# Grid Automation Controller COM600 4.0
# IEC 61850 Proxy Server User's Manual

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**Contents:**

# 1. About this manual

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## 1.3. General

This manual provides thorough information on the IEC 61850 Proxy Server and the central concepts related to it. You find instructions on taking it into use. The basic operation procedures are also discussed.

Information in this user’s manual is intended for application engineers who configure the IEC 61850 Proxy Server OPC Client to establish communication to an OPC server.

As a prerequisite, you should understand IEC 61850 protocol and the basic procedures in Station Automation Builder 600 (later referred to as SAB600).

This user’s manual is divided into following sections:

### Introduction

This section gives an overview of the IEC 61850 Proxy Server and its features.

### Configuration

In this section you find an overview of the configuration tasks and instructions on how to create and configure IEC 61850 Proxy Server OPC Client related objects.

### Operation

This section covers the basic operation procedures you can carry out when transferring or activating Grid Automation Controller COM600 (later referred to as COM600) with new configurations.

You are also given instructions on how to monitor and control the IEC 61850 Proxy Server OPC Client.

### Technical reference

This section contains a list of status codes and attributes.

## 1.4. Document conventions

The following conventions are used for the presentation of material:

- The words in names of screen elements (for example, the title in the title bar of a window, the label for a field of a dialog box) are initially capitalized.
- Capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, press the ENTER key.
- Lowercase letters are used for the name of a keyboard key that is not labeled on the keyboard. For example, the space bar, comma key, and so on.
- Press CTRL+C indicates that you must hold down the CTRL key while pressing the C key (to copy a selected object in this case).
- Press ESC E C indicates that you press and release each key in sequence (to copy a selected object in this case).
- The names of push and toggle buttons are boldfaced. For example, click **OK**.
- The names of menus and menu items are boldfaced. For example, the **File** menu.
  - The following convention is used for menu operations: **MenuName** > **MenuItem** > **CascadedMenuItem**. For example: select **File** > **New** > **Type**.
  - The **Start** menu name always refers to the **Start** menu on the Windows taskbar.
- System prompts/messages and user responses/input are shown in the Courier font. For example, if you enter a value out of range, the following message is displayed:

```
Entered value is not valid. The value must be 0 - 30  .
```

- You can be asked to enter the string MIF349 in a field. The string is shown as follows in the procedure:

  MIF349
- Variables are shown using lowercase letters:

  sequence name

## 1.5. Use of symbols

This publication includes warning, caution, and information icons that point out safety-related conditions or other important information. It also includes tip icons to point out useful information to the reader. The corresponding icons should be interpreted as follows.

The electrical warning icon indicates the presence of a hazard which could result in electrical shock.

The warning icon indicates the presence of a hazard which could result in personal injury.

The caution icon indicates important information or warning related to the concept discussed in the text. It may indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.

The information icon alerts the reader to relevant facts and conditions.

The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

## 1.6. Terminology

| Term | Description |
|---|---|
| Alarm | An abnormal state of a condition. |
| Alarms and Events; AE | An OPC service for providing information about alarms and events to OPC clients. |

| Term | Description |
|---|---|
| Data Access; DA | An OPC service for providing information about process data to OPC clients. |
| Data Object; DO | Part of a logical node object representing specific information, for example, status, or measurement. From an object-oriented point of view, a data object is an instance of a class data object. DOs are normally used as transaction objects; that is, they are data structures. |
| Data Set | The data set is the content basis for reporting and logging. The data set contains references to the data and data attribute values. |
| Device | A physical device that behaves as its own communication node in the network, for example, protection relay. |
| Event | Change of process data or an OPC internal value. Normally, an event consists of value, quality, and timestamp. |
| Intelligent Electronic Device | A physical IEC 61850 device that behaves as its own communication node in the IEC 61850 protocol. |
| Logical Device; LD | Representation of a group of functions. Each function is defined as a logical node. A physical device consists of one or several LDs. |
| Logical Node; LN | The smallest part of a function that exchanges data. An LN is an object defined by its data and methods. |
| LON | A communication protocol developed by Echelon. |
| LON Application Guideline for substation automation; LAG | A proprietary method of ABB on top of the standard LON protocol. |
| OPC | Series of standards specifications aiming at open connectivity in industrial automation and the enterprise systems that support industry. |
| OPC item | Representation of a connection to the data source within the OPC server. An OPC item is identified by a string <object path>:<property name>. Associated with each OPC item are Value, Quality, and Time Stamp. |
| Property | Named data item. |
| Report Control Block | The report control block controls the reporting processes for event data as they occur. The reporting process continues as long as the communication is available. |
| SPA | ABB proprietary communication protocol used in substation automation. |
| SPA device | Protection and/or Control Product supporting the SPA protocol version 2.5 or earlier. |
| Substation Configuration Language; SCL | XML-based description language for configurations of electrical substation IEDs. Defined in IEC 61850 standard. |

## 1.7. Abbreviations

The following is a list of abbreviations associated with COM600 that you should be familiar with. See also 1.6, Terminology.

| Abbreviation | Description |
|---|---|
| AE | Alarms and Events |
| ASDU | Application Service Data Unit |
| BRCB | Buffered Report Control Block |
| DA | Data Access |
| DMCD | Data Message Code Definition |
| DO | Data Object |
| GW | Gateway, component connecting two communication networks together |
| HMI | Human Machine Interface |
| IEC | International Electrotechnical Commission |
| IED | Intelligent Electronic Device |
| LAG | LON Application Guideline for substation automation |
| LAN | Local Area Network |
| LD | Logical Device |
| LN | Logical Node |
| NCC | Network Control Center |
| NV | Network Variable |
| OLE | Object Linking and Embedding |
| OPC | OLE for Process Control |
| P&C | Protection & Control |
| RTS | Request To Send |
| SA | Substation Automation |
| SAB600 | Station Automation Builder 600 |
| SCL | Substation Configuration Language |
| SLD | Single Line Diagram |
| SNMP | Simple Network Management Protocol |
| SNTP | Simple Network Time Protocol |
| SOAP | Simple Object Access Protocol |
| RCB | Report Control Block |
| URCB | Unbuffered Report Control Block |
| XML | eXtended Markup Language |

## 1.8. Related documents

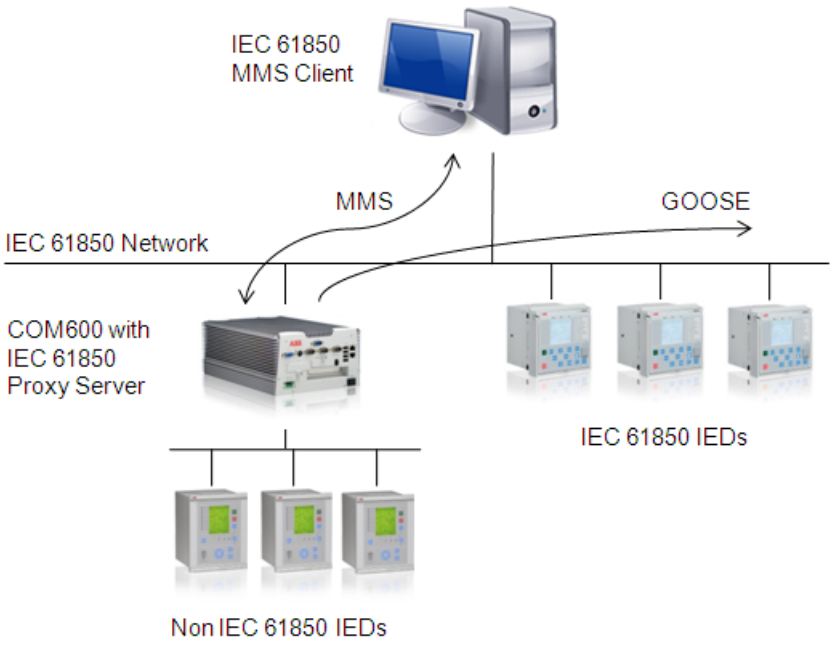
| Name of the manual | MRS number |
|---|---|
| COM600 User's manual | 1MRS756125 |

## 1.9. Document revisions

| Document version/date | Product revision | History |
|---|---|---|
| A/30.6.2011 | 3.5 | Document created |
| B/31.5.2012 | 4.0 | Document revised |

# 2. Introduction

## 2.1. Functional overview




IEC61850_Proxy_Server_Functional_Overview.PNG

*Figure 2.1-1 Functional overview of IEC 61850 Proxy Server*

IEC 61850 Proxy Server enables IEC 61850-8-1 MMS clients to access data and services of COM600. It also features a GOOSE send functionality for publishing data. With these features, it is possible to connect non-IEC61850 IEDs to the IEC 61850 network via COM600. Also calculated data from COM600 (e.g. from logic processor) can be published to IEC61850 network using the IEC 61850 Proxy Server.

IEC61850 Proxy Server is configured using the Proxy Configuration tool in SAB600. The Proxy Configuration tool shows a list of IEDs and their logical devices that are configured to COM600. You can select which of them will be added to the IEC61850 Proxy Server configuration. As the COM600 native data model is according to the IEC 61850 standard, complicated cross-reference configuration is not required. You can later adjust the data set and reporting configuration. The IEC 61850 Proxy Server configuration is stored into an SCL file, which is loaded to the COM600. The configuration can also be exported to an SCL SCD file, which can be used for the IEC 61850 client configuration.

When the IEC 61850 Proxy Server is started, it first reads and parses the SCL configuration. It creates the IEC 61850 data model according to the SCL and establishes connections to the related COM600 OPC servers. It initiates a refresh for the OPC servers to update all configured data. After the data is received, the IEC 61850 Proxy Server has

up-to-date data from the underlying process and the IEC 61850 server is started. The IEC 61850 Proxy Server starts normal operation. During normal operation the actions for the IEC 61850 Proxy Server are initiated by IEC 61850 service request from an IEC 61850 client or by data updates from the connected OPC servers.

## 2.2. IEC 61850 Proxy Server features

The IEC 61850 Proxy Server supports the following features:

- OPC Data Access v1.0/2.0 (client for process data, server for diagnostics)
- OPC Alarms and Events specifications v1.10 (server for diagnostics)
- IEC 61850 server
  - IEC 61850 data modeling
  - IEC 61850 buffered and unbuffered reporting services
  - IEC 61850 control services
  - IEC 61850 GOOSE send service
- One instance of IEC 61850 Proxy Server can be configured per COM600

# 3. Configuration

## 3.1. About this section

This section guides you in the configuration tasks required before you can start using the IEC 61850 Proxy Server. For information on the IEC 61850 data modeling, refer to COM600 User's Manual.

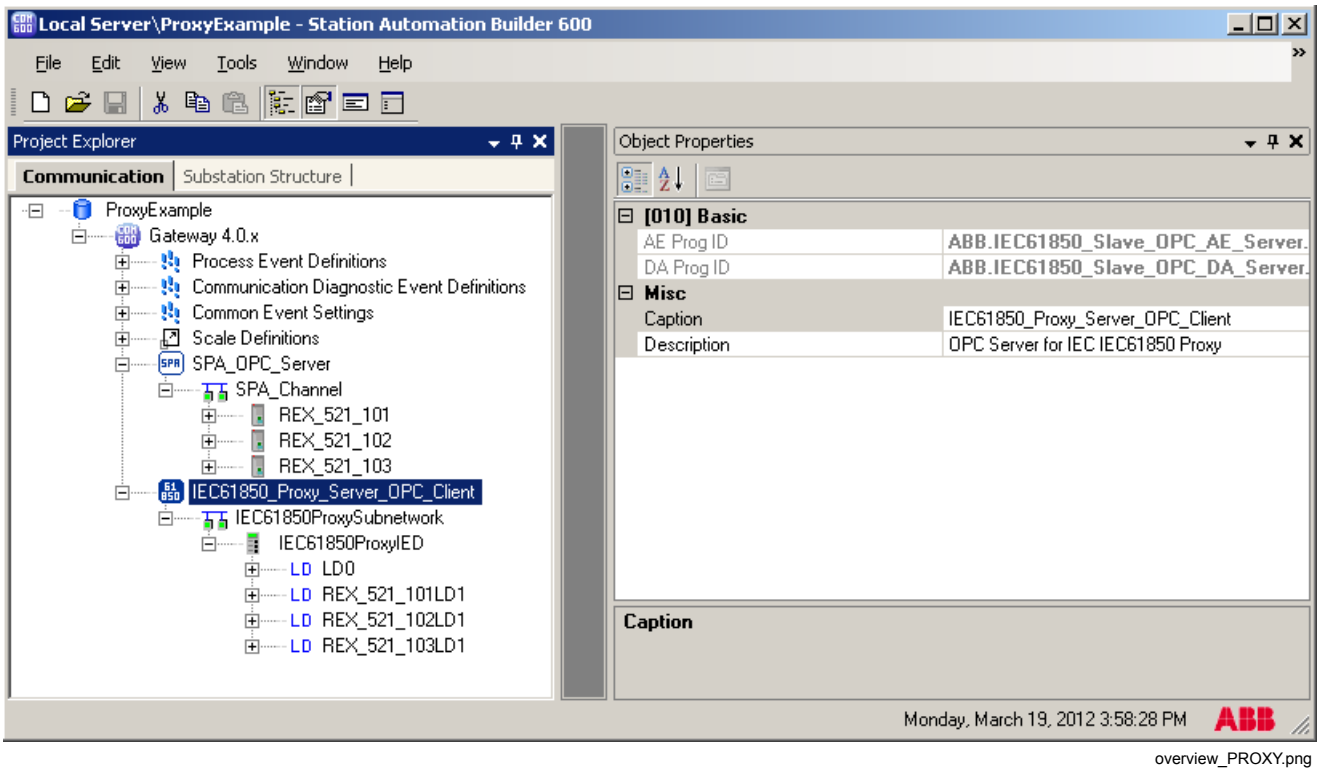
1. Select **File** > **Open/Manage Project...**.
2. In the Open/Manage Project dialog, select the required location for the project:
   - Projects on my computer
   - Projects on network
3. Select **New Project** on the left.
   - Enter a Project Name. The Description is optional.
4. Click **Create**.
5. Click **Open Project**.

## 3.2. Overview of configuration

Before you can start using the IEC 61850 Proxy Server, you need to build and configure an object tree in SAB600 to define the communication structure. Start the configuration by first configuring an OPC Server, for example, LON OPC Server. Then continue to configure the IEC 61850 Proxy Server. For information on configuring the OPC Server, see the related configuration manual.

Figure 3.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.

When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #. Also avoid using a space in object names.




overview_PROXY.png

*Figure 3.2-1 Example view of SAB600 communication structure*

The configuration work can be divided into two separate tasks:
1. building an object tree, and
2. configuring object properties.

First, you need to build an object tree. This is done by adding objects to the object tree, see 3.3.1, General about building object tree.

Figure 3.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the IEC 61850 Proxy Server OPC Client object and its child objects, such as subnetwork, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 3.5.1, General about configuring objects.

# 3.3. Building object tree

## 3.3.1. General about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 3.2-1. It is built by adding objects in a logical order starting from the OPC Server object.

Before the IEC 61850 Proxy Server can be taken into use, you need to configure an OPC server for the process communication. For more information on creating an OPC server, refer to COM600 User's Manual.

You have two ways to add objects to the object tree in the Communication structure:
- You can right-click the object to which you want to add a child object.
- You can copy the object.

First add the IEC 61850 Proxy Server OPC Client. The following objects are created by the Proxy Configuration Tool, and should not be added manually:

- IEC 61850 Proxy Subnetwork
- IEC 61850 Proxy IED
- Logical Devices
- Data objects

## 3.3.2. Adding IEC 61850 Proxy Server OPC Client object

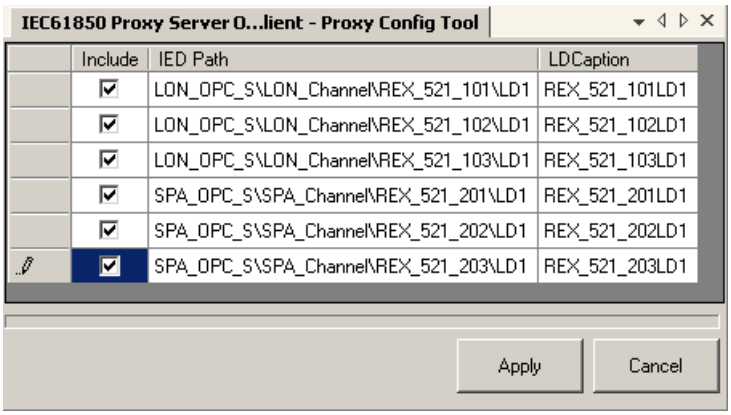
To add the IEC 61850 Proxy Server OPC Client object:
1. Add the IEC 61850 Proxy Server OPC Client object in the Communication structure by selecting the Gateway object.
2. Right-click the Gateway object and select the server object, for example **New > IEC61850 > IEC61850 Proxy Server OPC Client**.

## 3.3.3. Configuring IEC 61850 Proxy Server with Proxy Configuration Tool

Before configuring Proxy IEC 61850 Proxy Server, an OPC server handling the IED communication needs to be configured to the communication structure.

To configure IEC 61850 Proxy Server with the Proxy Configuration Tool:
1. Right-click the IEC 61850 Proxy Server OPC Client object and select **Proxy Config Tool**.

2. Select the check-boxes in the first column to add LDs to the IEC61850 Proxy Server OPC Client configuration.
3. Click **Apply** to create the configuration with the selected IEDs to the communication structure.




Proxy_config_tool.png

*Figure 3.3.3-1 Proxy Configuration Tool*

The Proxy Configuration Tool includes the following columns:
- **Include**: specifies if the LD is part of the Proxy configuration
- **IED Path**: the OPC path of the selected LD
- **LD Caption**: specifies the name of the referenced LD in the Proxy configuration

# 3.4. IEC 61850 data publishing

## 3.4.1. About data sets

A data set is an ordered group of data objects and data attributes organized as a single collection for the convenience of the client. Data sets are used to define the values of data to be transmitted in case a value of a data set member changes. A data set is used for reporting and GOOSE messaging.

## 3.4.2. Configuring data sets

### 3.4.2.1. Dataset Editor

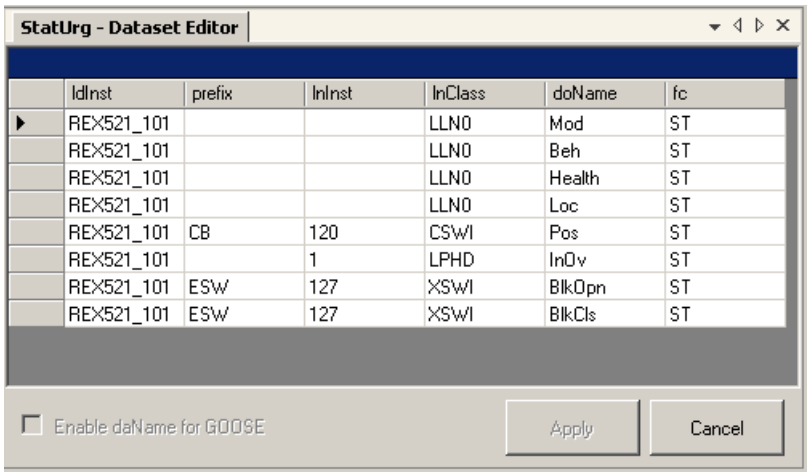
A data set groups selected data so that a client can access it easily with a single read operation. A data set is also used for event reporting; data is linked to spontaneous event sending only via report control blocks (RCB) data set definition. The client reads other data separately. Data set definitions are located always under the logical device LD0 and logical node LLN0.

The data set can be modified with the Dataset Editor. Open the Dataset Editor by right-clicking the Dataset object and selecting **Dataset Editor**.

The Dataset object has a set of data attributes:

- **IdInst**: Instance of Logical Device to which the referenced data set belongs.
- **Prefix**: Freely configurable part of LN caption.
- **InInst**: Instance of the LN type.
- **InClass**: Logical node class.
- **doName**: Name of the data object from which the data set is formed.
- **daName**: Name of the data attribute from which the data set is formed.
  Data attributes are collected to the data set in groups, and the functional constraint defines the data attributes.
- **fc**: functional constraint
  Functional constraint divides data attributes, which have the same functional constraint, to groups under the same data object. For example, functional constraint ST (status information) groups stVal, q and t data attributes to the data set.

The caption in the object tree consists of Prefix, InClass and InInst values.




Dataset_editor.png

*Figure 3.4.2.1-1 Dataset Editor*

## Creating data sets

If 61850 naming is used, the Proxy Configuration Tool automatically creates StatNrml, StatUrg and MeasFlt data sets and report control blocks for them. The creation is based on proxy_dataset_defaults.xml file, which is located in the **[installation drive]:\PCM-DataBases\COM600\ProxyConfigTool** folder.

The file has the following format:

```
<DataSet name="[name of dataset]">
                <LNClass name="[LNClass of ln]">
```

```
                        <DO cdc = "[61850-Type of DO]" name = "[Caption of
DO]">
                        </DO>
                ...
                </LNClass>
                ...
        </Dataset>
```

The data set identifies the data set to be created. LNClass and DO are used to determine which LN/DOs should be added to the dataset. For example:

```
<DataSet name="StatNrml">
                <LNClass name="GGIO">
                        <DO cdc="SPS" name="Alm"/>
                </LNClass>
                <LNClass name="PHAR">
                        <DO cdc="ACD" name="Str"/>
                </LNClass>
```

The StatNrml data set contains all Alm named SPS typed DOs under GGIO LNClass and all str named ACD typed DOs under PHAR LNClass, and so on.

Additional signals can be added to each data set by dragging and dropping the DO object to the Dataset Editor tool and applying changes.

The data sets for GOOSE have to be created manually.

To create data sets for GOOSE:
1. Create a Dataset object to the tree under the LN0 object.
2. Right-click the Dataset object and select **Dataset Editor**.
3. If you are creating a GOOSE data set, select the **Enable daName for GOOSE** checkbox.
4. Drag and drop DO objects from the object tree to the Dataset Editor.
5. Click **Apply**.

### 3.4.3. Data reporting

#### 3.4.3.1. About data reporting

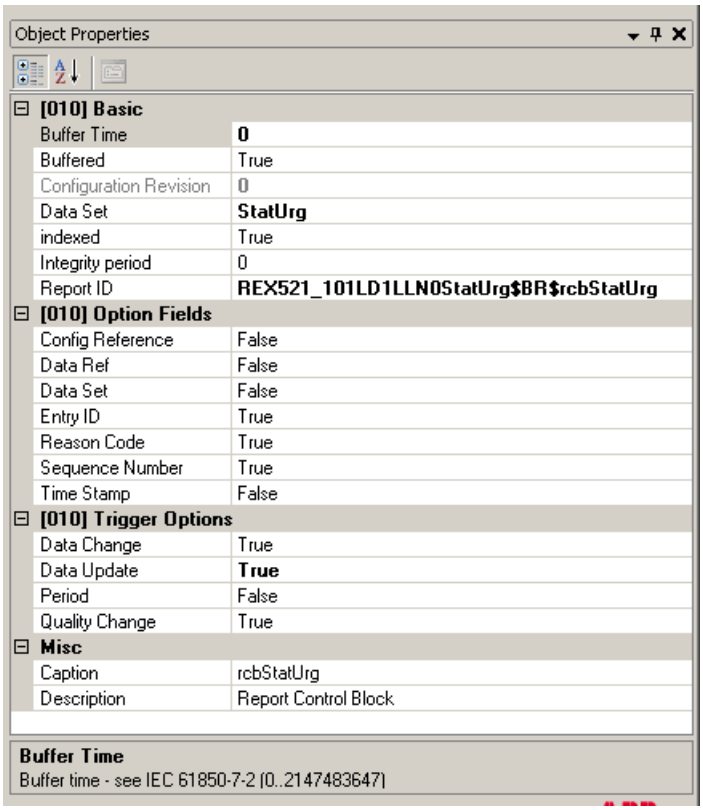
Data changes are used as a trigger for reporting. This information is grouped using a data set. The data set is the content basis for reporting. Reporting uses information reports to transmit data. The data configured in a data set is transmitted in information reports. Reporting is controlled by report control blocks.

### 3.4.3.2. Report control block

Report control describes the conditions for generating information reports based on parameters set by configuration or by a client. Report Control Blocks control the procedures that are required for reporting values of data from logical nodes to one client.

There are buffered and unbuffered report control blocks:

- In a **Buffered Report Control Block (BRCB)** internal events issue immediate sending of reports, or buffer the events for transmission. This way the values of a data object are not lost due to transport flow control constraints or loss of connection. BRCB provides sequence-of-events functionality.
- In an **Unbuffered Report Control Block (URCB)** internal events issue immediate sending of reports on a best efforts basis. If no association exists, or if the transport data flow is not fast enough to support it, events may be lost.




report_control_block_properties.png

*Figure 3.4.3.2-1 Report control block properties*

***Table 3.4.3.2-1 Report Control Block object properties***

| Property/Parameter | Value or value range/Default | Description |
|---|---|---|
| **Basic** | | |

| Property/Parameter | Value or value range/Default | Description |
|---|---|---|
| Buffer Time | Default: 0 milliseconds | With this value, RCB can be configured to wait for other events after the first change before sending the report. Value 0 means that a new change is immediately reported to the client. Configurable. |
| Buffered | True<br>False<br>Default: True | Controls if the RCB is buffered or unbuffered. |
| Configuration Revision | 0...2147483647 | Configuration revision of the data set referenced by this RCB. Every modification in the data set increases the Configuration Revision property by one. |
| Data Set | | The name of the data set to be sent by the report control block. |
| Indexed | True<br>False<br>Default: True | Indicates if this RCB is configured with indexed naming convention. |
| Integrity period | 0...214748647<br>Default: 0 | Integrity period in milliseconds. If this attribute has a value > 0 ms, an integrity report with all data listed in the data set is sent periodically in this interval. By default, this feature is not enabled, because it generates an unnecessary load to the server and network. If this feature is used, the Trigger Option 'Period' in RCB needs to be enabled. Configurable. |
| Report ID | | Used as identification in information reports to specify that the report is from this RCB. By default report control block MMS path name is used. Configurable. |
| **Option Fields** | | Defines what information is sent with the information report. Configurable. |
| Config Reference | True<br>False<br>Default: False | Config Reference |

| Property/Parameter | Value or value range/Default | Description |
|---|---|---|
| Data Ref | True<br>False<br>Default: False | Data Ref |
| Data Set | True<br>False<br>Default: False | Data Set |
| Entry ID | True<br>False<br>Default: True | Entry ID |
| Reason Code | True<br>False<br>Default: True | Reason Code |
| Sequence Number | True<br>False<br>Default: True | Sequence Number |
| Time Stamp | True<br>False<br>Default: False | Time Stamp |
| **Trigger Options** | | Defines the triggering conditions for creating reports. |
| Data change | True<br>False<br>Default: True | Specifies whether a report entry shall be generated due to a change of the value of the data attribute. |
| Data Update | True<br>False<br>Default: False | Specifies whether a report entry shall be generated due to freezing the value of an unfreezable attribute or updating the value of any other attribute. An updated value may have the same value as the old value. |
| Period | True<br>False<br>Default: False | Specifies whether a report entry shall be generated on the expiration of the integrity period. |

| Property/Parameter | Value or value range/Default | Description |
|---|---|---|
| Quality Change | True<br>False<br>Default: True | Specifies whether a report entry shall be generated due to a change of the value of the quality attribute. |

## 3.4.4. Configuring reporting

Reporting is preconfigured automatically. Data sets for necessary data are created and linked to configured report control blocks.

To configure reporting:

1. Create and configure a **Data Set** object.

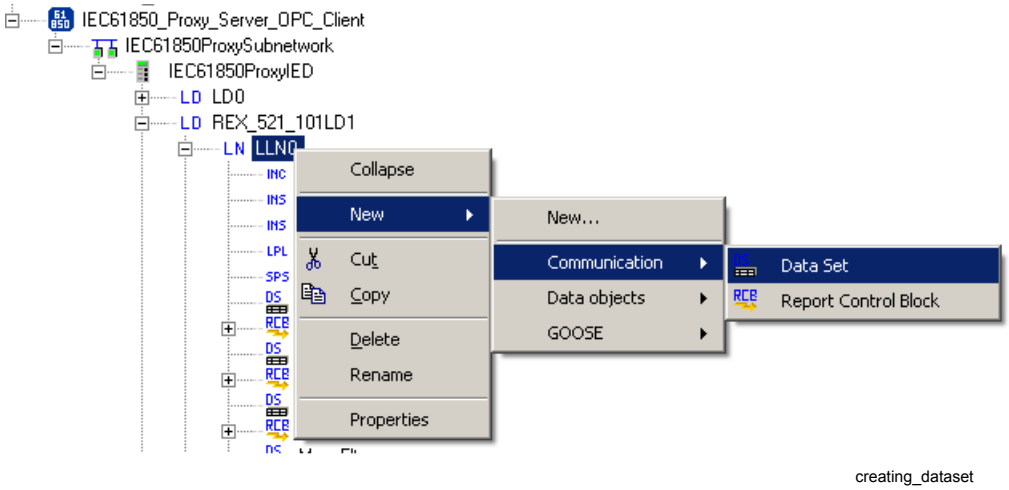



*Figure 3.4.4-1 Creating a new data set*

2. Create a **Report Control Block** object.

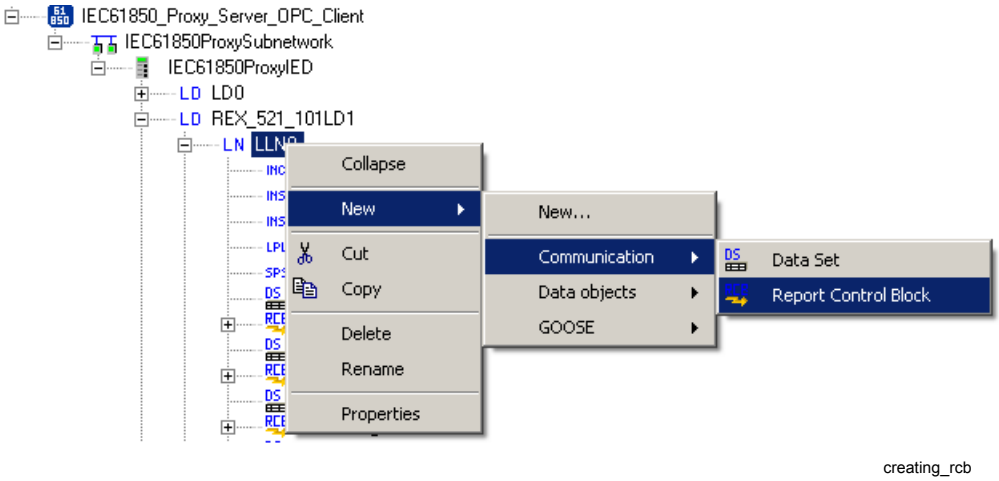



*Figure 3.4.4-2 Creating a new report control block*

3. Add a **Report Enabled** object. Add a **ReportClient** object for each IEC 61850 client. ReportClients create the same amount of instances of the RCB, each dedicated for one client.

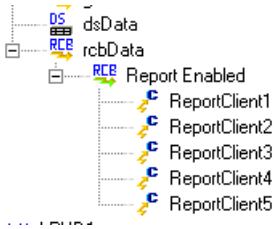
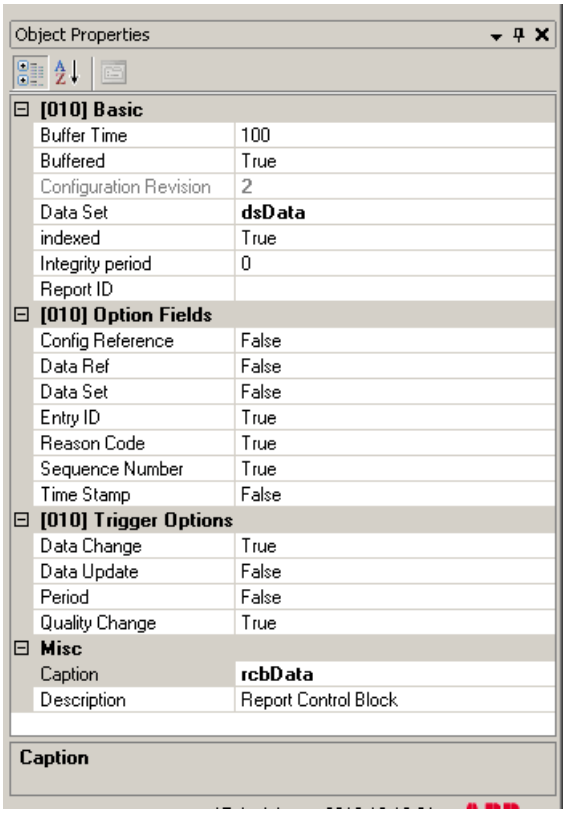



*Figure 3.4.4-3 Adding ReportClient objects*

4. Configure the report control block.
5. Configure the data set of the report control block.




data_set_properties

*Figure 3.4.4-4 Data set properties*

## 3.4.5. GOOSE messaging

The generic object oriented substation event (GOOSE) is used in substation automation for fast horizontal communication between IEDs. It can be used to exchange, for example, interlocking and blocking information. The information is shared from one IED to one or several IEDs using Ethernet multicast messages. A message is an image of a sent MMS data set that is defined in the CID configuration.

IEC61850 Proxy Server supports sending of GOOSE messages. The receiving of GOOSE messages is handled by the IEC 61850 OPC Server.

The GOOSE data is sent periodically in 802.1Q multicast frames over the local network. When data changes, the GOOSE frame is sent several times in a fast cycle to prevent data losses.

In GOOSE, the sent data is based on the data set and GOOSE Control Block (GoCB). The data set defines what type of data is sent in the GOOSE frame. GoCB links the GOOSE Control Block structure and its information to the data.

Table 3.4.5-1 lists the configurable GoCB object properties.

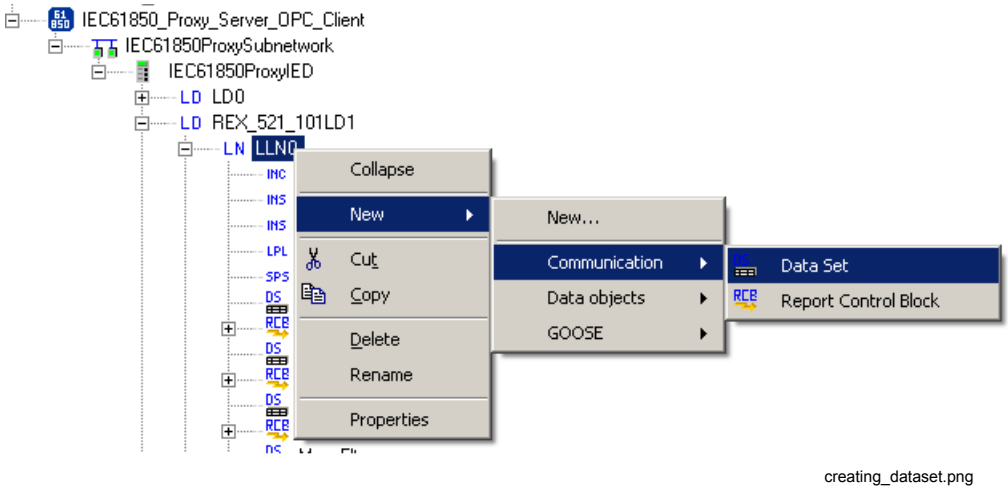
***Table 3.4.5-1 GoCB object properties***

| Property/Parameter | Value or value range/Default | Description |
|---|---|---|
| **Basic** | | |
| Configuration Revision | 1 | Configuration Revision identifies the version of GoCB. |
| Data Set | Data Set<br>Default: None | Data set to be sent in GOOSE. |
| GSEType | Default: GOOSE | GSEType identifies the type of GSE Element in configuration file (read only parameter). |
| **Goose Address** | | |
| APPID | 0000 - 3FFF<br>Default: 0000 | Application ID for the GOOSE control block (hex value). |
| GoID | Default: (GOOSE control block path) | String identifier for the GOOSE control block. |
| Max Time | 0...65535<br>Default: 10000 | Supervision heartbeat cycle time (ms). |
| Min Time | 0...65535<br>Default: 2 | Maximal sending delay on a data change (ms). |
| Multicast Address | 01-0C-CD-01-00-00 to 01-0C-CD-01-01-FF<br>Default: 01-0C-CD-01-00-00 | A multicast addressing scheme is used when sending GOOSE messages. A multicast address can be shared by several sending devices or it can be IED-specific. |
| VLAN-ID | 000 - FFF<br>Default: 000 | VLAN-ID hex value. |
| VLAN-Priority | 0...7<br>Default: 4 | VLAN-Priority. |

## 3.4.6. Configuring GOOSE publishing

To send GOOSE data, you must first define the sending data set used by the GOOSE control block and then create the control block.

1. Create a new **Data Set**. Rename it if you plan to use several different sets of data (see 3.4.2.1, Dataset Editor).

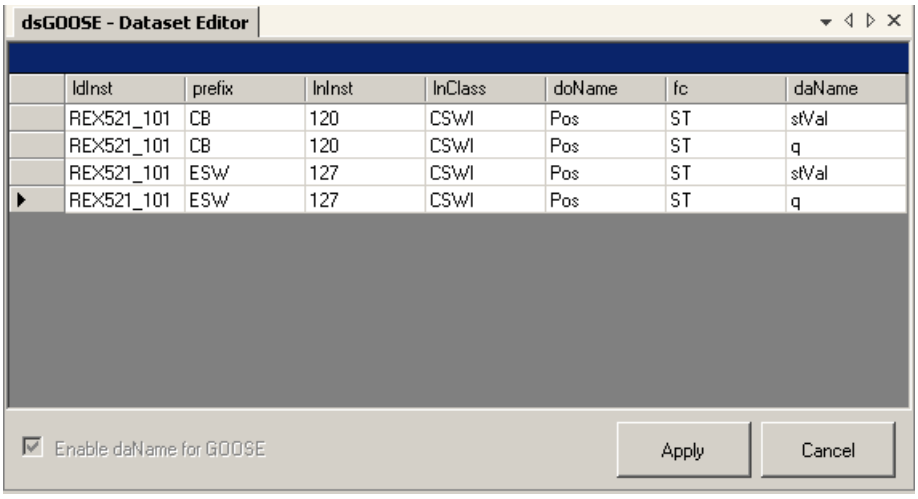



creating_dataset.png

*Figure 3.4.6-1 Creating a new data set*

2. Modify the data set to be sent with GOOSE.

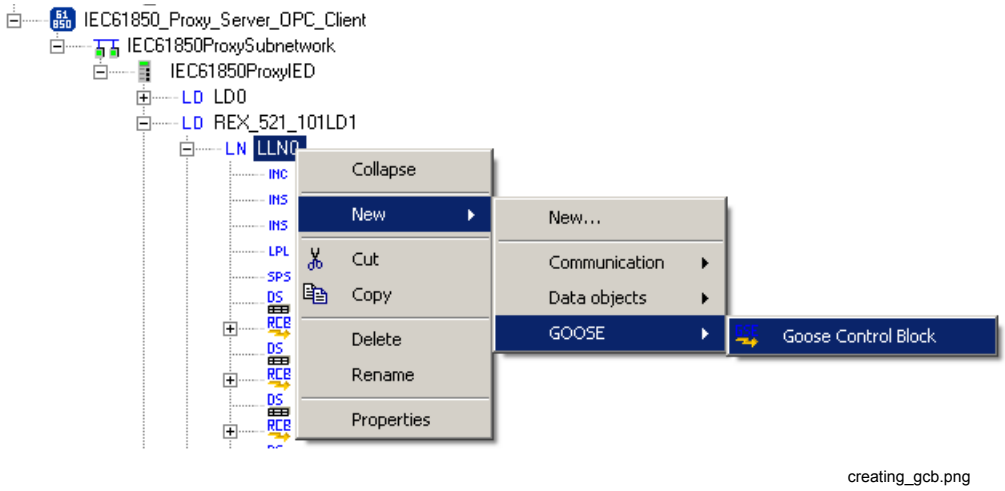
Normally GOOSE data sets are configured to the attribute level and only the value and quality are used (e.g. **Pos.stVal** and **Pos.q**). Use the **Enable daName for GOOSE** option and manually remove the unnecessary attributes from the data set.




modifying_dataset.png

*Figure 3.4.6-2 Modifying the data set to be sent with GOOSE*

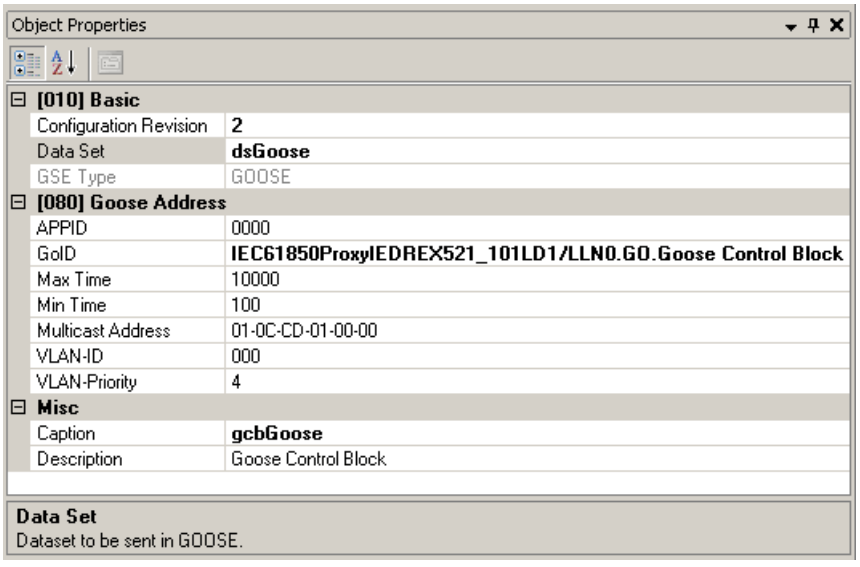
3. Create a new **GOOSE Control Block (GoCB)**.




creating_gcb.png

*Figure 3.4.6-3 Creating GOOSE Control Block*

4. Configure the GOOSE control block, see Figure 3.4.6-4.
   - Select the created data set.
   - Define APPID (Application Identifier) which is unique within the system. It identifies the purpose of this particular dataset.
   - Define a multicast address to which the specific GOOSE data is sent. The receiving IED understands which frames with a specific multicast address are the interesting ones and starts to process them.




GOOSE_control_block_properties

*Figure 3.4.6-4 GOOSE Control Block properties*

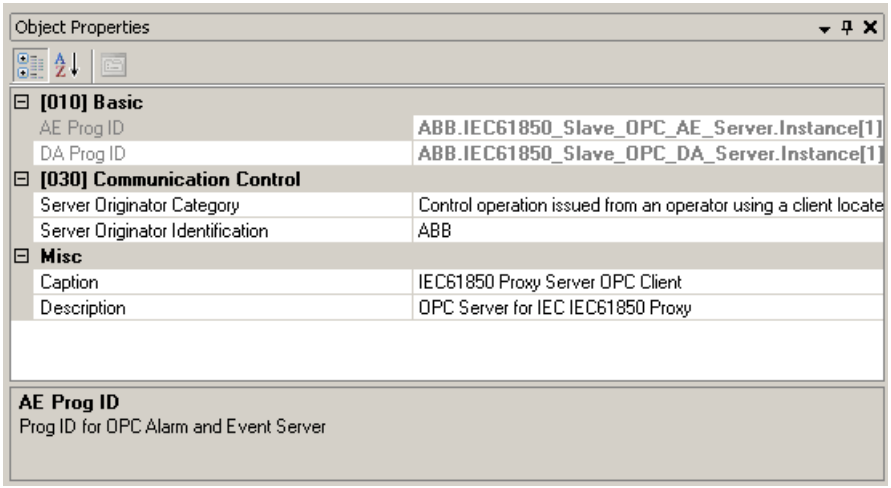
# 3.5. Configuring objects

## 3.5.1. General about configuring objects

After the objects have been added, configure the object properties. Figure 3.5.1-1 shows an example of how to use SAB600 to configure the object properties for IEC 61850 Proxy Server OPC Client.

To configure an object:

1. Select an object in the object tree of the communication structure. The object properties appear in the Object Properties window. The properties and their values can be viewed as shown in Figure 3.5.1-1.




PROXY_object_properties.png

*Figure 3.5.1-1 Example of object properties in the Objects Properties window*

2. Select the property you want to configure. Depending on the property value type, configuring is always done either by:
   - selecting a predefined value from a drop-down menu, or
   - entering a text string or a numerical value in a text field.

The available properties for different objects are listed in the following subsections.

## 3.5.2. Configuring IEC 61850 Proxy Server OPC Client

IEC 61850 Proxy Server OPC Client does not have any configurable properties.

***Table 3.5.2-1 IEC 61850 Proxy Server OPC Client properties***

| Property / Parameter | Value or Value range/ Default | Description |
|---|---|---|
| **Basic** | | |

| Property / Parameter | Value or Value range/ Default | Description |
|---|---|---|
| AE Prog ID | ABB.IEC61850_Slave_OPC_AE_Server.Instance[1] | ProgID for OPC Alarm and Event Server. (not configurable) |
| DA Prog ID | ABB.IEC61850_Slave_OPC_DA.Instance[1] | ProgID for OPC Data Access Server. (not configurable) |

## 3.5.3. Configuring IEC 61850 Proxy Subnetwork

Table 3.5.3-1 lists the configurable IEC 61850 Proxy Subnetwork object properties and the value ranges for them. The actual configuration using SAB600 is performed as described in 3.2, Overview of configuration.

***Table 3.5.3-1 IEC 61850 Proxy Subnetwork properties***

| Property / Parameter | Value or Value range/ Default | Description |
|---|---|---|
| **Communication Port** | | |
| Communication Port | ETH0<br>ETH1<br>Default: ETH0 | LAN port used by the IEC 61850 protocol used for GOOSE sending.<br>Values shown here are default values when no connection to COM600 has been made. When the first connection is made the communication port information is read from COM600 and the corresponding NIC value is written to NICInformation property. |
| IP Address | Default: 127.0.0.1 | Communication channel IP address in dotted decimal format. |
| **Communication Control** | | |
| TCP/IP Keepalive Timeout | 1...3600<br>Default: 15 seconds | TCP/IP keepalive timeout in seconds. |

## 3.5.4. Configuring IEC 61850 Proxy IED

Table 3.5.3-1 lists the configurable IEC 61850 Proxy IED object properties and the value ranges for them. The actual configuration using SAB600 is performed as described in 3.2, Overview of configuration.

***Table 3.5.4-1 IEC 61850 Proxy IED properties***

| Property / Parameter | Value or Value range/ Default | Description |
|---|---|---|
| **Addresses** | | |

| Property / Parameter | Value or Value range/ Default | Description |
|---|---|---|
| IP Address | Default: 127.0.0.1 | Communication IP address in dotted decimal format. (not configurable) |
| OSI ACSE AE Qualifier | Default: 23 | ACSE protocol level configuration parameter. AE Qualifier. |
| OSI ACSE AP Title Value | Default = 1,3,9999,23 | ACSE protocol level configuration parameter. AP Title. |
| OSI Presentation Selector | Default = 00000001 | ACSE protocol level configuration parameter. Presentation selector. |
| OSI Session Selector | Default = 0001 | ACSE protocol level configuration parameter. Session selector. |
| OSI Transport Selector | Default = 0001 | ACSE protocol level configuration parameter. Transport selector. |

### 3.5.5. Configuring IEC 61850 Proxy Device properties

IEC 61850 Proxy Device does not have any configurable properties.

# 4. Operation

## 4.1. About this section

This section describes the basic operation procedures you can carry out after the IEC 61850 Proxy Server object properties have been configured.

After this, you can, for example, monitor and control the condition of connections in the Proxy Subnetwork. This is done by using the Online diagnostics function in SAB600.

## 4.2. Activating COM600 with new configurations

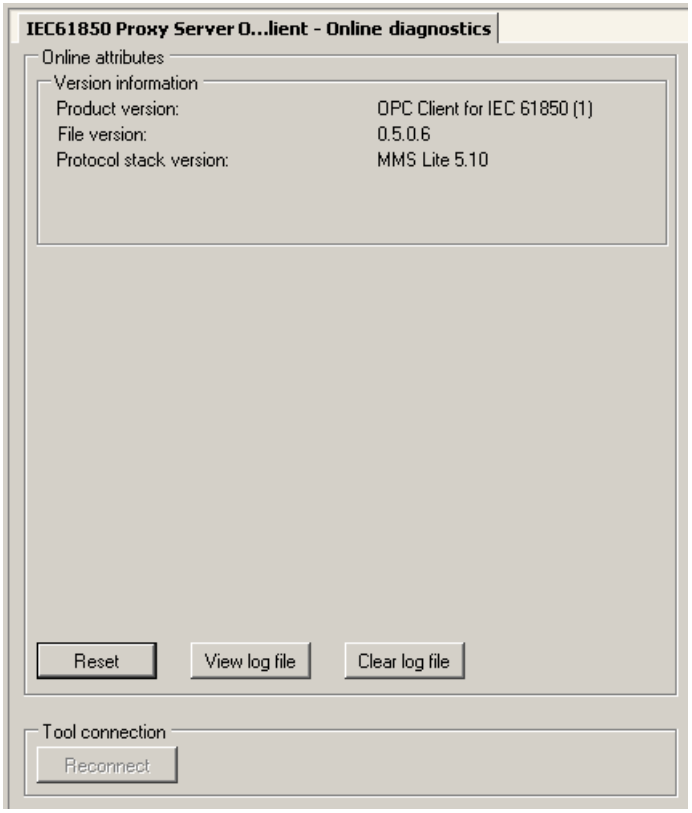
For information about activating COM600 with new configuration, see COM600 User’s Manual.

## 4.3. Diagnostics

### 4.3.1. IEC 61850 Proxy Server OPC Client

#### 4.3.1.1. Online diagnostics

To view version information on IEC 61850 Proxy Server Client or to monitor and control the state of the client, right-click the IEC 61850 Proxy Server OPC Client and select **Online diagnostics**.



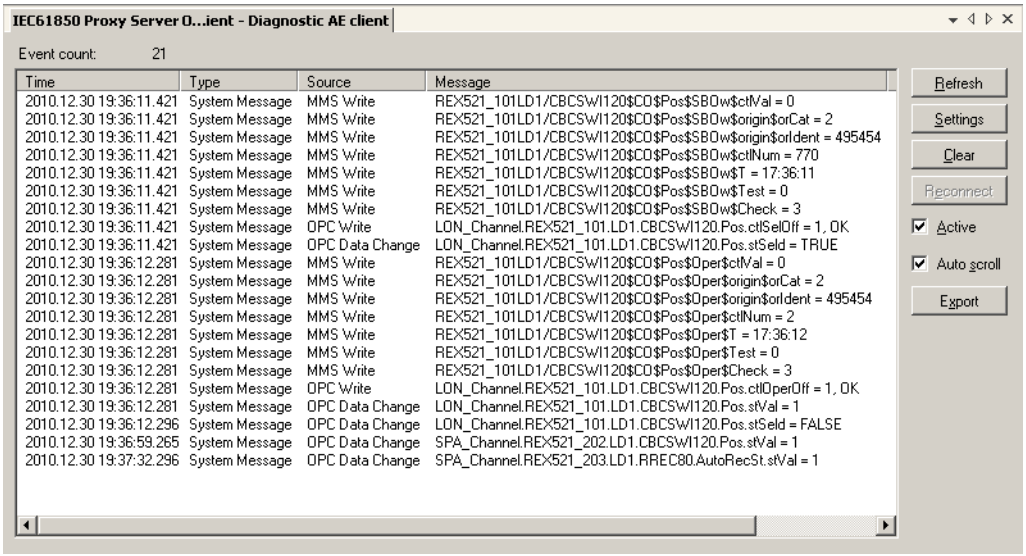

Proxy_online_diagnostics.png

*Figure 4.3.1.1-1 IEC 61850 Proxy Server Online diagnostics*

In Online diagnostics dialog box you can:
- reset the IEC 61850 Proxy Server OPC Client
- view the event log file
- clear the event log file

### 4.3.1.2. Diagnostic AE client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function, see Figure 4.3.1.2-1.




Proxy_diagnostic_AE_client.png

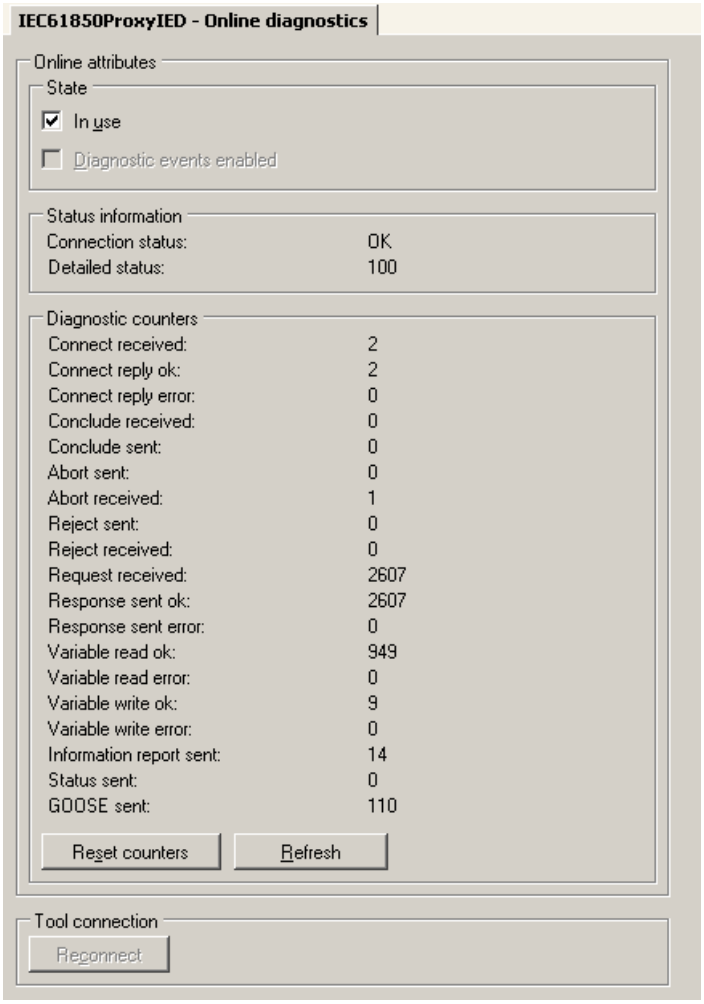
*Figure 4.3.1.2-1 IEC 61850 Proxy Server Diagnostic AE client*

## 4.3.2. IEC 61850 Proxy IED

## 4.3.3. Online diagnostics

The IEC 61850 communication activity can be monitored with the Online diagnostics function, see Figure 4.3.3-1:

- In the Status information field, you can monitor the device status.
- In the Diagnostic counters field, you can monitor the communication activity. The available attributes can be seen in Figure 4.3.3-1.
- To reset Diagnostic counters, click **Reset counters**.
- To take the IEC 61850 communication into use, select the **In use** checkbox. To take the communication out of use, clear the checkbox.
- Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.




IED_online_diagnostics.png

*Figure 4.3.3-1 IEC 61850 Proxy IED online diagnostics*

# 5. Technical reference

## 5.1. ASCI conformance statement

### 5.1.1. ACSI conformance statement

ACSI conformance statements shall be used to provide an overview and details about a device claiming conformance with ACSI:

- 5.1.2, ACSI basic conformance statement
- 5.1.3, ACSI models conformance statement
- 5.1.4, ACSI service conformance statement

These statements are used to specify the communication features mapped to an SCSM. The following tables provide the ACSI conformance statements for the COM600 IEC 61850 Proxy Server. The tables are according to IEC 61850-7-2.

### 5.1.2. ACSI basic conformance statement

***Table 5.1.2-1 Basic conformance statement***

| | | Client/Subscriber | Server/Publisher | Value/Comments |
|---|---|---|---|---|
| | **Client-Server roles** | | | |
| B11 | Server side (of TWO-PARTY-APPLICATION-ASSOCIATION) | - | c1 | SUPPORTED |
| B12 | Client side of (TWO-PARTY-APPLICATION-ASSOCIATION) | c1 | - | |
| | **SCSMs supported** | | | |
| B21 | SCSM: IEC 6185-8-1 used | | | SUPPORTED |
| B22 | SCSM: IEC 6185-9-1 used | | | - |
| B23 | SCSM: IEC 6185-9-2 used | | | - |
| B24 | SCSM: other | | | - |
| | **Generic substation event model (GSE)** | | | |
| B31 | Publisher side | - | O | SUPPORTED |
| B32 | Subscriber side | O | - | - |
| | **Transmission of sampled value model (SVC)** | | | |
| B41 | Publisher side | - | O | - |
| B42 | Subscriber side | O | - | - |

c1 – shall be ‘M’ if support for LOGICAL-DEVICE model has been declared.

O – Optional

M – Mandatory

### 5.1.3. ACSI models conformance statement

***Table 5.1.3-1 ACSI models conformance statement***

| | | Client/Sub-scriber | Server/Pub-lisher | Value/Comments |
|---|---|---|---|---|
| | **If Server side (B1) supported** | | | |
| M1 | **Logical device** | c2 | c2 | SUPPORTED |
| M2 | **Logical node** | c3 | c3 | SUPPORTED |
| M3 | **Data** | c4 | c4 | SUPPORTED |
| M4 | **Data set** | c5 | c5 | SUPPORTED |
| M5 | **Substitution** | O | O | - |
| M6 | **Setting group control** | O | O | - |
| | **Reporting** | | | |
| M7 | **Buffered report control** | O | O | SUPPORTED |
| M7-1 | sequence-number | | | |
| M7-2 | report-time-stamp | | | |
| M7-3 | reason-for-inclusion | | | |
| M7-4 | data-set-name | | | |
| M7-5 | data-reference | | | |
| M7-6 | buffer-overflow | | | |
| M7-7 | entryID | | | |
| M7-8 | BufTm | | | |
| M7-9 | IntgPd | | | |
| M7-10 | GI | | | |
| M7-11 | conf-revision | | | |
| M8 | **Unbuffered report control** | O | O | SUPPORTED |
| M8-1 | sequence-number | | | |
| M8-2 | report-time-stamp | | | |
| M8-3 | reason-for-inclusion | | | |
| M8-4 | data-set-name | | | |
| M8-5 | data-reference | | | |

| | | Client/Sub-scriber | Server/Pub-lisher | Value/Comments |
|---|---|---|---|---|
| M8-6 | BufTm | | | |
| M8-7 | IntgPd | | | |
| M8-8 | GI | | | |
| M8-9 | conf-revision | | | |
| | Logging | O | O | - |
| M9 | **Log control** | O | O | - |
| M9-1 | IntgPd | | | |
| M10 | **Log** | O | O | - |
| M11 | **Control** | M | M | SUPPORTED |
| | If GSE (B31/32) is supported | | | |
| | **GOOSE** | O | O | SUPPORTED (send) |
| M13 | **GSSE** | O | O | |
| | If SVC (41/42) is supported | | | |
| M14 | Multicast SVC | O | O | - |
| M15 | Unicast SVC | O | O | - |
| M16 | **Time** | M | M | - |
| M17 | **File Transfer** | O | O | - |

c1 – shall be ‘M’ if support for LOGICAL-DEVICE model has been declared.

c2 – shall be ‘M’ if support for LOGICAL-NODE model has been declared.

c3 – shall be ‘M’ if support for DATA model has been declared.

c4 – shall be ‘M’ if support for DATA-SET, Substitution, Report, Log Control, or Time model has been declared.

c5 – shall be ‘M’ if support for Report, GSE, or SMV models has been declared.

M - Mandatory

### 5.1.4. ACSI service conformance statement

The ACSI service conformance statement shall be as defined in Table 5.1.4-1 (depending on the statements in Table 5.1.3-1).

***Table 5.1.4-1 ACSI service Conformance statement***

| | Services | AA: TP/MC | Client/Sub-scriber | Server/Pub-lisher | Value/Comments |
|---|---|---|---|---|---|
| | **Server** | | | | |
| S1 | ServerDirectory | TP | | M | SUPPORTED |
| | **Application association** | | | | |
| S2 | Associate | | M | M | SUPPORTED |
| S3 | Abort | | M | M | SUPPORTED |
| S4 | Release | | M | M | SUPPORTED |
| | **Logical device** | | | | |
| S5 | LogicalDeviceDirectory | TP | M | M | SUPPORTED |
| | **Logical node** | | | | |
| S6 | LogicalNodeDirectory | TP | M | M | SUPPORTED |
| S7 | GetAllDataValues | TP | O | M | SUPPORTED |
| | **Data** | | | | |
| S8 | GetDataValues | TP | M | M | SUPPORTED |
| S9 | SetDataValues | TP | O | O | SUPPORTED |
| S10 | GetDataDirectory | TP | O | M | SUPPORTED |
| S11 | GetDataDefinition | TP | O | M | SUPPORTED |
| | **Data set** | | | | |
| S12 | GetDataSetValues | TP | O | M | SUPPORTED |
| S13 | SetDataSetValues | TP | O | O | - |
| S14 | CreateDataSet | TP | O | O | - |
| S15 | DeleteDataSet | TP | O | O | - |
| S16 | GetDataSetDirectory | TP | O | O | SUPPORTED |
| | **Substitution** | | | | |
| S17 | SetDataValues | TP | M | M | SUPPORTED |
| | **Setting group control** | | | | |
| S18 | SelectActiveSG | TP | O | O | - |
| S19 | SelectEditSG | TP | O | O | - |
| S20 | SetSGValues | TP | O | O | - |
| S21 | ConfirmEditSGValues | TP | O | O | - |
| S22 | GetSGValues | TP | O | O | - |
| S23 | GetSGCBValues | TP | O | O | - |
| | **Reporting** | | | | |

| | **Services** | **AA: TP/MC** | **Client/Sub-scriber** | **Server/Pub-lisher** | **Value/Comments** |
|---|---|---|---|---|---|
| | Buffered report control block (BRCB) | | | | |
| S24 | Report | TP | c6 | c6 | SUPPORTED |
| S24-1 | data-change (dchg) | | | | |
| S24-2 | qchg-change (qchg) | | | | |
| S24-3 | data-update (dupd) | | | | |
| S25 | GetBRCBValues | TP | c6 | c6 | SUPPORTED |
| S26 | SetBRCBValues | TP | c6 | c6 | SUPPORTED |
| | Unbuffered report control block (URCB) | | | | |
| S27 | Report | TP | c6 | c6 | SUPPORTED |
| S27-1 | data-change (dchg) | | | | |
| S27-2 | qchg-change (qchg) | | | | |
| S27-3 | data-update (dup | | | | |
| S28 | GetURCBValues | TP | c6 | c6 | SUPPORTED |
| S29 | SetURCBValues | TP | c6 | c6 | SUPPORTED |
| | **Logging** | | | | |
| | Logging control block | | | | |
| S30 | GetLCBValues | TP | M | M | - |
| S31 | SetLCBValues | TP | O | M | - |
| | Log | | | | |
| S32 | QueryLogByTime | TP | c7 | M | - |
| S33 | QueryLogByEntry | TP | c7 | M | - |
| S34 | GetLogStatusValues | TP | M | M | - |
| | **Generic substation event model (GSE)** | | | | |
| | GOOSE-CONTROL-BLOCK | | | | |
| S35 | SendGOOSEMessage | MC | c8 | c8 | SUPPORTED |
| S36 | GetReference | TP | O | c9 | - |
| S37 | GetGOOSEElementNumber | TP | O | c9 | - |
| S38 | GetGoCBValues | TP | O | O | - |
| S39 | SetGoCBValues | TP | O | O | - |
| | **GSSE-CONTROL-BLOCK** | | | | |
| S40 | SendGSSEMessage | MC | c8 | c8 | - |
| S41 | GetReference | TP | O | c9 | - |

| | **Services** | **AA: TP/MC** | **Client/Subscriber** | **Server/Publisher** | **Value/Comments** |
|---|---|---|---|---|---|
| S42 | GetGSSEElementNumber | TP | O | c9 | - |
| S43 | GetGsCBValues | TP | O | O | - |
| S44 | SetGsCBValues | TP | O | O | - |
| | **Transmission of sampled value model (SVC)** | | | | |
| | Multicast SVC | | | | |
| S45 | SendMSVMessage | MC | c10 | c10 | - |
| S46 | GetMSVCBValues | TP | O | O | - |
| S47 | SetMSVCBValues | TP | O | O | - |
| | Unicast SVC | | | | |
| S48 | SendUSVMessage | TP | c10 | c10 | - |
| S46 | GetUSVCBValues | TP | O | O | - |
| S47 | SetMSVCBValues | TP | O | O | - |
| | **Control** | | | | |
| S51 | Select | | M | M | SUPPORTED |
| S52 | SelectWithValue | TP | M | M | SUPPORTED |
| S53 | Cancel | TP | O | M | SUPPORTED |
| S54 | Operate | TP | M | M | SUPPORTED |
| S55 | Command-Termination | TP | M | M | SUPPORTED |
| S56 | TimeActivated-Operate | TP | O | O | - |
| | **File transfer** | | | | |
| S57 | GetFile | TP | O | M | - |
| S58 | SetFile | TP | O | O | - |
| S59 | DeleteFile | TP | O | O | - |
| S60 | GetFileAttributeValues | TP | O | M | - |
| | **Time** | | | | |
| T1 | Time resolution of internal clock | | | | (nearest negative power of 2 in seconds) |
| T2 | Time accuracy of internal clock | | | | T0 |
| | | | | | T1 |
| | | | | | T2 |
| | | | | | T3 |
| | | | | | T4 |

| | Services | AA: TP/MC | Client/Subscriber | Server/Publisher | Value/Comments |
|---|---|---|---|---|---|
| | | | | | T5 |
| T3 | supported TimeStamp resolution | | | | (nearest negative power of 2 in seconds) |

c6 – shall declare support for at least one (BRCB or URCB).

c7 – shall declare support for at least one (QueryLogByTime or QueryLogByEntry).

c8 – shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage).

c9 – shall declare support if TP association is available.

c10 – shall declare support for at least one (SendMSVMessage or SendUSVMessage).

## 5.2. SCL conformance

### 5.2.1. SCL conformance statement

The SCL conformance statement defines several degrees of conformance for which implementations may declare support of the substation configuration language. [1]

***Table 5.2.1-1 SCL conformance degrees***

| | SCL Conformance | | Client-CR | | | Server-CR | |
|---|---|---|---|---|---|---|---|
| | | Base | F/S | Value/Range | Base | F/S | Value/Range |
| SCL.1 | SCL File for Implementation Available (offline) | | | | M | M | SUPPORTED |
| SCL.2 | SCL File available from implementation online | O | O | | O | O | - |
| SCL.3 | SCL implementation reconfiguration supported online | O | O | | O | O | - |

## 5.3. PICS - protocol conformance statement

### 5.3.1. Profile conformance

Table 5.3.1-1 and Table 5.3.1-2 define the basic conformance statement.

***Table 5.3.1-1 PICS for A-Profile support***

| | | Client | | Server | | Value/Comment |
|---|---|---|---|---|---|---|
| | | F/S | | F/S | | |
| A1 | Client/Server A-Profile | c1 | | c1 | | SUPPORTED |
| A2 | GOOSE/GSE Management A-Profle | c2 | | c2 | | SUPPORTED |
| A3 | GSSE A-Profile | c3 | | c3 | | - |
| A4 | TimeSync A-Profile | c4 | | c4 | | - |

c1 – shall be ‘m’ if support for any service specified for Client/S are declared within the ACSI basic conformance statement.

c2 – shall be ‘m’ if support for any service specified for GOOSE/GSE Management are declared within the ACSI basic conformance statement.

c3 – shall be ‘m’ if support for any service specified for GSSE A-Profile are declared within the ACSI basic conformance statement.

c4 – support for at least one other A-Profile shall be declared (e.g. in A1-A3) in order to claim conformance to IEC 61850-8-1.

***Table 5.3.1-2 PICS for T-Profile support***

| | | Client | | Server | | Value/Comment |
|---|---|---|---|---|---|---|
| | | F/S | | F/S | | |
| T1 | TCP/IP T-Profile | c1 | | c1 | | SUPPORTED |
| T2 | OSI T-Profile | c2 | | c2 | | - |
| T3 | GOOSE/GSE T-Profile | c3 | | c3 | | SUPPORTED |
| T4 | GSSE T-Profile | c4 | | c4 | | - |
| T5 | TimeSync T-Profile | o | | o | | - |

c1 – shall be ‘m’ if support for A1 is declared. Otherwise, shall be “i”

c2 – shall be “o” if support for A1 is declared. Otherwise, shall be “i”.

c3 – shall be ‘m’ if support for A2 is declared. Otherwise, shall be “i”.

c4 – shall be ‘m’ if support for A3 is declared. Otherwise, shall be “i”.

## 5.3.2. MMS Conformance

MMS conformance is guaranteed by MMS stack vendor, i.e. Systems Integration Specialists Company, Inc. (SISCO).

All required IEC 61850 services for supporting the ACSI services stated to be supported are supported by the used MMS stack MMS-EASE Light.

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