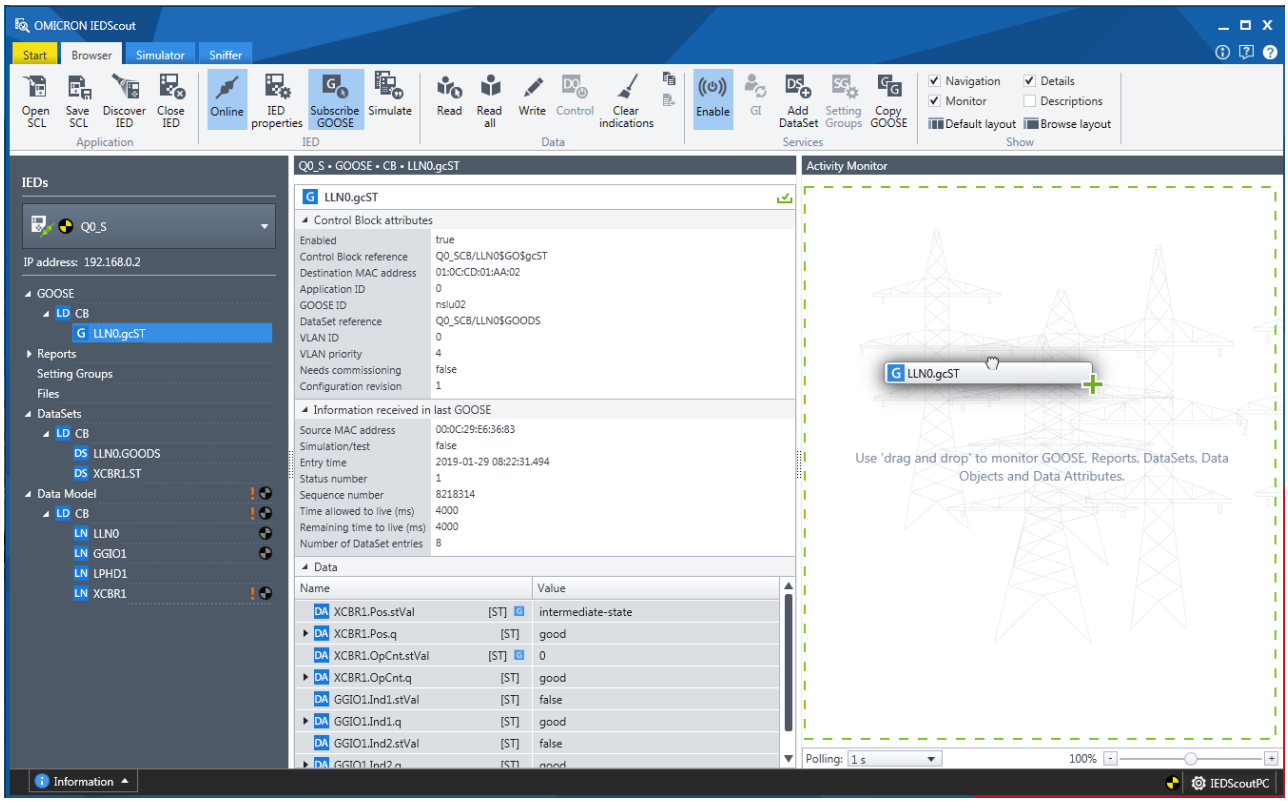

Figure 16: Drag and drop items to the **Activity Monitor**

You can do this on both the **Navigation** pane and the **Details** pane. What is happening in such a case?

Item	Result
Data object	Will be polled
Data attribute	Will be polled
GOOSE	Will be subscribed
Report	Will be enabled
DataSet	Will be visualized and updated permanently.

Table 2: Items in **Activity Monitor**

The result is shown in Figure 17:

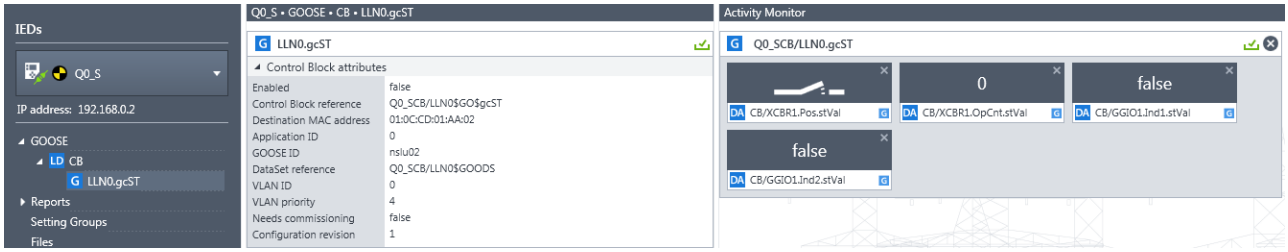

Figure 17: GOOSE in **Activity Monitor**

Use the zoom slider at the **Activity Monitor**'s lower edge to zoom in and out the monitored values (→ Figure 18, Figure 19):

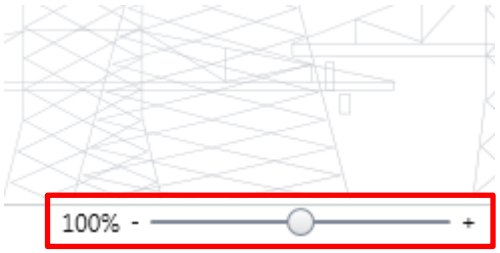

Figure 18: Zoom slider

Alternatively, hold the <Ctrl> key pressed and scroll the mouse wheel.

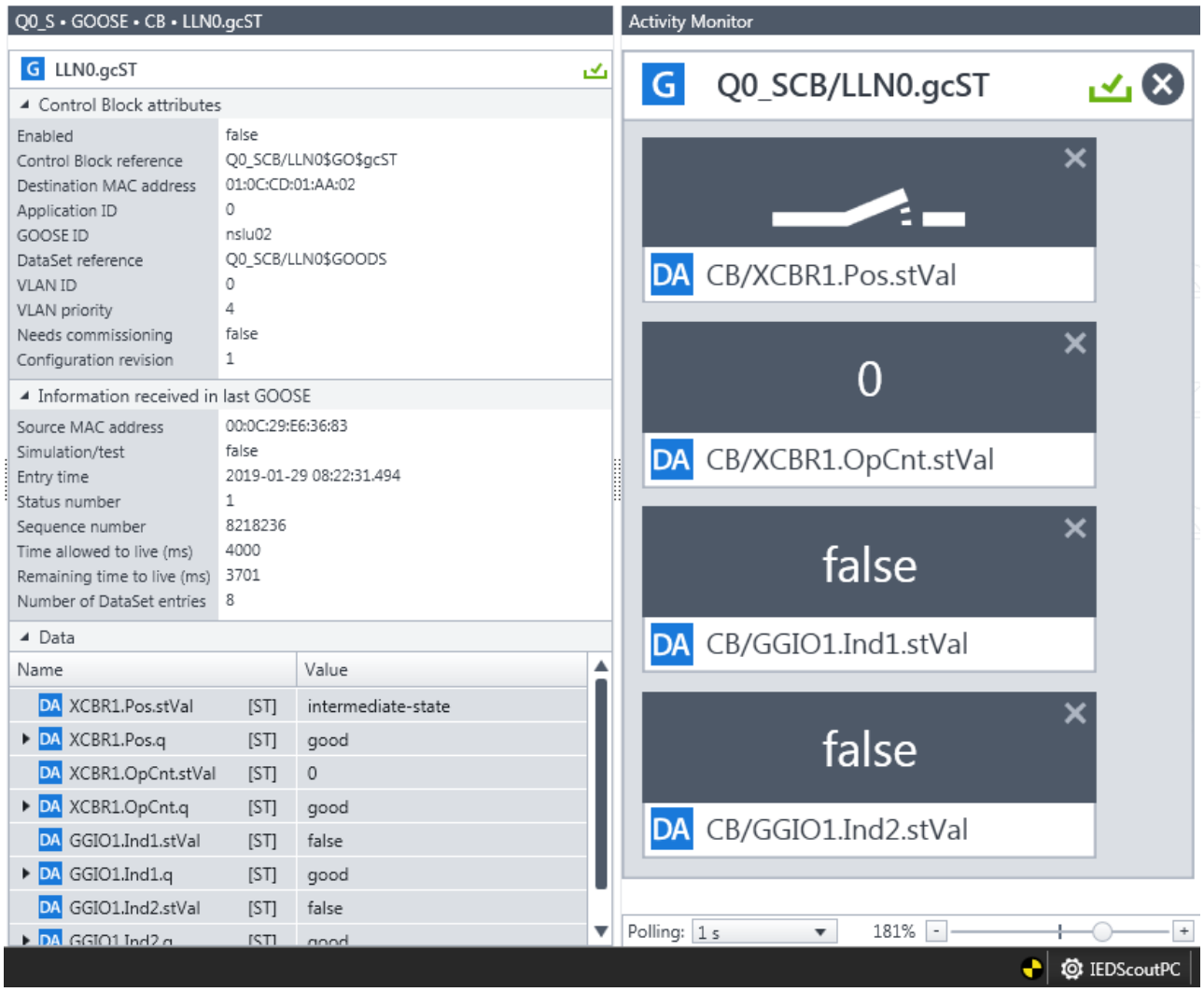

Figure 19: Zooming in to an item in the **Activity Monitor**

Working with SCL files

Starting *IEDScout* (→ Figure 20) allows opening SCL files right from the **Start** screen. If no recent files are displayed, a new one has to be chosen.

Figure 20: Start screen

IEDScout will look for IED-related information in all files based on the scheme called SCL (Substation Configuration Language). The following file types can be selected:

Extension	Meaning
scd	Substation configuration description containing all IEDs defined
ssd	System specification description describing system
icd	IED capability description (single IED describing its capabilities)
iid	Instantiated IED description (describing the single IED in its present configuration)
sed	System exchange description (to describe interfaces projects consisting of several parts)

Table 3: SCL files

Hint: We recommend working with **scd** files because they contain the engineered substation with all IEDs defined. In a next step, select the corresponding IED (→ Figure 21):

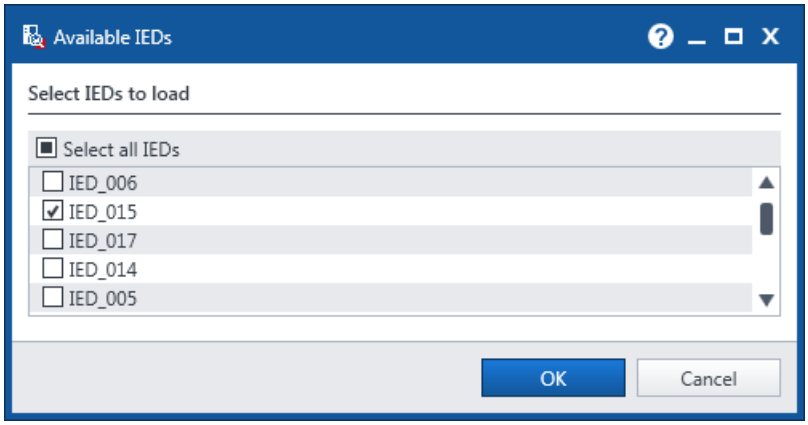

Figure 21: Select IEDs to load

Opening a file starts an automatic file validation. In case of a parsing error the IED is marked with a warning symbol. You can find detailed error information in the **Status History** (→ Figure 22).

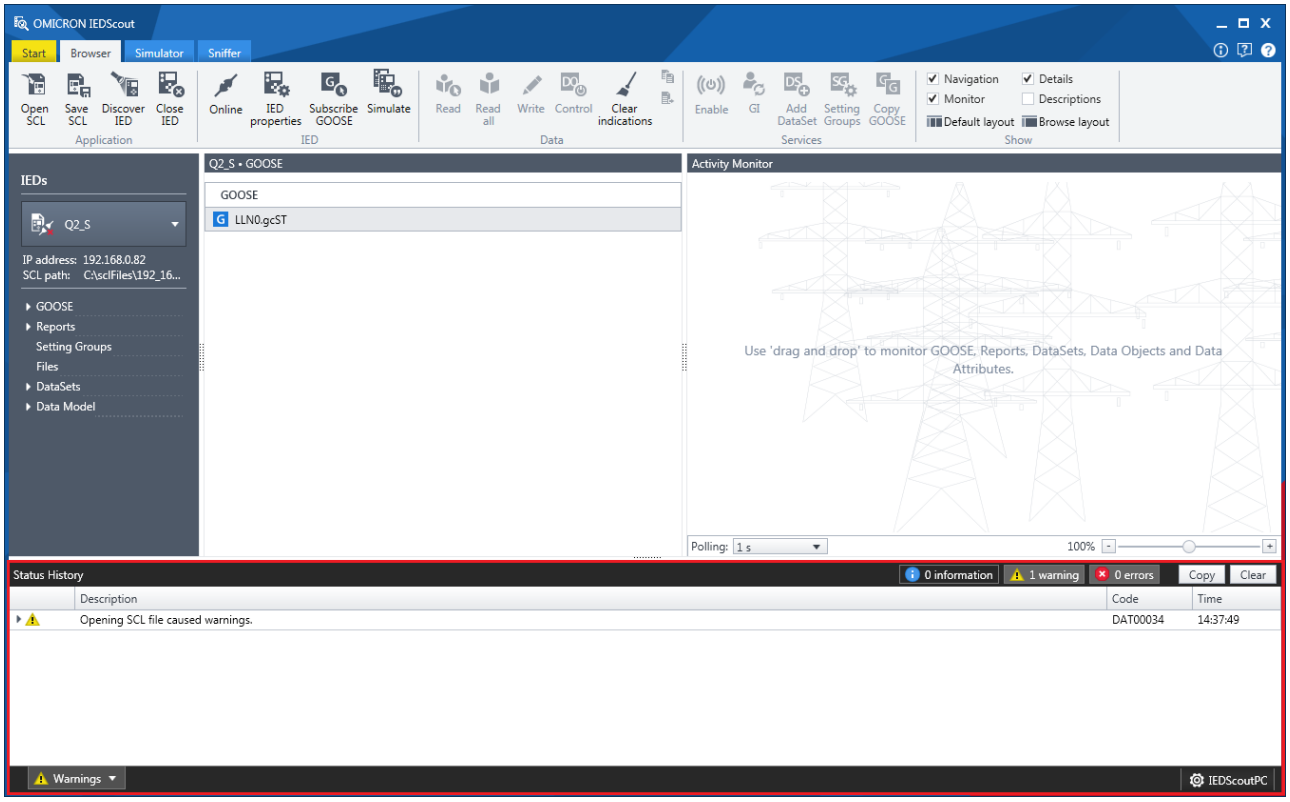

Figure 22: Opened SCL file containing a warning in the **Status History**

In case of a corrupt SCL file, *IEDScout* generates a message in the **Status History** (→ Figure 23).

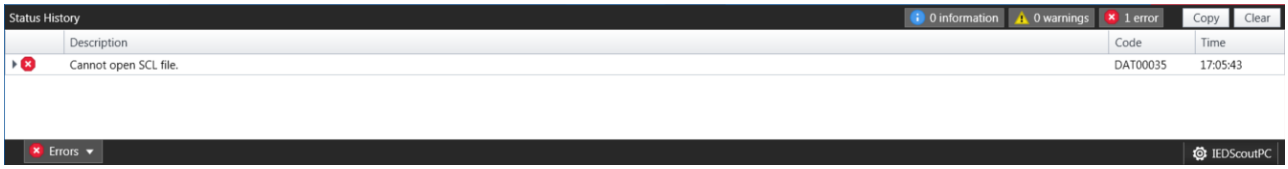

Figure 23: Opened SCL file containing an error in the **Status History**

Analyzing GOOSE

The GOOSE overview displays all GOOSEs defined in the present IED.

To subscribe the GOOSE, click **Subscribe GOOSE**, or drag the GOOSE to the **Activity Monitor**.
The GOOSE details are shown in **Details** view. For more information about the possible states check the *IEDScout* Help.

Unknown GOOSE indicates a GOOSE found, for example, by the **Sniffer**. They are listed below the IED list and grouped per IED/LD. Every single subscribed unknown GOOSE can be unsubscribed/closed clicking **Close IED**.

Working with Reports

The Report overview displays all Reports defined in the present IED.

The name of the single report is listed. For more information about the possible states, check the *IEDScout* Help.

The Report details are shown in **Details** pane.
To enable a Report, click its corresponding entry in the **Navigation** pane or drag the Report to the **Activity Monitor**.

Now select a DataSet and set the trigger and transmission options (→ Figure 24):

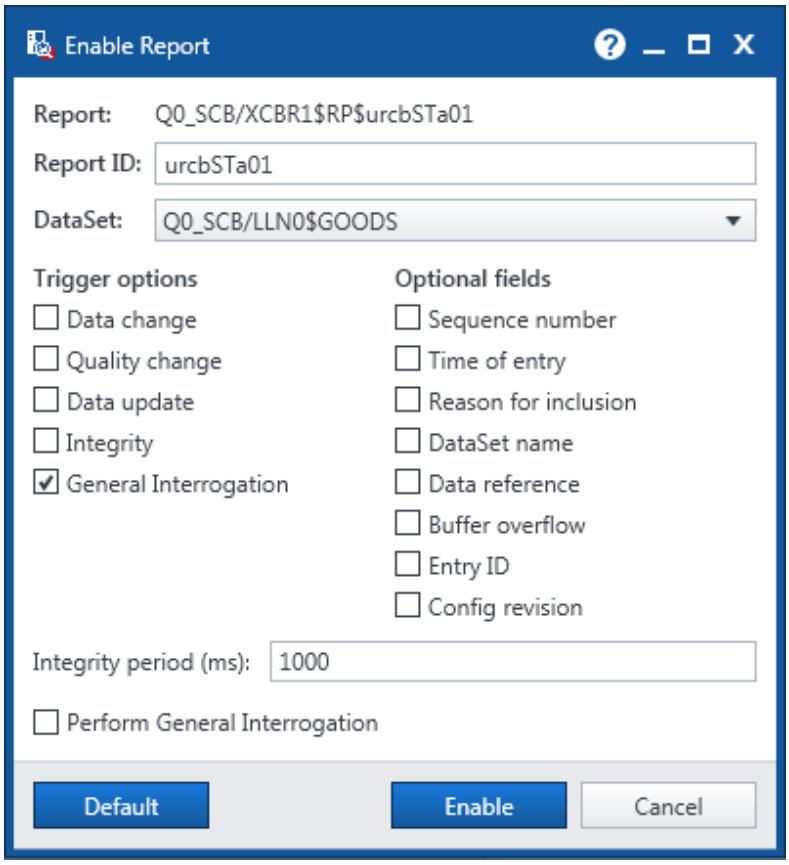

Figure 24: Trigger options

The preselected DataSet is the one defined in Report Control Block.

If the client picks up the information it is interested in and creates its own DataSet, this is sometimes called "Dynamic Reporting". The creation of a DataSet is described in chapter “Working with DataSets”.

Initiate General Interrogation

General Interrogation (GI) means the request for all the data defined of an IED; for example, when the connection is re-established. To do so, click **GI** on the **Browser** tab or select **Perform general interrogation** when enabling the report (→ Figure 24).

Working with DataSets

General

DataSets are references to the data model. Different services, such as GOOSE or Report, use DataSets to define the items to be transmitted. DataSets can be defined by the IED vendor, by the system configurator or they will be created on request of a client. Only this ("dynamic") DataSet can be deleted. *IEDScout* shows the DataSets under the DataSet node.

DataSets may be created as persistent or non-persistent instances. A persistent instance is visible to any client. Non-persistent DataSets are visible only to the client that created it. Pre-defined (configured) DataSets are visible to any client and cannot be deleted.

Add DataSet

If the server supports "dynamic reporting", as described in the last chapter, the client has to create the DataSet in the IED. To do so, click **Add DataSet** and select the items (drag & drop, → Figure 25).

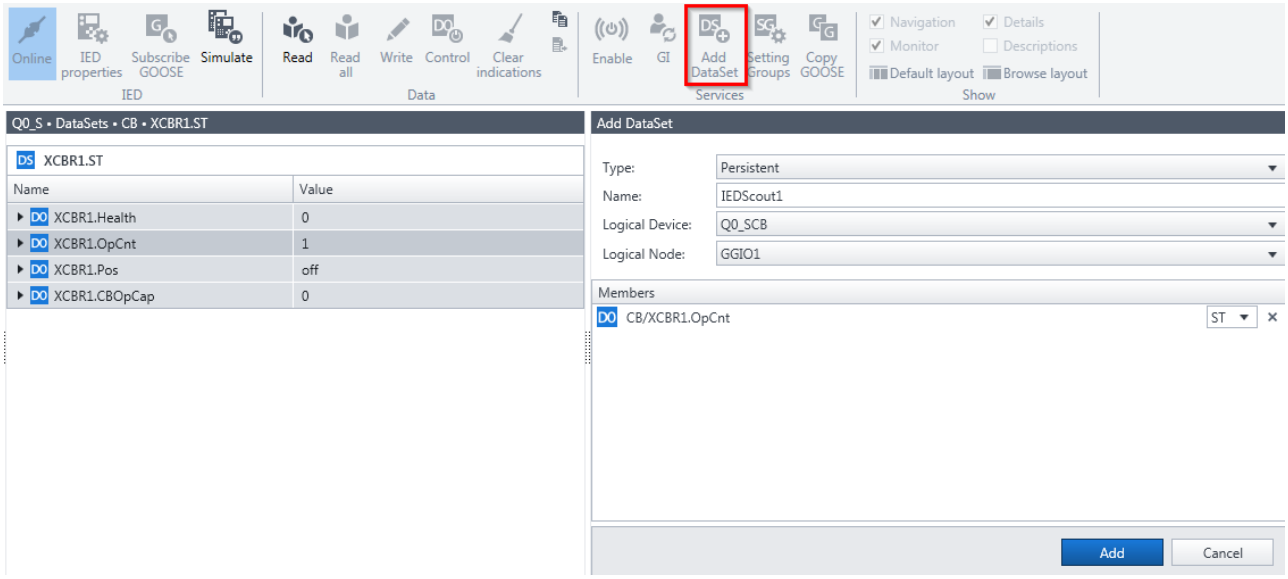

Figure 25: Add DataSet

Analyze network traffic by sniffing data

A typical application for the *IEDScout* **Sniffer** is the analysis of network traffic.

Since client/server communication (for example for SCADA purposes) is generally point-to-point traffic, only the "own" traffic between *IEDScout* and the connected IEDs will be visualized. For additional traffic the switch has to be equipped with a mirror port (Figure 26), or a so called "TAP" has to be inserted.

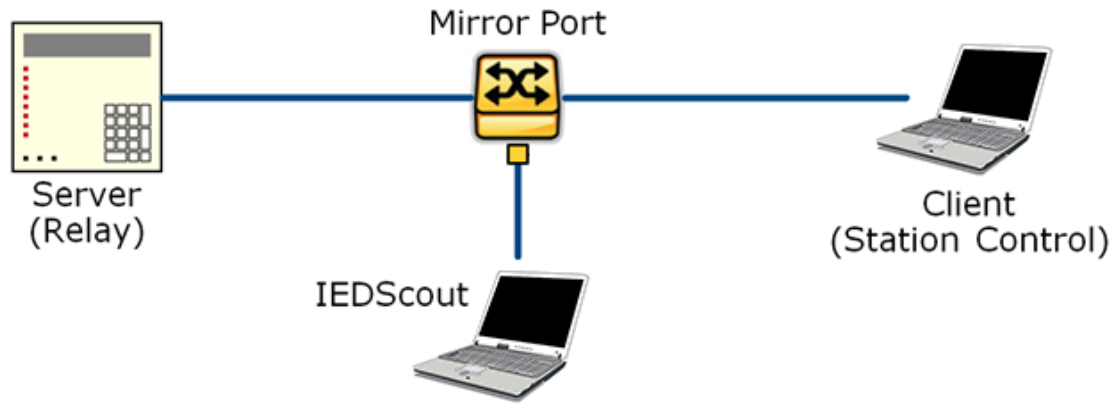

Figure 26: Mirror port

Start the **Sniffer** from the **Start** screen (→ Figure 27):

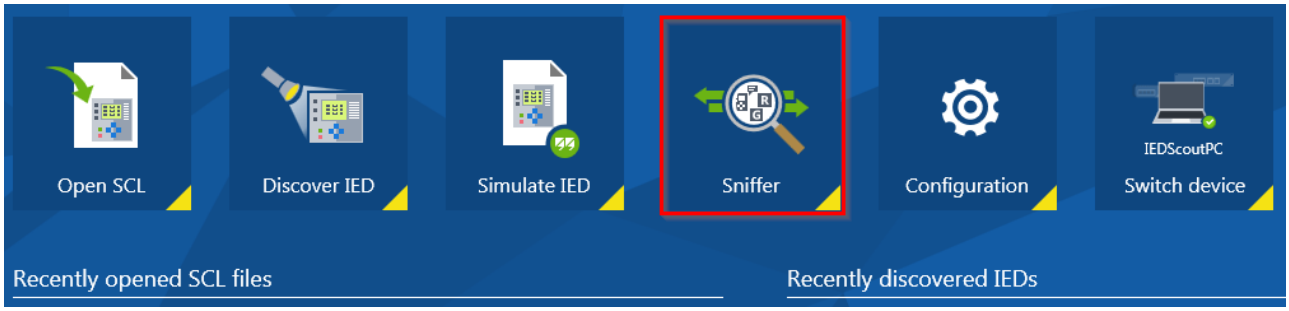

Figure 27: Sniffer on **Start** screen

or select *IEDScout*'s **Sniffer** tab (→

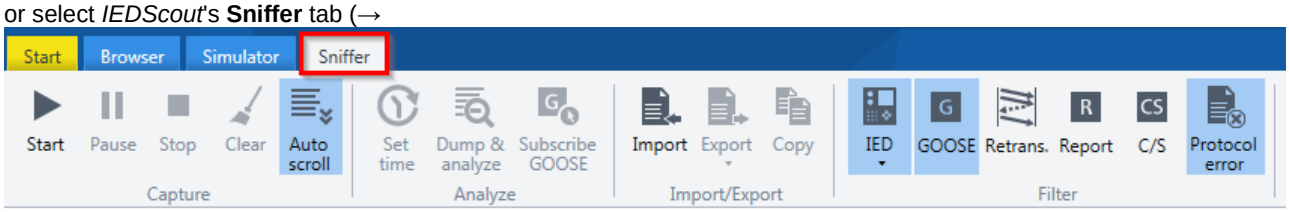

Figure 28).

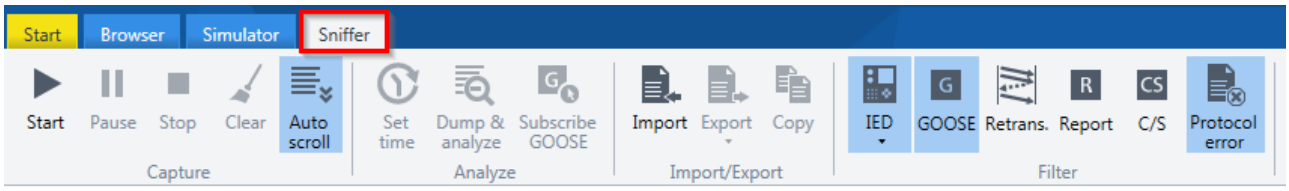

Figure 28: **Sniffer** tab

Start capturing network traffic clicking the **Start** command in the **Capture** group on the **Sniffer** tab. The **Messages** table shows the recorded messages. If you are interested in the details of a certain message, select the line. If you want to

select more than one recorded message from the table at a time, use the <Ctrl> or <⇑> button selection methods you are already familiar with from Windows Explorer. <Ctrl> + <A> selects all messages. To clear the selection of a message, press <Ctrl> and select the message.

The filters are very helpful for analyzing. The items highlighted blue in the **Filter** group are the selected ones. By default, GOOSE is visualized only for the first time and in case of changes. If you want to see the retransmissions, click **Retrans.**

Reports are shown if highlighted blue, **C/S** visualizes the entire client/server traffic (Reports, Control, Logs, Get...). If you are interested in a certain IED, select it in the IEDs list.

Protocol Errors filter visualizes issues in data transmission.

In addition to the Ribbon **Filter** commands, the text filter allows for filtering messages in the **Sniffed messages** table by a character string that you define yourself. Entering a character string constrains the display to messages that contain this string in one of the table's fields.
Text filtering is not case-sensitive, that is, it does not distinguish between uppercase and lowercase.

The recorded traffic can be exported to tools as Wireshark. This might be of interest, for example, to analyze MMS traffic. Exporting to CSV allows documentation or investigation in tools such as Microsoft Excel. The messages to be exported can be selected.

If an unknown GOOSE is found it can be subscribed. This allows a detailed investigation in the **Detail** view.

Write values

For some use cases it may be required writing values to an IED, for example, to change the configuration, enabling items or defining parameters. To write values to an IED, go to a DO or DA level in the **Details** pane, and click **Write** on the **Browser** tab. You can write either a single value or all defined values at once to the IED (→ Figure 29).

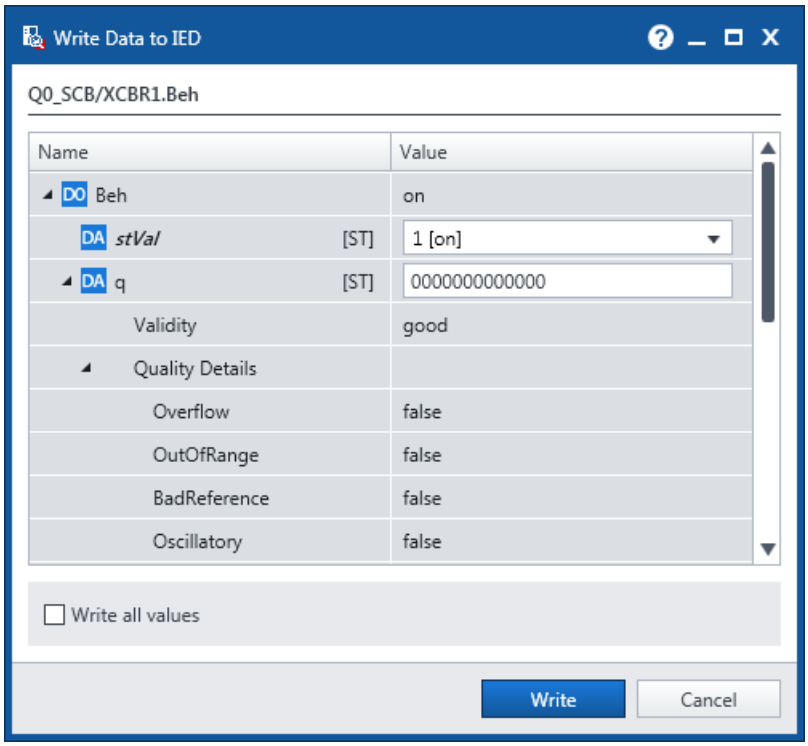

Figure 29: Write data to IED

Perform control

IEDScout supports the four control variants defined in IEC 61850. To enable **Control** in the **Data** group, the IED needs to be online, and a Data Object of a controllable common data class, such as SPC, DPC, IPC, and so on, needs to be selected in the **Details** pane (→ Figure 30).

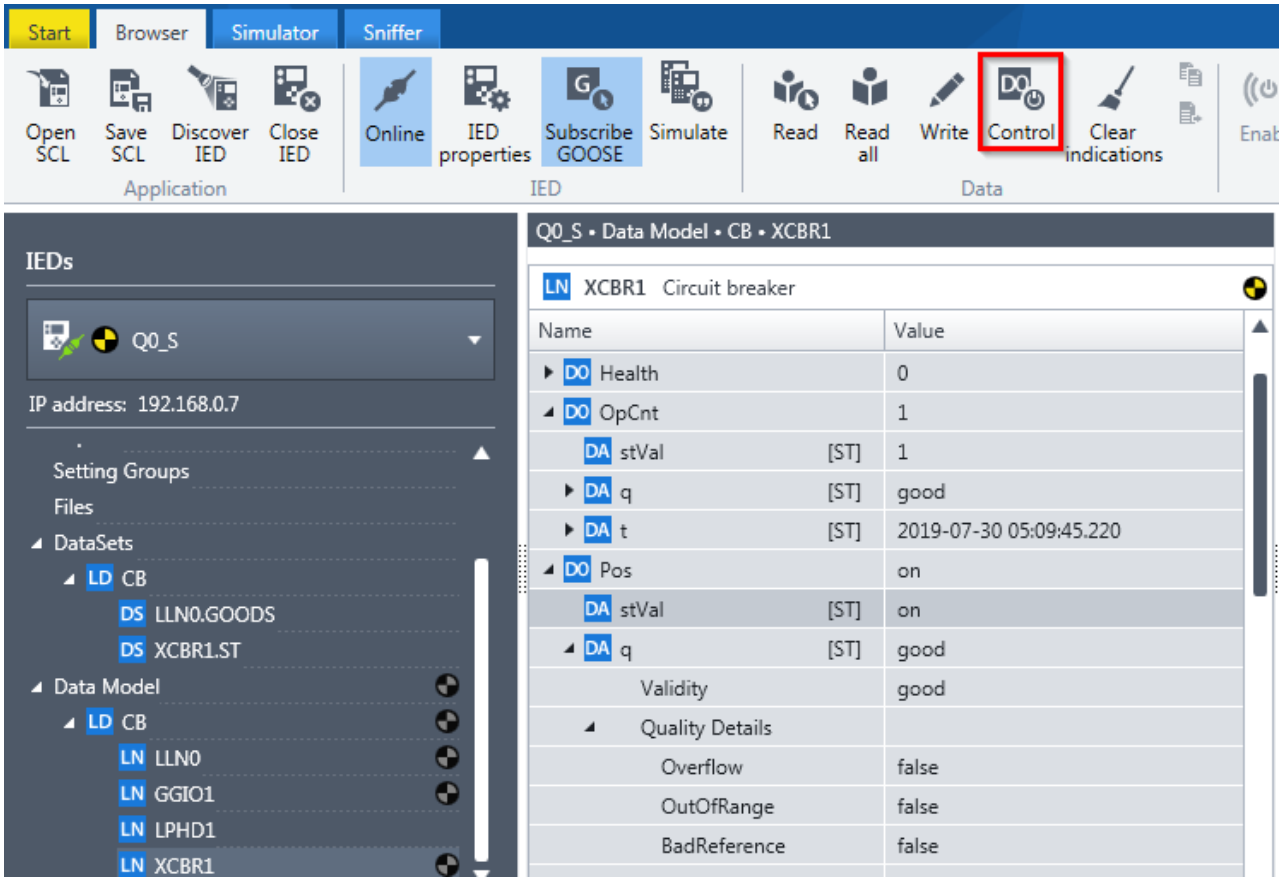

Figure 30: Control

In the **Details** pane, select an appropriate Data Object and click **Control**. This opens the **Control** window (→ Figure 31).

The upper part of the **Control** window holds Data Object information; **Control value** indicates the present status. The lower part provides you with the possibility to enter a set of **Control parameters**:

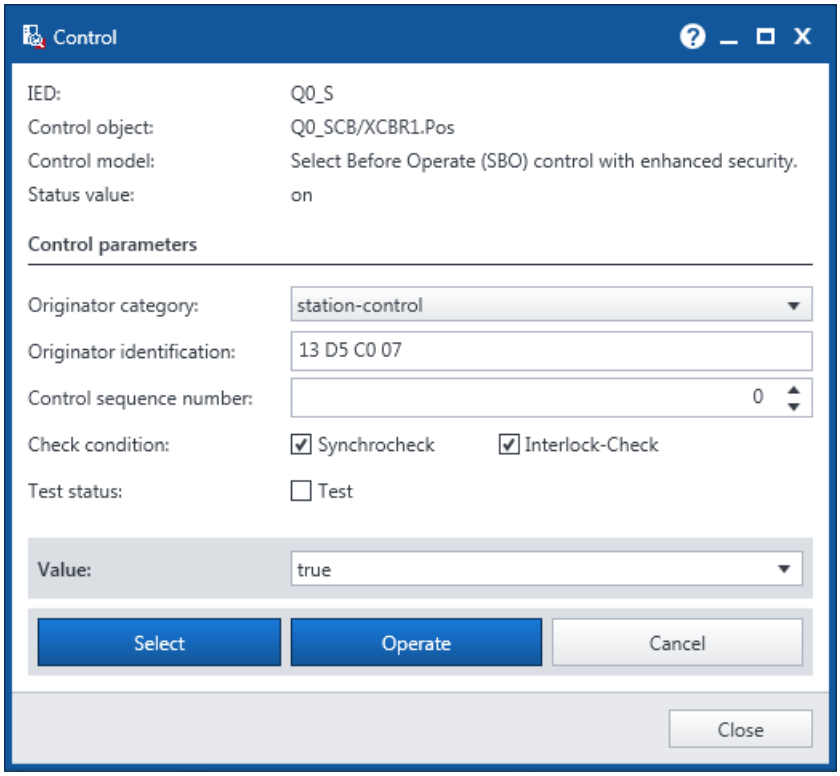

Figure 31: Control dialog

- **Originator category** (orCat) specifies the kind of client that issues this control operation.
- **Originator identification** (orIdent) identifies the client that issues this control operation.
- **Control sequence number** (ctlNum) of the control service. Change this number for testing purposes, only.
- **Check condition** specifies the kind of check (Synchrocheck and/or Interlock-Check) that is to be performed before executing the control operation.
- **Test status** defines whether this control operation is to be for testing purposes or not.

Once you have set the parameters you would like to write to the IED, click the **Select** button. The value's background validation process elapses and displays its result at the **Status** section (→ Figure 32), which folds out when you click **Select**.

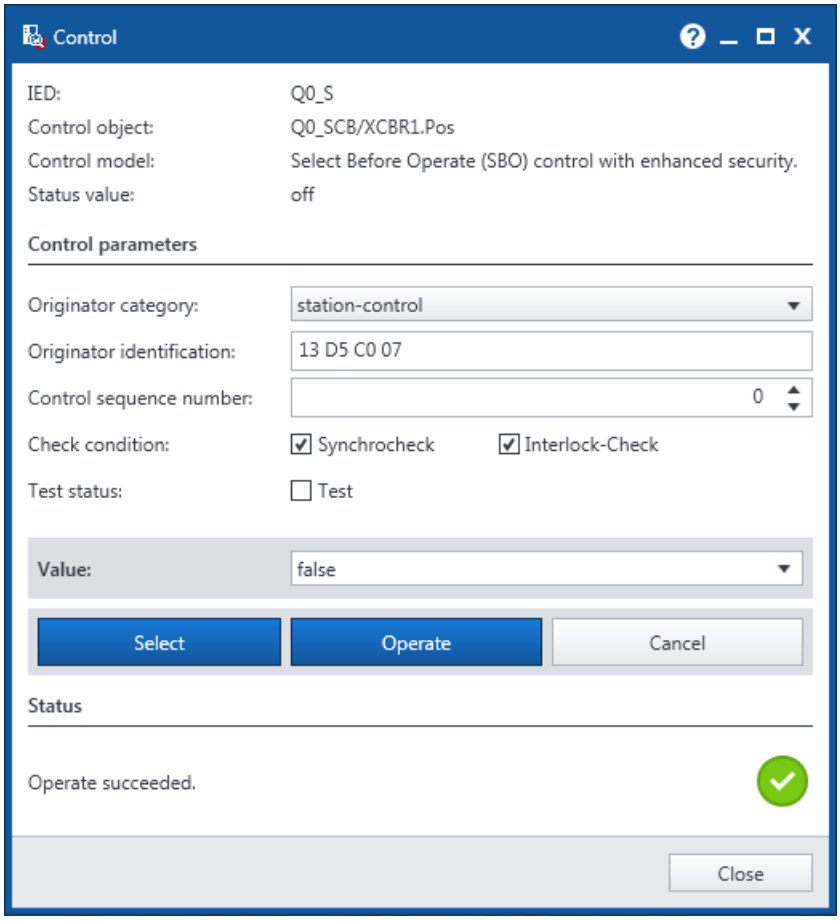

Figure 32: Operate operation succeeded.

- If **Select** succeeded, click **Operate** to write your selected value to the IED.
- If **Select** did not succeed, click **Cancel** and verify your selection.

If the **Cancel** button is disabled, "Cancel DataObject" is missing in the data set. Check the **Cancel** button's tooltip for details.

Note that the control dialog was not designed to write all additional values as defined in the standard. If this is required please use the write (→ chapter “Write values”) dialog. Some IEDs might require an initialization of values to perform control.

Handling of test and simulation indication

IEDScout supports different variants where test-related information can be changed. Every Logical Node has its own mode (off, test/blocked, test, on-blocked, on). The Logical Devices also have a mode. This combination results in "behaviors". If some of them are test-related, this is indicated in the data model.

For GOOSE since edition 1 of IEC 61850, a test indication is prepared. With edition 2 for GOOSE and Sampled Values, a "Simulate" indication was introduced. This information is shown in GOOSE representation (→ Figure 33).

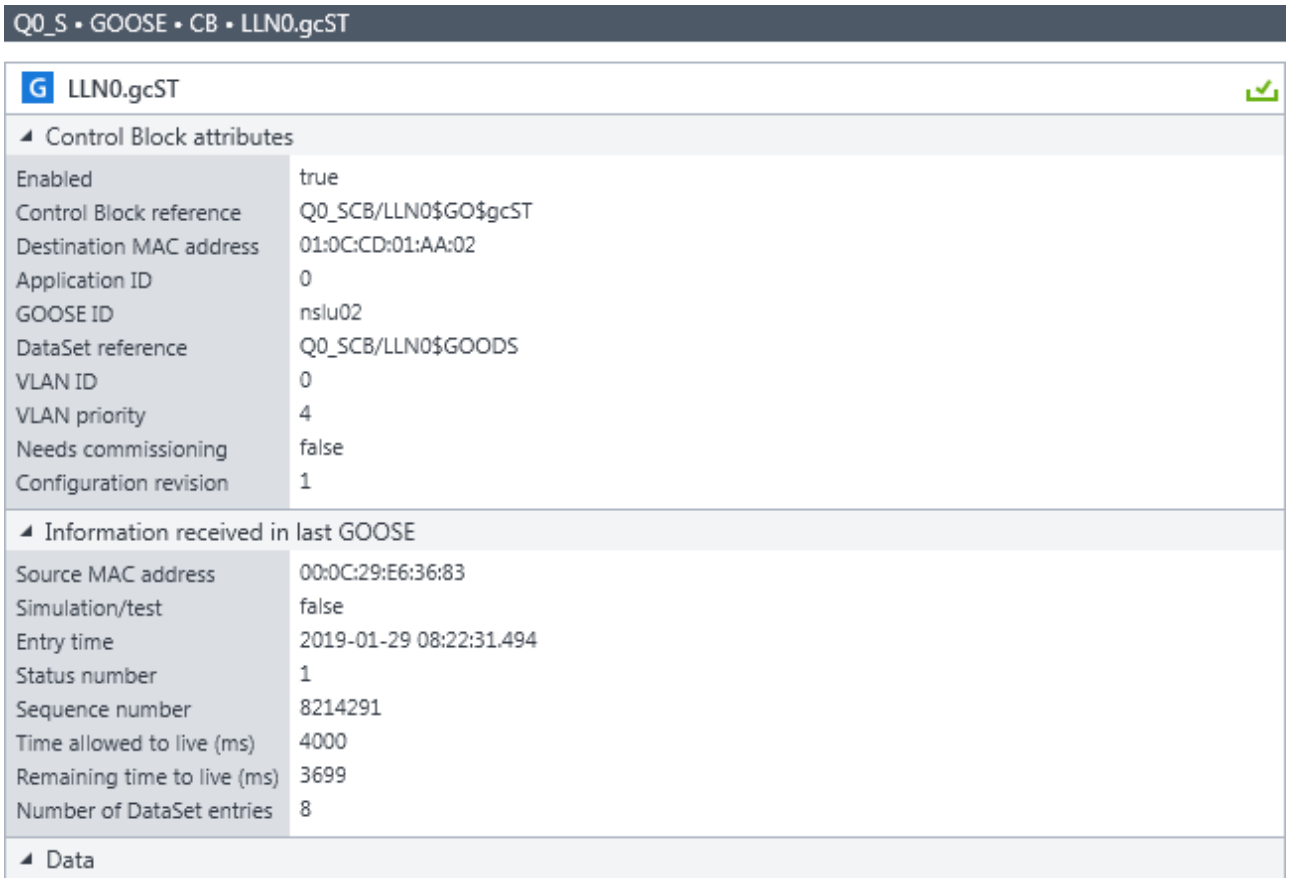

Figure 33: GOOSE details with simulation/test information

In case of simulating an IED (→ chapter Simulating IEDs), the test mode as well the simulation indication can be set.

Saving an SCL file

In case of missing icd or iid files, you can create your own ones. Click **Save SCL** on the **Browser** tab and select the SCL version you would like to use (→ Figure 34).

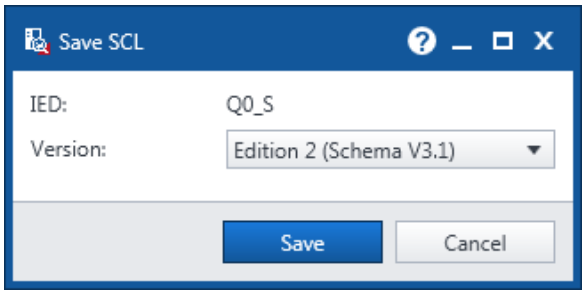

Figure 34: Select SCL file version

The IED name is fixed, it cannot be changed here. However, you need to specify the SCL file's version (select schema). Make your selection depending on the tool's capabilities and the edition of IEC 61850 that is used.

Simulating IEDs

Simulating an IED may prove advantageous in case you are missing the device. *IEDScout* provides the possibility to simulate entire servers with and without GOOSEs defined in an SCL file and to modify them. To directly simulate an IED opened in the **Browser** screen, select an IED in the **Navigation** pane and click **Simulate** in the **Services** group (→ Figure 35).

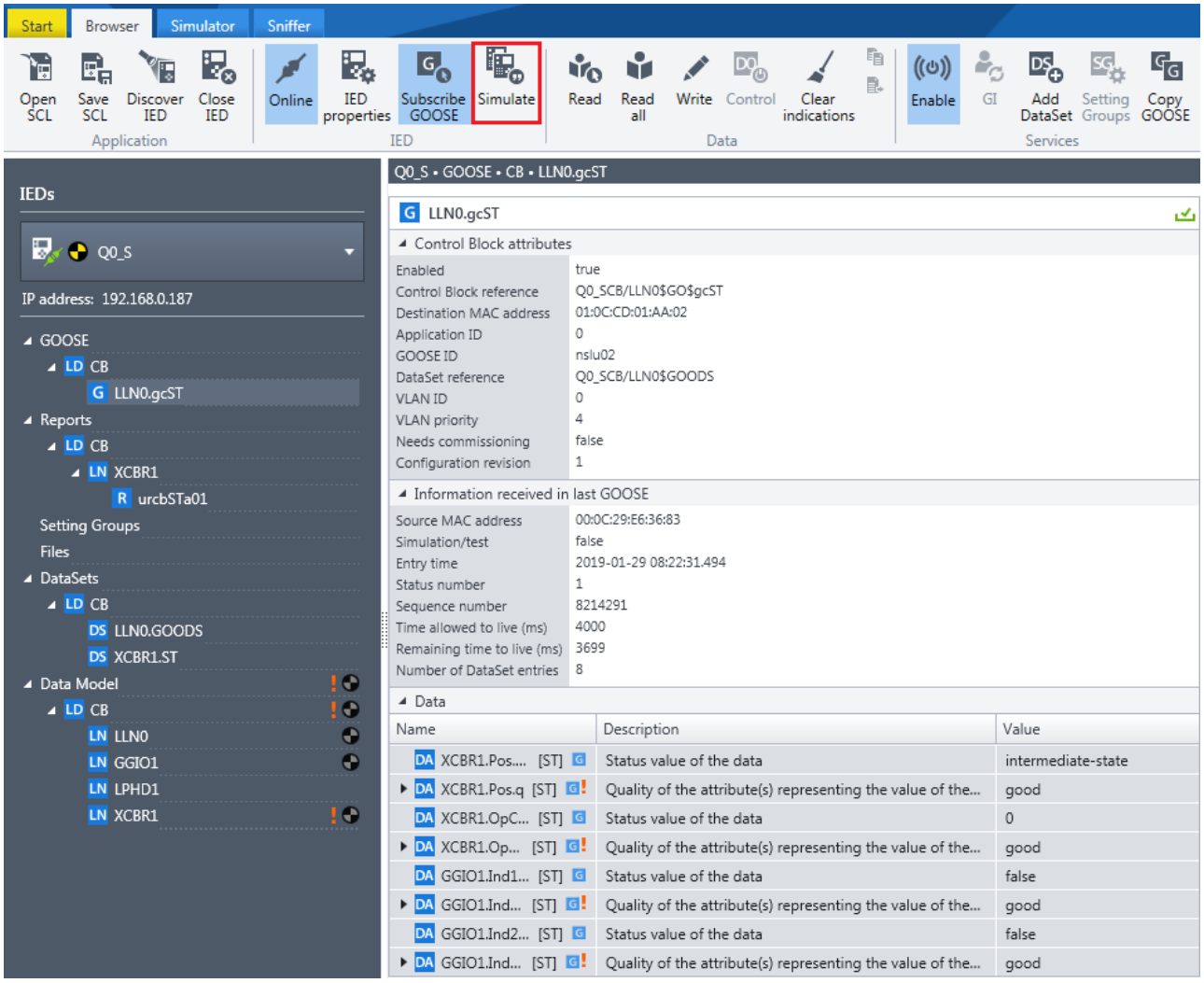

Figure 35: Simulate an IED in the **Details** pane

To simulate an IED according to its definition in the SCL file, select the **Simulator** tab. In the **Application** group, click **Open SCL** and selected the single IED you want to simulate. To start simulation in the **Application** group, click **Start** (→ Figure 36).

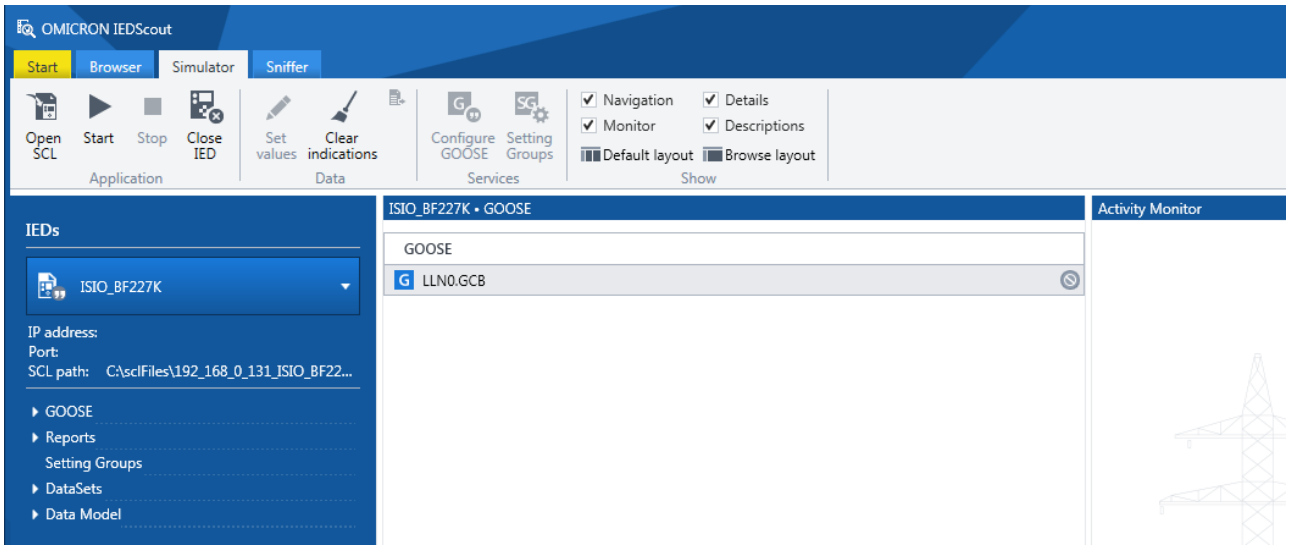

Figure 36: Simulate IED

The details of the simulation can be defined in the next dialog (→ Figure 37). By default the server is simulated with its Data Model and the corresponding services, such as Reports ("Enable Server"). GOOSE can be enabled and disabled separately ("GOOSE publishing settings", Enable GOOSE). You can set the Simulation indication for the GOOSE ("Simulation/Test") and the Mode/Behavior of the IED with its Logical Devices and Logical Nodes. MMS communication uses port 102 per default. If this port is blocked, you can select another one ("Port").

The IED is then simulated on the computer; requests from clients will be accepted in the IP addresses selected at **Listening on**.

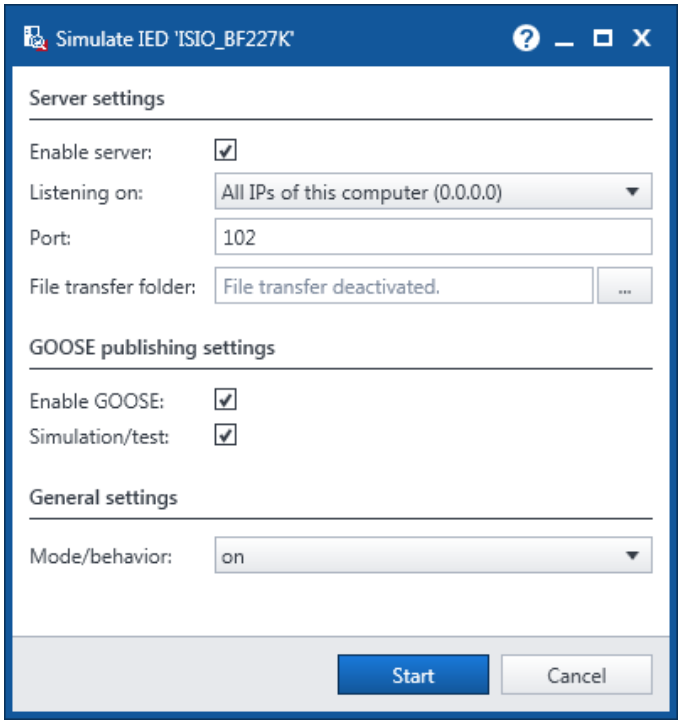

Figure 37: Simulate IED (settings)

The IED is predefined by the SCL and cannot be modified. All the other values can be changed within the limits of the IEC 61850 standard. Select an appropriate element, then click **Set values**. This opens the **Change data of the IED** dialog box where you can view all Data Attributes of the selected element.

Editable Data Attribute values are indicated by entry fields.

The **Activity Monitor** (→ Figure 35, Figure 36) combines simulated and monitored data.

Copy GOOSE to Test Universe

If you would like to use the OMICRON Test Universe *GOOSE Configuration* module, the recommended workflow is to import SCL files containing GOOSE Control Block information. If an SCL file is not available, or in case you would like to use a sniffed GOOSE, do this as follows:

Select a GOOSE, and then click **Copy GOOSE** in the **Services** group of the **Browser** tab (→ Figure 38).

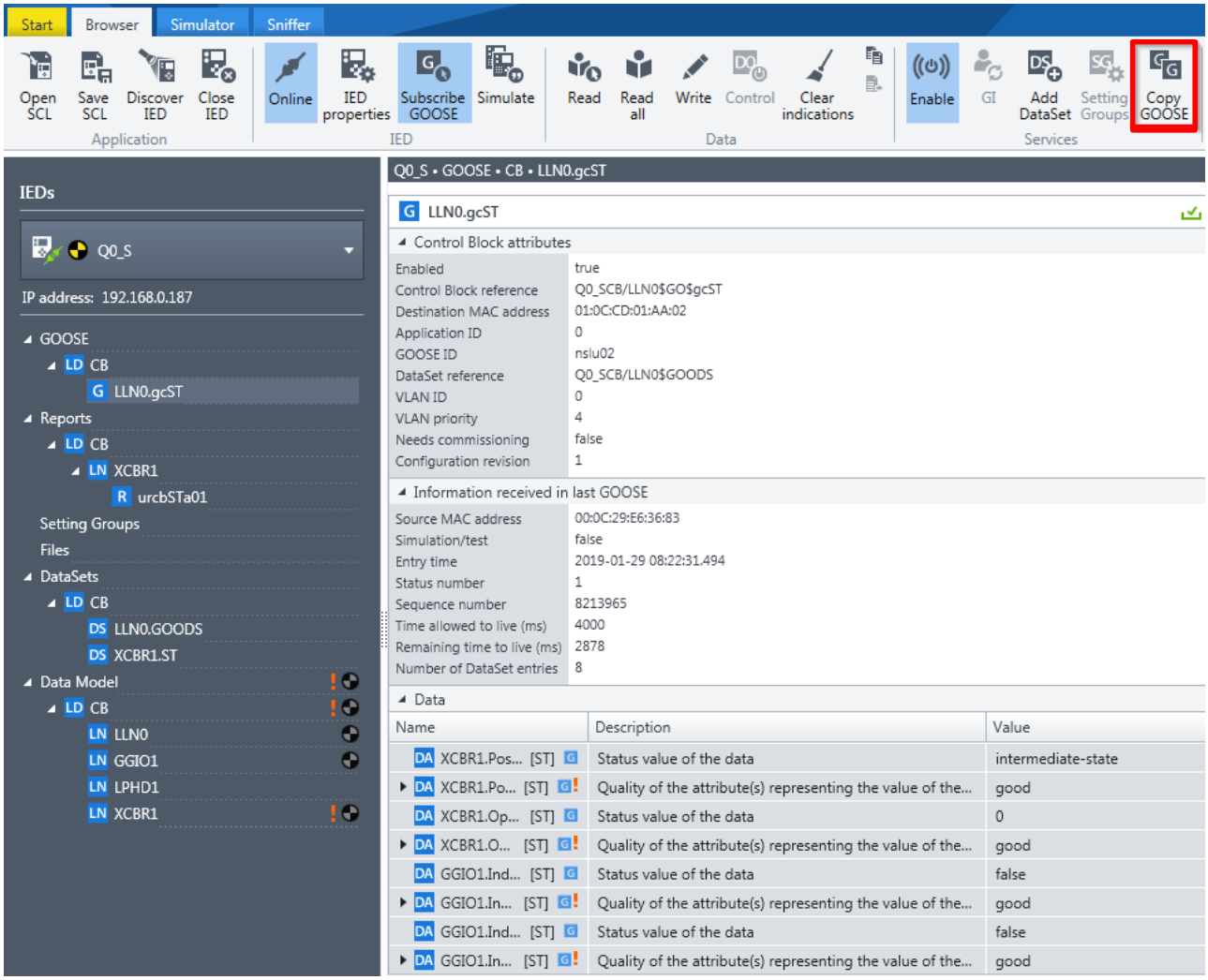

Figure 38: Copy GOOSE in *IEDScout*

In *Test Universe* this GOOSE can then be pasted into the *GOOSE Configuration* module by a right mouse click (→ Figure 39, Figure 40):

Note: If you wish to copy a GOOSE to *Test Universe* that was captured by the **Sniffer**, proceed as follows:

1. Select the captured GOOSE of your choice in the **Sniffer**'s **Messages** table.
2. Click **Subscribe GOOSE** on the **Sniffer** tab. This changes to the **Browser** tab. There you will see this GOOSE labeled as (unknown GOOSE).
3. Select the (unknown GOOSE) and click **Copy GOOSE**.

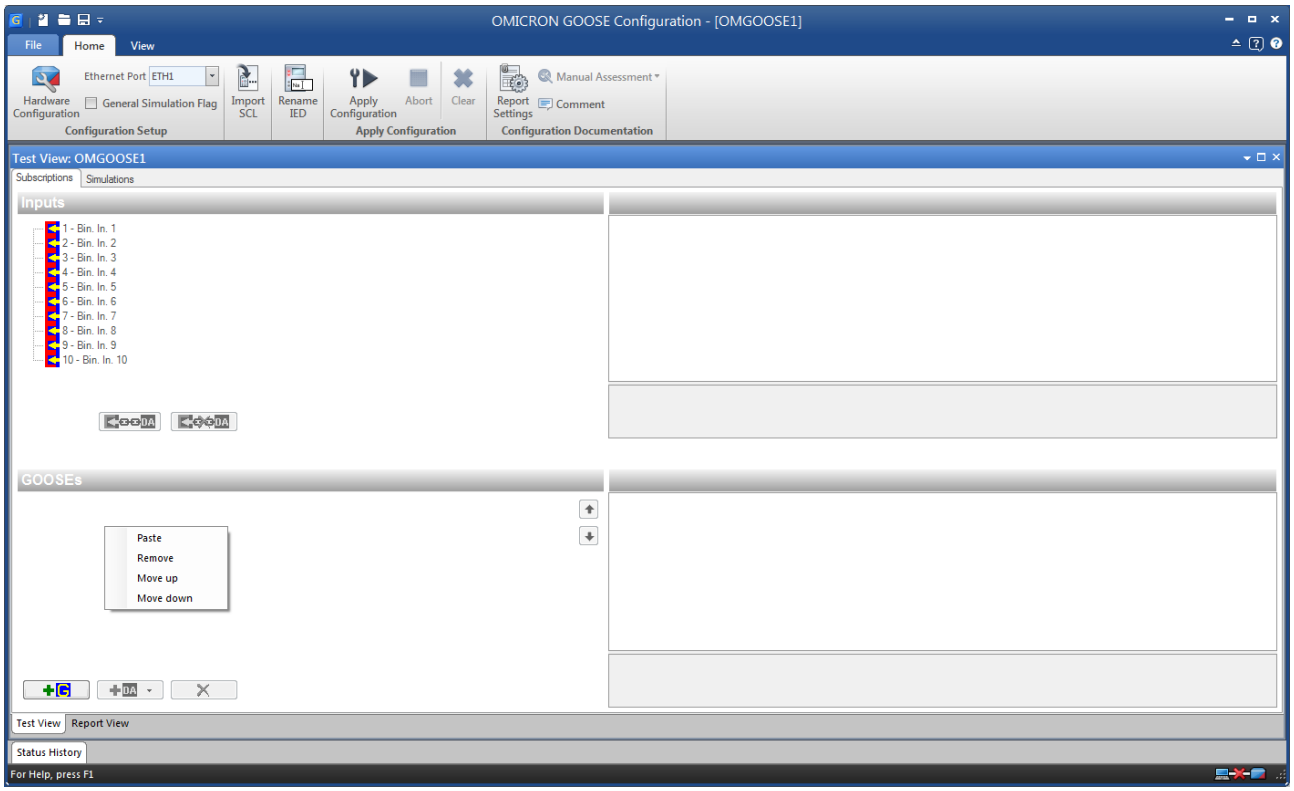

Figure 39: Paste GOOSE into the *GOOSE Configuration* module

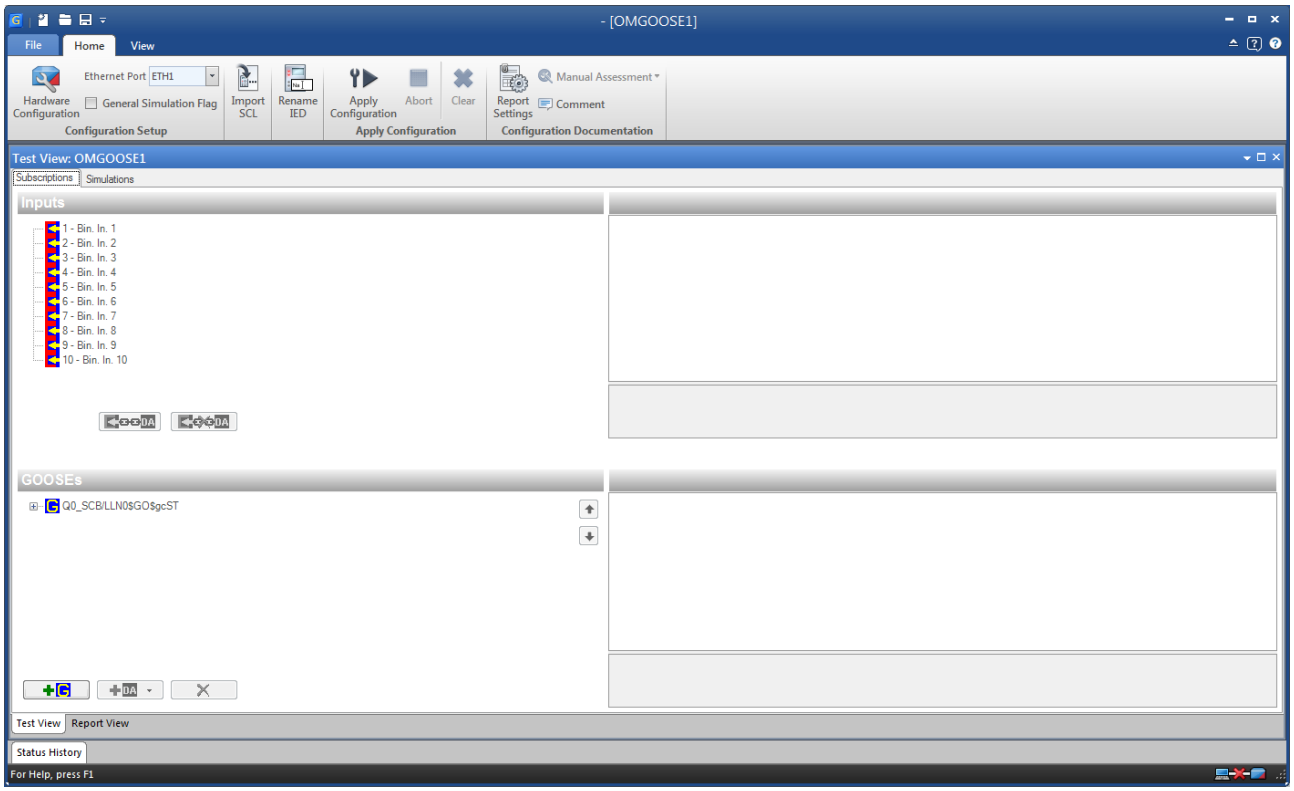

Figure 40: Pasted GOOSE in the *GOOSE Configuration* module

Using File Transfer

IEDs as protection devices contain disturbance records and event logs. Accessing and transferring them is possible with *IEDScout*. If files are provided by File Transfer they are shown in a flat structure. Focusing on disturbance records utilizing COMTRADE files the different extensions (as *.cfg and *.dat) will be combined in a single file.
Clicking **Open** opens the file in the application associated (as OMICRON Transview) (→ Figure 41).

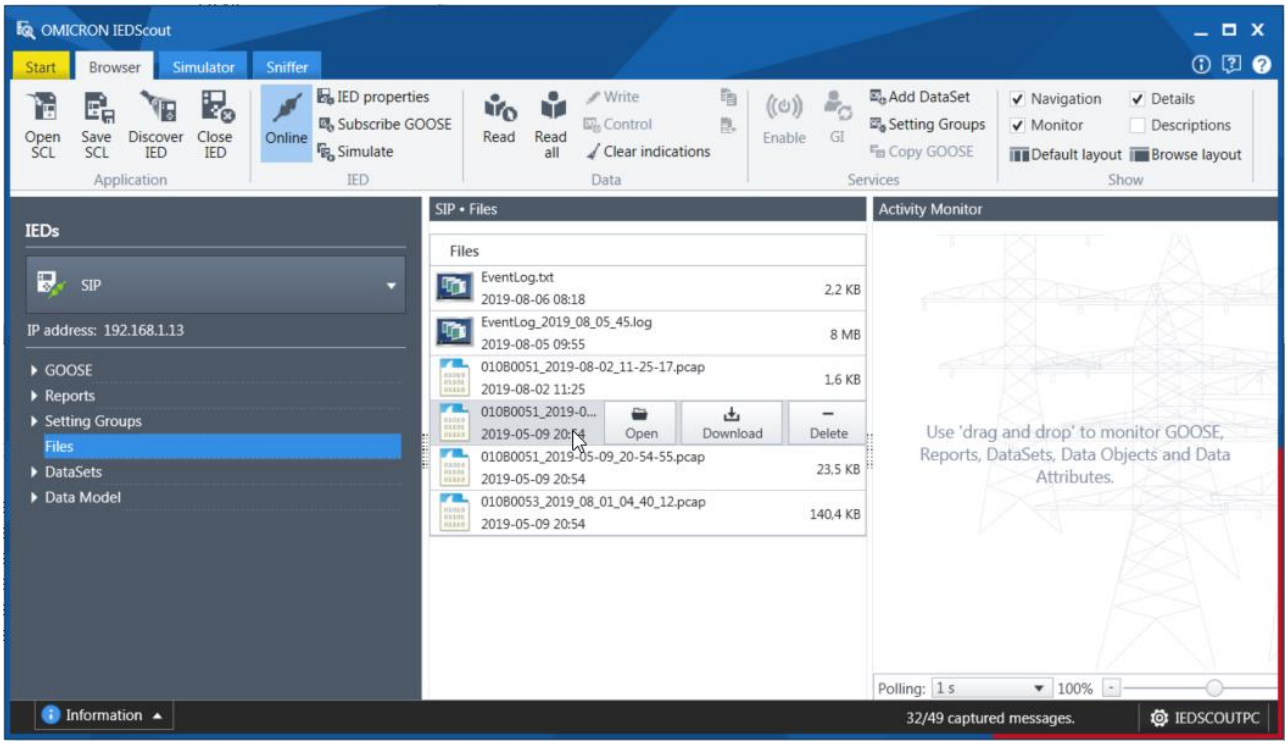

Figure 41: File transfer

If file transfer is not supported or there are no files this is indicated (→ Figure 42)

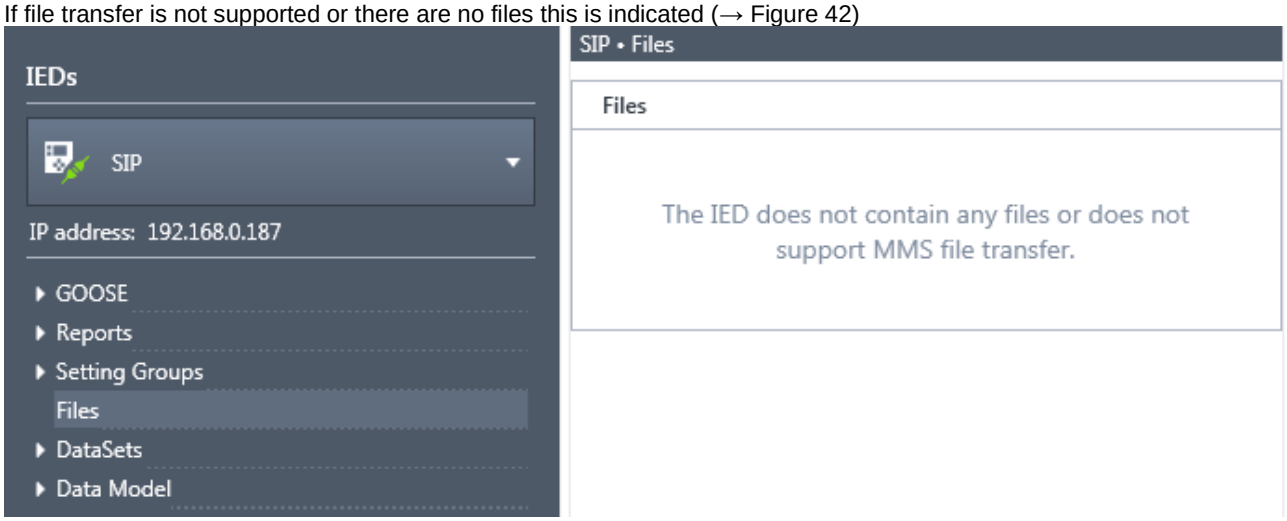

Figure 42: File transfer not implemented

Working with Setting Groups

Setting groups in IEDs are quite common for a long time already. The IEDs have implemented several parameter sets to be activated internally or by control. IEC 61850 extends the concept significantly. As in the past setting groups can be activated, but the content of the settings- the parameters – can be changed if enabled. *IEDScout*'s setting group dialog offers both possibilities and makes handling comfortable. → Figure 43 shows an IED with setting groups. To work with them select **Setting Groups** in **Services** group.

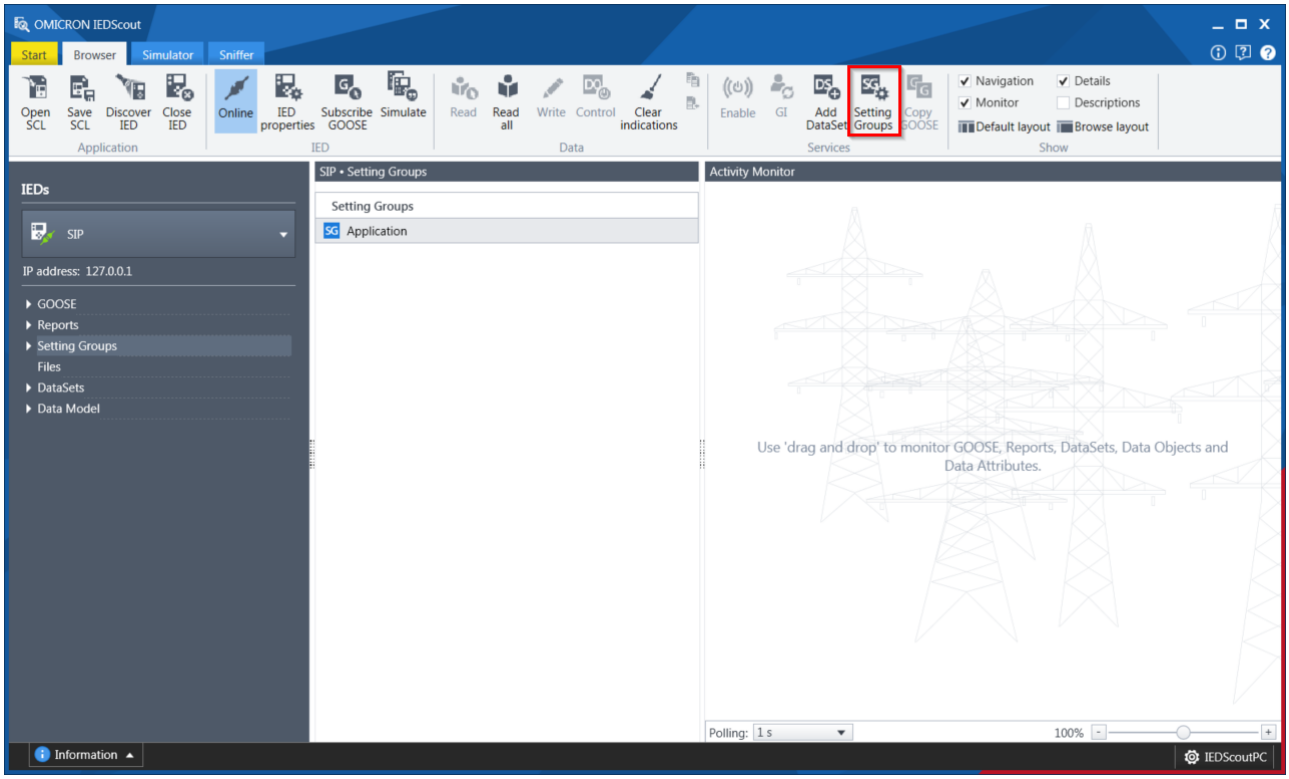

Figure 43: IED with implemented setting groups

The **Setting Groups** dialog appears → Figure 44.

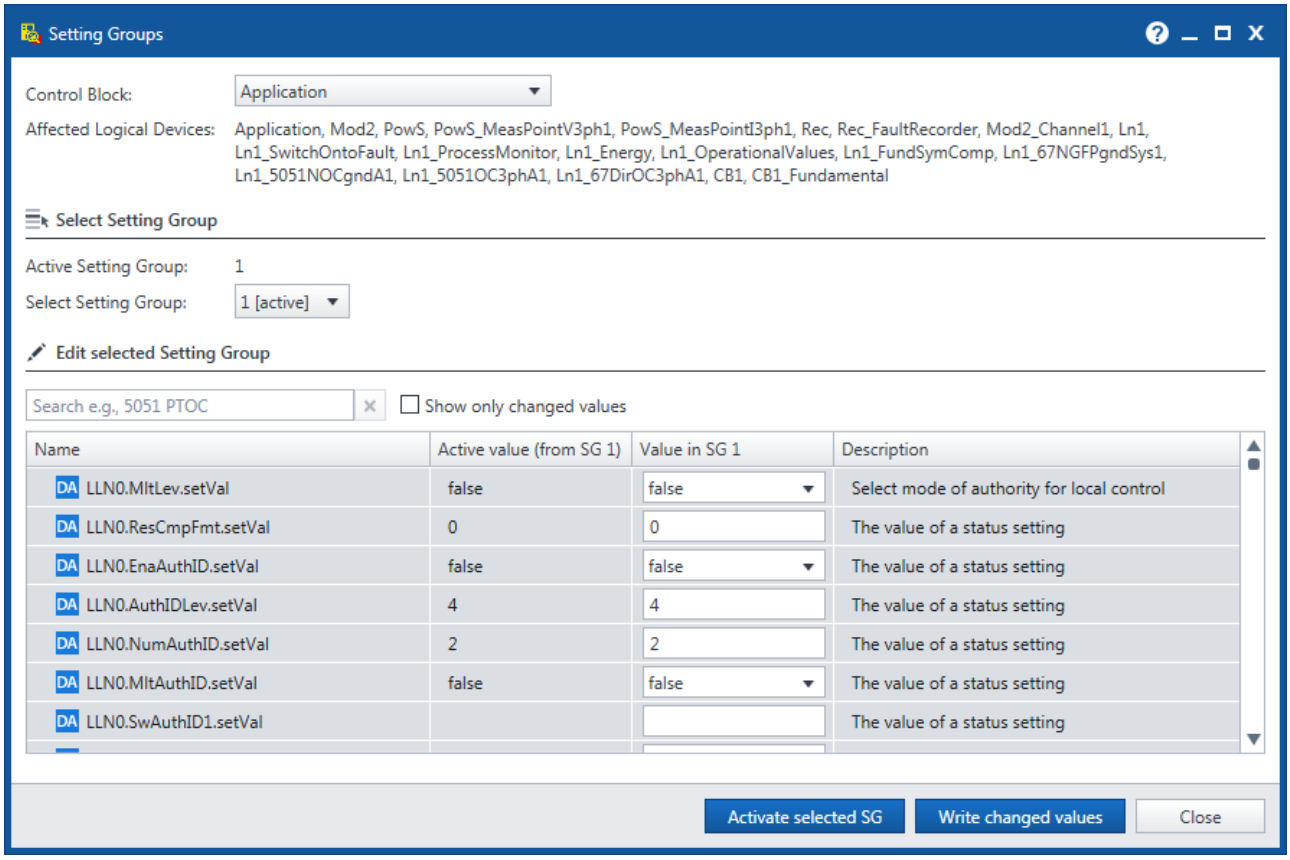

Figure 44: Setting groups

To select a setting group the active one is shown and another can be selected. Click **Activate selected SG** to apply the choice.
To edit parameters of an active or none active setting group the values are shown. The values of the selected (active or inactive) setting groups can be changed. Since several parameters are available the filter might be helpful. In → Figure 45 the startup value (StrVal) of a protection function is filtered and can be changed. To write the new values click **Write changed values.** The **Show only changed values** checkbox reduces the values shown for final checks.

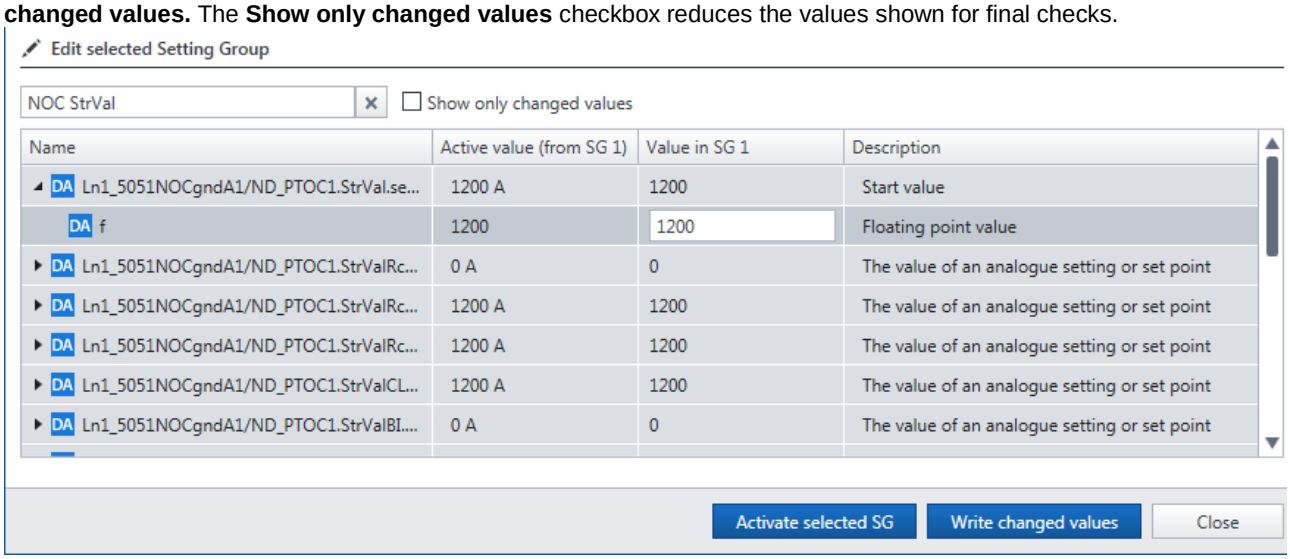

Figure 45: Edit setting groups

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