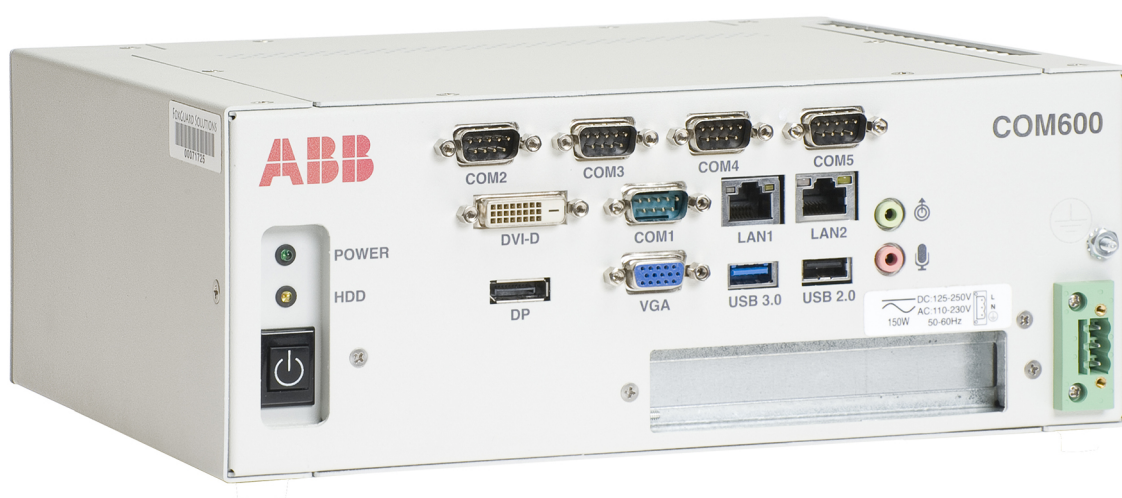


COM600 series 5.1

User's Manual



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Warranty

Please inquire about the terms of warranty from your nearest ABB representative.

<http://www.abb.com/substationautomation>

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The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties. All persons responsible for applying the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are complied with. In particular, any risks in applications where a system failure and/ or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment, and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks.

This product is designed to be connected and to communicate information and data via a network interface, which should be connected to a secure network. It is sole responsibility of person or entity responsible for network administration to ensure a secure connection to the network and to establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB is not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

This document has been carefully checked by ABB but deviations cannot be completely ruled out. In case any errors are detected, the reader is kindly requested to notify the manufacturer. Other than under explicit contractual commitments, in no event shall ABB

be responsible or liable for any loss or damage resulting from the use of this manual or the application of the equipment.

1.3. **Conformity**

This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-1 and EN 60255-27 for the low voltage directive. The product is designed in accordance with the international standards of the IEC 60255 series.

1.4. **Trademarks**

ABB is a registered trademark of ABB Group. All other brand or product names mentioned in this document may be trademarks or registered trademarks of their respective holders.

1.5. **General information**

This manual provides thorough information on Grid Automation Controller COM600 (later referred to as COM600) and the central concepts related to it. The manual provides information about COM600 features, installation and unistallation instructions for the Station Automation Builder 600 (SAB600), and configuration and operation instructions for SAB600. For more information on each topic related to a specific protocol, refer to the list of related documents in 1.10, Related documents.

1.6. **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

1.7. 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.

1.8. 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.
COM600 Series; COM600	COM600 as a generic name for COM600S IEC and COM600F ANSI products
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.
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.

1.9. Abbreviations

Abbreviation	Description
AE	Alarms and Events
DA	Data Access
DO	Data Object
GW	Gateway, component connecting two communication networks together
WebHMI	Web Human Machine Interface
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
LAN	Local Area Network
LD	Logical Device
LN	Logical Node
NCC	Network Control Center
OLE	Object Linking and Embedding
OPC	OLE for Process Control
P&C	Protection & Control
PLC	Programmable Logic Controller
POU	Program Organization Unit
RTS	Request To Send
SA	Substation Automation
SCD	Substation Configuration Description
SCL	Substation Configuration Language
SFC	Sequential Function Chart
SLD	Single Line Diagram
XML	eXtended Markup Language

1.10. Related documents

Name of the manual	MRS number
COM600 User's Manual	1MRS756125
COM600 Operator's Manual	1MRS756705
COM600 HMI Configuration Manual	1MRS756740
COM600 Data Historian Operator's Manual	1MRS756739
COM600 Sequence Control Configuration Manual	1MRS755001

Name of the manual	MRS number
Master Protocols (Ethernet based) Configuration and Operation Manual	1MRS758689
Master Protocols (Ethernet based) Technical Reference Manual	1MRS758690
Slave Protocols (Ethernet based) Configuration and Operation Manual	1MRS758691
Slave Protocols (Ethernet based) Technical Reference Manual	1MRS758692
DNP 3.0 Serial Master (OPC) User's Manual	1MRS756567
DNP 3.0 Serial Slave (OPC) User's Manual	1MRS755495
IEC 60870-5-101 Slave (OPC) User's Manual	1MRS755382
IEC 60870-5-101 Master (OPC) User's Manual	1MRS756703
IEC 60870-5-103 Master (OPC) User's Manual	1MRS752278
COM600 Logic Processor User's Manual	1MRS756738
Modbus Serial Master (OPC) User's Manual	1MRS756126
Modbus Serial Slave (OPC) User's Manual	1MRS756913

1.11. Document revisions

Document version/date	Product revision	History
A/16.10.2006	3.0	Document created
B/22.1.2007	3.0	Document revised
C/8.6.2007	3.0	Document revised
D/21.12.2007	3.1	Document revised
E/17.6.2008	3.2	Document revised
F/13.2.2009	3.3	Document revised
G/6.11.2009	3.4	Document revised
H/30.6.2011	3.5	Document revised
J/18.6.2012	4.0	Document revised
K/13.3.2015	4.1	Document revised
L/24.5.2017	5.0	Document revised
M/26.3.2018	5.1	Document revised

2. Introduction

2.1. General information about the COM600 series

The COM600 product series are versatile Substation Management Units that help realize smart substation and grid automation solutions in industrial and utility distribution networks.

They get deployed together with protection and control IEDs, substation devices such as RTUs, meters and PLCs in dedicated cabinets and switchgear.

The COM600 product is an all-in-one unit that functions as:

- Communication gateway
- Web Human Machine Interface (WebHMI)
- Automation controller
- Real-time and historical data management unit

The COM600 product series use process information and device data, acquired over Ethernet or serial communication protocol interfaces to execute specific substation functions and applications. Thus, they are critical building blocks to realize substation secondary system solutions and in the process solving diverse customer needs.

2.2. COM600 product series variants and rationale

To facilitate substation and grid automation solutions in IEC and ANSI market areas, a variant-based system similar to Relion® 615 and 620 series is being followed from COM600 5.0 release.

The main reasons for such an approach are the following:

- To ensure all COM600 product series features are advantageously used in end-customer projects in the medium voltage substation automation domain.
- To ensure an optimum feature set to be bundled together to realize specific applications required in IEC and ANSI market areas.
- To ensure a future-proof product approach.

This release then comprises of two variants, based on the primary intent or application are defined as follows:

- COM600S IEC – COM600 for substation automation, analysis and data management (for IEC markets)
 - COM600S IEC is a substation automation, analyzer and data management unit that integrates devices, facilitates operations, manages communication and runs analysis applications pertinent to equipment or operations in utility or industrial distribution substations.
- COM600F ANSI – COM600 as distribution automation controller (for ANSI markets)

- COM600F is a dedicated distribution automation controller unit that runs distributed grid and feeder applications for ANSI power networks and inherits all core features of the COM600 series.

2.3. Overview of COM600

COM600 provides gateway functions for mapping signals between protection and control IEDs in industrial or utility substations and higher-level systems. It further includes an optional WebHMI that provides data and information from the substation to the users.

COM600 gathers data from protection and control IEDs and from process devices using different communication protocols. The supported protocols can be combined freely in one station computer, limited only by the number of hardware interfaces and the license. COM600 uses web technology to display data to different users in a professional and user-friendly manner. The web technology is further used to transfer information to a network control center (NCC) or distributed control system (DCS).

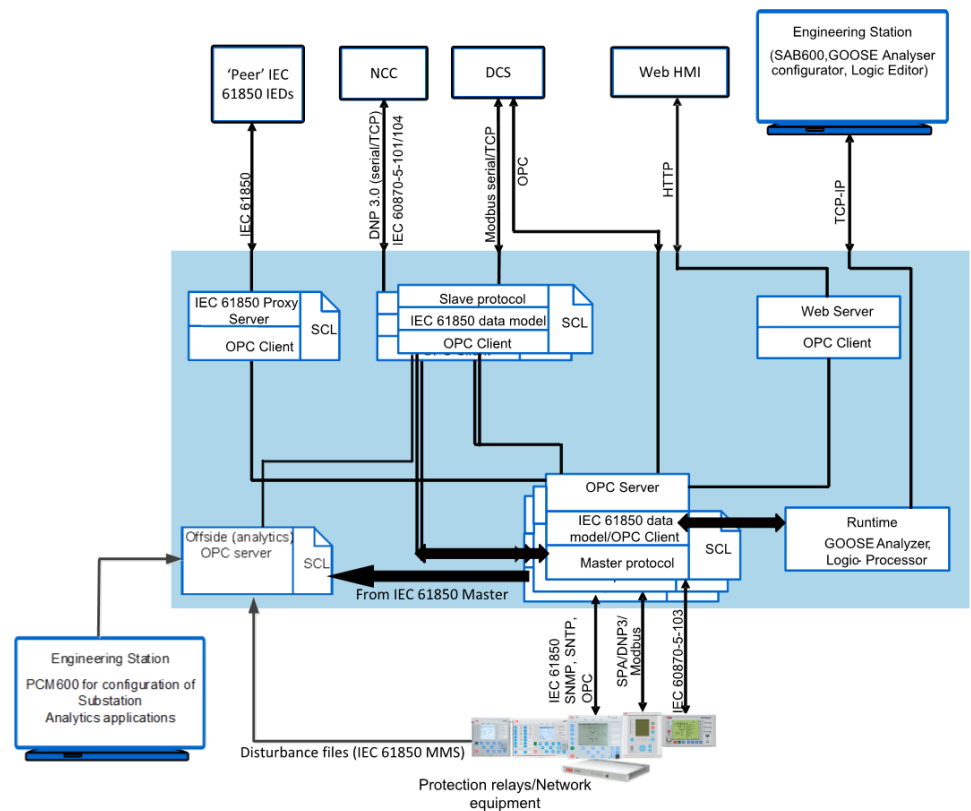
COM600 benefits from the potential of the IEC 61850 standard by using the IEC 61850-6 substation configuration language (SCL) and IEC 61850 -7 communications modeling regardless of protocol used. As the IEC 61850 data modeling is used for all communication protocols the gateway cross-reference is done in the same way regardless of the protocol, for example IEC 61850-8-1 or DNP3. '

With the optional WebHMI, COM600 can be used for efficient substation visualization, monitoring, and control. The supported browsers are Microsoft Internet Explorer, Mozilla Firefox® and Google Chrome. Measured values from process devices are displayed on the WebHMI. Single-line diagrams can be used to view any available measured values from the process devices.

3. Features

3.1. Gateway functionality

The Gateway functionality provides a framework that enables the use of OPC server and client components, such as OPC Client for IEC 60870-5-101 and OPC Server for IEC 61850. This manual presents the principles that are common to the protocols available at the moment as well as to those that will be applicable in the future. For protocol-specific information, refer to the respective client and server user's manuals.



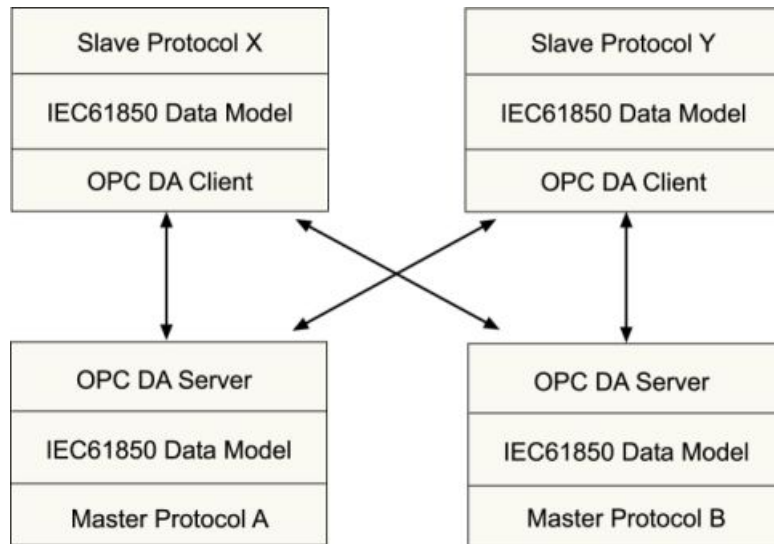
COM600_Conceptual_View.png

Figure 3.1-1 Conceptual view of COM600 Gateway

1. Network Control Center (NCC)
2. Engineering PC with Station Automation Builder 600 (SAB600)
3. COM600 with embedded operation system, OPC client(s) for NCC connection(s), OPC server(s) for process connection
4. Protection and control devices

Normally, there is one OPC client per NCC connection. If you want to create several NCC connections with the same protocol, use multiple instances.

COM600 consists of OPC Data Access (DA) server and client components. OPC Servers are used mainly for master/client protocol stacks to provide access to the data in the devices in the protocol. OPC Clients are used for slave/server protocol stacks to enable external systems to access data available in the OPC Servers.



GWComponents.jpg

Figure 3.1-2 Example of COM600 Gateway components

3.2.

WebHMI

3.2.1.

WebHMI functions

The WebHMI enables the user to access the COM600 computer via a web browser.

The features of WebHMI include:

- Substation, Voltage Level and Bay Single Line Diagram views
- Busbar coloring
- Event lists
- Alarm lists
- Parameter settings
- Disturbance data upload
- System supervision
- Breaker and switch control
- Measurement display
- User management
- Data historian (optional feature)
- Disturbance data viewer (locally in COM600 computer)
- GOOSE Analyzer (optional feature)
- Sequence Control

- Documents linked to primary device objects (text, image, and so on)
- Substation analytic reports
- Fault location, circuit breaker condition monitoring (optional feature)

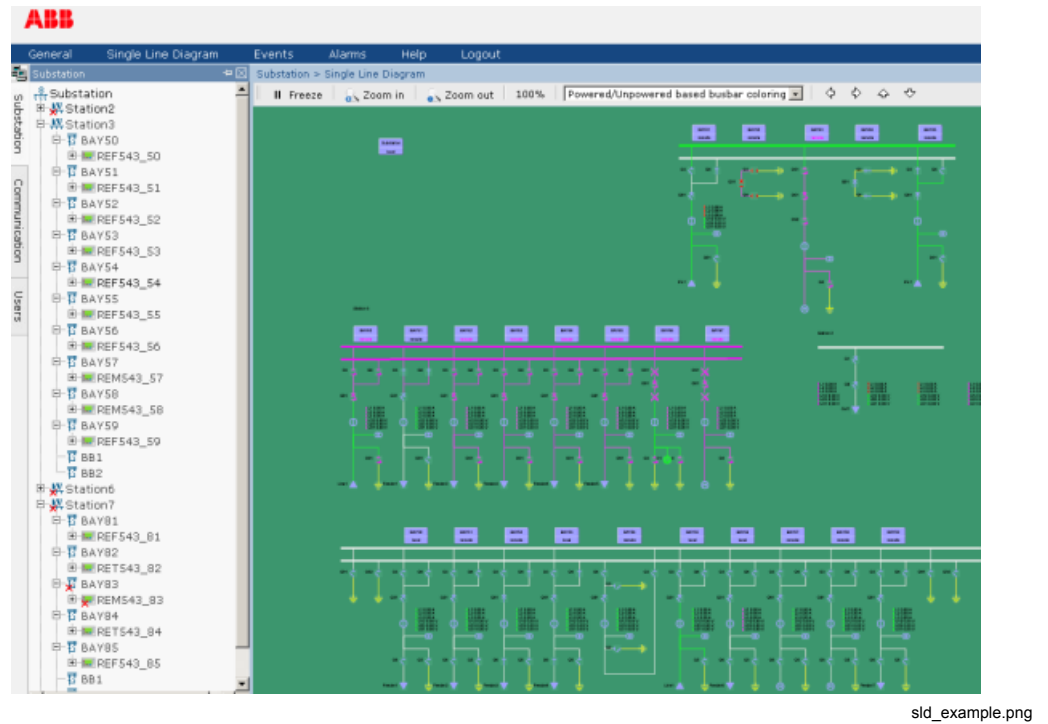


Figure 3.2.1-1 Example view of the COM600 WebHMI

The WebHMI can be accessed:

- locally via an optional local WebHMI screen
- locally by connecting your laptop to COM600 via LAN
- remotely through the internet or over LAN/WAN

3.2.2. Predefined user account

The predefined **COM600** user account also works as a WebHMI administrator user account. It's not possible to modify it in any way from the WebHMI though. It cannot be deleted, it's not possible to change its user group and its password must always be changed from SAB600.

3.3. OPC server

The OPC server component consists of a Master/Client Protocol Stack, OPC DA/AE Server, and Configuration SCL.

The protocol stack component implements the protocol functions, such as handshaking signal handling, message coding/decoding, check sum calculations, polling logic, protocol level timers, and so on. The OPC server/protocol handler implements the functionality for publishing and updating data on the OPC interfaces and protocol conversion between the OPC and the protocol stack using the common IEC 61850 data model.

The configuration of the OPC server and the protocol stack is handled using a configuration parser. The OPC server is configured using SAB600. The configuration information is exported to an SCL/XML configuration file according to the IEC 61850 SCL specification. When the OPC server is started, the configuration information is read from the file.

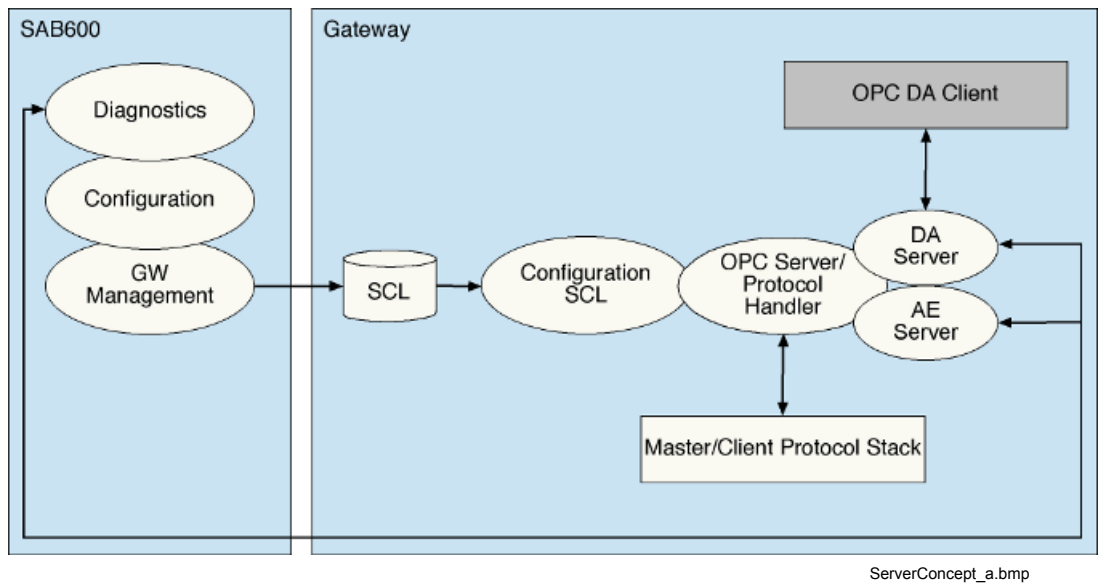


Figure 3.3-1 Conceptual view of OPC server

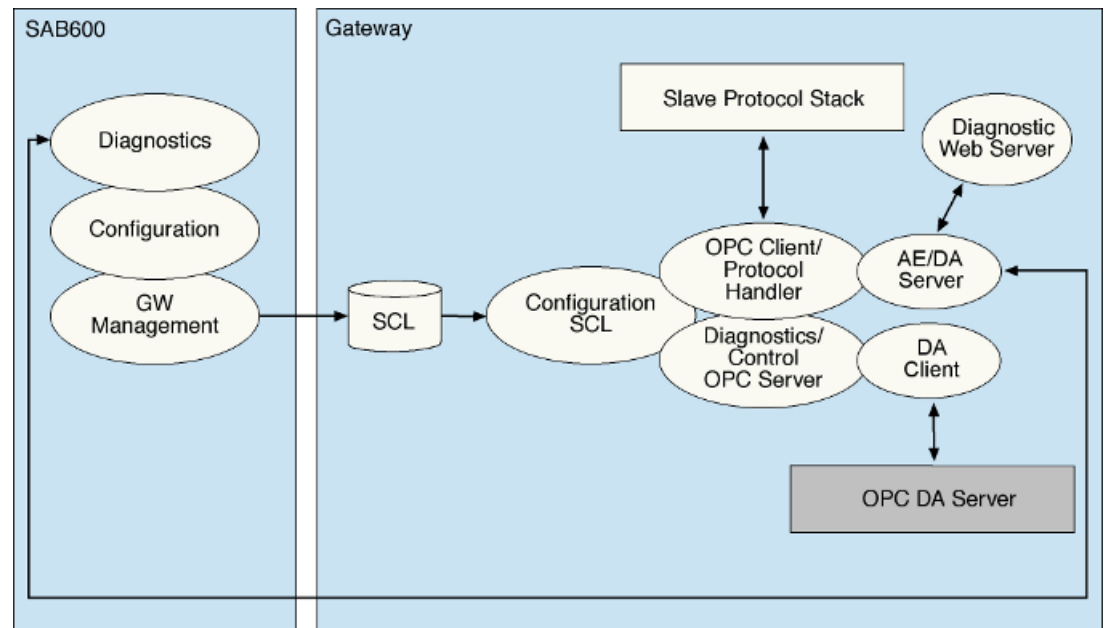
3.4. OPC client

The OPC client software consists of a Slave/Server Protocol Stack, OPC DA Client, Configuration SCL, OPC Data Access Server and Alarm&Event server components for diagnostic and control.

The protocol stack component implements the protocol functions, such as handshaking signal handling, message coding/decoding, check sum calculations, polling logic, protocol level timers, and so on. The OPC client/protocol handler implements the functionality for data subscription from the OPC servers and protocol conversion between the OPC and the protocol stack using the common IEC 61850 data model.

The configuration of the OPC client and the protocol stack is handled using a configuration SCL. The OPC server is configured using SAB600. The configuration information

is exported to the SCL/XML configuration file according to the IEC 61850 SCL specification. When the OPC client is started the configuration information is read from the file.



ClientConcept_b.bmp

Figure 3.4-1 Conceptual view of OPC client

3.5. Logic Processor

COM600 offers an straightforward approach to the languages specified by the IEC 61131-3 standard for programmable logic controllers (PLC). The programmable logic processor in COM600 is offered as a selectable software option. The PLC programming system enables programming and execution of automation tasks. In addition, the IEC 61131-3 programming in COM600 offers on-line and off-line functionality for engineering and diagnostics.

The Logic Processor OPC Server transfers information between CodeSys SP runtime and other COM600 components, such as OPC servers, slave clients, and WebHMI.

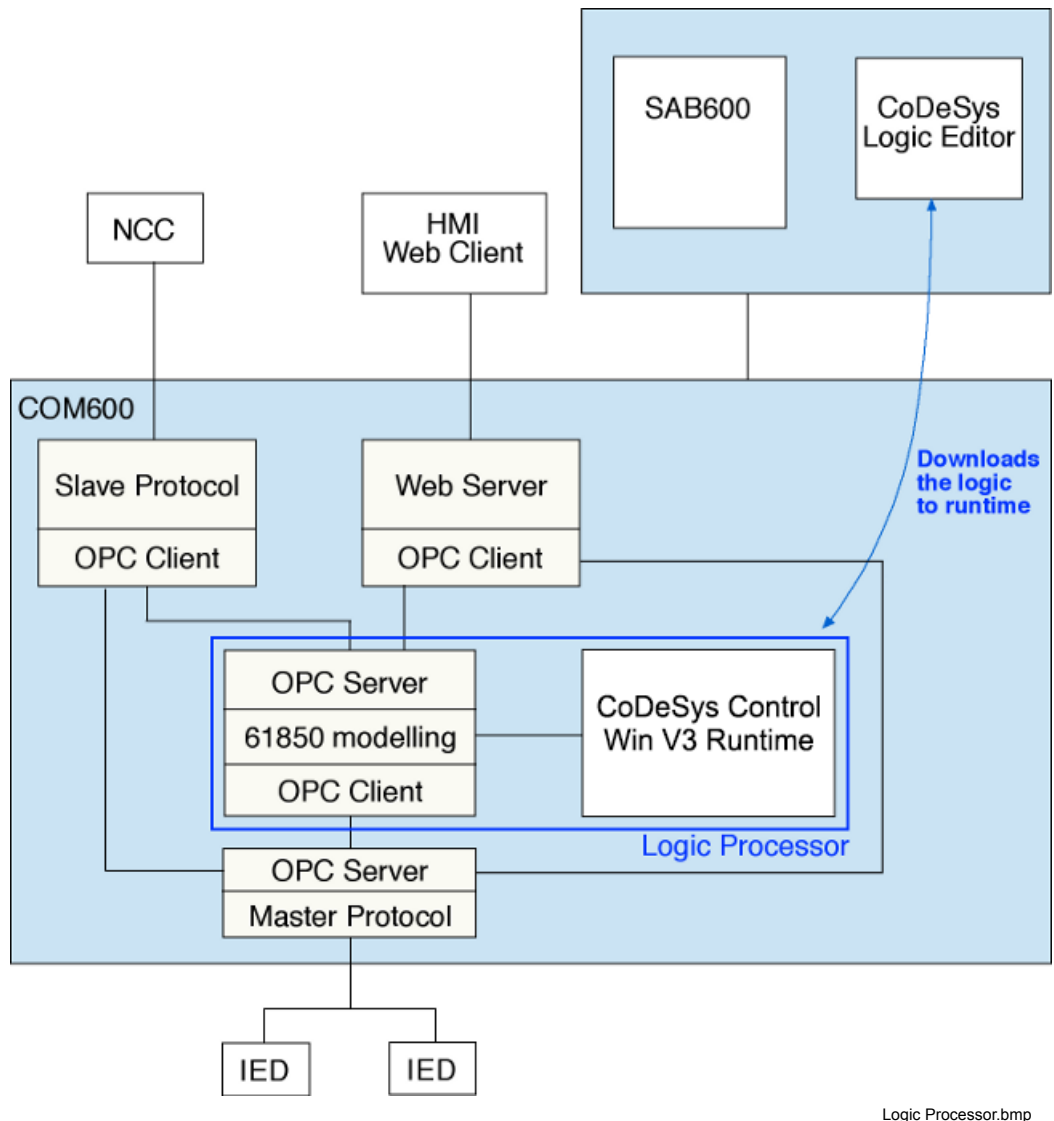


Figure 3.5-1 Functional overview of Logic Processor

CoDeSys SP runtime system is manufactured by 3S-Smart Software Solutions GmbH (www.3s-software.com).

3.6. Data Historian

The COM600 data historian is a real-time database designed and optimized for process information management and extensive history recording. The data historian is based on ABB's cpmPlus Knowledge Manager software. It combines the benefits of an easy-to-use real-time database with industrial reliability, performance, and real-time functionality to provide an excellent platform for process information management.

The data historian can be used for accurate process performance monitoring by following process and equipment performance calculations with real-time and history values. Better understanding of the process behaviour by joining time-based process measurements with production and maintenance events helps the user to understand the process dynamics. It further provides required information for learning how to keep the process running. High performance and reliability, together with maintenance-free operation, provide a solid platform for trending.

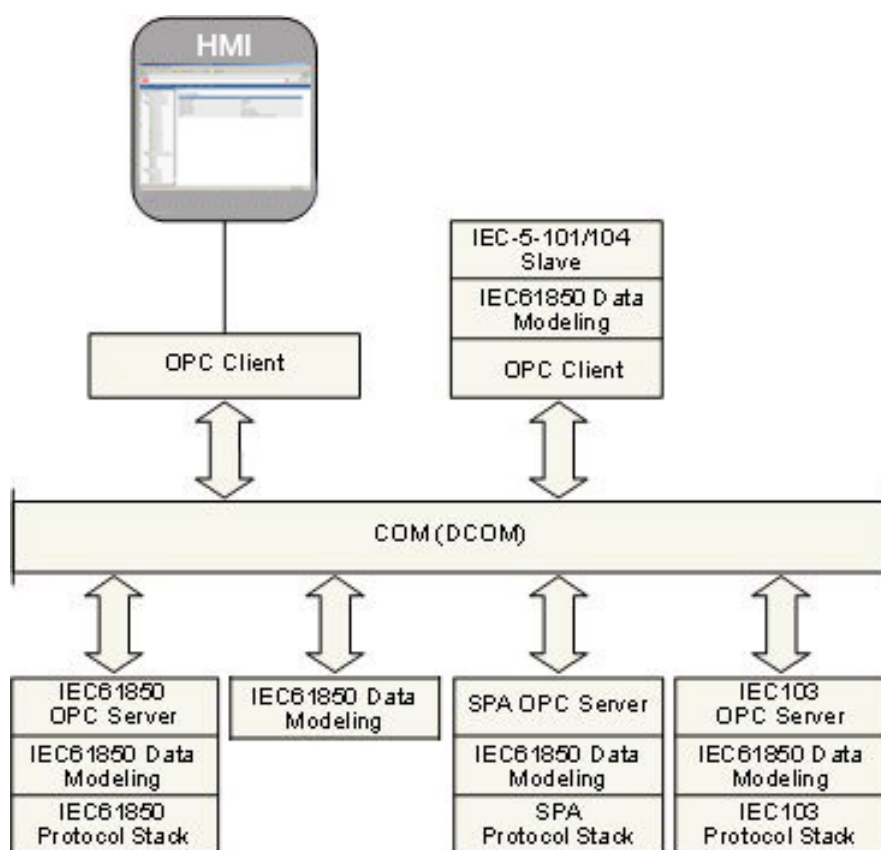
The optional data historian functionality offers means of storing, analyzing and presenting process data.

3.7. IEC 61850 data modeling

To simplify protocol conversion and signal mapping in the gateway, each component uses a common data model. The data model is based on common data classes and services specified in the IEC 61850 standard. Each client and server component is a separate program. The components interact with each other only via OPC interfaces. This means that they can be developed and used independently as a part of the gateway as long as they conform with the OPC DA and common data model specifications.

Protection and control products are connected to the gateway via OPC interfaces. Although OPC provides means to access data on devices, it does not specify the semantics of the data. This means that the same information is available in different formats depending on which device and communication protocol is used. In addition, services, such as breaker operation, vary among devices and protocols.

These differences complicate the reuse of gateway applications. To overcome this problem, all the applicable data and services are remodeled in OPC servers according to the data and service model specified in the IEC 61850 standard. This provides a protocol and device independent interface between the applications and the process. Figure 3.7-1 presents an overview of the IEC 61850 model usage.



IECmodelling.jpg

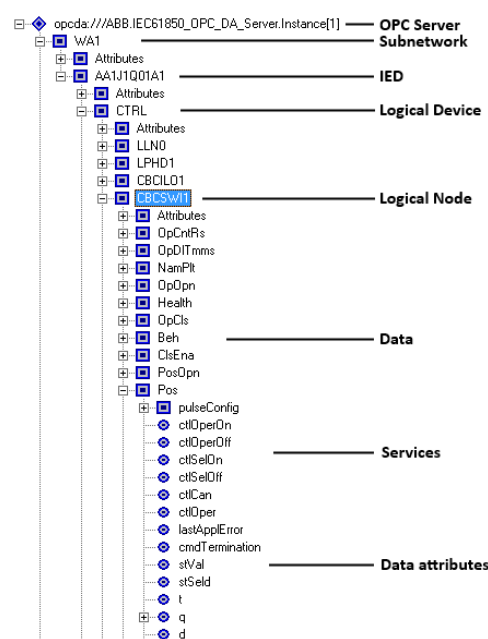
Figure 3.7-1 Overview of IEC 61850 model usage

The smallest unit in the IEC 61850 modeling is a data attribute which is linked to an OPC item in the OPC server. A data attribute can be, for instance, the state value of a double point object (stVal), quality information (q), or timestamp (t). In the OPC server, some of the services are also mapped to the same level as the attributes. This means that, for example, control services (such as ctlOperOn, ctlOperOff) for operating a double point object are available as OPC items.

For different types of data, the IEC 61850 standard defines over 30 common data classes including a set of mandatory and optional attributes and services. For example, common data classes are defined for Controllable double point (DPC), Single point status (SPS) and Measured value (MV).

Furthermore, the standard defines approximately 90 functional groups of data, based on common data classes. These groups are called logical nodes. Examples of logical nodes are controllable switch (CSWI) and distance protection (PDIS).

Logical nodes can be further grouped under logical devices (LD), forming logical groups within a physical device (IED), see Figure 3.7-2.



SAB600_IEC61850_Data_Modelling.png

Figure 3.7-2 IEC61850 data modelling

3.8. Station/Remote switch function

The COM600 gateway provides a common Station/Remote (S/R) switch functionality for OPC servers and clients. The S/R switch is used to determine whether the objects in a logical device of an IED can be controlled within the station, or remotely via a gateway.

A station can have one or more S/R switches. The switches are either physical switches or software switches in a simulated IED of an OPC server. The S/R switches are modeled using the IEC 61850 SPS, SPC, DPS, DPC, INS, or INC data class.

Each IED or logical device in an IED is linked with an S/R switch during the configuration process. If a logical device has no linking information configured, the linking information of the IED is used instead. At runtime, an OPC server publishes the logical device S/R switch linking information for the OPC clients of the COM600 gateway. Each time an OPC client sends a command to a device, it first checks the S/R switch position to determine whether the operation is allowed or not. The COM600 gateway OPC client is allowed to operate only if the S/R switch is in remote position.

A COM600 gateway OPC client has the operation modes disabled and enabled for S/R switch handling. When the switch is in the enabled mode, the values for S/R switch position failures are **Allow controls if position unknown** and **Reject controls if position unknown**.

WebHMI is considered a local station WebHMI, if it uses the local display of the COM600 computer, or if the IP address of the WebHMI client is in the range specified with a

Station IP Address Filter property in the Gateway object. Otherwise WebHMI is considered a remote WebHMI. The state of the station/remote switch controls whether the operations are allowed from WebHMI or not.

The station/remote switch for the WebHMI is configured with the SLD editor by inserting the Station Switch Indicator symbol to the substation SLD and specifying the data object for the position information. If a real switch indication is not available, it is possible to use a simulated data from a virtual IED. This can be done by creating an IED configuration in the communication structure and setting the simulation mode of the IED to true.

Edition 1 supports only Loc setting.

The new settings to be supported from Edition 2 are the data objects Loc, LocSta and MltLev.

Loc functions similar to the current bay switch, when any relevant Loc is in Local position then no control will be allowed from the COM600 WebHMI. Loc can be found on the LN for used for the control operation (e.g. CSWI), in the LLN0 LN for the logical device and in the LN for the switchyard equipment (e.g. XCBR) used by the control LN.

LocSta is similar to the current station switch in semantics and it can be found in the same places as Loc. However, only one LocSta instance will be checked (as opposed to all relevant Loc instances), the one that is closest to the LN being operated, as it's possible to have different settings on different levels. The innermost one will take precedence. LocSta for the switchyard equipment LN (if any) will not be checked, as the WebHMI only operates on the LN above it.

MltLev can be used to allow operation from both local and remote WebHMI users at the same time when LocSta.stVal = FALSE. Normally this means that only remote WebHMI users will be allowed to operate, but if MltLev.setVal = TRUE, then both local and remote WebHMI users may operate at the same time.



There's no need to use the new LocKey data object in COM600, Loc value will automatically follow LocKey value.

3.9. COM600 Watchdog

The COM600 computer has a built-in hardware watchdog function. The function can be enabled with SAB600 from the Gateway object properties. When enabled, the watchdog monitors the COM600 software. If the COM600 software fails to send the keep-alive triggering to the watchdog within a certain time, the watchdog restarts the COM600 computer.

3.10. External watchdog for COM600

COM600 can be configured to send periodically a command to an IED connected to COM600. This function can be used to monitor the health of COM600. For example, SACO 16D2 can be connected with SPA protocol to COM600 and configured to create an alarm if no command from COM600 is received within specified time. Configuration of an external watchdog device is described in 6.8, Configuring external watchdog for COM600.

3.11. Network Fault Tolerance for COM600

COM600 can be configured to provide a certain level of tolerance against network failure by using either the ABB DuoDriver feature or the Intel Teaming Feature, Switch Fault Tolerance. These features are available when the optional dual port PCI Ethernet network adapter is used.

DuoDriver

DuoDriver implements the Parallel Redundancy Protocol (PRP) for Ethernet as specified in IEC 62439 DIS. PRP is based on duplicated networks, where each message is sent via both networks, the receiver node accepts the first received message and discard the duplicate. Message replication and discard function is done by the DuoDriver and it hides the two networks from the upper level applications. In PRP there is practically no switch over time in the case of one of the network fails as every message is always sent to both networks. The diagnostic data can be further used on COM600 WebHMI and gateway applications. See 6.9, Installing and configuring Duo Driver for installation and configuration details.

Switch Fault Tolerance

The Switch Fault Tolerance feature of the Intel network adapter requires the Teaming Feature to be enabled.

Teaming Features include Failover protection, increased bandwidth through aggregation, and balancing of traffic among team members. Teaming Modes are AFT, SFT, ALB, RLB, and EtherChannel*/3ad (LA/FEC/GEC/3ad). Only Failover protection using SFT is supported by COM600.

3.12. Queuing of Process Data Updates

This section describes the common queue mechanism for OPC Clients (slave protocols) in COM600. There can be additional queuing mechanisms on different levels of the protocol stacks, that are specific for the protocol, which are not described here.

Process data updates are queued in the OPC Clients of COM600. Each OPC Client has its own queues independent from other clients, which prevents disturbances on one client connection from interfering with other connections. There are four separate queues for different type of data with configurable length.

- High Priority
 - command replies/confirmations
 - internal protocol stack control commands
 - protocol stack database initialization commands
- State Indications
 - binary data and other state indications
- Measurements
 - analog data
- Interrogated
 - interrogation-related data and commands

Queue logic

For high priority and interrogated queues the oldest message is skipped when the queues fill up. Generally these queues should never fill up since they contain a limited number of updates (proportional to the number of OPC items).

When the state indication queue is full, the new updates are always skipped until there is free space in the queue.

When the measurement queue is full, an older update is always skipped when a new update is pushed the queue.

The updates are skipped according to the following logic:

- If an item has two or more updates, the oldest update is skipped
- If no item has two or more updates, the oldest update in the queue is skipped.

For measurements, older updates for an item are also skipped when the queue reaches a configurable percent of the maximum capacity (but only if there is an item with multiple outstanding updates to send).

Queue priorities

If a high priority queue contains an update, it is always sent first. After that, the interrogated queue is checked. If none of these queues has updates, the state indications and measurements are checked in round-robin fashion.

Queue capacities

The capacity (maximum size) of each queue is independently configured. If one queue fills up, capacity from another, possibly non-full queue is not used.

3.13. Event Printer

COM600 Event Printer enables printing of events as they arrive to COM600. The same event information is presented on the COM600 WebHMI event list and printed on the event printer. It is possible to customize the printout, for example, by selecting the printed columns and their lengths. Alarming events can be marked with a configurable symbol. For more information about the configuration of the Event Printer, see 6.4.5.3, Configuring COM600 event printer.



Currently supported printer models are Fujitsu DL3750+ and DL3850+. Any dot matrix printer should work, but their compatibility with COM600 cannot be guaranteed. If local special characters are needed, check that the printer character set supports them.

Event Printer is connected to a serial communication port (RS-232) of COM600 with a null-modem cable (to be purchased separately).

For diagnostic purposes, Event Printer generates the following non-printable supervision events to the WebHMI event list.

Table 3.13-1 Supervision events

Event	Description
Failed to print event	The event printer is incorrectly configured, the events cannot be printed.
Too many outstanding printing jobs, printer problems?	Operating system print job limit reached. Possible reasons are that events are occurring faster than the printer is able to print, or the printer is offline. Printed events are still queued in the internal printing queue.
Printing queue is full, incoming events will no longer be printed	Internal printing queue full. Possible reasons are that events are occurring faster than the printer is able to print, or the printer is offline. New events will be discarded from the printing queue, until there is place in the queue. The size of the queue is configurable.

3.14. GOOSE Analyzer

The GOOSE Analyzer functionality in COM600 can be used throughout the entire life cycle of the IEC 61850 substation automation system. It supports the commissioning, maintenance and upgrade phases of the IEC 61850 system by means of communication diagnosis enabling features, communication status follow-up and storing of GOOSE events for auditing purposes.

GOOSE Analyzer consists of a server and a WebHMI. The GOOSE Analyzer server includes a real-time analysis engine for diagnosing live GOOSE packets (messages) over the connected subnetwork and outputting GOOSE events and GOOSE diagnostic events to the historical database.

With the GOOSE Analyzer WebHMI, you can view the GOOSE connection diagram with a real-time diagnosis and event list, query historical events, build GOOSE testers, view reports and plot specific network load trend graphs.

3.15. Sequence control

COM600 offers a possibility to create control sequences. The sequence control feature allows you to create sequences in the Logic Processor environment using the sequence control library and control breakers through them. The created sequences can be controlled using COM600 WebHMI. This feature requires the Logic Processor option. Configuration sequences are described in the COM600 Sequence Control Configuration Manual.

4. Technical data

4.1. Mechanical properties

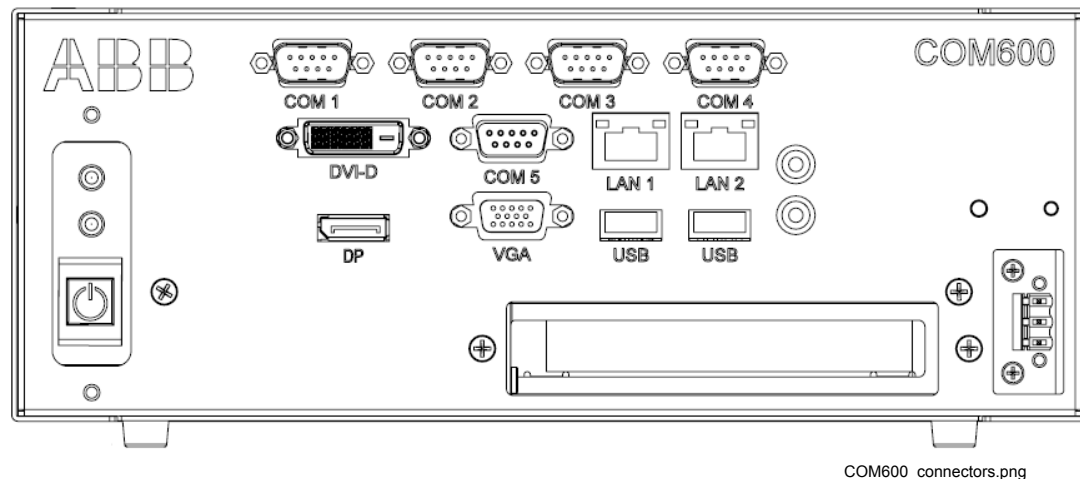


Figure 4.1-1 COM600 interfaces shown in a high voltage model. The COM600 low voltage model includes the same interfaces but without the AC text.

The technical data of COM600 is presented in the following tables.

Table 4.1-1 Dimensions

Description	Value
Width	10.45in (265.43mm) 12.38in (314.45mm) with mounting bracket
Height	4in (101.6mm) 4.68in (118.87mm) with mounting bracket
Depth	9in (228.6mm)
Weight	12lbs (5.44kg)

Table 4.1-2 Power Supply

Description	Type 1	Type 2
Nominal Input Voltage U_n	110 - 230 V AC 50 and 60Hz 125 - 250 V DC	24 - 60 V DC
Hold-up Time	50 ms at U_n	
Input Voltage Range	85...264 V AC 110...375 V DC	19...72 V DC
Power Consumption	~45W @ max CPU load ¹⁾	

Description	Type 1	Type 2
Fuse type		10A/125V

1) Without option cards.

Table 4.1-3 Hardware

Description	Value
Processor	Processor Intel Core i5-4590T Haswell Quad-Core 2.0GHz LGA 1150
System memory	System Memory 8 GB DDR3 204-Pin SO-DIMM
Hard Drive	Hard Drive 128GB Solid State Drive
Real Time Clock Battery	Lithium battery

Table 4.1-4 Interfaces

Description	Value
Serial interfaces	Serial Interfaces 3x RS-232; 2x RS-232/422/485 Configurable
Ethernet interfaces	Ethernet Interfaces 2x GbE RJ-45
Display interfaces	Display Interfaces 1x VGA; 1x DVI-D; 1x Display Port
USB	1x USB 2.0; 1x USB3.0
Audio	1x Line-out; 1x MIC-in

Table 4.1-5 Optional PCI Extensions

Description	Value
Serial interfaces ¹⁾	8x RS-232/422/485 Configurable
Ethernet interfaces ²⁾	2x GbE RJ-45
Fiber Optic Interfaces ³⁾	2x 100FX LC

1) Operating temperature = 0 to 55° C; Storage temperature = -20° C to 85° C; Relative Humidity = 5 to 95% (non-condensing)

2) Operating temperature = 0 to 55° C; Storage temperature = -40° C to 70° C; Relative Humidity = 90% (non-condensing) at 35° C

3) Operating temperature = 0 to 50° C; Storage temperature = -25° C to 70° C; Relative Humidity = 5 to 95% (non-condensing)

Table 4.1-6 Operating System

Description	Details
Operating System	Windows Embedded Standard 8

Table 4.1-7 Inspection of Mechanical Structure

Description	Reference
Markings of Mechanical Structure	IEC 61850-3:2013 6.1
Degree of Protection by Enclosure	IEC 61850-3:2013 6.11, IEC 60529
Clearance and Creepage Distances	IEC 61850-3:2013 6.6.1, IEC 60255-27

Table 4.1-8 Insulation Tests

Description	Reference
Dielectric Test	IEC 61850-3:2013 6.6.4, IEC 60255-27
Impulse Voltage Test	IEC 61850-3:2013 6.6.3, IEC 60255-27
Insulation Resistance	IEC 61850-3:2013 6.6.6, IEC 60255-27
Protective Bonding Impedance	IEC 61850-3:2013 6.6.5, IEC 60255-2

Table 4.1-9 Electromagnetic Compatibility Tests

Description	Reference
Electrostatic Discharge Immunity: <ul style="list-style-type: none"> Contact Discharge Air Discharge 	According to IEC 60601-1-2, IEC 61850-3:2013 <ul style="list-style-type: none"> +/- Volts = 6 kV +/- Volts = 8 kV
Radiated Electromagnetic Field Immunity	According to IEC 61000-4-3:2010, IEC 61850-3:2013 Severity = 10V/m Start Frequency = 80 MHz Stop Frequency = 3,000 MHz Modulation = 1kHz, 80%
Electrical Fast Transient/Burst Immunity <ul style="list-style-type: none"> Power Supply RJ-45 Port Serial Port 	According to IEC 61000-4-4:2012, IEC 61850-3:2013 Amplitude = 2 kV Amplitude = 1 kV Amplitude = 1 kV
Surge Immunity <ul style="list-style-type: none"> Power Supply RJ-45 Port Serial Port 	According to IEC 61000-4-5:2005, IEC 61850-3:2013 Test Level = 2 kV Line to Ground, 1kV Line to Line Test Level = 1 kV Line to Ground, 0.5kV Line to Line Test Level = 1 kV Line to Ground

Description	Reference
Conducted Radio Frequency Immunity	According to IEC 61000-4-6:2008, IEC 61850-3:2013 Test level = 3 Vrms Frequency Range = 0.15 MHz to 80 MHz
Damped Oscillatory Waves <ul style="list-style-type: none"> • Transverse • Common 	According to IEC 61000-4-18:2009, IEC 61850-3:2013 Test Voltage = 0.5 kV Test Voltage = 1 kV
Voltage Dips, Interruptions and Variations	According to IEC 61000-4-11:2004, IEC 61850-3:2013 30% for 0.1 s 60% for 0.1 s 100% for 0.05 s
Conducted Emissions	According to CISPR 22:2010, IEC 61850-3:2013 Class A
Radiated Emissions	According to CISPR 22:2010, IEC 61850-3:2013 Class A

Table 4.1-10 Environmental Conditions

Description	Reference
Operating Temperature Range	-10° C to 55° C ¹⁾
Relative Humidity Range, Non-Condensing	5 to 95% ¹⁾
Storage Temperature	-40° C to 85° C ¹⁾

1) Without option cards. See table 4.1-5 for more information.

Table 4.1-11 Environmental Tests

Description	Reference
Dry Heat Test - Operational	According to IEC 60068-2-2:2007, IEC 61850-3:2013 16h at 55° C
Cold Test - Operational	According to IEC 60068-2-1:2007, IEC 61850-3:2013 16h at -10° C
Dry Heat Test - Storage	According to IEC 60068-2-2:2007, IEC 61850-3:2013 16h at 85° C
Cold Test - Storage	According to IEC 60068-2-1:2007, IEC 61850-3:2013 16h at -40° C

Description	Reference
Temperature Change Test	According to IEC 60068-2-2:2007, IEC 60068-2-1:2007, IEC 60068-2-14:2009 IEC 61850-3:2013 5 Cycles, 3h Dwells at Upper (55° C) and Lower (-10° C) Temperatures, 1 C/min Ramp Rate
Damp Heat Steady State Test	According to IEC 60068-2-78:2001, IEC 61850-3:2013 10d at 40° C, 93% Relative Humidity
Damp Heat Cyclic Test	According to IEC 60068-2-30:2005, IEC 60068-2-78:2001, IEC 61850-3:2013 6 Cycles (12 h + 12 h) Upper Limit = 40° C, 93% Relative Humidity Lower Limit = 25° C, 96% Relative Humidity

Table 4.1-12 Mechanical Tests

Description	Reference
Vibration Tests	According to IEC 60255-21-1, IEC 61850-3:2013
<ul style="list-style-type: none"> Vibration Response Test Vibration Endurance Test 	Class 1 Class 1
Shock and Bump Tests	According to IEC 60255-21-2, IEC 61850-3:2013
<ul style="list-style-type: none"> Shock Response Test Shock Withstand Test Bump Test 	Class 1 Class 1 Class 1
Seismic Test	According to IEC 60255-21-3, IEC 61850-3:2013
<ul style="list-style-type: none"> Single Axis Sine Sweep (Method A) 	Class 1

Table 4.1-13 EMC Compliance

Description	Reference
Complies with 61850-3:2013	61850-3:2013 – Communication networks and systems for power utility automation – Part 3: General requirements

Table 4.1-14 Product Safety

Description	Reference
Complies with 61850-3:2013	61850-3:2013 – Communication networks and systems for power utility automation – Part 3: General requirements

Table 4.1-15 RoHS Compliance

Description	Reference
Complies with RoHS Directive	2011/65/EU

4.2.

Software properties

The software properties of COM600 are presented in the following tables.

Table 4.2-1 Communication protocols

Master protocol	Slave protocol
DNP3 LAN/WAN	DNP3 LAN/WAN
DNP3 Serial	DNP3 Serial
External OPC	
IEC 60870-5-101	IEC 60870-5-101
IEC 60870-5-103	
IEC 60870-5-104	IEC 60870-5-104
IEC 61850-8-1 (MMS & GOOSE)	IEC 61850-8-1 Proxy (MMS & GOOSE)
Modbus Serial	Modbus Serial
Modbus TCP	Modbus TCP
SNMP	
SNTP	SNTP

Table 4.2-2 Hardware requirements for SAB600

Hardware	Minimum	Recommended
Free hard disk space		SSD 128 GB

Table 4.2-3 Supported operating systems ¹⁾

Description
Microsoft Windows Server 2008 R2 (64-bit)
Microsoft Windows Server 2012 R2 (64-bit)
Microsoft Windows Vista (32-bit) SP2
Microsoft Windows 7 (32-bit/64-bit) SP1
Microsoft Windows 8 (32-bit/64-bit)
Microsoft Windows 8.1 (32-bit/64-bit)

Description
Windows 10 (32-bit/64-bit)

1) Microsoft® .NET Framework 4.6.1 is required for running SAB600. The software is automatically installed during the installation of SAB600 if not already available on the PC.

Table 4.2-4 Supported web browsers (WebHMI)

Description	Version
Microsoft Internet Explorer	10.0 or later
Google Chrome	54.0 or later
Mozilla Firefox	45.0 or later

Other web browsers (except IE8 and older) will likely work but have not been tested.

4.3. Mounting of COM600 computer

The COM600 computer is designed for mounting at a control panel.

To mount the COM600 computer to the wall-mount kit:

- 1. See Figure 4.3-1 for mounting instructions.
- 2. After the brackets have been installed, fasten four screws on each bracket.
- 3. After fastening the two brackets on the bottom lid of COM600 computer, the wall-mount kit installation is finished.

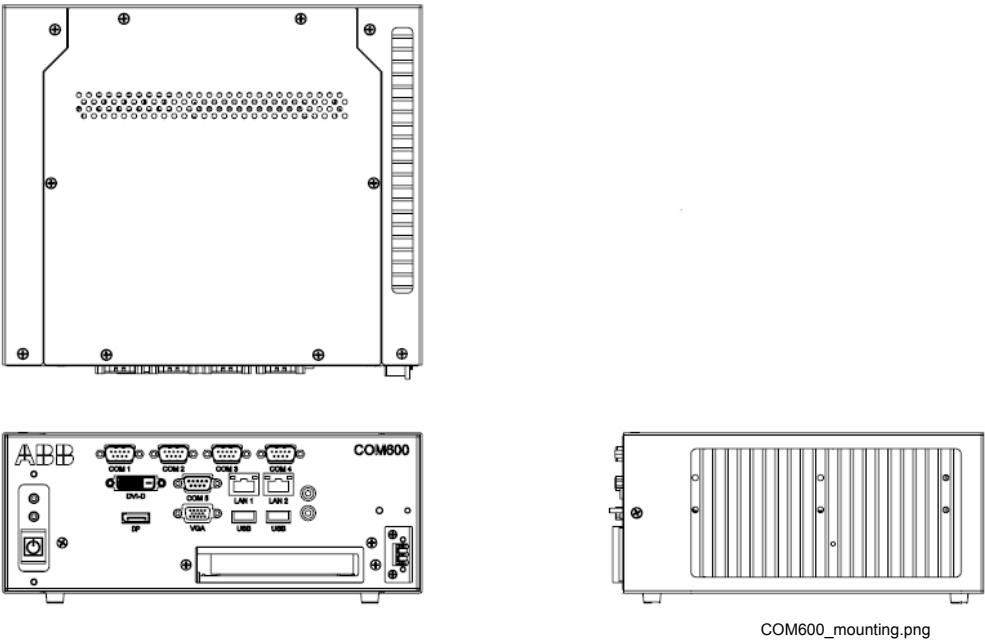


Figure 4.3-1 Mounting diagram of the COM600 computer

For mechanical properties of the COM600 computer, see 4.1, Mechanical properties.

4.4. Setting up the COM1 or COM2 port for RS-232/RS-485

By default the COM1 and COM2 ports are configured to RS-232 mode. The mode of the port (RS-232/RS-485) can be changed via the BIOS setup of the computer.



RS-485 mode can only be used with the Modbus serial master protocol. For more information on configuration settings, see Modbus Master User's Manual.

To change the mode of the port:

1. Connect a local keyboard and display to the COM600 computer.
2. Restart the computer and press the **Del** key during restart to access the BIOS setup.
3. Select **Integrated Peripherals** from the main SETUP menu. Use the cursor keys for moving and enter key for selection.
4. Select **SuperIO Device** from the next menu.
5. On the **SuperIO Device** configuration page, go to the **COM1** or **COM2 Select parameter** and press ENTER. Now you can choose between RS-232 and RS-485.
6. Press the F10 key to save the changes and exit the BIOS setup.

Pinout of COM port when RS-485 mode is used:

DB9 connector:

1. TX-/RX-
2. N/A
3. TX+/RX+
4. N/A
5. GND
6. N/A
7. N/A
8. N/A
9. N/A

4.5. Disposing of COM600

Definitions and regulations of hazardous materials are country-specific and change when the knowledge of materials increases. The materials used in this product are typical for electric and electronic devices.

All parts used in this product are recyclable. When disposing of cast-off COM600 or its parts, contact the local entrepreneurs who are authorized and specialized in handling electrical/electronic waste. These partners can sort the material by using dedicated sorting processes and dispose of the product according to the local requirements.

Table 4.5-1 Materials of COM600 parts

COM600	Part	Material
Case	Top cover, heat sink	Aluminium
	Other covers, screws	Steel (SECC)
	Plastic parts	PC ² , PP ³
Modules	Compact flash disk	Various
	Modules inside the case	Various
	Battery	Lithium
Package	Box	Cardboard
Attached material	Accessory kit	Steel (SECC), PBT ¹
	DVD	PC ² , PP ³

1. Polybutylene terephthalate
2. Polycarbonate
3. Polypropene

5. Installation

5.1. About this section

This section describes the installation and uninstallation of SAB600, the installation of the touch screen, and modifying and setting up of the COM600 computer. For more detailed instructions on installation of the gateway components, refer to the 1.10, Related documents.



It is forbidden to install SAB600 to the COM600 device.

5.2. Requirements for SAB600

The hardware requirements for SAB600 and supported operating systems are listed in 4.2, Software properties.

5.3. Installing SAB600

The SAB600 installation DVD includes the SAB600 software and different versions of the CoDeSys programming environment dependent to the COM600 version. In the installation wizard you can select, which software you want to install. For installation of the CoDeSys programming environment, see Installing CoDeSys programming environment.

To install SAB600:

1. Close all open programs and insert the SAB600 installation DVD to the CD-ROM drive of your PC.
2. The installation program should start automatically. If the installation does not start, open the program by browsing to the DVD drive, and start COM_600.exe. The installation wizard includes the options to install the SAB600 software and different versions of the CoDeSys programming environment. Select the software that you want to install.
3. Wait for the Wise Installation Wizard to extract the installation files to your PC.
4. The SAB600 installation program opens. Click **Next**.
At any stage of the installation, you can return to the previous window by clicking **Back**, or exit the Installation Wizard by clicking **Cancel**.
5. Read the License Agreement, then check the option **I accept the license agreement** and click **Next** to continue the installation.
If you check the option **I do not accept the license agreement**, the **Next** button is not available and you cannot continue the installation.
6. Select the folder where you want to install SAB600.

- To select the default folder shown at the bottom of the window, click **Next**.
 - To select another folder, click **Browse**, select a new the folder, and click **Next**.
The default installation folder is C:\Program Files (x86)\ABB\COM600_2.
7. Select the desired installation type.
 - **Typical**: This option is recommended for most users.
 - **Complete**: All SAB600 features are installed.
 - **Custom**: Use this option to choose which SAB600 features you want to be installed.
 8. Click **Next** to start the installation.
You can follow the progress of the installation in a window that also shows the directory path where the files are copied. At this point, you can still cancel the installation by clicking **Cancel**.
 9. A window opens showing that SAB600 has been successfully installed. Close the window and finish the installation by clicking **Finish**.
 10. The installation wizard will next install the Microsoft SQL Server, if it is not already installed on your PC.
 11. Restart your computer.

Start SAB600 by selecting **Start > Programs > ABB > Station Automation Builder 600 > SAB600** from the Windows task bar.

Installing CoDeSys programming environment

The SAB600 installation DVD includes also the CoDeSys programming environment. In the installation wizard you can select, which software version you want to install.

1. Close all open programs and insert the SAB600 installation DVD to the CD-ROM drive of your PC.
2. The installation wizard includes the options to install the SAB600 software and CoDeSys programming environment. To install the CoDeSys programming environment, select the correct version and continue with the installation by clicking **Next**.
The installation program should start automatically. If the installation does not start, open the program by browsing to the DVD drive, and start setup.exe.
3. Continue with the installation by clicking **Next** on every page of the wizard.
4. When the installation wizard asks for the folder where to install the CoDeSys programming environment, select C:\Program Files (x86)\3S CoDeSys 35SP9P4.
5. It is recommended to install all the features listed on the opening page.
6. Continue the installation and when completed, click **Finish**.

5.4. Updating SAB600

If you have replaced an old COM600 with newer version, update your project that contains that Gateway object. The project is updated by a conversion wizard. The conversion can be activated in two ways after you have installed the latest SAB600 software.



Please run installation always with “Run as Administrator” option, even if user has administrator rights.

To convert a project:

1. Open the old project in the new SAB600. The conversion wizard is launched automatically. Follow the wizard instructions.
2. If the conversion wizard was canceled, you can run the conversion by right-clicking on the Gateway object and selecting **Convert project**. Follow the wizard instructions.
3. Check the Gateway object properties to see if the COM600 version is the latest version to confirm the conversion.



You can use SAB600 5.0 to configure COM600 versions 4.1 or later.

5.5. Setting up the COM600 computer

5.5.1. Accessing the COM600 computer

Local and Remote LAN ports

The COM600 computer has by default two LAN ports, a local port (LAN 1) and a remote port (LAN 2), see Figure 4.1-1.

There are two firewall profiles: Private (home and work) and Public. The Private profile is intended for a local substation LAN with substation protocols and SAB600 configuration allowed. The Public profile is intended for remote LAN connection.

You cannot preconfigure a specific profile for a specific network adapter. Therefore, you must select the correct profile when configuring COM600 and connecting it to the network. The operating system tries to identify the connected network based on the configured default gateway. If the default gateway is found, you can select the firewall profile to be used for the network in **Network Connections** – open settings for the network and turn sharing off to use Public profile or turn sharing on to use Private profile. Network connections can be opened by clicking the network icon in the system notification area (systray) of the Windows Task bar.

For convenience a script has been added to configure the COM600 default network profiles for the local and remote LAN connections. When the LAN connections to be used are connected to their networks, then just run `C:\Program Files\COM610 GW SW\Common\bin\configure_network_types.cmd`. This will set the Private profile for local LAN connection and Public profile for the remote LAN connection.

If no default gateway is configured or found, the network is considered unidentified. For unidentified networks the firewall profile is selected based on the local security policy settings. By default unidentified networks use the Public firewall profile. All unidentified networks use the same profile.

To change the profile used for unidentified networks:

1. Select **Control Panel > Administrative Tools > Local Security Policy**.
2. Browse to Network List Manager Policies and modify the Location type in the Unidentified Networks properties.

For more information about firewall configuration, see Microsoft Windows 8 Firewall documentation.



By default, response to the ping command is blocked by the firewall. To allow ping response, change the Allow incoming echo requests configuration setting in the firewall's Advanced ICMP Settings.

Table 5.5.1-1 shows the default IP addresses for the LAN ports.

Table 5.5.1-1 Default IP addresses for the LAN ports

LAN Port	Gateway	Mask	IP Address	
LAN 1	Not defined	255.255.255.0	192.168.2.11	Local Area Connection (Local)
LAN 2	Not defined	255.255.255.0	10.0.0.11	Local Area Connection (Remote)

Some tasks, for example changing the IP addresses or adding users, require access directly to the COM600 computer either locally or via the remote desktop software.

Accessing the COM600 computer:

- Locally by connecting a USB keyboard, a USB mouse, and a display to the computer.
- Remotely with the remote desktop program via LAN. By default the security settings allow the remote desktop connection only via the interface reserved for the local use.

Regional settings

The default regional setting is English (United States).

Remote desktop

You can use the COM600 computer as a local console from an engineering computer with remote desktop.

The COM600 computer can be restarted remotely by running restart.bat command from the root of C drive. It is also possible to just click the Windows desktop, press Alt - F4 and then use the opened “Shut Down Windows” dialog. Restart or shutdown can be selected from dropdown list.

Due to security reasons, the remote desktop access to COM600 computer is by default disabled. To allow remote desktop access, you must enable and configure the settings in the COM600 computer.

To allow remote desktop access:

1. In COM600 computer select **Start -> Control Panel -> System**.
2. In the **System Properties** dialog, select **Remote tab** page.
3. Select the **Remote desktop access** check-box.

Built-in user accounts

The following user account is predefined in the COM600 computer:

- Username: COM600
- Password: aEc2006rs

This is the main account of the COM600 computer. It is used for configuration purposes. Processes of the COM600 computer are run under this account. It will also work as a WebHMI user account and has in that context WebHMI administrator user rights.

Connecting configuration computer with SAB600 to COM600 computer



With COM600 version 3.4 or newer the COM600 user is not anymore required in the SAB600 computer. Also the communication between SAB600 and COM600 computer is now based on .NET remoting, which uses fewer ports to enable easier access through firewalls.

For improved security, disable access from SAB600 to COM600 after the configuration work is finished by disabling the port used by SAB600 in COM600 firewall exception settings, or by disabling the remoting service in the COM600 computer (if firewall is not used).

To disable access using firewall configuration:

1. Select **Control Panel -> Windows Firewall -> Advanced settings -> Inbound Rules**.
2. Double-click SAB600 on the list and change the Action property to **Block the connection**.

To disable access by disabling the remoting service:

1. Select **Control Panel -> Administrative Tools -> Services -> ABB COM600 Remoting Server**.

2. Right-click and select **Properties**.
3. Stop the service and change the startup type to **Disabled**.



Alternatively, the remoting service can also be disabled/enabled from the WebHMI. This is done from **Communication – Security Settings – Configuration service**. If the COM600 product variant is using other configuration services in addition to ABB COM600 Remoting Server, this option will disable/enable these as well.

To configure the network settings:

1. Configure the network settings of the configuration computer and the COM600 computer to allow them to communicate with each other. This is done by configuring the IP addresses of the computers into the same subnetwork. By default, the communication from SAB600 to the COM600 computer will use TCP port 8080. Make sure that the port is opened in the firewall of the SAB600 computer. For callbacks from COM600 computer another port is required. This is used by the spontaneous updates in the online diagnostic tools. By default, the software reserves a free port for the callbacks automatically.
2. Connect either a crossover LAN cable between the computers or connect both computers to a network switch. Use the LAN port used for local use in COM600 computer.
3. Create a project and add the Gateway object to the communication structure.
4. Type the IP address of the COM600 computer LAN port used for configuration to the IP address property of the Gateway object.
5. Right-click the Gateway object and select **Management**. Verify that the communication with the COM600 computer is working properly. The first time you open the management tool, you are required to change the COM600 user password. Click **Change password** to change the password in the COM600 computer.



The COM600 user password must always be changed as described above to ensure that the password is changed correctly for each component in the COM600 computer.



If you lose the password, you cannot access the COM600 computer either locally or remotely.



The user must run the GAT Server Config utility in the COM600 computer after the IP address is changed if the GOOSE Analyzer is used.

Setting the remoting communication parameters

To change the port number used for the communication from SAB600 to the COM600 computer:

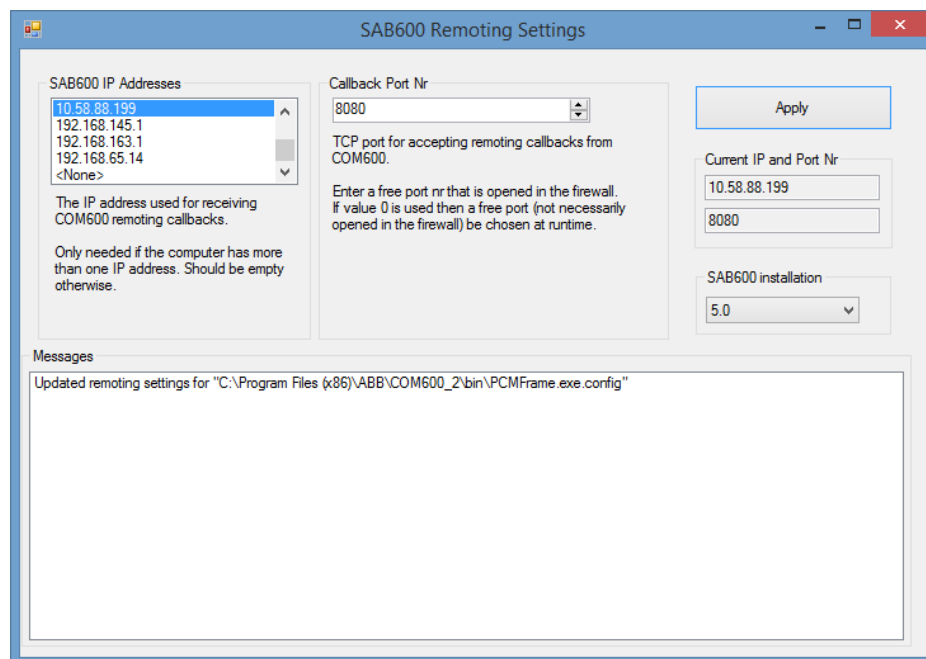
1. Modify the Port Number property of the Gateway object in the SAB600 project.
2. In COM600 computer, select **Start -> All Programs -> ABB -> SetRemotingParameters**.
3. Set the port number in **Set Remoting Parameters utility**.
4. Click **Apply**.

If multiple network adapters are used in COM600, you must specify the one used for the SAB600 communication. In the Set Remoting Parameters utility, select the IP address of the COM600 network adapter used for the SAB600 communication.

To change the port number used for the callbacks from COM600:

1. Close the SAB600 program.
2. In SAB600 computer, select **Start -> Programs -> ABB -> Station Automation Builder 600 -> Set Remoting Parameters**.
3. Set the port number in the **Set Remoting Parameters utility**.
4. Click **Apply**.
5. Restart the SAB600 program.

If multiple network adapters are used in SAB600 computer, you must specify the one that is used for the COM600 communication. In the Set Remoting Parameters utility, select the IP address of the SAB600 network adapter used for the COM600 communication.



SAB600_Set_Remoting_Parameters.png

Figure 5.5.1-1 Setting Remoting Parameters in SAB600

5.5.2. Configuring COM600 without keyboard and mouse

A headless COM600 is delivered without a local display and keyboard. It is configured using the web interface, remote desktop, and SAB600. In order to configure the COM600, it should have the factory default settings.

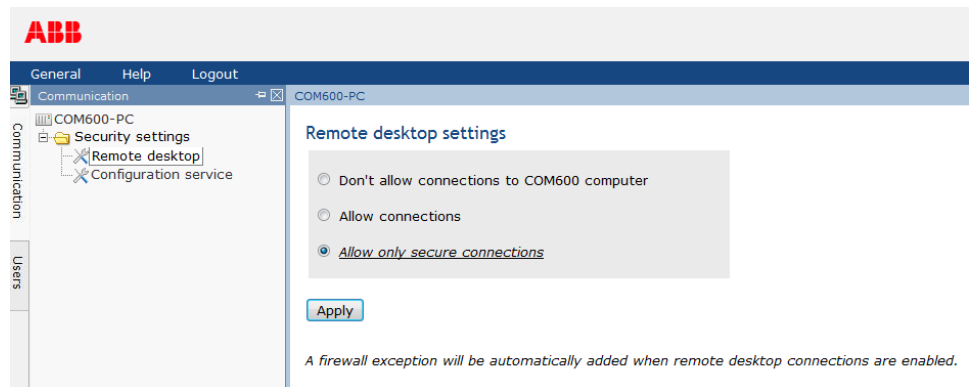
Configuring a headless COM600:

1. Start the COM600 computer.
2. Connect the engineering computer to the COM600 computer with a web browser. Use the Local LAN port (192.168.2.11). Login as COM600 user with the default password.



In order to connect, you may have to temporarily change the IP settings of the engineering computer to use the same subnet as the COM600 computer.

3. In the COM600 WebHMI, navigate to **Communication > Security Settings > Remote desktop settings**. Select one of the **allow connections** options and click **Apply**. Remote desktop connections will now be enabled for the COM600 computer.



config of headless com600 - sec settings.png

Figure 5.5.2-1 Security settings

4. Connect with remote desktop from the engineering computer to the COM600 computer using the same Local LAN port.
5. In the COM600 remote desktop session, configure Windows Firewall as described previously in *Local and Remote LAN ports* to use the Private profile for the Local LAN port. This is necessary to allow SAB600 to connect later on.
6. If necessary, change the network and IP settings for the COM600 computer:
 - a. If the IP address used for the remote desktop connection is changed, the remote desktop session will freeze. In this case, just close it and reconnect to the new

IP address. Make sure to write the new IP address up before applying so it's not forgotten!

- b. If the IP settings of the engineering computer were temporarily changed in step 2, then change them back here so they are compatible with the new IP settings of the COM600 computer.
- c. If the new COM600 IP address will be used for SAB600 connections, connect again with remote desktop and run the **Set Remoting Parameters** utility from the COM600 desktop to select and apply the new IP address.

Now you can connect SAB600 from the engineering computer to the COM600 computer for further configuration.



If remote desktop connections to COM600 computer are no longer needed, they can be disabled using the **Security Settings** in the COM600 WebHMI.

5.6. Uninstalling SAB600

To uninstall SAB600:

1. Open the Add or Remove Programs dialog by selecting **Start > Settings > Control Panel > Add or Remove Programs** in the Windows task bar.
2. Select SAB600 and click **Remove**.



The uninstallation only removes SAB600 so that you can install a new version and update the software. It does not remove the Microsoft SQL Server and .Net Framework. Removing these programs may infect the functionality of other ABB applications installed on your PC.

Uninstalling CoDeSys

1. To open the Add or Remove Programs dialog, select **Start > Settings > Control Panel > Add or Remove Programs** in the Windows task bar.
2. Select CoDeSys and click **Remove**.

5.7. Turning off COM600 computer

To turn off a COM600 computer when a local display, keyboard and mouse are connected to the COM600 computer:

1. Login as a user that has administrator privileges to COM600 WebHMI (if COM600 browser is used).
2. Select **Start menu > Shut down**, or select **CTRL+ALT+DEL** and click **Shut down** in the bottom right corner power button symbol.

If the remote desktop session is active, run the shutdown.bat located in the C:\ of the COM600 computer. It is also possible to just click the Windows desktop, press Alt - F4 and then use the opened “Shut Down Windows” dialog. Shutdown can be selected from the dropdown list.

If no desktop is available, press the front panel power button briefly and wait until the computer shuts down.

6. Configuration

6.1. Opening a project in Station Automation Builder 600

This section describes the configuration tasks common to all OPC servers, and gives an overview of the configuration tasks related to OPC clients.



All the possible configuration scenarios are not included in this manual. Refer to the corresponding user's manuals listed in 1.10, Related documents for more detailed instructions.

6.2. Configuration and maintenance

SAB600 is used to configure and maintain COM600. Communication networks are described in the Communication structure of the Project Explorer window. The structure is built using OPC server/client, communication channel/subnetwork, and device objects. These objects have communication properties that can be accessed via the Object Properties window. The properties define for example the communication port, bit rate, timing parameters, unit addresses, and so on .

The substation structure of SAB600 is used to configure the WebHMI functions of the COM600 products. The substation structure presents the functional view of the substation. It includes substation, voltage level, bay, busbar, and conducting equipment objects.

The Single line diagram is a graphical presentation of the process objects in the substation. The Single line diagram can be edited on different levels. The bay layout can be configured by opening the SLD Editor from a bay object. When the SLD Editor is opened from a voltage level object, it is possible to assign the positions of the bays within a voltage level. The position of the voltage levels in the complete substation single line diagram is done by opening the SLD editor from the substation object.

Substation objects are linked to communication structure objects by using the Data Connection tool. For example, the circuit breaker object in the substation structure is linked to the CSWI logical node in the communication structure. The link between the structures is also used on the event list, to present the events using the names according the substation structure.

Process data accessible on the devices is modeled according to the IEC 61850 standard. In the communication structure this is seen as logical devices (LD), logical nodes (LN) and data objects (DO). It is possible to insert an empty device into the structure and then manually add and configure LD, LN, and DO objects. It is also possible to use pre-configured object types of the devices, which have the objects defined and configured to add efficiency. The device configuration can also be imported from an IED SCL

description. Data objects include configuration properties, that contain cross-referencing information between protocol and the OPC/IEC 61850.

Process data is connected to a Gateway client using a Cross-References function available in the client IED object. Data objects that are transferred to the client are dragged from the servers on the structure to the function tool. Cross-referencing information is filled in the function window. The Cross-References function supports import and export with Microsoft Excel.

When the structure is complete and all the objects have been set up properly the configuration is downloaded to COM600 using the Gateway Management function available on the Gateway object.

The Logic Processor function is programmed with a separate programming editor.

6.3. Recommended Maximum Configuration

We have analyzed the recommended maximum configuration for COM600 for IEC 61850 Communication with WebHMI and Data Historian configured.

Based on this configuration we recommend the following amount of connected IEDs or maximum load of 90 load units, as shown in the table below.

IED Family	IED Count	Load Unit
611 series	60	1,5
615 series	45	2
620 series	30	3
630 series	90	1
670 series	90	1

It is also recommended not to exceed the amount of 30 IEDs per IEC 61850 OPC Server Instance.

For example if project consist following combination of devices:

IED Family	IED Count	Load Unit
615 series	20	40
630 series	20	20
620 series	5	15
Total	45	75

This means that Maximum Load Unit count of 90 has not been exceeded. Count of 45 IEDs in system means that IEDs should be divided between two IEC61850 OPC Server instances. For more information, see 4.1, Mechanical properties.

6.4. Configuration process

6.4.1. Overview of configuration process

Before you can start using COM600, build and configure the communication and substation structure of your project in SAB600.

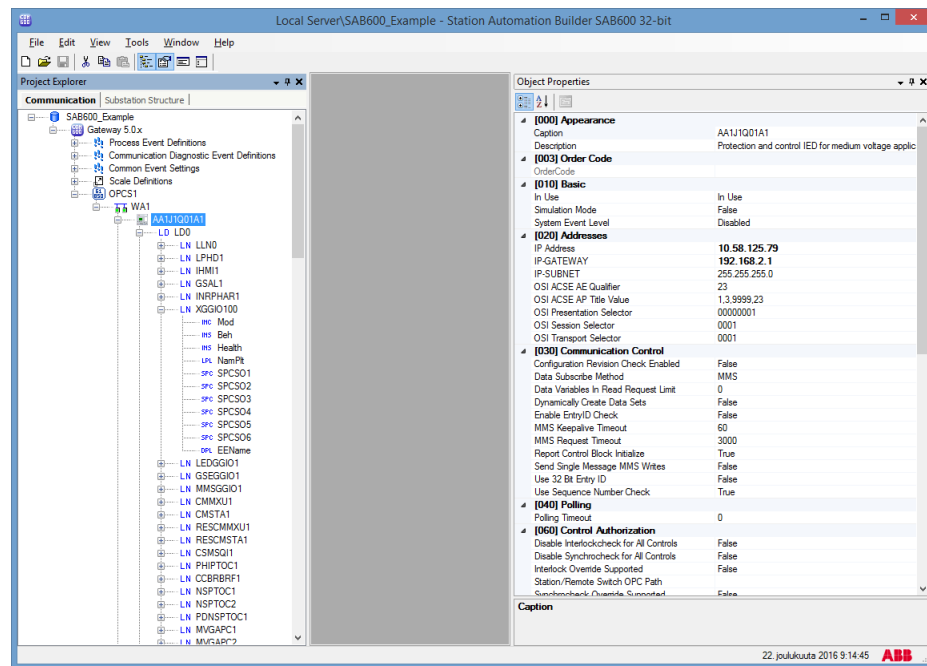
Start SAB600 and open and name a project.

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**.



A project can have only one COM600 configuration.

Figure 6.4.1-1 shows an example view of SAB600 including an object tree in the Communication structure on the left and property window displaying the object properties on the right.



SAB600_Example_View.png

Figure 6.4.1-1 Example view of SAB600

The configuration can be divided into three tasks:

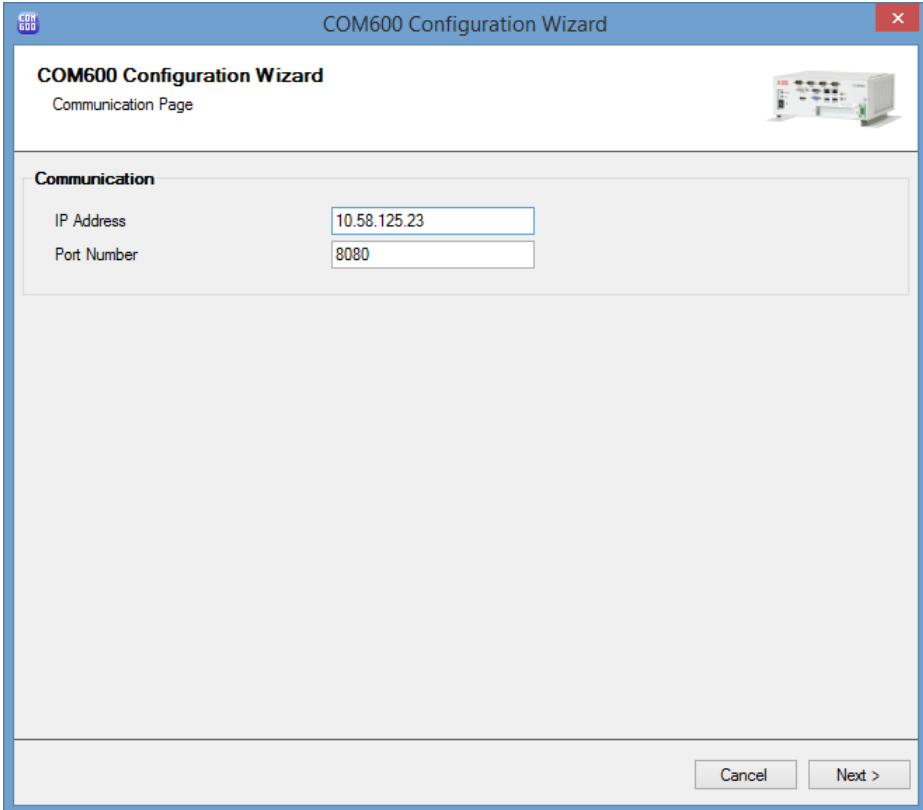
1. Building the object tree and configuring the object properties for OPC servers (process communication).
2. Building the substation object tree and configuring the object properties for WebHMI functions.
3. Activating COM600 with a new configuration.

First, build an object tree by adding objects to the object tree. Building the object tree can be done using the COM600 Configuration Wizard (see 6.4.2, COM600 Configuration Wizard) or building each part separately (see 6.4.3, Building and configuring object structures). For more information refer to the respective user's manual listed in 1.10, Related documents. Connectivity packages for certain protection and control products usually contain preconfigurations and tools to facilitate the building of the object tree.

6.4.2. COM600 Configuration Wizard

To configure COM600 with COM600 Configuration Wizard:

1. Define the IP address and port number of the COM600 device on the **Communication Page** of the wizard.



COM600 Configuration Wizard

Communication Page

Communication

IP Address 10.58.125.23

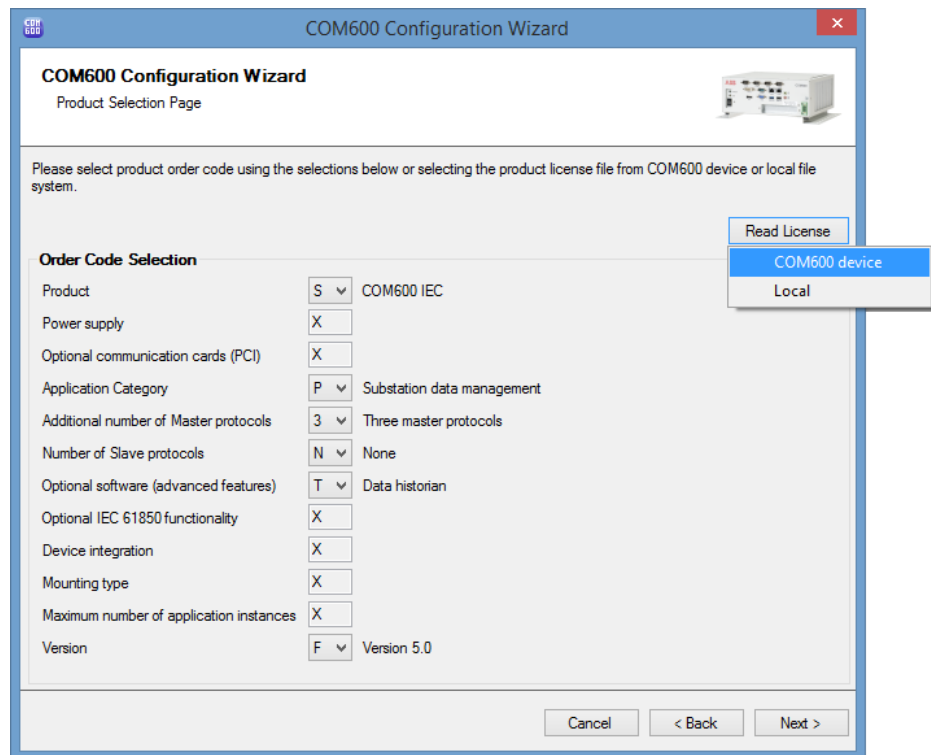
Port Number 8080

Cancel Next >

SAB600_Wizard_Communication.png

Figure 6.4.2-1 COM600 Configuration Wizard Communication Page

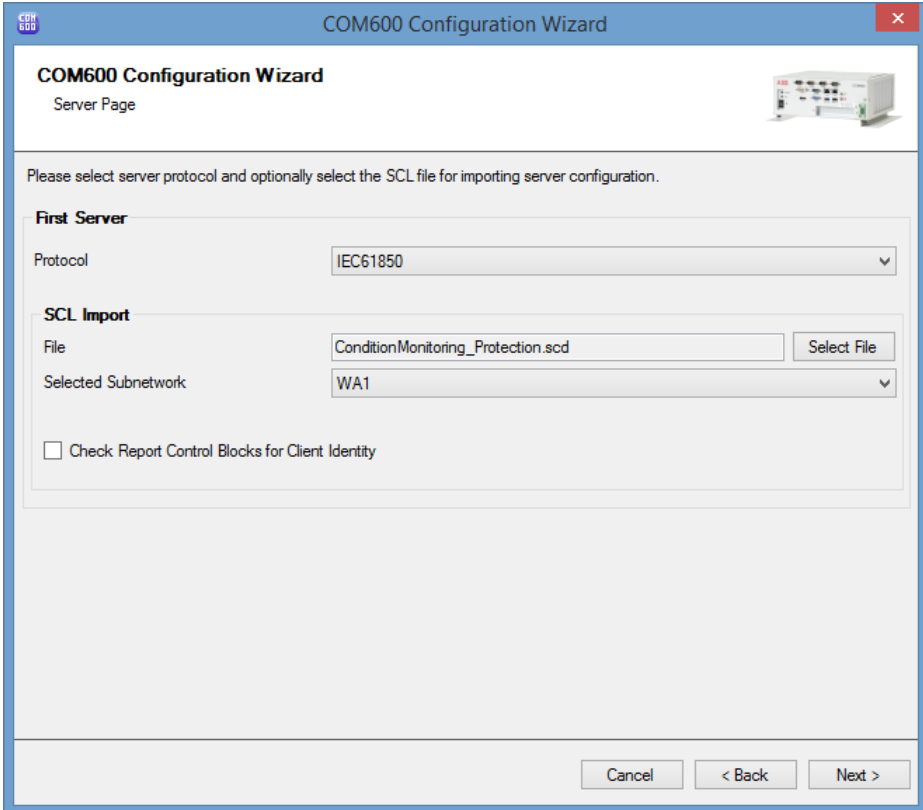
2. Define the desired functionality of the COM600 device on the **Product Selection Page** of the wizard. If the COM600 device is already reachable through the network, you can read available functionality from the device. Options readable from the device include master and server protocols and other functionality such as Data historian and Logic programming.



SAB600_Wizard_OrderCode.png

Figure 6.4.2-2 COM600 Configuration Wizard Product Selection Page

3. Add the desired protocols on the **Server Page** of the wizard. If you have created IEC 61850 protocol settings earlier with an external tool such as PCM600, it is possible to import the SCD file. For legacy protocols, such as SPA, the import option is not available.



COM600 Configuration Wizard

COM600 Configuration Wizard
Server Page

Please select server protocol and optionally select the SCL file for importing server configuration.

First Server

Protocol: IEC61850

SCL Import

File: ConditionMonitoring_Protection.scd

Selected Subnetwork: WA1

☐ Check Report Control Blocks for Client Identity

SAB600_Wizard_Server.png

Figure 6.4.2-3 COM600 Configuration Wizard Server Page

4. If you have created a COM600 configuration for Condition Monitoring & Protection related applications, import the associated file. The wizard will configure the necessary functionalities automatically.

COM600 Configuration Wizard

COM600 Configuration Wizard
Server Page

Please select server protocol and optionally select the SCL file for importing server configuration.

Product Specific

Protocol: COM600A

SCL Import

File: ConditionMonitoring_Protection.scd [Select File]

Selected OPC Server: COM600_OPC_Server

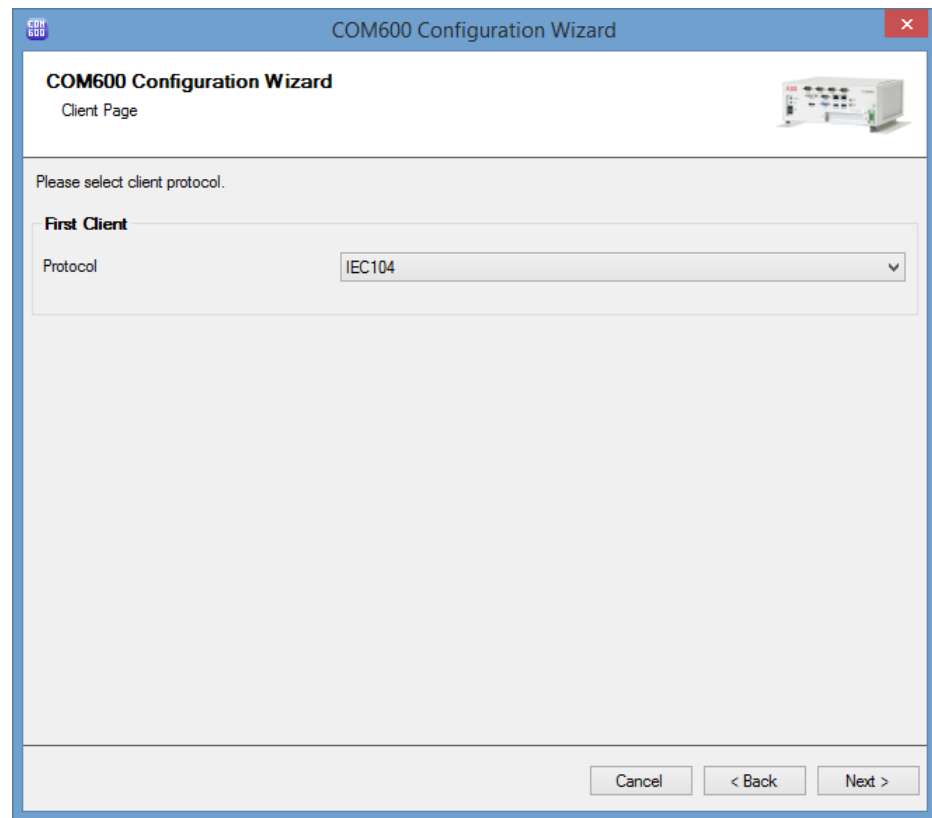
Selected IED: COM600_IED1

Cancel < Back Next >

SAB600_Wizard_ProductSpecific.png

Figure 6.4.2-4 COM600 Configuration Wizard Product Specific Server Page

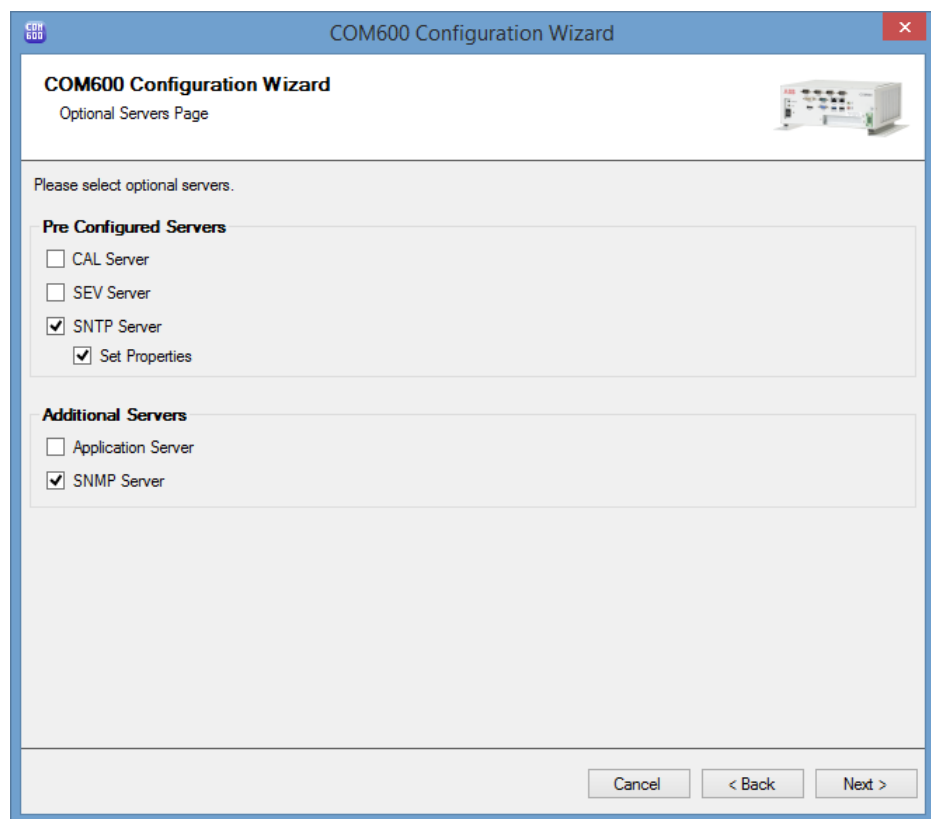
5. Select the desired slave protocols on the **Client Page** of the wizard.



SAB600_Wizard_Client.png

Figure 6.4.2-5 COM600 Configuration Wizard Client Page

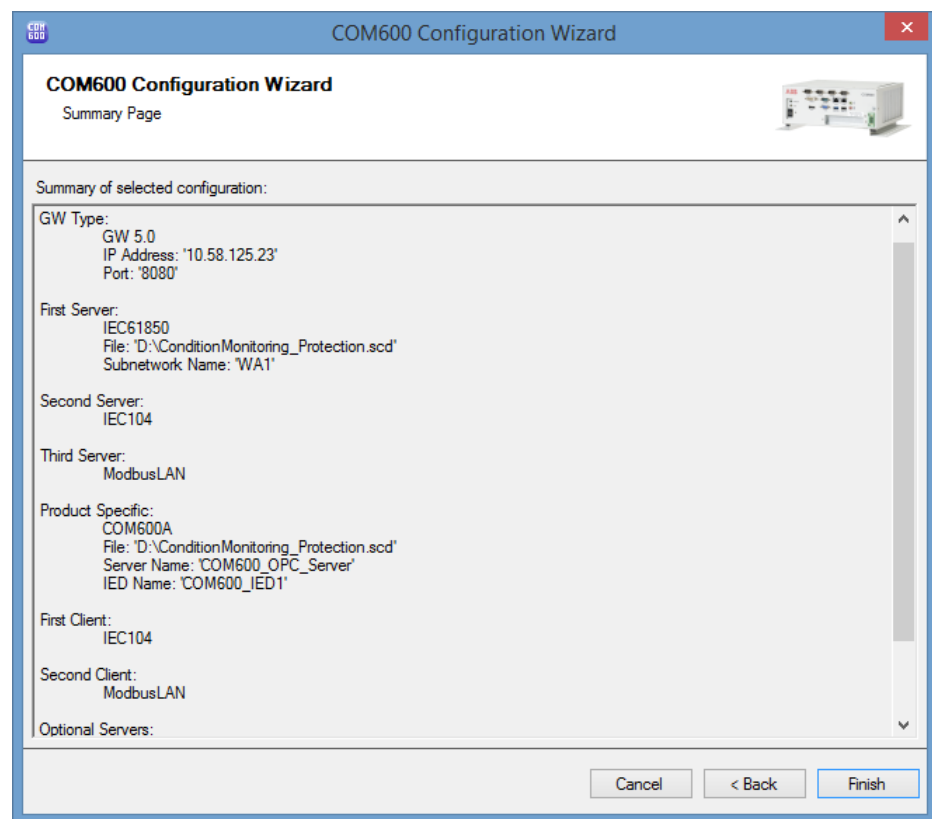
6. You can include preconfigured or additional servers to the configuration on the **Optional Servers Page** of the wizard. Preconfigured servers contain a skeleton configuration that can be used.



SAB600_Wizard_OptionalServers.png

Figure 6.4.2-6 COM600 Configuration Wizard Optional Servers Page

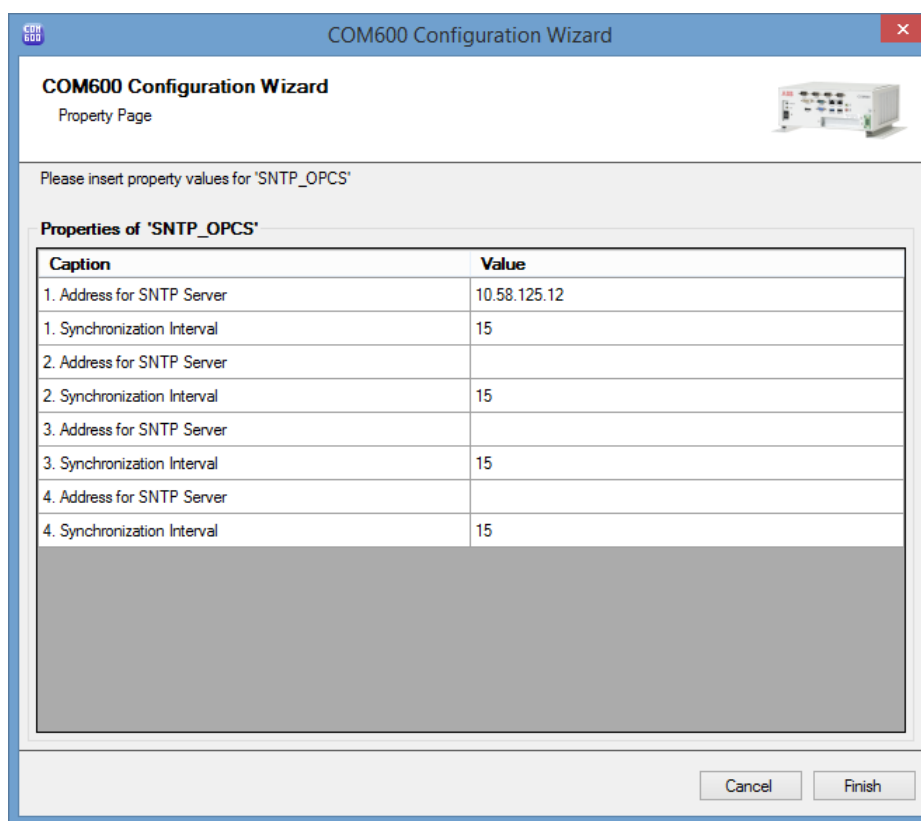
7. Check the selected configuration options on the **Summary Page** of the wizard. Click **Finish** to start the configuration process.



SAB600_Wizard_Summary.png

Figure 6.4.2-7 COM600 Configuration Wizard Summary Page

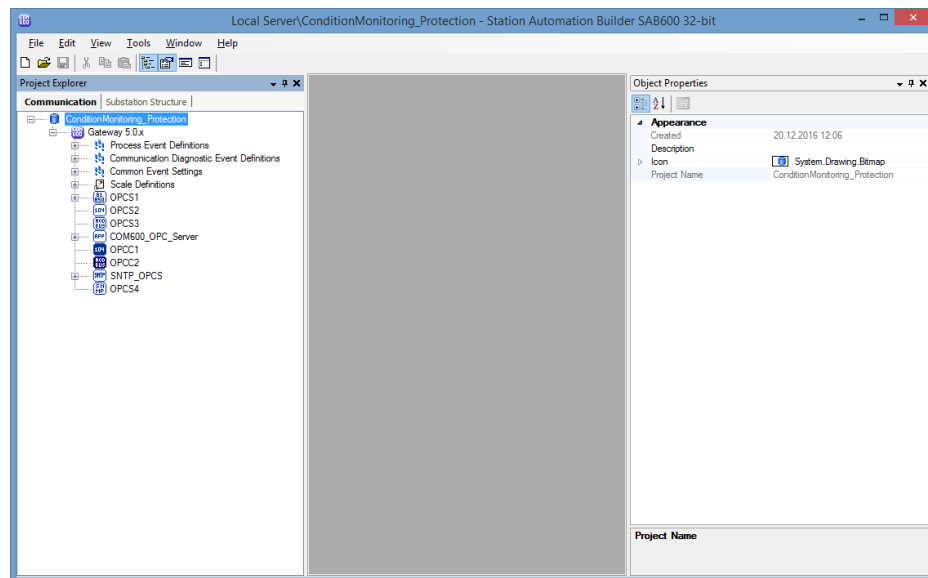
8. After the wizard has generated the structures, it will ask you to fill in properties for functionalities such as SNTP OPC Server, if they have been selected in the wizard.



SAB600_Wizard_Property.png

Figure 6.4.2-8 COM600 Configuration Wizard Property Page

After the wizard has finished the configuration process, the created project is opened automatically.



SAB600_Wizard_ProjectCreated.png

Figure 6.4.2-9 COM600 Configuration Wizard complete

6.4.3. Building and configuring object structures

6.4.3.1. Naming conventions



Objects in the communication structure shall follow the naming conventions defined in the IEC 61850-7-2, chapter Naming Conventions.

6.4.3.2. OPC servers

Start the configuration work from the server objects. Before an OPC client can be taken into use, configure an OPC server for the process communication.

The object tree is built in the communication tab of SAB600. There are several possible ways to build an object tree. One of them is to build the object tree by adding objects in logical order starting from the OPC server object. You can either use basic or pre-defined objects. Using basic objects means that you have to configure the objects manually. If objects are pre-defined, they are preliminary configured and all the necessary child objects are automatically added.

Add the objects in the following order:

1. OPC server object
2. Channel/Subnetwork object depending on protocol

3. Device object
4. Logical device object(s)
5. Logical node object(s)
6. Data objects.



If you want to connect events or scales to data objects or device connection status event classes to device objects at this point, make sure that you have already created and configured the event and scale objects.

For more detailed information on adding objects to the object tree, refer to the appropriate protocol manual (see 1.10, Related documents).

6.4.3.3.

Substation structure for WebHMI

Configuring the substation is the main task in configuring WebHMI functionality. If connectivity packages or IED SCL description files with substation structure information are used, most of the substation structure can be built automatically when the IEDs are added to the communication structure. If no substation structure information is available the structure must be built manually.



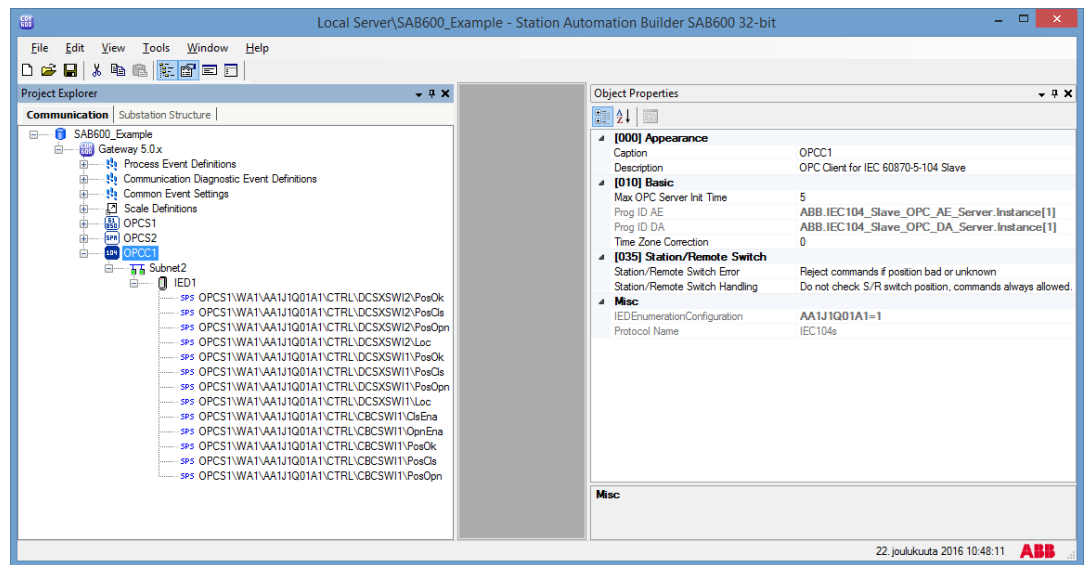
Before you can create a substation structure, you have to create a communication structure with OPC Server and communication channel objects, IEDs, Logical Devices, Logical Nodes and Data objects.

For more detailed information, see COM600 HMI Configuration Manual.

6.4.3.4.

OPC clients

The object tree is built in the communication structure. Before an OPC client can be taken into use, configure an OPC server for the process communication.



SAB600_OPC_Client_Example_View.png

Figure 6.4.3.4-1 Example of OPC client communication structure

The OPC client object is added to the same hierarchy level as the OPC server, see Figure 6.4.3.4-1. Below the OPC client object, you can add only channel and device objects. The data objects are linked using the **Cross-References** function from the servers to the client and further to the NCC. The **Cross-References** function can be also used to configure the parameters of the data objects.

Add the objects in the following order:

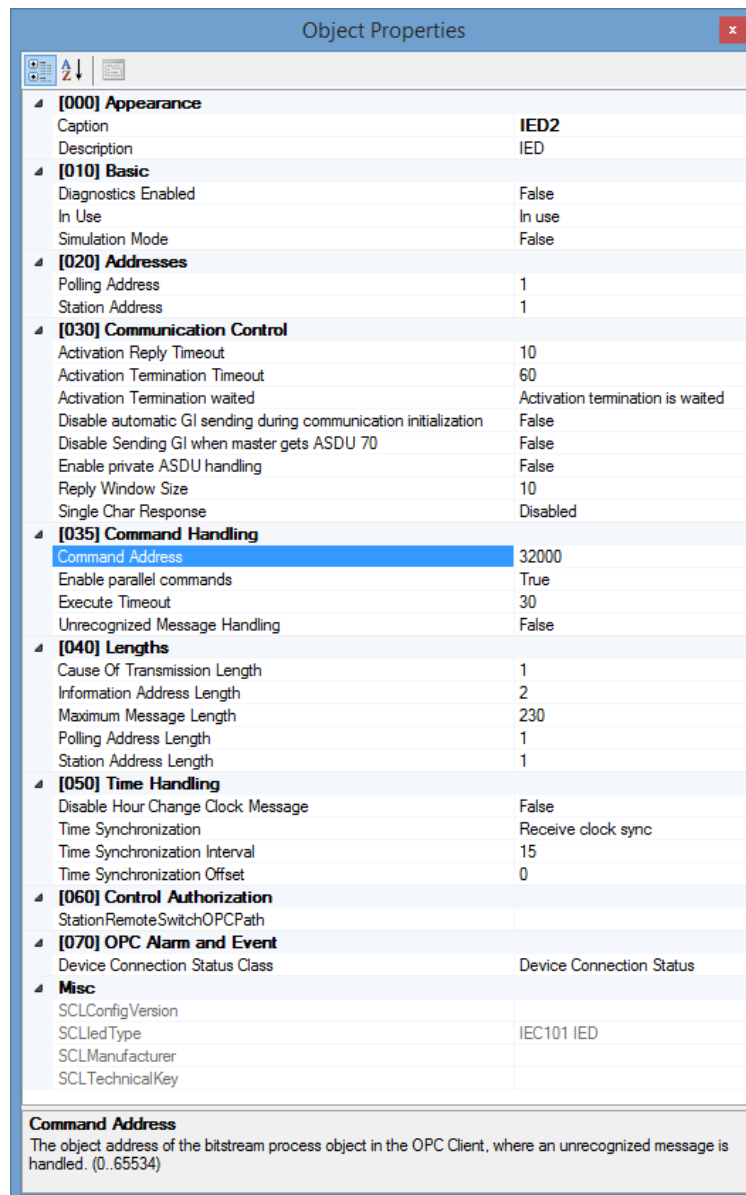
1. OPC client object
2. Channel/Subnetwork object depending on protocol
3. Device object.

6.4.3.5. Configuring object properties

After the objects have been added, configure the object properties.

To configure an object:

1. Select an object in the object tree of the Communication structure.
2. The object properties appear now in the Object Properties window, see Figure 6.4.3.5-1. You can see the selected object on the left and the available properties on the right.



SAB600_Object_Properties_Example.png

Figure 6.4.3.5-1 Example of object properties

3. 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 combo box, or
 - entering a text string or a numerical value in a text field.

With SCL import function, you can import new objects with configurations from an existing file. Right-click the device and select **SCL Import** from the shortcut menu.

To import a new configuration file:

1. Click **Choose File**.

2. Browse to a new configuration file from the appearing dialog.
3. Select the file and click **Open**.
4. Select the device to import from the drop-down list. You can preview the configuration on the right.
5. Click **Import**.

The new preconfigured objects appear in the object tree. If the configuration file is large the import can take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps.

For detailed information about the SCL Import function, see 6.4.3.6, SCL Import function.

6.4.3.6.

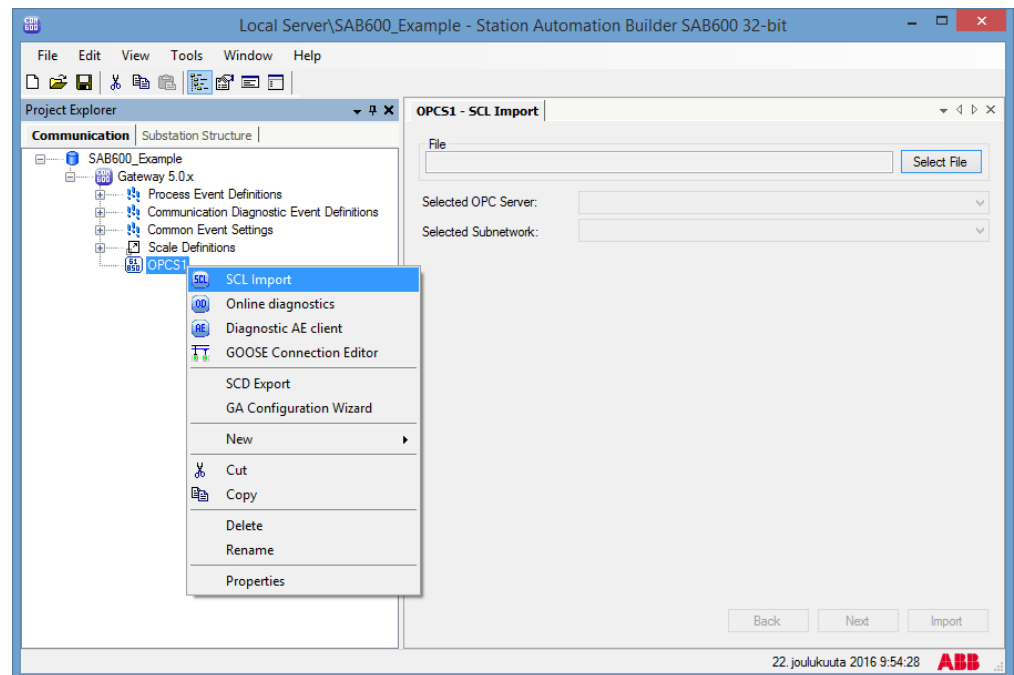
SCL Import function

You can import the communication structure under OPC Server or a single IED object. If an OPC Server configuration file is used, the whole communication structure is imported. Configurations for single IEDs can be imported by selecting the SCL Import function under an IED object.

The file extensions for the import files can be .icd, .cid, .iid, .scd, .sed, or .xml.

To import a configuration file:

1. Right-click the OPC Server or IED and select **SCL Import** from the shortcut menu.

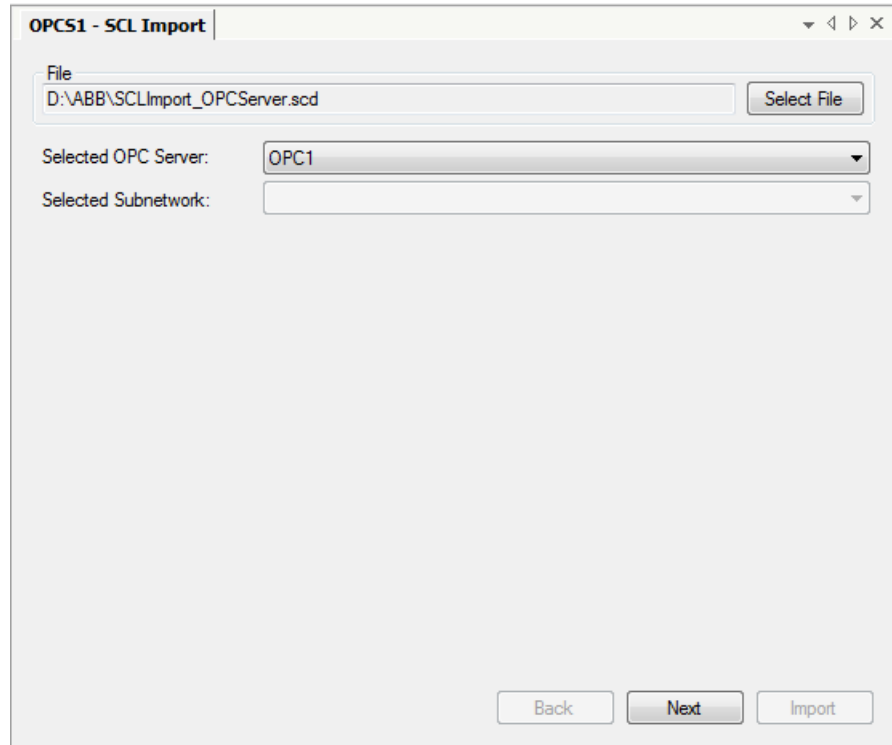


SAB600_SCLImport_Example.png

Figure 6.4.3.6-1 Example of IEC 61850 OPC Server SCL Import

2. Click **Select File**.
3. Browse for a new configuration file from the opening dialog.

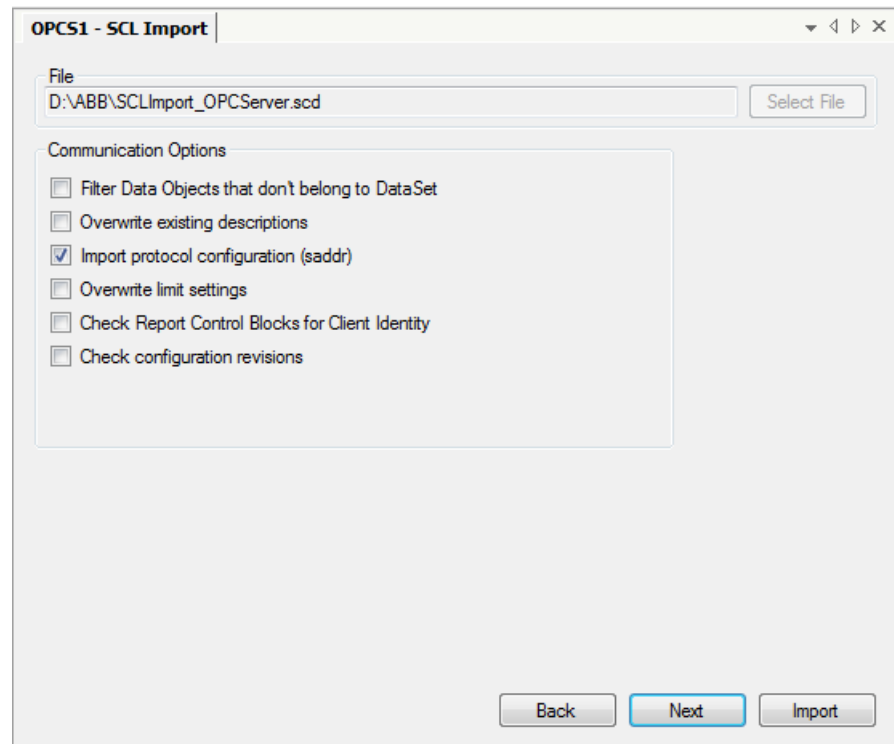
4. Select the file and click **Open**.
5. In the dropdown menu, select the OPC Server, subnetwork or IED, and accesspoint (depending on whether the SCL import has been selected from OPC Server or IED object) to be imported.



SCLImport_OPCTServer.png

Figure 6.4.3.6-2 Selecting OPC Server to be imported

6. Click **Next** to proceed to communication options.
7. Select the desired communication options in the Communications Options page.



SCLImport_communicationOptions.png

Figure 6.4.3.6-3 Communication options

You can select the following options:

- **Filter Data Objects that don't belong to DataSet:** By selecting this option, you can enhance performance. This option limits the amount of data objects being created in SAB600, meaning that if a data object does not belong to any data set, it will not be created in to the SAB600. Some IEDs can provide large amounts of data that is not reported (that is, not updated) in COM600 WebHMI.
- **Overwrite existing descriptions:** This option overwrites all existing descriptions of objects affected by the import operation.



Select this option only if you know that the imported file contains better descriptions than your current configuration.

- **Import protocol configuration (sAddr):** When selecting this option, both the object tree and protocol configuration will be created. If you do not select this option, only the object tree structure will be created.
- **Overwrite Limit settings:** This option overwrites all configured unit and limit configurations and assigns them values from the SCL file.

- **Check Report Control Block for Client Identity:** This option imports IEDs from the file in which the Report Control Blocks' client identity matches the selected OPC Server.
- **Check Configuration Revisions:** By selecting this option, the configuration revision attributes of the project are compared with the SCL file to be imported. If differences are found, the IED configuration will be updated. If no differences are found, the IED configuration will not be updated. This will improve the performance of the import, as only the IEDs with changed configuration will be imported.



Not every option in the **SCL Import** function is available for all protocols.

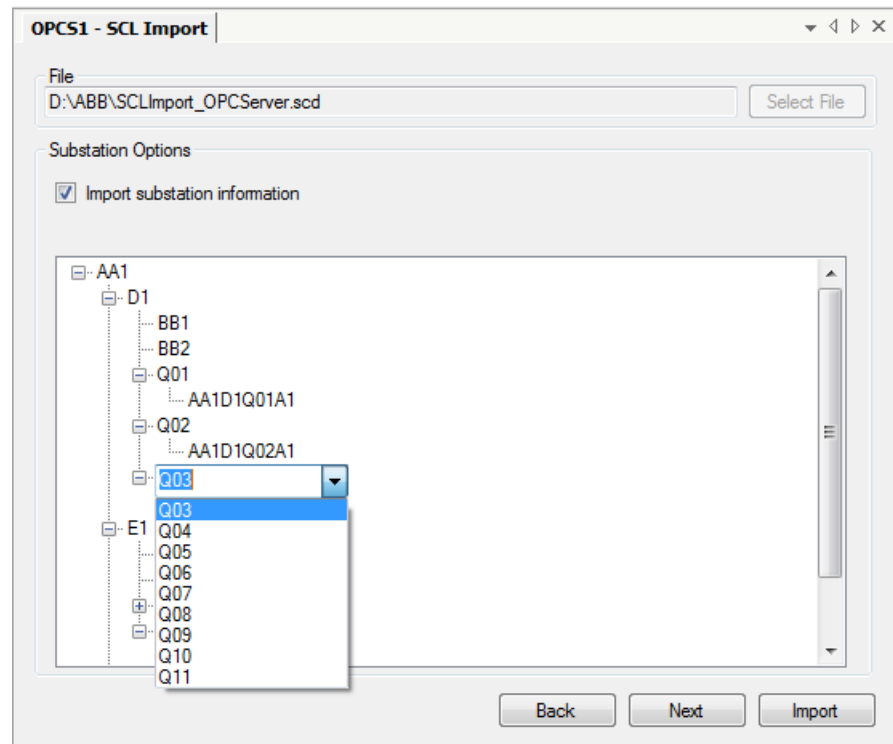
8. Click **Next** to proceed to the Substation Options page or **Import** if you do not want to change options in the following pages.

Additional SCL import options

In the following are presented the SCL Import options for the following pages: Substation Options, Configure Alarm and Event Template, Configure Parameter Filtering Tool Template, Configure SLD Template, Configure Summary Table Template. You can choose the options you want or proceed to **Import** without changing the options.

Substation Options

1. On the Substation Options page, the following option can be selected:
 - **Import substation information:** This option imports the substation structure. If you only want to import the communication section, do not select this option.
 - For each IED, you can select which substation, voltage level, and bay is imported. You can select them in a dropdown menu. You can edit the names by double-clicking the object name (or pressing Enter or Ctrl + E when the object is selected) in the tree view on the Substation page. Select the edited name by pressing **Enter** or cancel the edit by pressing **Esc**.



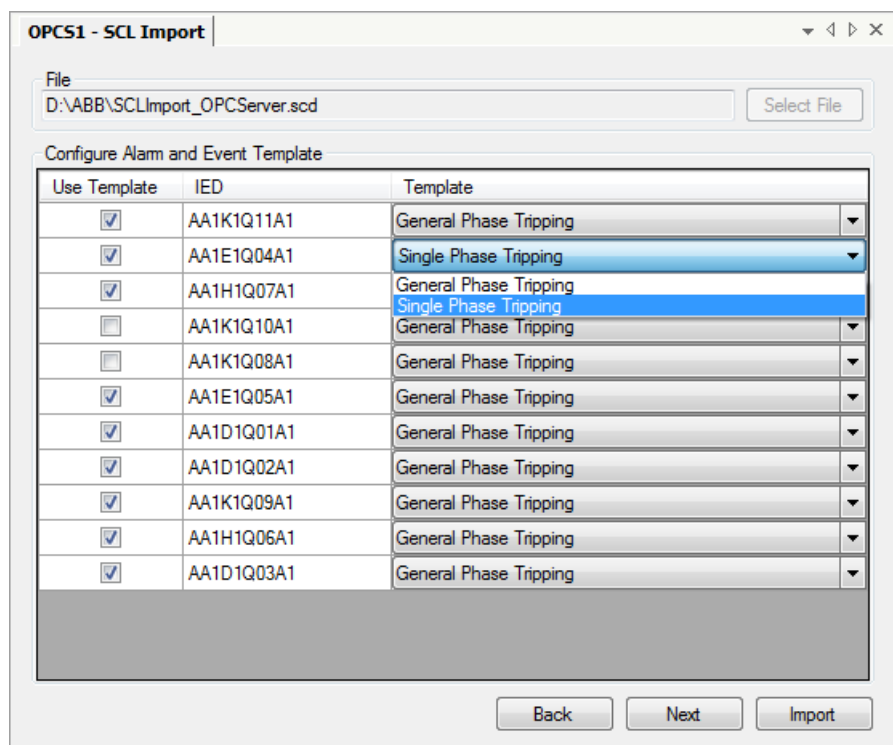
SCLImport_substationOptions.png

Figure 6.4.3.6-4 Substation options

2. Click **Next** to proceed to the Configure Alarm and Event Template page or **Import** if you do not want to change options in the following pages.

Configure Alarm and Event Template

1. Select the **Alarm and Event Template** for IEDs on the **Configure Alarm and Event Template** page.
2. Select the **Use Template** checkbox if you want to use the Alarm and Event Template when the IED is imported. You can select one of the predefined templates in the dropdown menu to set the alarm and event handling for the imported objects. There are two template options:
 - **General Phase Tripping:** By selecting this template, protection functions are configured to send general alarms and events regardless of which phase is activated. Depending on the device, phase-specific information may be provided.
 - **Single Phase Tripping:** By selecting this template, protection functions are configured to send phase A, B, or C-specific alarms and events, depending on whether the device provides phase-specific information.



SCLImport_AETemplate.png

Figure 6.4.3.6-5 Alarm and Event Template

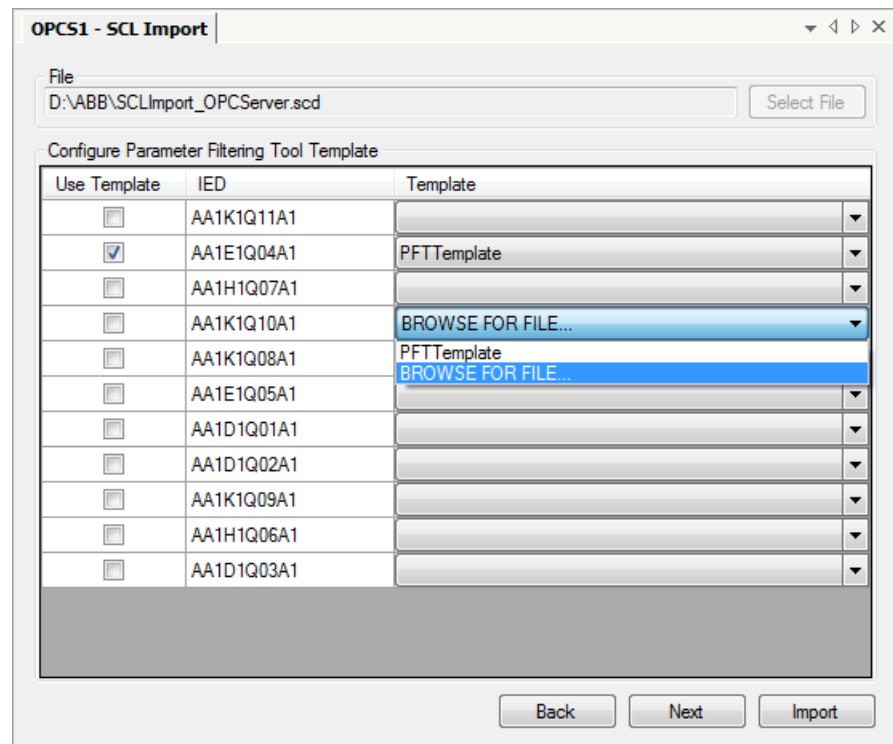
You can also create your own templates if you are familiar with the issue:

- Browse to **C:\PCMDDataBases\COM600\TemplateManager**.
- Copy the **AETemplatephasetrippingmapping.xml** file from the folder to the directory and give it a meaningful name.
- Open the file in an XML editor.
- Enter the name of the new template in the **AETemplateName** element.
- Add or modify mappings in the **LNClass** and **DO** elements. Use the information in the file as a guide.

3. Click **Next** to proceed to the Configure Parameter Filtering Tool Template page or **Import** if you do not want to change options in the following pages.

Configure Parameter Filtering Tool Template

1. Select the **parameter filtering tool** for IEDs on the **Configure Parameter Filtering Tool Template** page.



SCLImport_PFTTemplate.png

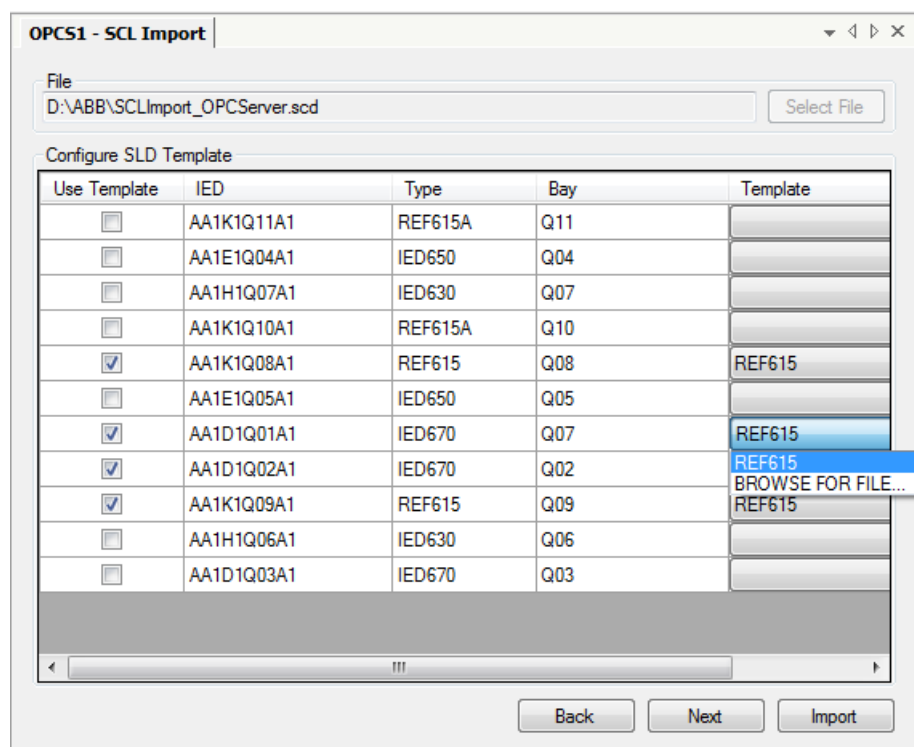
Figure 6.4.3.6-6 Parameter Filtering Tool Template

You can use the Parameter Filtering Template to set predefined parameters for the IED.

- If you want to use the parameter filtering tool template when importing the IED, select the **Use Template** checkbox.
 - Select a template in the dropdown menu. The dropdown menu shows the templates that are stored in **C:\PCMDDataBases\COM600\TemplateManager**. You can also browse for a template in another location.
 - You can create templates by using the **Export** function in the **Parameter Filtering Tool**.
2. Click **Next** to proceed to Configure SLD Template page or **Import** if you do not want to change options in the following pages.

Configure SLD Template

1. Select the **SLD template** for IEDs on the **Configure SLD Template** page.



SCLImport_SLDTemplate.png

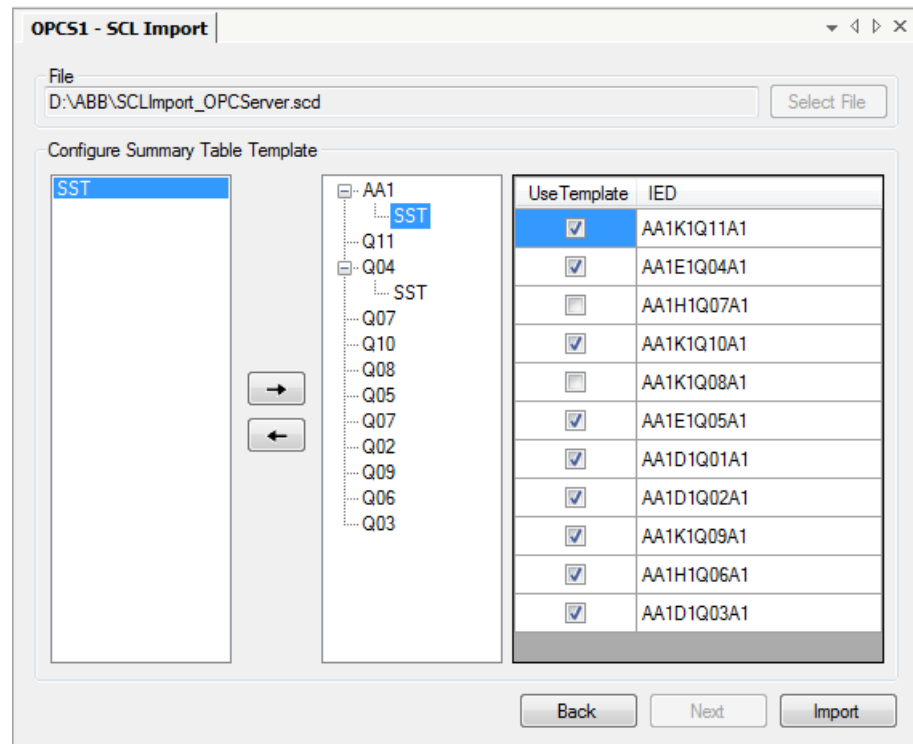
Figure 6.4.3.6-7 SLD Template

You can use the SLD template to set the predefined substation structure for the IED.

- If you want to use the SLD template when importing the IED, select the **Use Template** checkbox.
 - Select a template in the dropdown menu. The dropdown menu shows the templates that are stored in **C:\PCMDDataBases\COM600\TemplateManager** and the name of which start with "SubstationTemplate". You can also browse for a template in another location.
 - You can create templates by using the **CID Export** function under **IED object**.
2. Click **Next** to proceed to the Configure Summary Table Template page or **Import** if you do not want to change options in the following pages.

Configure Summary Table Template

1. Select the **Summary Table Template** for IEDs on the **Configure Summary Table Template** page.



SCLImport_SSTTemplate.png

Figure 6.4.3.6-8 Summary Table Template

You can use the Summary Table Template to set predefined summary tables for IEDs in Substation and Bay objects.

- If you want to use the Summary Table template when importing the IEDs, select the **Use Template** checkbox.
 - Templates stored in **C:\PCMDDataBases\COM600\TemplateManager** are shown in the tree view on the left side of the Configure Summary Table Template page. You can move the templates under the chosen Substation or Bay object by using the arrow buttons. When you select a template that you have moved, you will see the IEDs under that object.
 - You can create Summary Table templates by using the **Summary Table Configuration Tool** under the Substation and Bay objects.
2. Click **Import** to import the selected file.

The new preconfigured objects appear in the object tree. If the configuration file is large, the import may take some time.

6.4.3.7. System Consistency Check

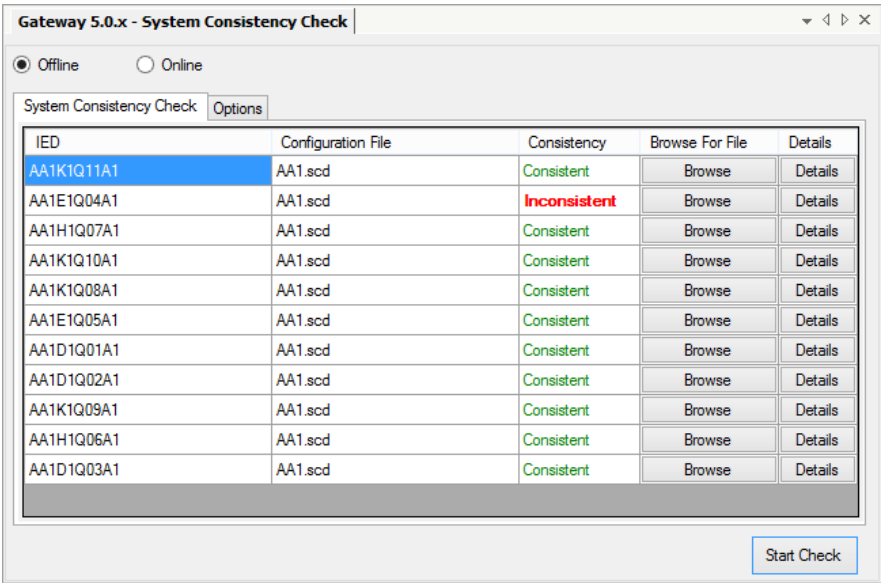
System Consistency Check is intended to be used with IEC 61850 protocol to check that the IED configurations currently used in the COM600 project are consistent with the compared IED configurations. According to the IEC 61850 standard, IEDs can have two configuration revisions: one for data model and one for reporting. Configuration revision

for data model is modeled on the LD0\LLN0\NamPlt\configRev object. It is the most important indicator of the configuration revision. Additionally, each Report Control block has a confRev attribute that defines the revision and the DataSet of RCB. System Consistency Check checks each LDs LLN0\NamPlt\configRev and confRev of each RCB.

The GUI tool is divided into two tabs: the first tab gives an overview of the project with the configuration consistency status of the IEDs. The second tab is used for setting the options for the update procedure. Additionally, by clicking **Details**, a dialog on consistency differences is shown.

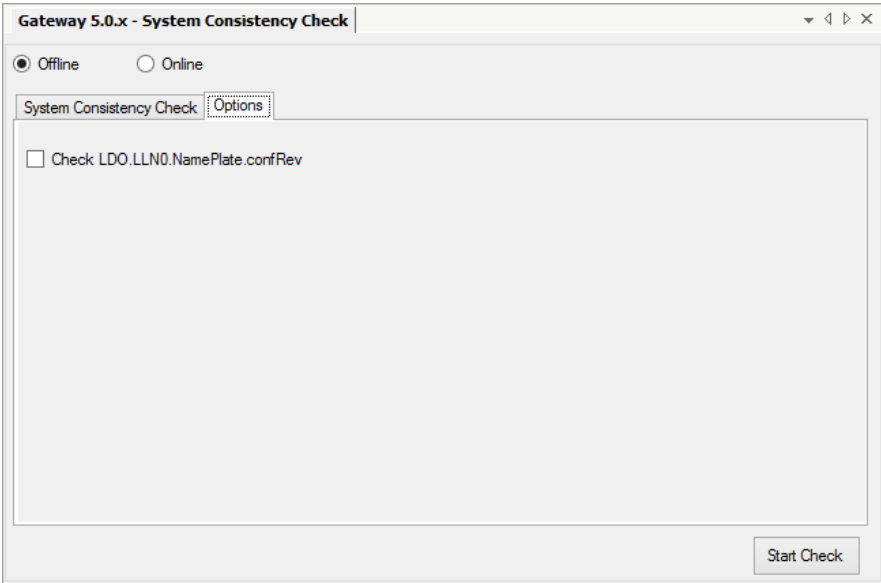
Choose between the offline and online mode by selecting the corresponding radio button. When the tool is started, it will automatically perform the offline check. In the offline mode, the IED configuration revisions used in the SAB600 project are compared to the specified IED configuration files. When the IED configuration file is imported to SAB600, the file name and location are saved, and the information is later used by the System Consistency Check tool. To enable the correct result of the comparison, always store the changed configuration files with the same name to the same location as the originals. If the location or the file name has changed, you can browse the new file with the **Browse** button. If the configuration is inconsistent, click the **Details** button for more detailed information.

In the online mode, configuration revisions are read from the IEDs and compared to the current SAB600 project configuration. To use the online mode, the IEDs must be connected to the same network with the computer running SAB600. After you have selected the online mode, start the check by clicking the **Start check** button. Interrupt the check by clicking the **Stop Check** button. For certain IEDs, it is possible to fetch the configuration file from the IED, such as SPA-ZC 40x. To enable this, the FTP user and password properties need to be correctly configured in the IED object.



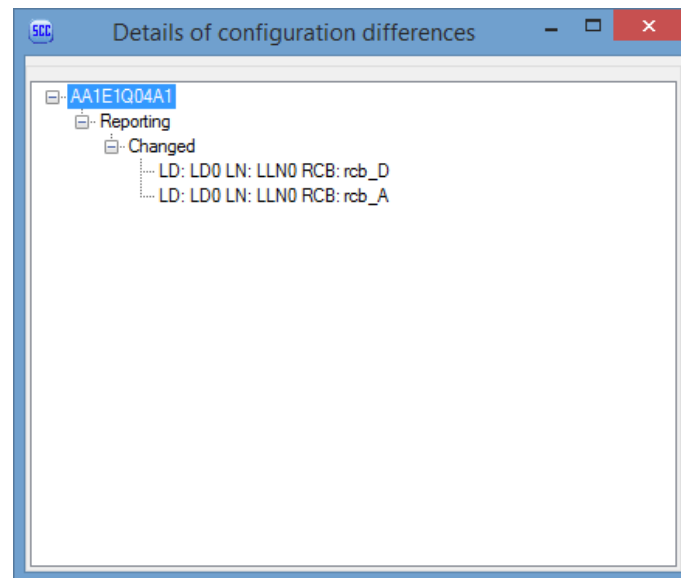
SAB600_SCC_View.png

Figure 6.4.3.7-1 System Consistency Check view



SAB600_SCC_Options.png

Figure 6.4.3.7-2 System Consistency Check Options view



SAB600_SCC_Details.png

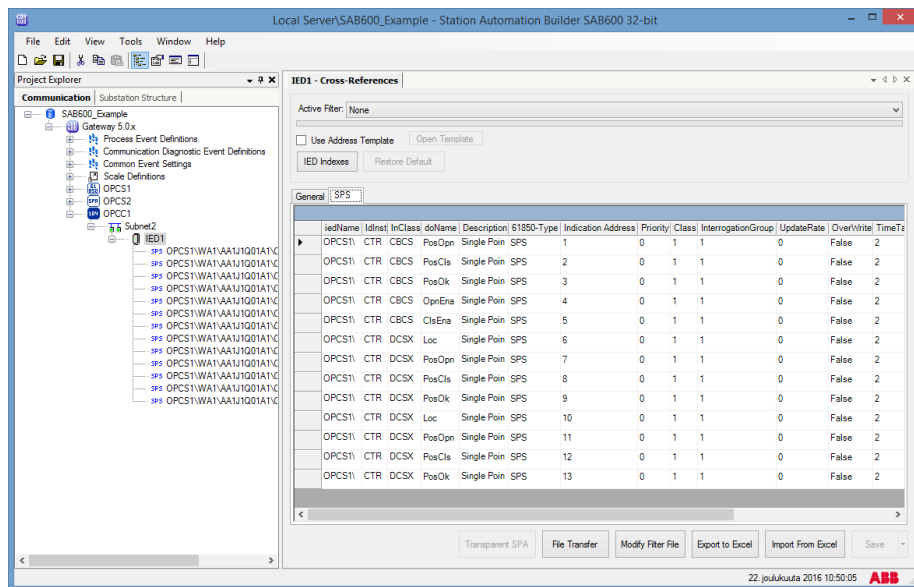
Figure 6.4.3.7-3 System Consistency Check Details view

The **Details** view shows added or deleted LDs and RCBs. Additionally, it shows the modifications to the content of LD or RCB.

6.4.3.8.

Cross-References function

Data objects are added differently for OPC clients than for the upper level objects. Drag and drop the data objects you need from an OPC server to the slave. You also can select an upper level (server, channel, and so on) object and drag and drop it into the **Cross-References** function. As a result, all the data objects within the selected object appear in the Cross-References function and can be connected to the slave OPC client.



SAB600_Cross_References.png

Figure 6.4.3.8-1 Cross-References function

In the **Cross-References** function, you can use a filter file to leave out some of the data objects to be connected to the slave device.

Select the filter file from the drop-down menu under **Active Filter**. If there are no filter files listed in the drop-down menu, you can create your own filter file by clicking **Modify Filter File**.

You can also modify an existing filter file to meet your needs. The **Cross-References** table allows you to view the data objects by type. Use the tabs in the upper part of the table to do this. Under the **General** tab, you can see all the data objects and their property values. Here you can sort the data objects by clicking the column heading (Object Name, Description, 61850-Type, and so on).

You can also export the cross-references table to and import a table from Microsoft Excel.

Clicking **Save** connects the data objects to the slave device. After that you can change the data object values either in the **Object Properties** function or in the **Cross-References** function.



Some properties visible on the Excel sheet depend on the sub-type of the object. Therefore, it is important to select the correct sub-type.

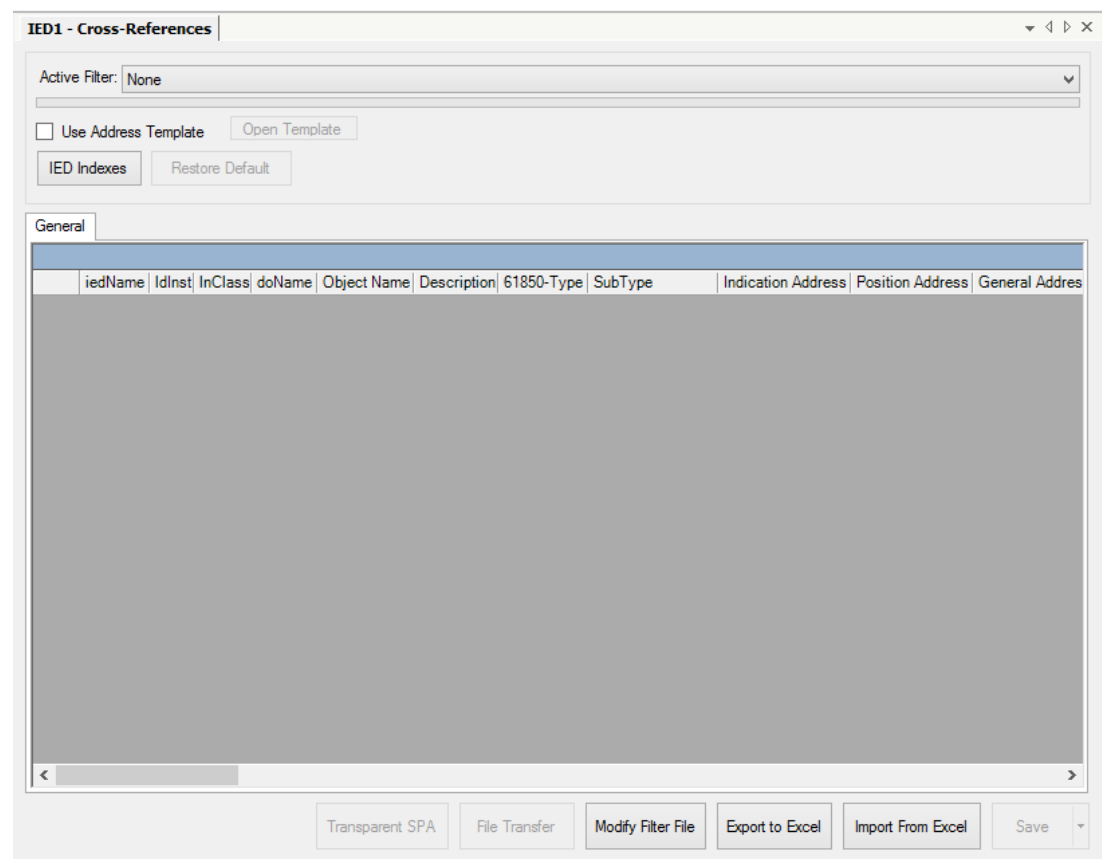
For more detailed instructions on configuring the data object properties in the **Cross-References** function, refer to the slave protocol user's manuals listed in 1.10, Related documents.

Template based Cross-Referencing

The purpose of this functionality is to provide a template functionality for slave addressing for IED types.

There are four different functions:

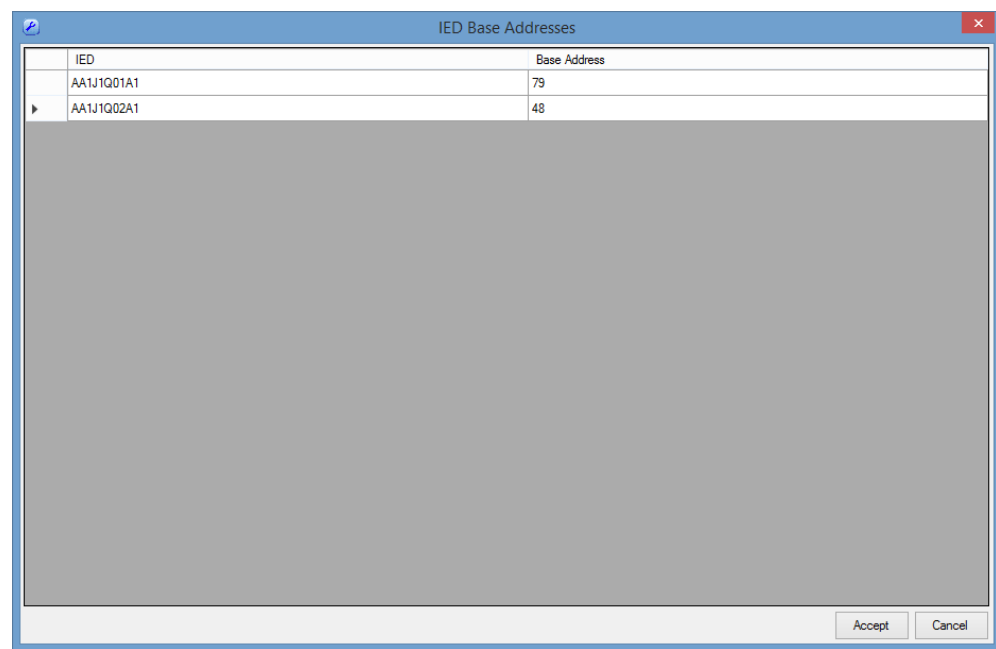
- Enable checkbox - enables template functionality
- Restore default - restores built in default template in use
- Open template - opens currently active template
- IED Indexes - shows cross referenced IEDs base addresses



SAB600_Cross_Reference_General.png

Figure 6.4.3.8-2 Cross-References view

When template functionality is enabled, dropped data objects are compared to the data in the template. If matching data is found, the address properties are modified according to template.



SAB600_Cross_Reference_Base_Address.png

Figure 6.4.3.8-3 Base addresses

Base addresses

The Base Address determines the base address value for each signal in template. The default value is determined by either the last digit of the IP address property or the Station Address property of IED.

$[\text{Baseaddress}] * 1000 + \text{signal address value} = \text{address value in Cross References.}$

For example:

TMW_Anvil IED Base Address= 61

QA1CSWI1.Pos Indication index = 301

$61 * 1000 + 301 = 61301$

	IEDType	OrderCode	prefix	LNClass	InInst	CDC	CDCName	IndicationIndex	PositionIndex	GeneralIndex	CommandIndex	PhsAInd
	REF615	Generic		LLN0		INS	Beh	301				
▶	REF615	Generic		LLN0		SPS	SetSeld	302				
	REF615	Generic		LLN0		SPS	SetChg	Not Defined				
	REF615	Generic		LLN0		INC	ActSG	Not Defined			Not Defined	
	REF615	Generic		LLN0		SPS	Loc	Not Defined				
	REF615	Generic		LLN0		INS	LocRem	Not Defined				
	REF615	Generic		LPHD	1	INS	PhyHealth	Not Defined				
	REF615	Generic		LPHD	1	INS	PhyHealth1	Not Defined				
	REF615	Generic		LPHD	1	INS	PhyHealth2	Not Defined				

CID Import

Export

Import

Apply

Cancel

SAB600_Cross_Reference_Uplink_Addresses.png

Figure 6.4.3.8-4 Uplink addresses

Filter Functionality in Uplink Address Table

- Import - Imports another template file from hard drive
- Export - saves current template file to hard drive
- CID Import - creates base template based on datasets in imported CID file
- Apply - takes current template in use
- Cancel leaves functionality without taking it in use.

You can use different filters to change the visibility of the rows in the datagrid of the tool control. The filter can be used in any column.

Uplink Address Table												
IEDType	OrderCode	prefix	LNClass	Inst	CDC	CDCName	IndicationIndex	PositionIndex	GeneralIndex	CommandIndex	PhsAlndex	PhsBlnc
(All)	Generic	EFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REB611	Generic	DPHH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REB650	Generic	DPHL	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REB670	Generic	DPHL	PTOC	2	ACD	Str			Not Defined		Not Defined	Not Defin
REC650	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REC670	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
RED615	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
RED670	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REF610	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REF611	Generic	DEFH	PTOC	1	ACD	Str			Not Defined		Not Defined	Not Defin
REF615	Generic	DEFH	PTOC	2	ACD	Str			Not Defined		Not Defined	Not Defin
REF620	Generic	PHI	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF630	Generic	NS	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF630	Generic	NS	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF650	Generic	NS	PTOC	2	ACT	Op			Not Defined		Not Defined	Not Defin
REL650	Generic	PDNS	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REL670	Generic	PDNS	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REM610	Generic	EFH	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REM611	Generic	DPHH	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DPHH	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DPHL	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DPHL	PTOC	2	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DEFH	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DEFH	PTOC	1	ACT	Op			Not Defined		Not Defined	Not Defin
REF615	Generic	DEFH	PTOC	2	ACT	Op			Not Defined		Not Defined	Not Defin

207 of 4831 records found
Show All

CID Import

Export

Import

Apply

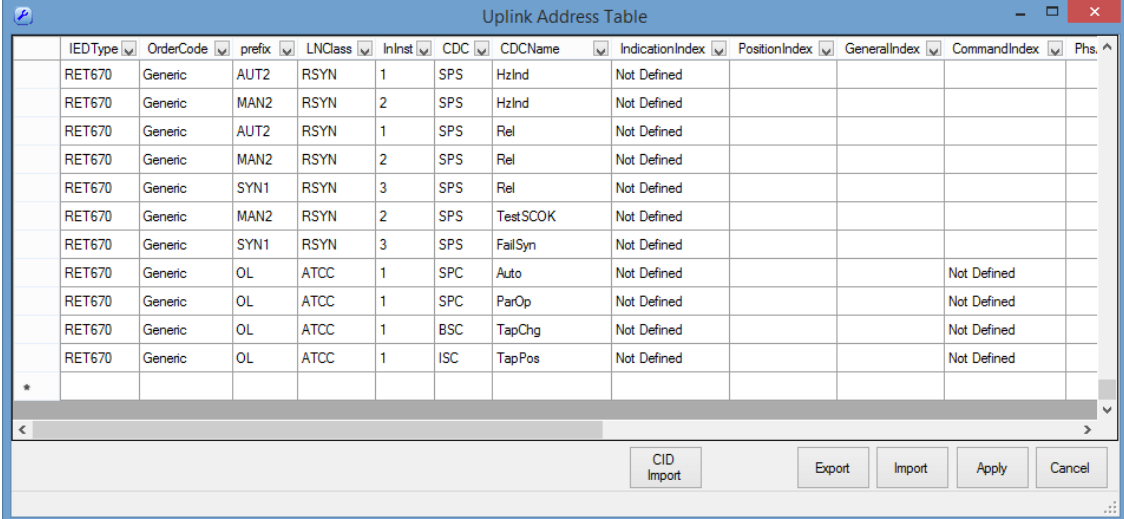
Cancel

SAB600 Cross Reference Uplink Address Filter.png

Figure 6.4.3.8-5 Uplink Address Table Filter

Adding Row in Uplink Address Table

You can add rows to the template by editing values of the cells in rows marked with *.



	IEDType	OrderCode	prefix	LNCClass	InInst	CDC	CDCName	IndicationIndex	PositionIndex	GeneralIndex	CommandIndex	Phs
	RET670	Generic	AUT2	RSYN	1	SPS	HziInd	Not Defined				
	RET670	Generic	MAN2	RSYN	2	SPS	HziInd	Not Defined				
	RET670	Generic	AUT2	RSYN	1	SPS	Rel	Not Defined				
	RET670	Generic	MAN2	RSYN	2	SPS	Rel	Not Defined				
	RET670	Generic	SYN1	RSYN	3	SPS	Rel	Not Defined				
	RET670	Generic	MAN2	RSYN	2	SPS	TestSCOK	Not Defined				
	RET670	Generic	SYN1	RSYN	3	SPS	FailSyn	Not Defined				
	RET670	Generic	OL	ATCC	1	SPC	Auto	Not Defined			Not Defined	
	RET670	Generic	OL	ATCC	1	SPC	ParOp	Not Defined			Not Defined	
	RET670	Generic	OL	ATCC	1	BSC	TapChg	Not Defined			Not Defined	
	RET670	Generic	OL	ATCC	1	ISC	TapPos	Not Defined			Not Defined	
*												

SAB600_Cross_Reference_Uplink_Address_AddRow.png

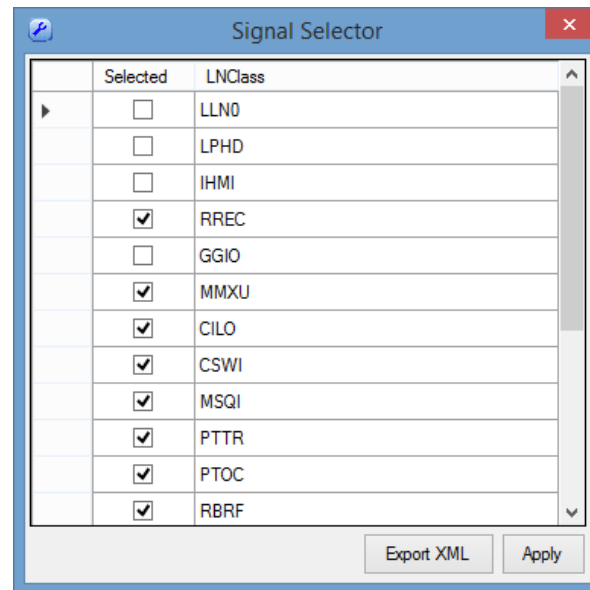
Figure 6.4.3.8-6 Adding Row to Uplink Address Table

Editing values

Ideally you don't have to add any signals to the template manually.

All cells are editable, but you are supposed to edit only the **Index** columns. These columns represent signal addresses to be for that IED type.

CID Import Signal Selector



SAB600_Cross_Reference_Uplink_Address_Signal_Selector.png

Figure 6.4.3.8-7 Signal Selector

You can create templates based on CID files by using the CID Import feature. When a CID file is imported by using this feature, you are shown the Signal Selector form in which you can define the logical nodes from datasets that contain values of interest. The selected logical nodes will be added to the template and the ones not selected are left out of the template.

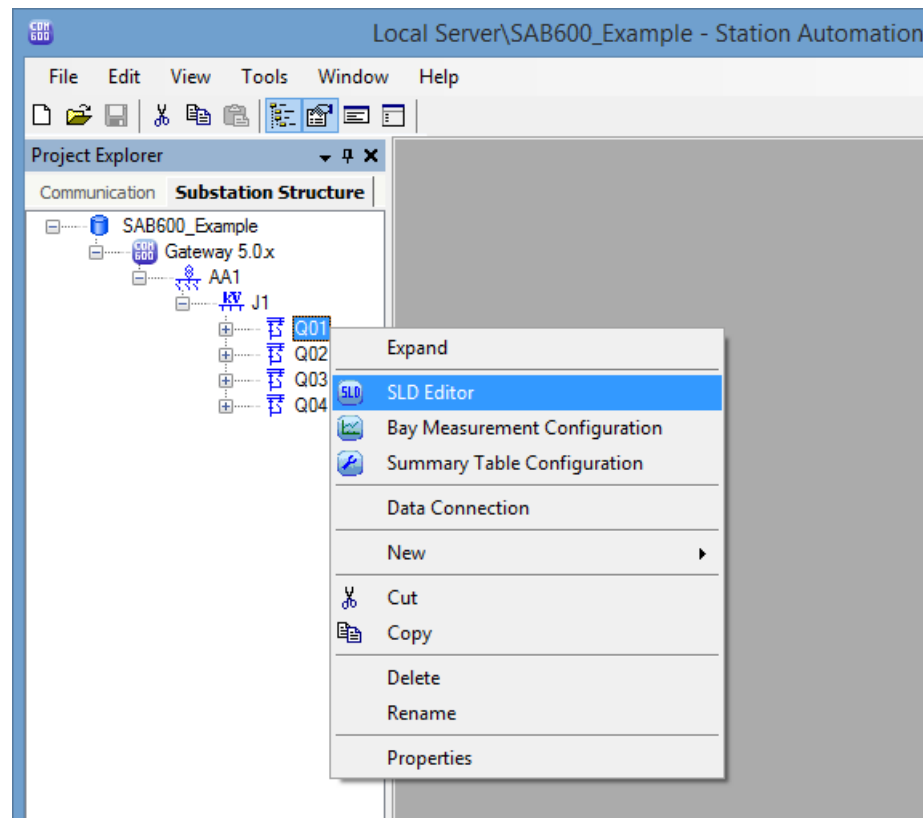
Functions of Signal Selector form:

- **Export XML**
Saves template based on user selections to hard drive in XML format.
- **Apply**
Adds rows based on user selection to current template.

6.4.3.9.

SLD Editor

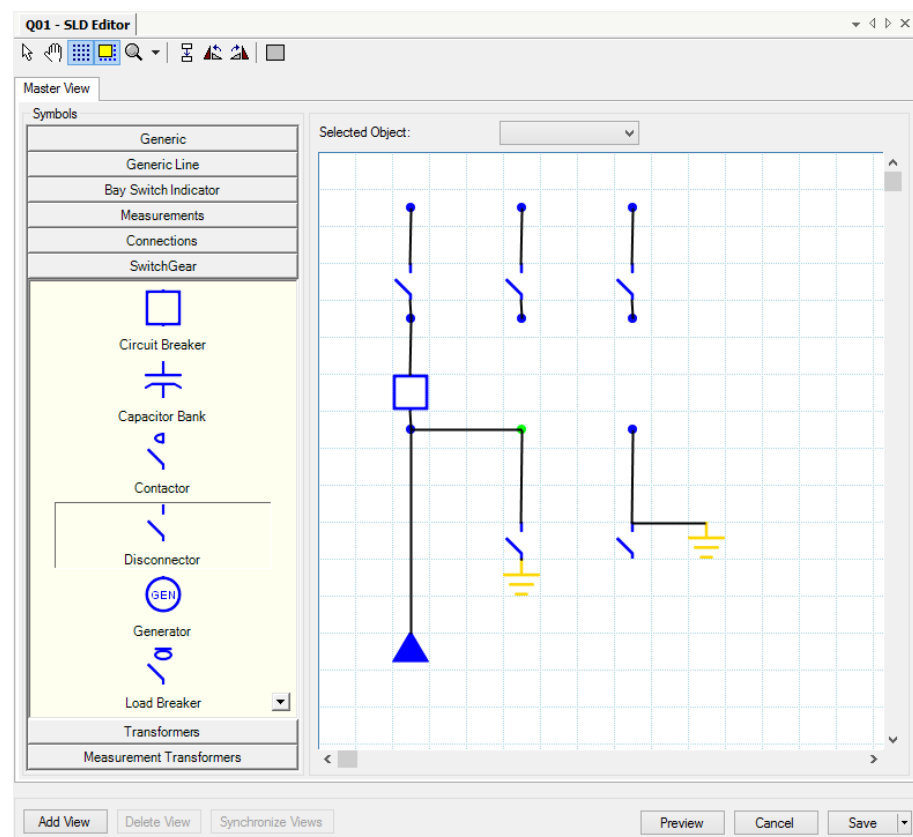
SLD Editor tool can be used to draw a graphical presentation of the process objects in the substation. The Single line diagram can be edited on bay, voltage and substation levels.



SAB600_SLD_Editor_open.png

Figure 6.4.3.9-1 Opening SLD Editor

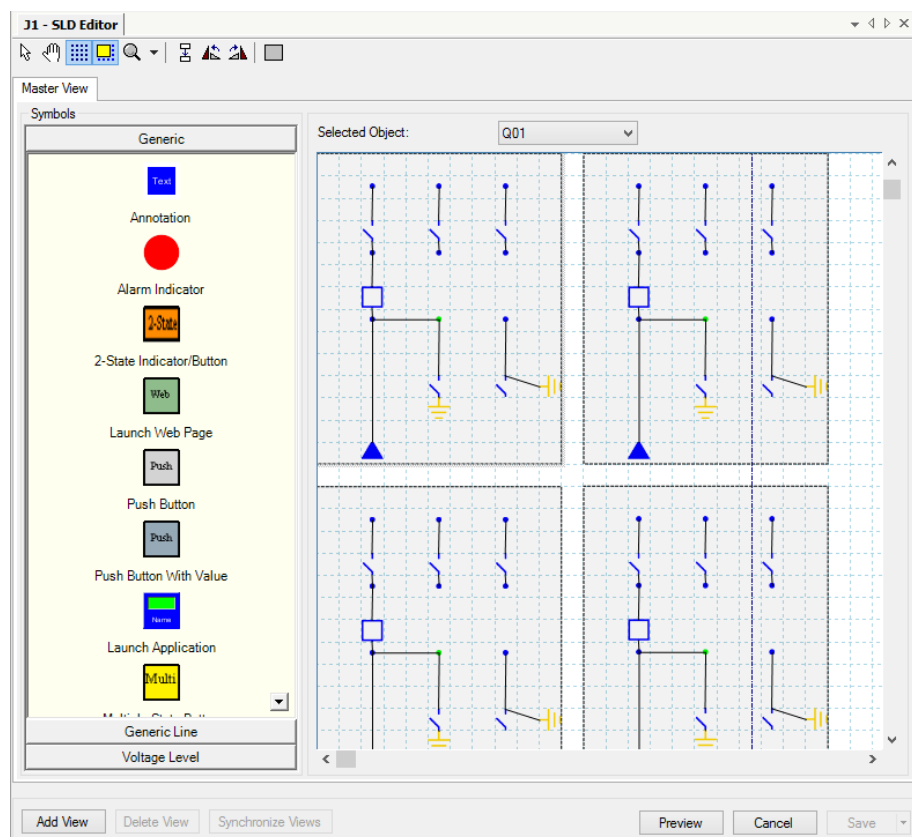
In the bay level SLD Editor you can add Switchgear objects, transformers and other objects to a single line diagram and connect them together as single line diagram. Also generic SLD extension objects like measurements, buttons, annotations and alarm indicators can be added.



SAB600_SLD_Editor_bay.png

Figure 6.4.3.9-2 Drawing bay level single line diagram

In the voltage level SLD Editor you can assign the positions of the bays within voltage level and add SLD extension objects.



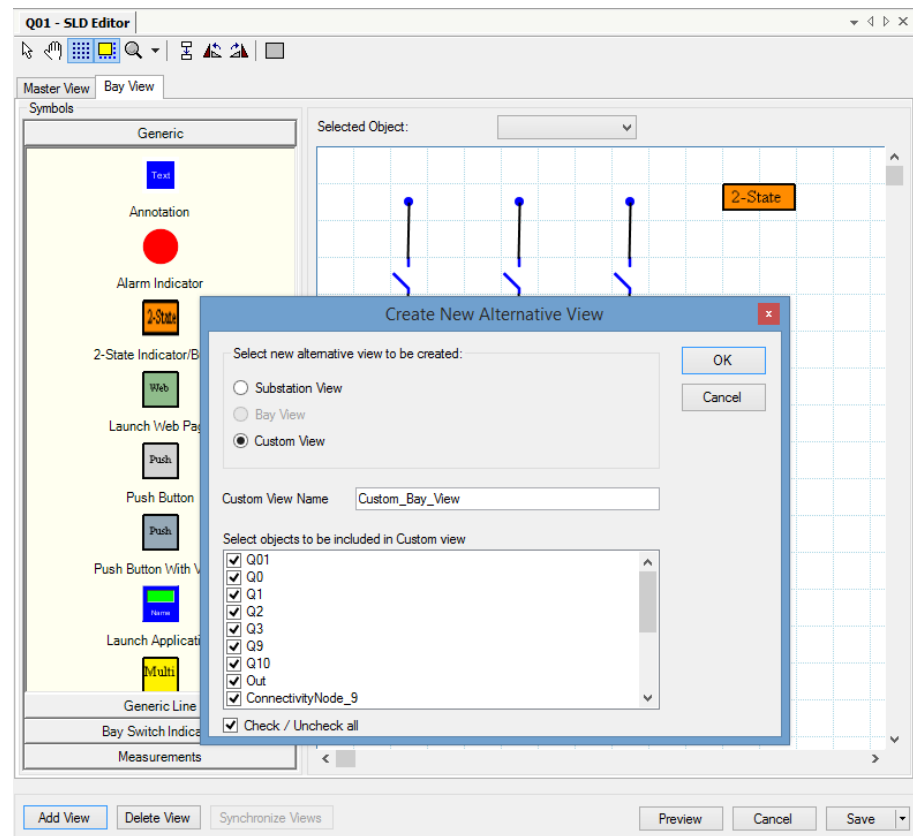
SAB600_SLD_Editor_voltage_level.png

Figure 6.4.3.9-3 Voltage level single line diagram

The position of the voltage levels in the complete substation single line diagram can be modified by opening the SLD Editor from substation object.

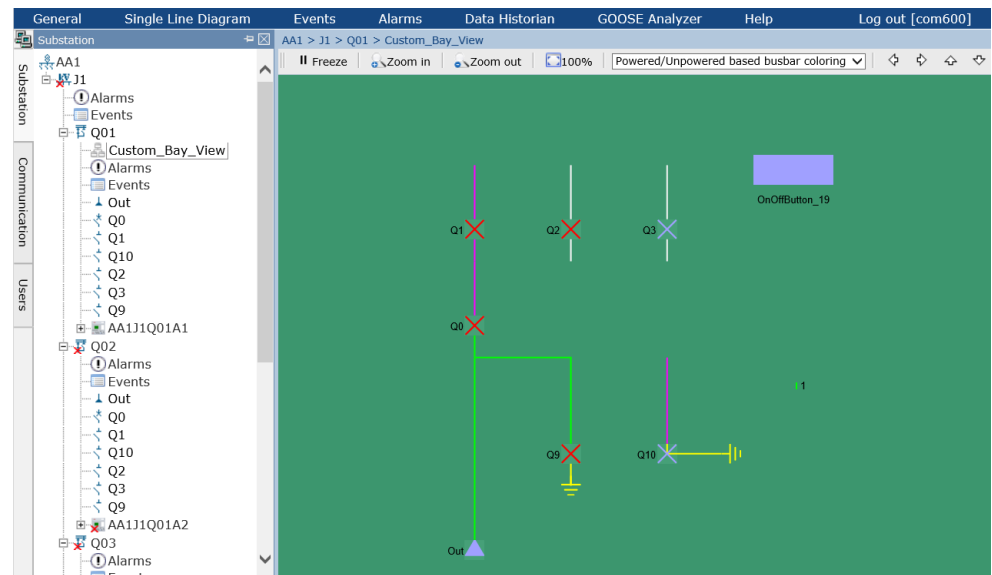
Alternative SLD views

Alternative SLD views in SLD Editor can be used for grouping the single line diagram to smaller parts for easier viewing of large diagrams in COM600 WebHMI. Alternative SLD views can be created on bay, voltage level and substation levels using **Add View** button in SLD Editor tool. The alternative SLD view dialog contains selections for creating substation, bay or custom views depending on the level where SLD Editor has been opened. The substation view contains all substation objects and the bay view all objects in the bay where it has been created. For custom view you can select which objects will be shown. Alternative views cannot have objects that are not included in a master view except SLD extension objects like buttons and measurements.



SAB600_alternative_SLD_view.png

Figure 6.4.3.9-4 Creating alternative SLD view



COM600_alternative_SLD_view.png

Figure 6.4.3.9-5 Alternative SLD view in COM600 WebHMI

6.4.4. Configuration of Station/Remote switch

Each IED and logical device in the OPC Server has a configuration parameter defining the OPC node path for the S/R switch that is used for that IED/logical device. If a logical device does not have an S/R switch path configured, the path defined in the IED is used instead. At run-time, the S/R path of a logical device can be read from the OPC Server; the LD S/R switch path is located in the LD node. The OPC server that has the S/R switch position information must have at least one signal mapped to the OPC client using this information.



With IEC 61850, the control commands from COM600 WebHMI and from slave protocols are always sent using the fixed originator category configured in the Server Originator Category property of the IEC 61850 OPC Server object. Due to this some IEDs (e.g. REF615) need to be configured with Station Authority check disabled to allow controls with the originator category used by COM600.

The S/R switch OPC path points to an OPC node modeled according to one of the supported IEC 61850 data classes. The stVal OPC item of the S/R object presents the state of the S/R switch, 1 = station and 0 = remote. If the stVal item has the vartype VT_BOOL, VARIANT_TRUE is interpreted as 1 and VARIANT_FALSE as 0.

Several IEDs/LDs can share the same S/R switch OPC path, or each IED/LD can have an own S/R switch OPC path. The OPC node pointed by the path can be located in an OPC server providing the S/R information from a physical switch or from a simulated software switch.

The WebHMI is considered to be local or remote based on the IP-address of the web client. The gateway object has a configuration property which defines the addresses that are handled as local. It can be either a single IP address or using wild cards a range of IP addresses.

6.4.5. Alarms and events

6.4.5.1. Alarm and event definitions

For information on creating and configuring alarm and event definitions, see COM600 HMI Configuration Manual.

6.4.5.2. Configuring Alarm groups

Alarms can be grouped using the Group Alarm Configurator tool.

To create an alarm group:

1. Create virtual Application OPC server.
2. Create Virtual Subnetwork.
3. Create Virtual IED.
4. Create Virtual LD.
5. Create LN.
6. Create GroupAlarm SPS object
If you are going to create several Group Alarm objects, rename each object with a unique name within LN.
7. Open Group Alarm Configurator.

Drag and drop the data objects, which shall belong to the alarm group to Group Alarm Configurator tool. You can use data objects from any of the OPC servers of COM600. The data objects of following types can be used as a member of alarm group: ACD, ACT, SPS, SPC, DPS, DPC, ENS, ENC, INS, or INC. When the objects are inserted to the tool, they have by default the alarming states configured according the event definition linked to the object. If no event definition is linked to an object, it does not have any of the states as alarming. Alarming states can be manually specified in the tool by checking the corresponding check box of the state.

When the objects have been added and the alarm states are configured, accept the configuration by clicking apply.

The logic of the alarm group is configured with the Group Alarm Logic Property of the object. There are three choices:

- **AND**
Alarm group is active if all signals belonging to the alarm group are active. Signal changes which does not change alarm group state or quality does not cause an update in the alarm group object.
- **Dynamic OR**
Group alarm is active if any of the signals belonging to the alarm group is active. Any signal state change causes an update of the alarm group object even if the state or quality of the alarm group does not change.
- **Static OR**
Group alarm is active if any of the signals belonging to the alarm group is active. Signal changes, which do not change the alarm group state or quality, does not cause an update in the alarm group object.

The handling of the source signal quality is configured with the Signal Handling property. There are three choices:

- **Group Quality Follows Signal Quality**
Group alarm is calculated using only the signals with good/known quality. The group alarm has the quality of the signal with the worst quality in the group.
- **Unknown Signal States Treated As Alarming**

If the alarm group contains any signal with bad or unknown quality then the alarm group is active. The quality of the group alarm is always good.

- **Unknown Signal States Ignored**

Group alarm is calculated using only the signals with good/known quality. If no signals have good/known quality then the group alarm is inactive. The quality of the group alarm is always good.

Group Alarm object is an SPS data object, which has value true when the group alarm is active and value false when it is inactive. The object can be further used in the COM600 WebHMI or it can be forwarded to external systems using the slave protocol cross-reference tool.

6.4.5.3.

Configuring COM600 event printer

To configure Event Printer in COM600 computer:

1. Open **Control Panel -> Devices and Printers**.
2. Select **Add a printer**. Configure a local printer connected to a serial port. Select the **"Generic / Text Only"** printer model. Follow instructions in the dialogs.
3. To change the printer and serial port configuration after the printer has been added, right-click the printer icon and select properties. In the serial port configuration, it is recommended to change the Flow control setting to **"Xon /Xoff"**.

To configure Event Printer in SAB600:

1. Click the Gateway object in the communication tree.
2. In the Object properties window, change the **Event Printer Enabled** value to **True**.
3. Configure the event printer values shown in the following table.

Table 6.4.5.3-1 Event printer values

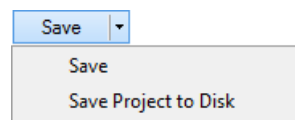
Property	Value	Description
Column Name	Date Time BayDevice ObjectText EventText Quality AlarmIndicator	Text displayed in columns 1 - 7.
Column Truncate	False True	Specifies whether column should be truncated if actual value overflows width.
Column Width	0...1000	Width of columns 1 - 7
Event Printer Alarm Indicator	*	Defines the string which identifies alarms.

Property	Value	Description
Event Printer Code Page		Specifies the code page that is used to convert strings (event) to be printed into bytes that are sent to the printer.
Event Printer Enabled	False True	Specifies whether the event printer functionality is in use.
Event Printer Name		The name of the printer used by the COM600 operating system. The name is specified, when the printer is configured in the COM600 computer.
Max Printing Queue Size	0...1000	Specifies the maximum number of events in the print queue that are waiting to print.
Maximum Line Length	1...180	Specifies the maximum number of characters printed to one line.
Printer Init Command	0 - 127	The configured string is split by a space and each individual number (0 - 127) is converted to the corresponding ASCII character.
Truncate Lines	False True	Specifies how the line overflow is handled. If the value is True, the extra characters are left out. Otherwise, the extra characters are printed on the next line.

6.4.6. Saving configuration

You can save the current configuration to the hard drive in SAB600 by selecting **File > Save Project** or clicking the **Save** button.

Many of the tools in SAB600 also have the **Save** button that allows you to save the configuration either to RAM or hard drive.



SaveButton.png

Figure 6.4.6-1 Save button

It is faster to save the configuration to RAM than to the hard drive, and you can use saving to RAM to speed up the configuration process in large configurations. Note that

it is recommended to save the configuration to the hard drive at regular intervals to avoid possible data loss.



The configuration is always saved to the hard drive when the SAB600 project is closed or the configuration is uploaded to the COM600 device using the Management tool.

6.4.7. Using scales

6.4.7.1. General information about using scales

You have to use scaling if a measurement value provided by the device is not as such suitable for the applications, and you need to change the provided value to another.

With a scale you can convert one value to another by using a scaling algorithm. OPC servers support two types of scales: Stepwise Linear and Look-up Table. The Stepwise Linear scale multiplies the value to be converted with a scale factor and adds an offset value to the result, and the Look-up Table scale uses a look-up table to find the required value.

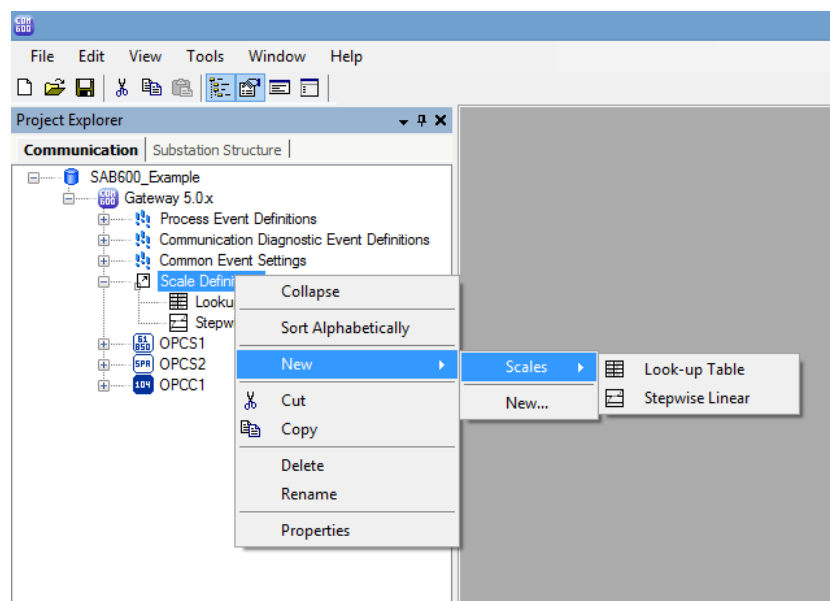


Before you can connect a scale to a data object, add and configure the scale in SAB600. Add and configure the scales before adding and configuring any other objects.

6.4.7.2. Creating scales

To create scales:

1. Right-click Scale Definitions in SAB600, see Figure 6.4.7.2-1.
2. Select **New -> Scales**.
3. Select the scale to add (a Look-up Table or Stepwise Linear).
4. The new scale appears in the Scale Definitions. Enter a unique name for the scale by right-clicking it and selecting **Rename**. It can be configured and connected to a data object.



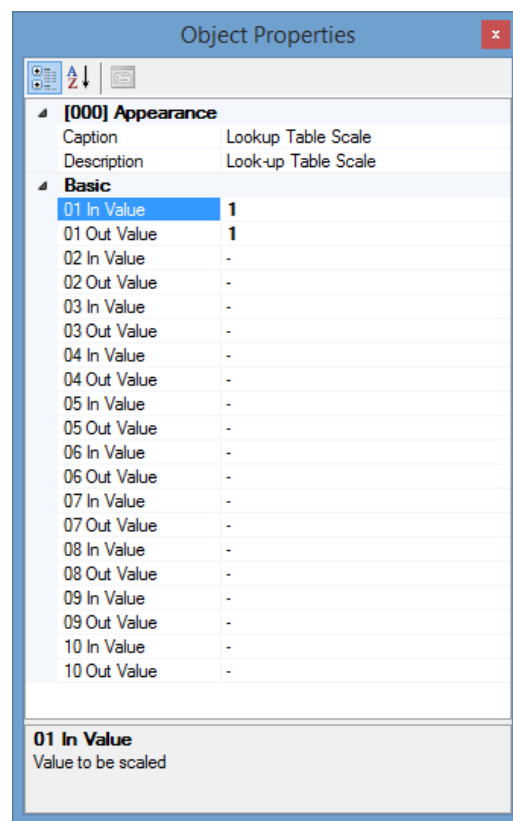
SAB600_Creating_Scales.png

Figure 6.4.7.2-1 Creating scales

6.4.7.3. Configuring scales

To configure scales:

1. Select the scale you want to configure in the object tree.
2. The object properties appear now in the Object Properties window, see Figure 6.4.7.3-1.
3. You can assign the scale with parameter values.



SAB600_Editing_Scales.png

Figure 6.4.7.3-1 Object properties of the scales

Table 6.4.7.3-1 Scales

Property/Parameter	Value or value range/ Default	Description
Basic		
Look-up Table and Stepwise Linear		
01 In Value	-	Value to be scaled
01 Out Value	-	Scaled value
02 In Value	-	Value to be scaled
02 Out Value	-	Scaled value
03 In Value	-	Value to be scaled
03 Out Value	-	Scaled value
04 In Value	-	Value to be scaled
04 Out Value	-	Scaled value
05 In Value	-	Value to be scaled
05 Out Value	-	Scaled value

Property/Parameter	Value or value range/ Default	Description
06 In Value	-	Value to be scaled
06 Out Value	-	Scaled value
07 In Value	-	Value to be scaled
07 Out Value	-	Scaled value
08 In Value	-	Value to be scaled
08 Out Value	-	Scaled value
09 In Value	-	Value to be scaled
09 Out Value	-	Scaled value
10 In Value	-	Value to be scaled
10 Out Value	-	Scaled value

After you have performed all the necessary configurations, see 7.1, Activating COM600 with new configurations.

6.5. Project revision

6.5.1. Project revision

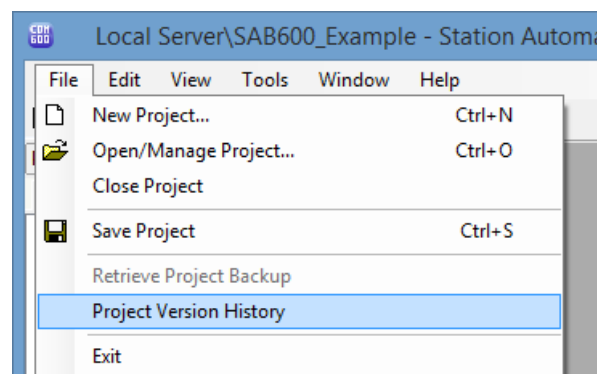
When using COM600 5.0 and above, users can associate a version number to project configuration being loaded into COM600 by using the Project Revision Handling feature available in SAB600. This allows for easier and more defined management of application configuration loaded into COM600.

The version number will be automatically incremented whenever:

- New objects are added to communication/substation structure through an **Add** action.
- Existing objects in communication/substation structure are renamed through a **Rename** action.
- Existing objects in communication/substation structure are deleted through a **Delete** action.
- Properties of existing objects are changed by editing through **Object Properties** view.
- Tool specific configuration is changed. This includes tools like SLD Editor and Topic Generator.

6.5.2. Project version history

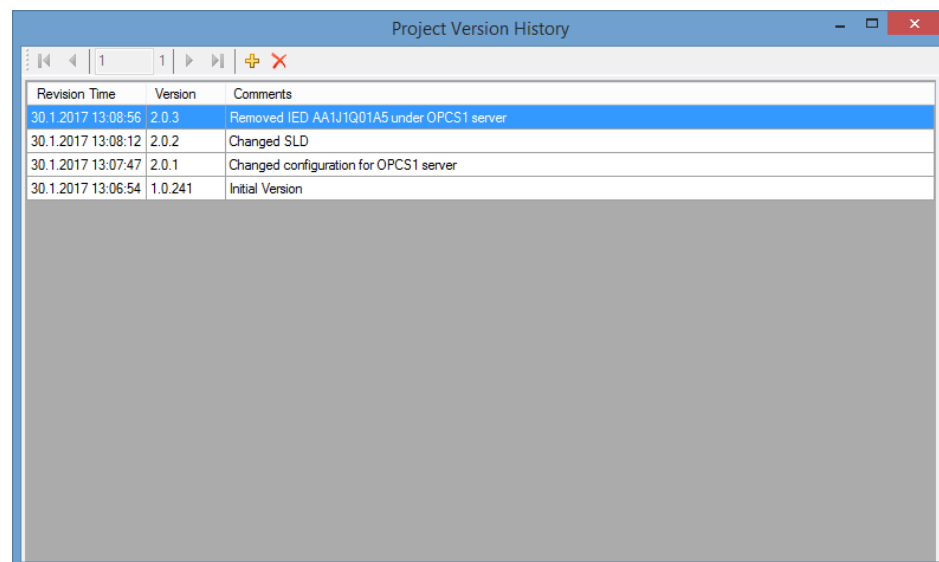
To view project revisions, select **File > Project Version History** in the SAB600 menu. This menu item is enabled only when a project is used from a Gateway 5.0 or above object.



SAB600_launch_project_version_history.png

Figure 6.5.2-1 Launching Project Version History

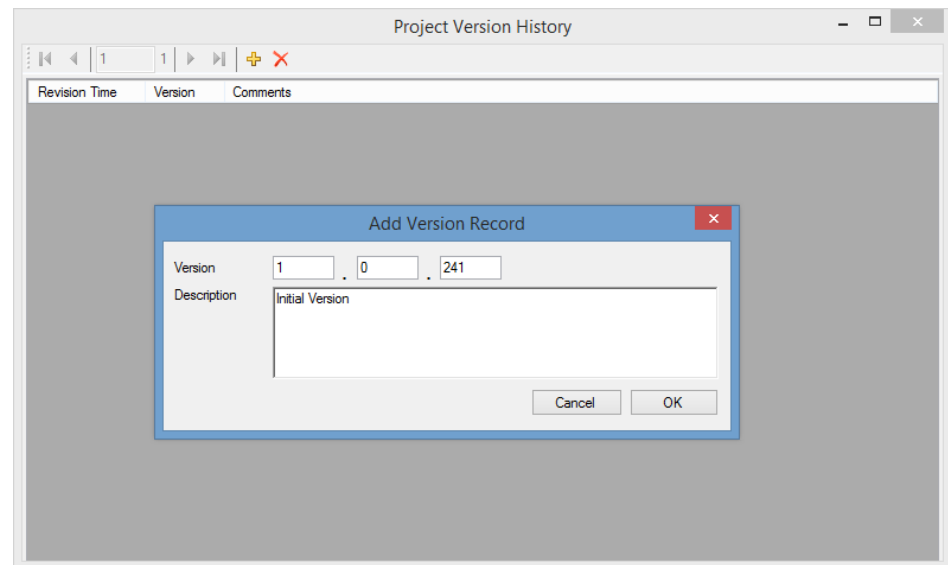
The Project Version History window lists all revisions that are deemed worthy to be marked for historical review purposes. Figure 6.5.2-2 shows Project Version History window displaying all revisions made.



SAB600_project_version_history.png

Figure 6.5.2-2 Project Version History dialog

Note that not every automatic change in project version causes a revision entry in Project Version History. The user can open this window at any point to create a revision entry whenever deemed appropriate and add revisions, as shown in Figure 6.5.2-3. The user can also change the version number as per choice, and subsequent automatic increments in project version number will commence from the chosen number.



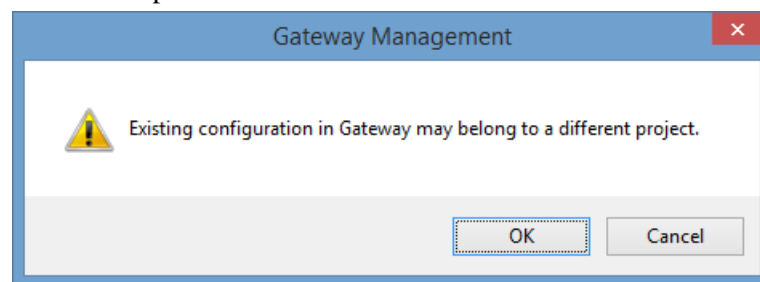
SAB600_project_version_add_revision.png

Figure 6.5.2-3 Add Revision entry

6.5.3. Project version verification

When the user initiates an upload of a project configuration to COM600 through SAB600's Gateway Management tool, SAB600 performs further validation using project version numbers to ensure that the user does not unintentionally or accidentally upload a configuration to COM600. The validation includes:

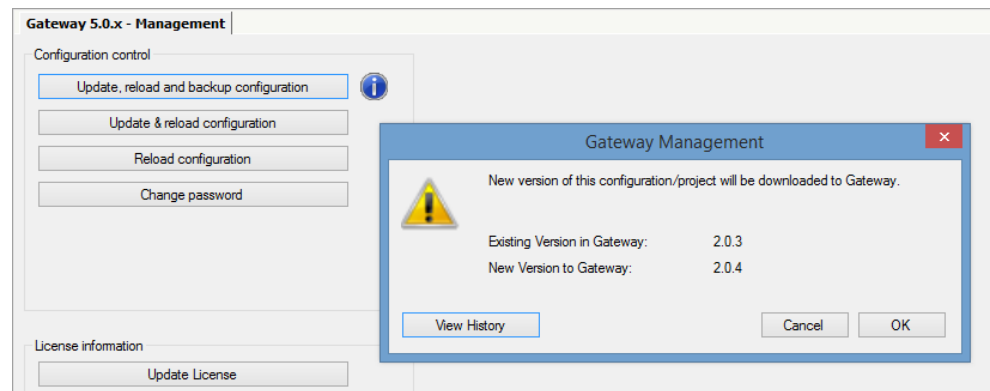
1. Validating if the existing configuration in COM600 is from the same project. If not, the user is prompted for further action through a warning message window, see Figure 6.5.3-1. Click **OK** to continue uploading the configuration, or **Cancel** to cancel the upload.



SAB600_project_mismatch_warning.png

Figure 6.5.3-1 SAB600 Project Mismatch warning message

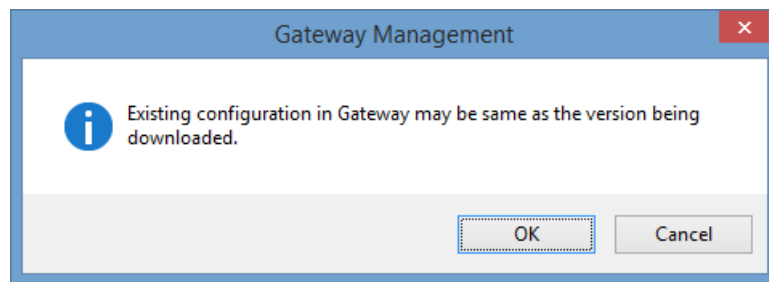
2. Validating if the existing version of the project configuration is the same as the version being downloaded. If not, user is prompted for further action through a warning message window. Click **OK** to continue uploading the configuration, or **Cancel** to cancel the upload.



SAB600_project_version_mismatch_warning.png

Figure 6.5.3-2 SAB600 Project version mismatch warning message

After the validation, if the project configuration being uploaded from SAB600 is found to be the same as the existing configuration, the user is shown a message window. Click **OK** to continue uploading the configuration, or **Cancel** to cancel the upload.



SAB600_project_version_match.png

Figure 6.5.3-3 SAB Project version match message

6.6. SAB600 project backup and retrieval

6.6.1. SAB600 project backup and retrieval

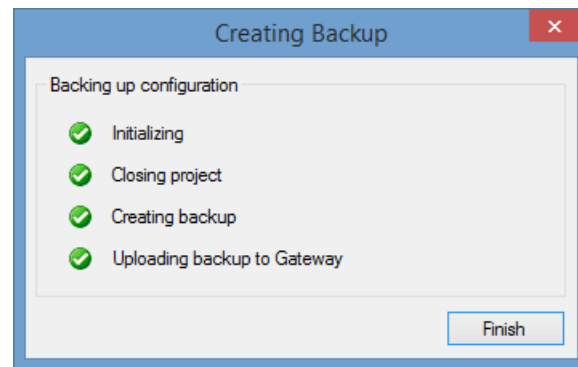
When using COM600 5.0 and above, SAB600 includes a project revision feature that allows the user to take a backup of the current project and upload it to COM600. The backup can be retrieved later for further use.

6.6.2. Project backup to COM600 device

When using COM600 5.0 and above, you can use Gateway Management tool to upload a backup of the configuration along with the configuration being loaded into COM600.

To create a project backup and upload it to COM600:

1. Launch SAB600 and open an existing project.
2. Open Gateway Management tool.
3. Click **Update, reload and backup configuration**.
4. Click **OK** in the subsequent warning message window showing a project/version mismatch
5. Click **Finish** after backup has been created and uploaded to COM600.



SAB600_create_project_backup.png

Figure 6.6.2-1 Creating Project Backup

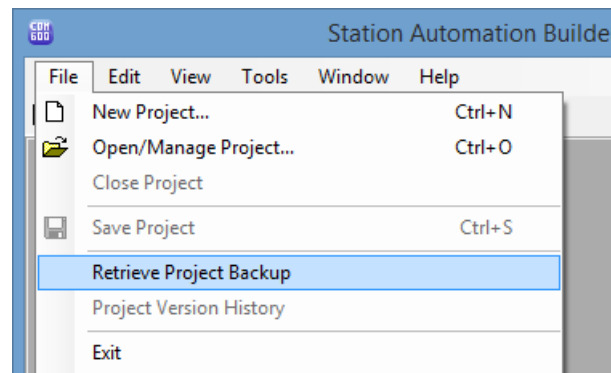
6.6.3. Retrieving a project from COM600 device

When using COM600 5.0 and above, you can retrieve an existing backup of the project configuration from COM600.

Retrieve Using SAB600

To retrieve a project backup from COM600:

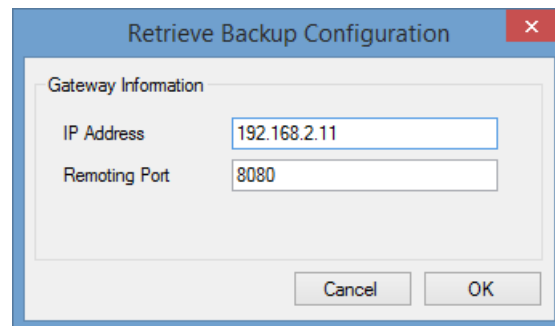
1. Launch SAB600.
2. If an existing project is opened by default, close the project by selecting **File > Close Project**.
3. Select **File > Retrieve Project Backup**. The Retrieve Backup Configuration window opens.



SAB600_launch_retrieve_project_backup.png

Figure 6.6.3-1 Launch Retrieve Project Backup

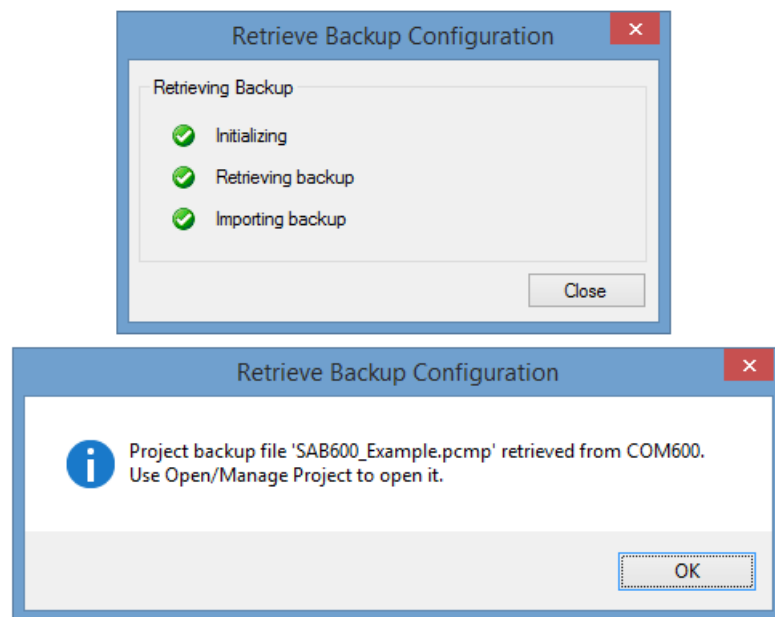
4. Enter the IP address of COM600 and click **OK**.



SAB600_retrieve_backup_configuration.png

Figure 6.6.3-2 Retrieve Backup Configuration

5. After the project has been successfully retrieved, it will be loaded into SAB600. You can now open the project.



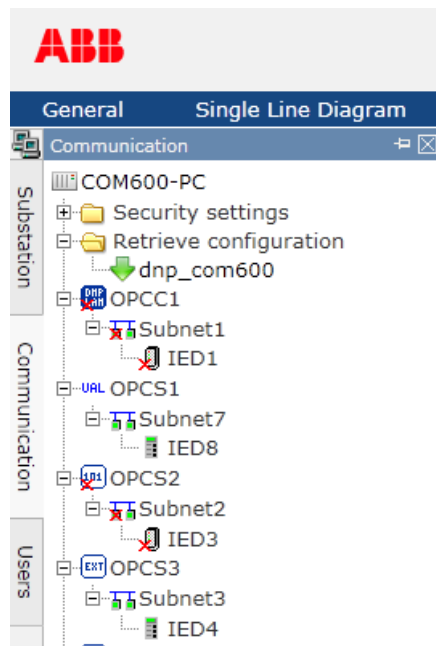
SAB600_backup_retrieval.png

Figure 6.6.3-3 Processing backup retrieval

Retrieve Using WebHMI

The projects backed-up from the SAB600 management tool can be retrieved from the COM600 unit via its WebHMI.

This feature is available in the Communication structure.



COM600_Retrieve_configuration.png

Figure 6.6.3-4 COM600 retrieve configuration

All backed-up SAB600 projects can be downloaded from the “Retrieve configuration” node. Clicking on the project node(s) will download the corresponding PCMP file to the user’s computer.

6.6.4. Project backup and restoring locally

To back up the SAB600 project:

1. Select **File > Open/Manage Project**.
2. Select the project you want to back up.
3. Select **Export Project**.
4. The File window opens. Select the location where to export the database.

To restore your backup:

1. Select **File > Open/Manage Project**.
2. Select **Projects on my computer**.
3. Select **Import Project**.
4. The File window opens. Choose the exported database you want to import.

6.7. SCL Export

Export the configuration files of the COM600 OPC Servers and Clients in SCL format using the SCL Export function in the Gateway object. This function can be used to transfer the configuration information to other systems and tools.

To export configuration files in SCL format:

1. Right-click the server object in the Communication tree and select **SCD Export**.
2. The **SCD Export** window opens.
3. Click **Export** and select the location where you want to save the SCL file. Click **OK**.

Both the communication view and substation view configurations are exported.

To export just the communication view:

1. Right-click the Gateway object in the Communication tree and select **SCL Export**.
2. The **SCL Export** window opens. Select whether you want to export all configurations or a certain OPC Server or Client configuration.
3. Click **Export** and select the location where you want to save the SCL file. Click **OK**.

CID Export

Export the configuration files of IEDs in CID format.

To export configuration files in CID format:

1. Right-click the IED in the Communication tree and select **CID Export**.
2. A Windows **Explorer** window opens. Rename the file, if necessary, and browse to the location where you want to save to file.
3. Click **Save**.

Both the communication view and substation view configurations are exported.

6.8.

Configuring external watchdog for COM600

The communication to the IED used as a watchdog is configured as with any IEDs using SAB600. The IED is configured with SPC or INC type of data object to which the cyclical command is sent.

To configure COM600 to use an IED as an external watchdog:

1. Right-click on the Gateway object and select **Properties**.
2. Enter the **Command OPC Item Path** in the following format:
Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name\Data Attribute Name

Other properties are set according to the preference of the user, but they can be left as they are by default. These are:

- Command Write Value
The value that is written to the command OPC item. The default value is 1.
- Command Write Interval

How often the command is sent. The default value is 5 seconds.

6.9. Installing and configuring Duo Driver

Duo Driver is available when the optional LAN card is installed in COM600.

Before the installation, it is recommended to rename Intel(R) PRO/1000 MT Dual Port Server Adapter ports to **DUO Line A** and **DUO Line B**. Open the **Network Connections** dialog and select the **Properties** for the Duo Driver devices. Configure static IP address on **DUO Line A** and a dummy IP address on **DUO Line B**. The IP address of the **DUO Line A** is used for the pair.

To install the Duo Driver:

1. Run the **Duo Driver Setup Wizard** file, `c:\DuoDriver\setup.exe` (in the COM600 computer).
2. Click **Next**.
3. In the **Select Installation Folder** dialog, click **Install**.
4. Setup for Duo Driver dialog opens. Enter a name for the Duo Driver Instance. Choose network adapters to be used in the pair with the Adapter A and Adapter B selection. Select or enter the common MAC address to be used with the adapters. After configuring the options, click **Add Virtual Adapter** to accept the configuration.
5. In the following dialogs, click **Done** and **Finish** to finalize the installation. If you need to modify the configuration, re-install the Duo Driver.



By default DuoDriver Virtual Adapter name has # character in it. Remove # from the name as it causes problems with the OPC naming.

6.10. Installing Intel Teaming feature to COM600

The Teaming feature is available only if a LAN optional card has been installed in COM600.

Teaming Features include Failover protection, increased bandwidth through aggregation, and balancing of traffic among team members. Teaming Modes are AFT, SFT, ALB, RLB, and EtherChannel*/3ad (LA/FEC/GEC/3ad). However, only Failover protection using SFT is supported by COM600. SFT uses two (total) adapters connected to two devices (that is, switches) to provide a fault tolerant network connection if the first adapter, its cabling or the device (switch) fail. This is determined by a link failure.

To use the SFT connect Intel(R) PRO/1000 MT Dual Port Server Adapter network ports to two devices (that is, switches). Spanning tree protocol must be switched on in the devices (switches). Do not put clients on the link partner switches, as they do not pass to the partner switch at fail.

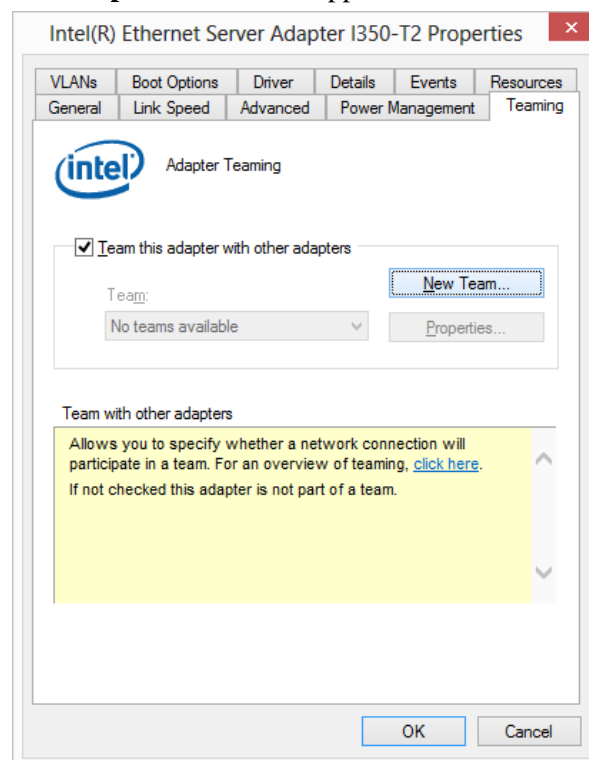
To install Intel Teaming Feature:

1. Install advanced network services. Run `c:\Intel\PROWinx64.exe` and follow the installation instructions.



Intel PROSet drivers are installed by default in the image, so select **Modify** and then check the **Advanced Network Services** to install those as well.

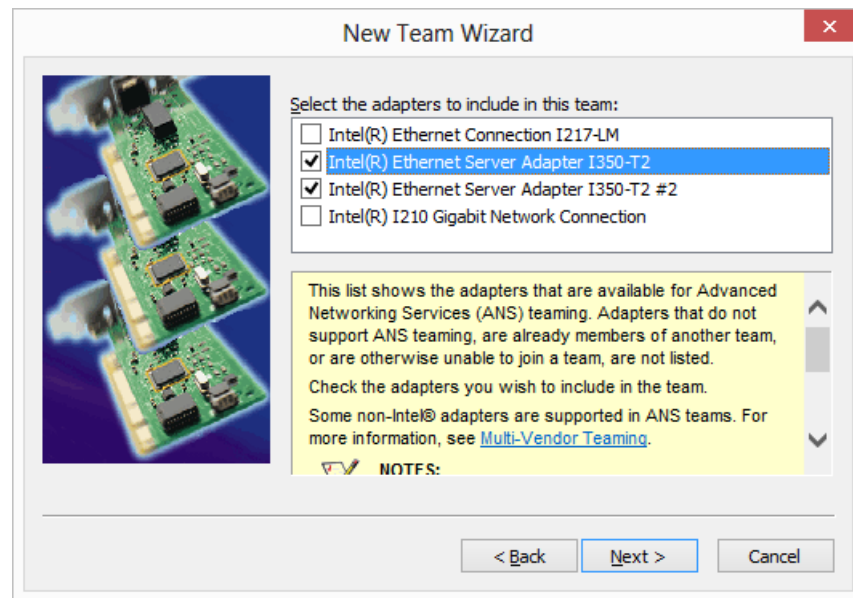
2. Open **Control Panel**.
3. Click **Device Manager**.
4. Expand **Network adapters** and double-click **Intel(R) Ethernet Connection I217-LM**.
5. The **Properties** windows appear. Select the **Teaming** tab.



COM600_Intel_Teaming.png

Figure 6.10-1 Opening the Teaming tab

6. Select **Team this adapter with other adapters** and click **New Team**.
7. Specify a name for the team and click **Next**.



COM600_Intel_New_Team_Wizard.png

Figure 6.10-2 New Team Wizard

8. Unselect **Intel(R) Ethernet Connection I217-LM** adapter and select both **Intel(R) PRO/1000 MT Dual Port Server Adapters**. Click **Next**.
9. Select **Switch Fault Tolerance** to a team mode and click **Next**.



COM600_Intel_Switch_Fault_Tolerance.png

Figure 6.10-3 Switch Fault Tolerance selection

10. Click **Finish** to start installation
11. Configure the Team. Click **OK** to close the **Properties** dialogs.

The Team is now made. One virtual network adapter (named “Local Area Connection 3”) appears into **Control Panel > Network connections**. Configure the IP address for this adapter.

For more information about Intel Teaming feature, see Intel documentation.

6.11. Configuring Data historian

6.11.1. Preparing COM600 for Data Historian

The following operations must be performed in the COM600 computer as the administrator user to prepare COM600 for Data Historian feature.

Configuring website security certificate

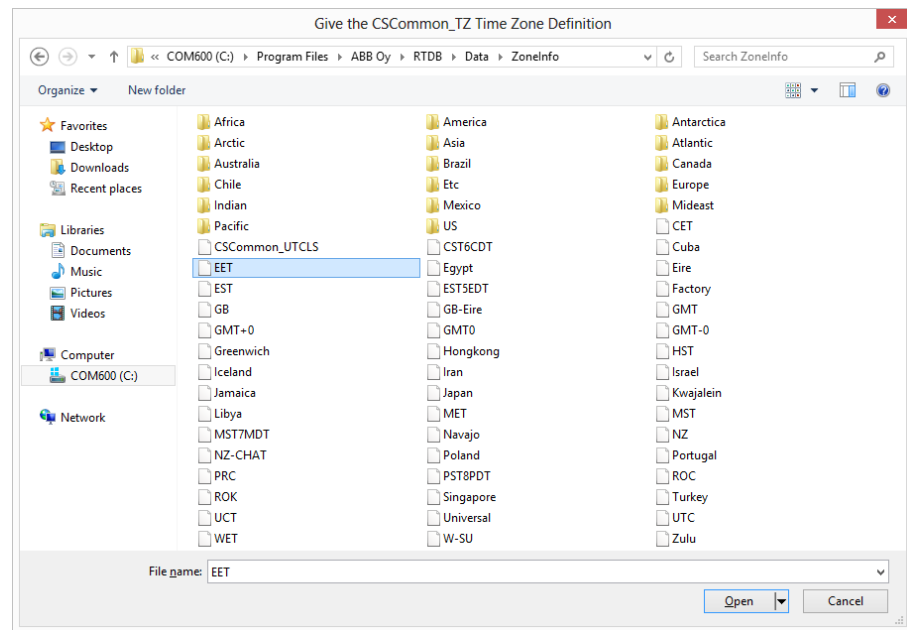
Data Historian uses the COM600 WebHMI security certificate by default and needs this to be properly configured before Data Historian can be used from other computers. For more information, see 7.3.1, Using web site security certificates.

Setting the time zone of RTDB

The time zone of the RTDB is by default GMT and it must be set before taking the Data Historian feature into use.

To set the time zone:

1. Select **Windows Start Screen -> All Apps (right-click background to show it) -> Data Historian -> Change Time Zone**. (Can also just open Start Screen and then write “time” to find it faster.)
2. The following file browser dialog opens.



COM600_RTDB_Timezone.png

Figure 6.11.1-1 Time Zone Definition

3. Select the time zone from the list and click **Open**.
4. Reboot the computer so that the service processes notice the new setting.
The setting is stored in a system environment variable.

Preconfiguring Vtrin Client Environment

To change the default layout and views for Vtrin users, log in to Vtrin with the COM600 WebHMI administrator user name and password. The administrator user has full access to Vtrin functions and objects.

Enabling Vtrin into use

To be able to use the Data Historian Vtrin tool, Vtrin must be installed on the client computer. When clicking the **Data Historian** menu item in WebHMI for the first time, the Vtrin client is installed.



Description	Value
Substation name	A1
Product name	COM600
Product version	5.0
License version	5.0
Software version	5.0.6197.20139
Customer name	*****
Site	*****

Description	Value
CPU Usage	1,53 %
CPU Package Temperature (°C)	38
CPU Core Temperatures (°C)	35 33 33 36
Physical Memory Total (MB)	8 070
Physical Memory Available (MB)	6 266
Disk Total (MB)	118 285
Disk Free (MB)	99 825
Disk Read (B/s)	0
Disk Write (B/s)	10 019
Disk Temperature (°C)	33
Network Received [Remote] (B/s)	0
Network Sent [Remote] (B/s)	0
Network Received [Local] (B/s)	2 584
Network Sent [Local] (B/s)	1 165

HMI_Data_Historian_menu.bmp

Figure 6.11.1-2 Data Historian menu item shown in WebHMI



The TLS connection between COM600 and the client computer must be set up properly before VTrin can be installed on the client computer. This may involve either installing a well-known certificate on the COM600 or installing the default self-signed certificate on COM600 to the client computer.

To enable the Vtrin installation to client computers, select **Start -> All Apps -> Data Historian -> Change Vtrin IP Address** on the COM600 computer.



If the IP address of the COM600 computer is changed, change the Vtrin IP Address again.

6.11.2.

Configuring Data Historian measurements and signals

In Data historian configuration measurements and signals from devices are selected for history information. The trends can then be investigated in COM600 WebHMI. The function includes several configuration parameters.

To configure Data historian:

1. Right-click the Gateway object and select **Data Historian Configuration** from the shortcut menu.

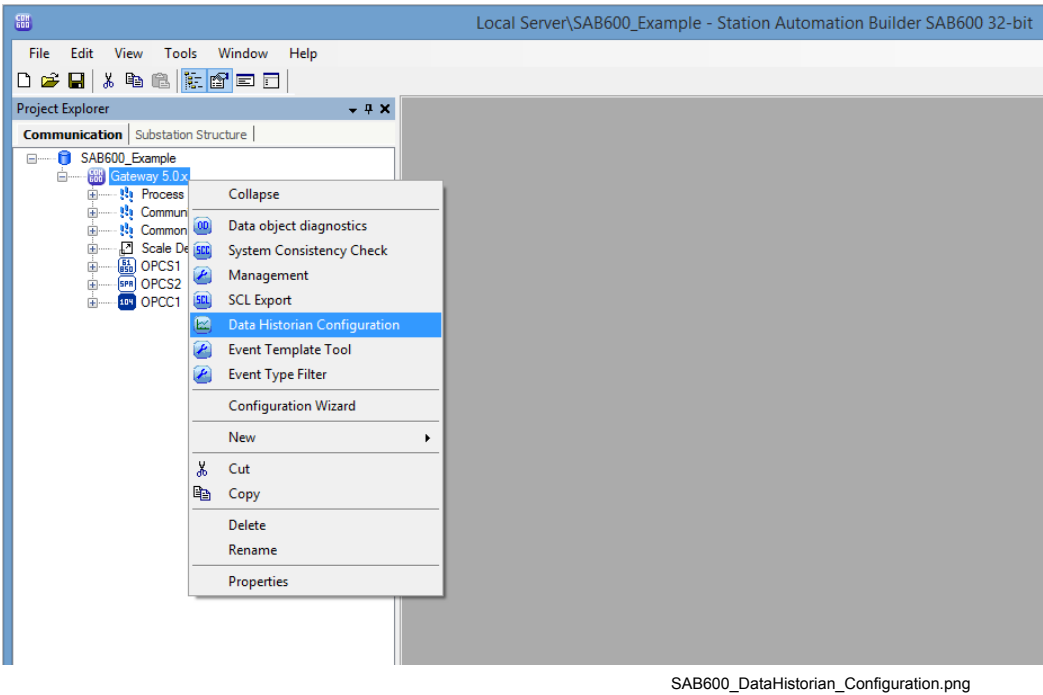


Figure 6.11.2-1 Opening Data Historian Configuration tool

2. The Data Historian Configuration dialog opens.

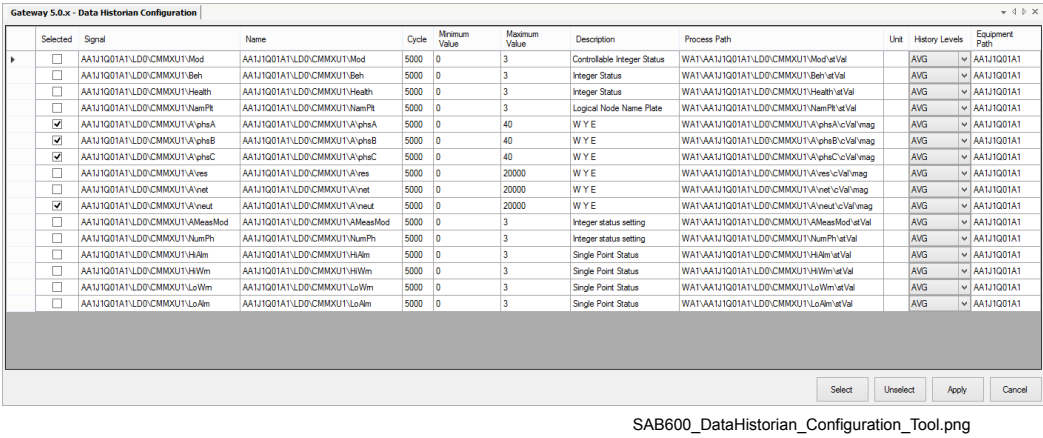


Figure 6.11.2-2 Data Historian Configuration tool

- 3. Drag and drop data objects to the Data Historian Configuration tool, where they are displayed as rows. Some of the rows are write-protected. You can modify the values in the **Cycle**, **Minimum Value**, **Maximum Value**, **Description**, **Unit**, and **History Levels** columns, although the values are set according to the values defined for the data object.
- 4. You can modify the editable values. Check the values for the **History Levels** column from COM600 Data Historian Operator's Manual.

5. Select the desired signals for the configuration with the checkboxes in the **Selected** column. With **Select** and **Unselect** you can select or unselect multiple rows at the same time.
6. Save the configuration in the SAB600 project by clicking **Apply**.

The configuration is activated to COM600 as described in 7.1, Activating COM600 with new configurations.

6.12. Security event list backup

You can take a backup of the COM600 Security event list either manually using a bat file or automatically by setting the Windows task scheduler to take an automatic backup at certain intervals.

You can take a manual backup by using the **COM600EventStoreBackup.bat** script. The script is located at **C:\Program Files\COM610 GW SW\Common\bin** folder in the COM600 computer.

Note that you need admin rights to the computer run the script and perform the backup successfully.

The script takes an input parameter, which indicates the folder of which the backup is taken. When the input is valid, the script copies all the security event list files to the intended backup location.

The source folder for the security event list files is specified in the **gwConfig.ini** file located at **C:\Program Files\COM610 GW SW\Common\bin**.

To take a manual backup of a COM600 Security event list:

1. Log into COM600 computer operating system.
2. Open command prompt as an administrator by choosing **Start/>Run/>Cmd**.
3. Change the runtime directory to **C:\Program Files\COM610 GW SW\Common\bin**, like for example, **cd "C:\Program Files\COM610 GW SW\Common\bin"**
4. Launch the **COM600EventStoreBackup.bat** script and specify the intended backup location. For example, **COM600EventStoreBackup.bat "C:\COM600_Security_Events_Backup"**.
5. Wait until the backup script is finished.
6. Close the command prompt window.

To make the backup automatic, you can set the Windows task scheduler to automatically perform the backup function at certain intervals.

The task is named **"\COM600\COM600EventStoreBackup"** in the Windows task scheduler. It is disabled by default.

When enabled, the task launches the **COM600EventStoreBackup.bat** script with the intended backup location as the input parameter.

To automatically backup COM600 Security event list

1. Log into COM600 computer operating system.
2. Launch Windows Task Scheduler from **Control Panel>Administrative Tools**.
3. Locate the **COM600EventStoreBackup** task as in shown in the picture below.
KUYA
4. Right click the **COM600EventStoreBackup** task and select **Properties** to enable the task and set the time interval for task execution.
5. In the following **COM600EventStoreBackup Properties** dialog, select the **Triggers** tab.
6. Double click the **Daily** Trigger entry to setup time interval for task execution and click **Ok**. Make sure to check the **Enabled** check box to enable the task.
7. To edit the backup location for the task, choose the **COM600EventStoreBackup Properties** dialog and select the **Actions** tab.
8. Double click on the **Start a program** action item to launch the **Edit Action** dialog.
9. Edit the textbox for **Add arguments (optional)** to change the intended backup location and click **Ok**.
10. Click **Ok** in the **COM600EventStoreBackup Properties** for any changes made to the properties of the task.
11. Check the backup result in the Windows event log using Windows Event Viewer tool. You can open it by choosing **Control Panel/ > Administrative Tools**.

6.13. SAB600 user management

6.13.1. SAB600 user management

This chapter describes the user authentication for SAB600.

SAB600 supports both authenticated and anonymous users. The following chapters describe the functionality in both use cases. By default, no authentication method is enabled.



It is recommended not to use administrator accounts by default, but to create limited user accounts that only allow to perform the tasks related to the user role.

Activating user authentication

The system engineer can enable or disable user authentication. When user authentication is disabled, all users have full rights to operate. User authentication also defines whether

user login is needed or not. To start user management, go to **Tools** in the main menu and select **Options**.

User authentication is also used to control login function. To set user management, go to **Tools** in the main menu and select **Options**.

The SAB600 administrator account has to be created before authentication can be enabled. The user can select the name for the administrator account and by default the account does not have a password.



Create a password for the administrator account immediately after it is created.

To activate user authentication:

1. Go to **System Settings** folder.
2. Select or unselect **Use Authentication** to enable or disable user authentication.
3. Select **PCM Authentication** or **Windows Authentication** under **Authentication Method**.



Windows Authentication is the recommended authentication method.

Windows Authentication uses the current user's Windows account to determine if the user is allowed to log in to SAB600. If Windows Authentication is selected, it is checked that all user accounts contain the Windows account name that is used to log in the user.

PCM Authentication uses user name and password specified in the user management of SAB600.

6.14. User categories

6.14.1. Creating user categories

User management in SAB600 is based on user accounts and user categories. Each user account is mapped to one user category that defines the permission to access certain functions. There are three default user categories:

- **System Engineer:** administrator for the system, has full rights to perform any function and can define the user accounts
- **Application Engineer:** can access most of the functions, has read and write access to the IED engineering processes
- **Operator:** can perform certain simple tasks, has read-only access to certain functionality of the SAB600

Check the settings for each of the user categories from SAB600/Options/Category Manager.



Only System Engineer users can create user categories.

To create a user category:

1. Select **Tools > Options**.
2. Go to the **Category Manager** folder.
3. Click **Add New Category**. The Add New Category window opens.
4. Fill in a name for the user category.



The name of each user category must be unique.

5. Specify the rights to perform different functions in the **Functions And Rights** field.
6. Click **OK** to save the settings.

6.14.2.

Deleting a user category



Only System Engineer users can delete user categories.



The System Engineer category cannot be deleted.

To delete a user category:

1. Select **Tools > Options**.
2. Go to the **Category Manager** folder.
3. Select the user category from the drop-down list.
4. Click **Delete Category** to remove the user category.
5. Click **Yes** to confirm the operation.

If you try to delete a category that has any members, you will be asked to confirm the action. If the category is removed, the user accounts remain but they are no longer mapped to any user category. Any changes to the categories are saved to the system configuration data.

6.14.3. Modifying an existing user category



Only System Engineer users can change the access rights of existing user categories.



The access rights of the System Engineer category cannot be changed.

To modify user categories:

1. Select **Tools > Options**.
2. Go to the **Category Manager** folder.
3. Select the user category from the drop-down list to access the **Functions and Rights** field.
4. Change the user rights by selecting one of the user levels in the drop-down list.
The Functions and Rights field is divided into different sections for specifying the user rights of a specific tool component or function.

6.15. User management

6.15.1. User management

This chapter explains how to manage SAB600 users. For IED user management, see IED's Cyber Security Deployment Guidelines.

6.15.2. Creating users

You need to define the following info when creating a new SAB600 user:

- User name (mandatory)
- Real name of the user
- User category



Windows account can be used to log in automatically. Multiple Windows account names can be used for a single SAB600 account. Windows account names are separated by a semicolon (;). These Windows account names are only used for login if the administrator has enabled Windows authentication.

To create a new user:

1. Select **Tools > Options**.
2. Go to the **User Manager** folder.

The default Real Name is System Administrator.

3. Click **Add new user** in the **User Profile** field. The **Add new user** window opens.
4. Fill in User name and select User Category from the drop-down list. The user name must be at least three characters long.
5. Click **OK**.

The new user name has to be a member of a user category to have permission to SAB600 functions, for more information see 6.14.1, Creating user categories.

6.15.3. Deleting a user



Only users with System Engineer rights can delete a user.



The System Engineer account cannot be deleted.

To delete a user:

1. Select **Tools > Options**.
2. Go to the **User Manager** folder.
3. Select the user you want to delete from the drop-down list.
4. Click **Delete user** in User profile.

6.15.4. Changing password

To change SAB600 password:

1. Select **Tools > Options**.
2. Go to the **User Manager** folder.
3. Click **Set Password** under **User Preferences**. The **Set Password** window opens.
4. Type in your old password.
5. Type in the new password.

The password must meet the following requirements:

- At least 8 characters long
 - Starts and ends with an alphabetic character of European languages
 - Contains at least one special character ~!@#\$\$%^*_+=`|\(){}[]:<>.,?/
 - Contains at least one number 0-9
 - Contains at least one uppercase character
 - Contains at least one lowercase character
6. Retype the new password.
 7. Click **OK**.

The validity of the password is checked and the new password is saved to the database.

6.16. Data access password

SAB600 needs a connection to PCMSERVER instance of SQL Server. The password for this connection is generated automatically by the installation. The password complies with de facto password complexity requirements as stated below. It is recommended to change the automatically generated password.

System engineer user can change the data access password. This password is not used by a user but by SAB600 itself.

To change the data access password:

1. Select **Tools > Options**.
2. Go to the **System Settings** folder.
3. Click **Set Data Access Password**. The **Set Password** window opens.
4. Type in the old password.
5. Type in the new password.

The password must meet the following requirements:

- At least 8 characters long
 - Starts and ends with an alphabetic character of European languages
 - Contains at least one special character ~!@#%&^*_-=+`|()\{\}[]:<>.,?/
 - Contains at least one number 0-9
 - Contains at least one uppercase character
 - Contains at least one lowercase character
6. Retype the new password.
 7. Click **OK**.

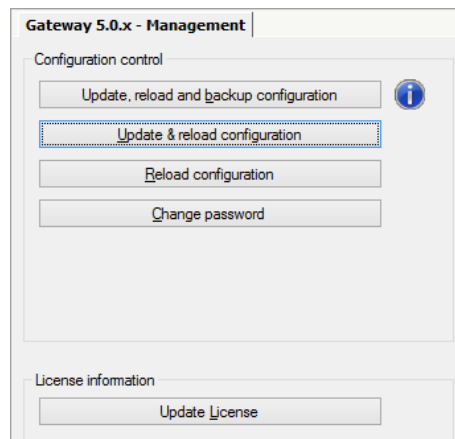
7. Operation

7.1. Activating COM600 with new configurations

After the configurable objects in the object tree have been created, the configuration must be transferred to the COM600 computer. This is done by using the **Management** function.

To activate the COM600 configuration

1. Right-click the Gateway object in SAB600 and select **Management**.
2. The Management dialog opens.



SAB600_Gateway_Management.png

Figure 7.1-1 Gateway management function

- To update COM600 with the SAB600 project configuration and create backup, click **Update, reload and backup configuration**.
- To update COM600 with the SAB600 project configuration, click **Update & reload configuration**.
- To request COM600 software to restart and reload current configuration, click **Reload configuration**.
- To change the password of the COM600 user in COM600 computer, click **Change password**.

7.2. License handling

The COM600 Management tool displays the license information for COM600 under License Information. The license and the protocols it supports have been predefined before the COM600 computer has been handed over by ABB.

The following information is shown in the window:

- owner of the license
- product revision

- protocols supported by the license.
- number of servers supported by the license.
- number of clients supported by the license.
- if WebHMI is enabled.

To update the license with a new set of protocols, order a new license from ABB and update it to COM600 with SAB600.

To update the license:

1. Open the Management tool from the Gateway object in SAB600.
2. Click **Update License**.
3. Browse for the new license file and click **Open**.

The license is COM600 specific and the COM600 computer verifies the compatibility of the license. Also the servers and clients verify the license.

7.3. Using web site security certificates

7.3.1. Using web site security certificates

Use of web site security certificates is necessary in order to ensure the secrecy and integrity of communication between COM600 and the web browsers that connect remotely to it. They will also verify that the user actually connects to COM600 and not another server impersonating it.

Make sure to check that the certificate is valid when connecting with a web browser.

By default COM600 comes with a self-signed certificate. It is recommended to get a real certificate from a recognized certificate authority instead if possible.

If the self-signed certificate is used instead, then it must be installed to every client computer that is used to connect to COM600. See below for details.



COM600 also makes use of the web site certificate when opening the Data Historian and GOOSE Analyzer WebHMIs from the WebHMI. If the certificate is not correctly set up at that point this will fail.

7.3.2. Creating self-signed certificates



By default, COM600 has a certificate tied to the factory default computer name. You need to create a new self-signed certificate only if the name of the COM600 computer is changed.

After the self-signed certificate is re-created it also needs to be re-exported to every COM600 client computer.

To create a new self-signed certificate:

1. In the COM600 computer, select **Start > Control Panel > System > Computer Name**.
2. Change the computer name by clicking **Change** and by typing the new name in the Computer Name Changes dialog.



Do not use the underscore character '_' in the computer name.

3. In the COM600 computer, open an administrative command prompt and go to directory `C:\Program Files\COM610 GW SW\Common\bin`.
4. Create and install a new certificate with the command `COM600SelfSSL.cmd`.
5. Add the COM600 computer to the same domain as the client computer (in the Computer Name Changes dialog), or add the COM600 computer information to the client computer hosts file (`...\system32\drivers\etc\hosts`).



By default the COM600 IP addresses are not included in the created self-signed certificate and so cannot be used to connect securely. This can be changed by providing "ip" as the first command argument and then the IP addresses to be added when running `COM600SelfSSL`.

For example:

```
COM600SelfSSL ip 192.168.2.11 10.0.0.1 10.0.200.1
```

It is generally preferable to connect using the COM600 computer name, and in that case this is not necessary.

7.3.3. Using self-signed certificates with Internet Explorer 7

To use a self-signed certificate with Internet Explorer (IE) 7:

1. Export the certificate from the COM600 computer.

- a. Select **Start > Control Panel > Administrative Tools > Internet Information Services**.
- b. In the tree view, select the computer and then **Web Sites**.
- c. Right-click **Default Web Site** and select **Properties**.
- d. In the Properties dialog, select **Directory Security > View Certificate > Details > Copy to File**.
- e. Click **Next > No, do not export private key > DER encoded binary X.509 (.crt) > Next**.
- f. Type the file name.
2. Copy the exported certificate file to the client computer running IE.
3. In the client computer, start IE.
4. Select **Tools > Internet Options > Content > Certificates**.
5. Select **Trusted Root Certification Authorities > Import**.
6. Select the previously exported certificate file from COM600.
7. Place the certificate to Trusted Root Certification Authorities as suggested.
8. Use the COM600 computer name to access COM600 WebHMI from IE7.

7.3.4. Using self-signed certificates with Internet Explorer 8,9,10 and 11



This method assumes the initial connection to COM600 can be trusted also without a valid certificate. You can also use the more complicated method above if that is not the case.

To use self-signed certificates with IE8 - 11:

1. In the client computer, start Internet Explorer with Run as Administrator.
2. Browse to the COM600 computer with the computer name.
Ignore the certificate warnings.
3. Click **Certificate Error** at the top of the screen and select **View certificates**.
4. In the Certificate dialog, click **Install Certificate > Next**.
5. Select **Place all certificates in the following store > Browse**.
6. Select the **Show Physical Stores** checkbox.
7. Select **Trusted Root Certification Authorities > Local Computer**.
8. Click **OK > Next > Finish > OK**.
9. Restart IE.

7.3.5. Using self-signed certificates with Mozilla Firefox

To use self-signed certificates with Mozilla Firefox:

1. Start the Firefox browser.
2. Browse to the COM600 computer with the computer name.
Firefox warns that the connection is untrusted.

3. Click **Add Exception**.
4. Click **Confirm Security Exception**.

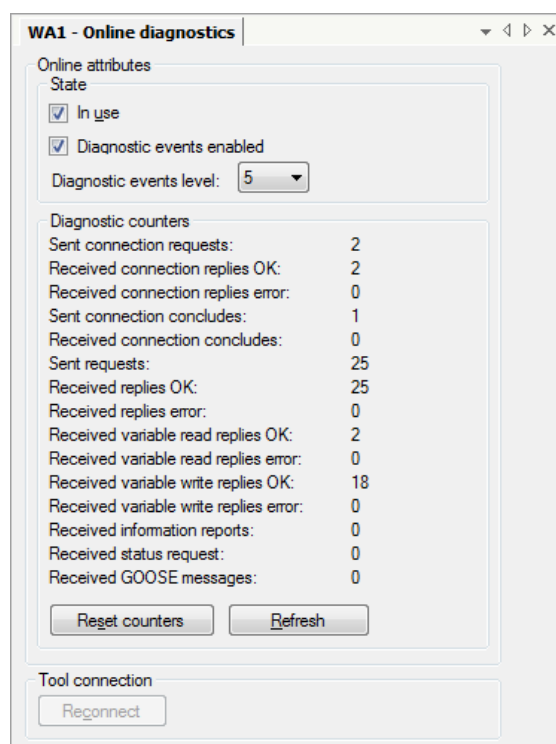
7.3.6. Using self-signed certificates with Google Chrome

Google Chrome will use the same security certificates as Internet Explorer, so installing it for IE will install it for Chrome as well.

7.4. Diagnostics

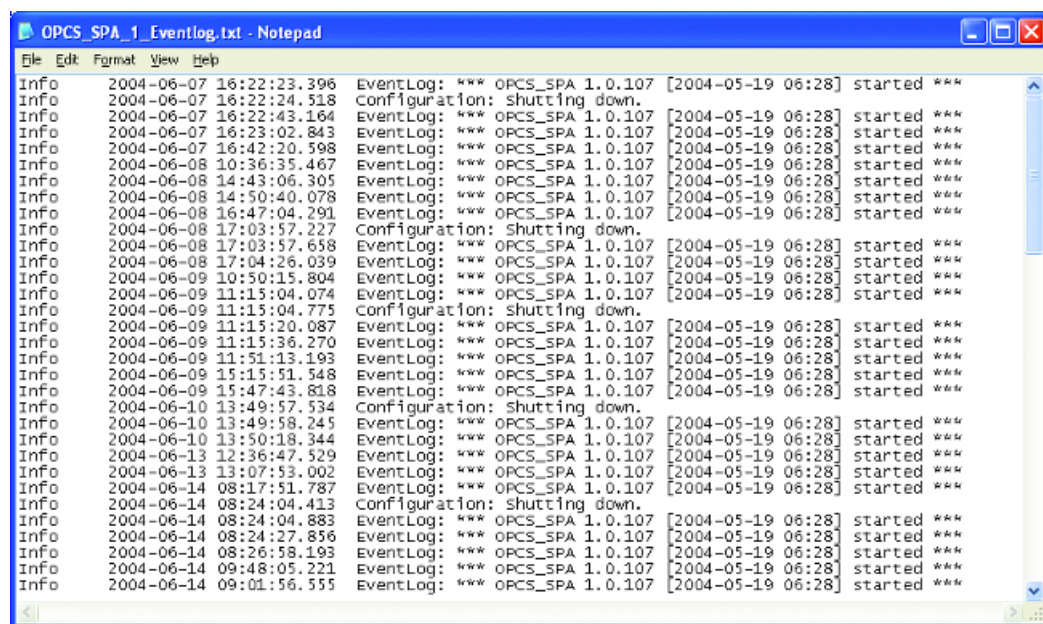
7.4.1. General information about diagnostics

SAB600 provides comprehensive functions for diagnosing the operation of the Gateway. This includes communication diagnostics with monitoring the communication channel, diagnostic counters, and IED-specific communication status and diagnostic counters. It is also possible to monitor and control process data and follow the data flow on the Gateway using diagnostic functions of SAB600. Figure 7.4.1-1 displays a sample view of a diagnostic counter dialog. An example of an event log file is displayed in Figure 7.4.1-2.



SAB600_Subnet_Online_Diagnostics.png

Figure 7.4.1-1 An example of IEC 61850 subnetwork online diagnostics



EventDial.jpg

Figure 7.4.1-2 An example of a SPA event log file

7.4.2.

Channel online diagnostics with Analyzer

The Analyzer function is available in the channel diagnostics for most of the protocols. The Analyzer function shows transmitted and received telegrams in hex format. In addition, it can show control signal changes for serial communication protocols.

The Analyzer function requires a Telnet software to be installed on the SAB600 computer. In Windows 7, Telnet is an optional Windows feature that needs to be activated. In 64-bit Windows 7, the telnet.exe file needs to be copied from the System32 folder to the SysWOW64 folder.

By default, the Analyzer function uses the Telnet port 50000. You can change the port in the Online diagnostics dialog. By default, the port is not opened in the COM600 firewall. To enable the Analyzer function, add a rule for the port to the COM600 firewall configuration.

7.4.3.

Data object diagnostics

You can monitor and control the data objects under the Gateway object tree with Data object diagnostics.

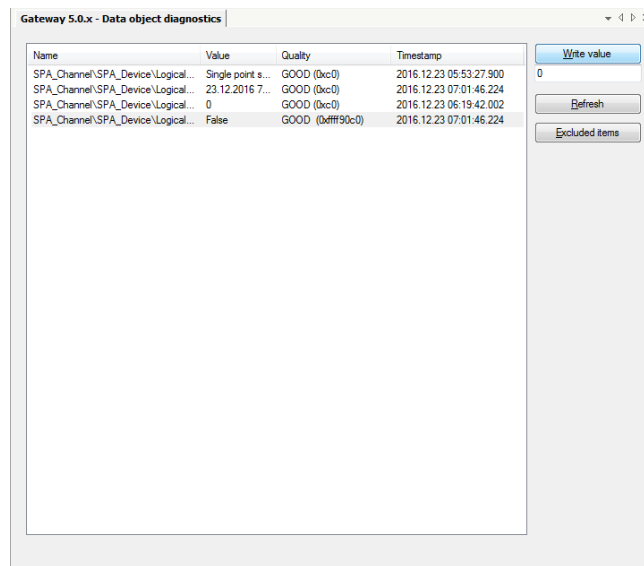
To monitor and control the data objects:

1. Right-click the Gateway object in SAB600.

2. Select **Data object diagnostics** from the shortcut menu, see Figure 7.4.3-1. The Data object diagnostic dialog opens.
3. Drag and drop data objects from the object tree to the Data object diagnostics.

Or

1. Select a specific data object from the object tree.
2. Select **Tools > Online diagnostics**.



SAB600_Data_Object_Diagnostics.png

Figure 7.4.3-1 Data object diagnostics

To change the value of a data object attribute:

1. Select a specific attribute.
2. Write a new value to the text box under the **Write value** button.
3. Click **Write value** to change the value.

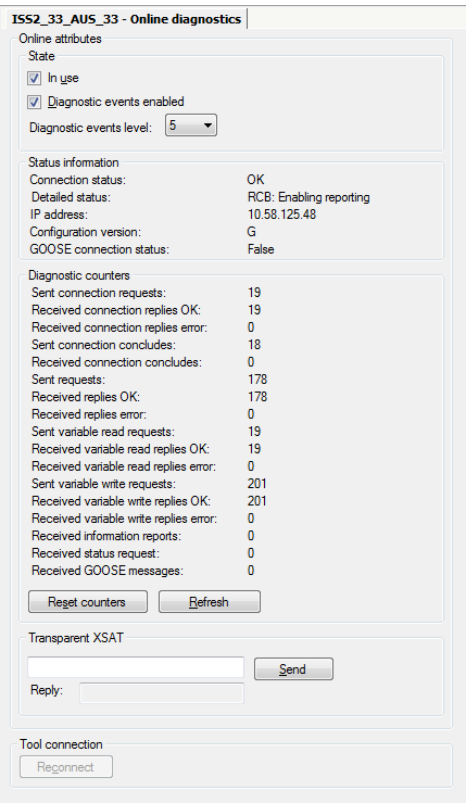
To filter the displayed data object:

1. Click **Excluded items**.
2. Notepad opens. Write to Notepad the data object types you want to exclude from the Data object diagnostics view.
3. Save the file as a .txt file by selecting **File > Save**.

7.4.4. Diagnostic services of OPC servers and clients

You can control and monitor the server and client channel and device communication in the communication structure of the Project Explorer. You can take channels/subnetworks and devices into use or out of use via the respective diagnostics function. You can also monitor the channel/subnetwork and device communication with the help of

various diagnostic counters, and check the device status information, see Figure 7.4.4-1.



SAB600_IEC61850_IED_Online_Diagnostics.png

Figure 7.4.4-1 An example of IEC 61850 IED online diagnostics

For more detailed information and instructions on controlling and monitoring channel and device communication, refer to the respective user's manual for the client or server (see 1.10, Related documents).

7.4.5. Signal diagnostics

OPC clients have a diagnostics function which makes it possible to monitor the flow of process data changes and commands. Activate the function by marking the **Diagnostic Events Enabled** check box, located in the Online diagnostics function of the IEC101/IEC104 Device. When the diagnostics function is activated, the IEC101 OPC Client Alarm & Event server generates events with information about data changes and commands.

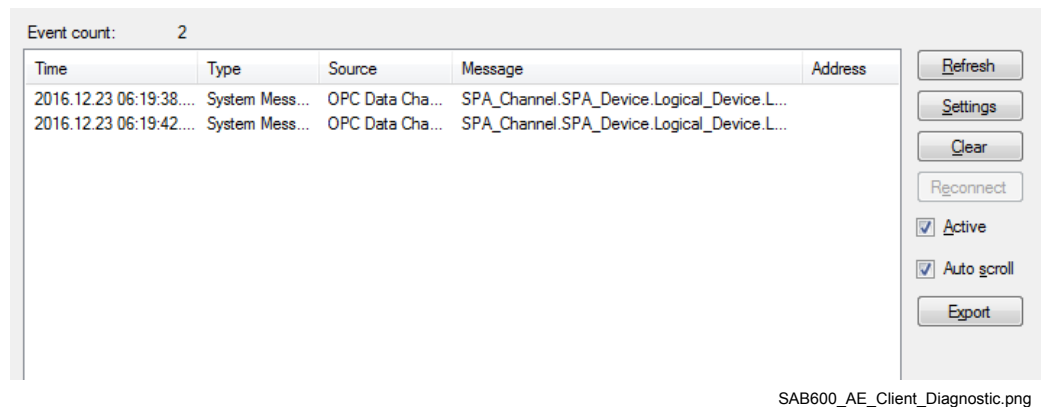
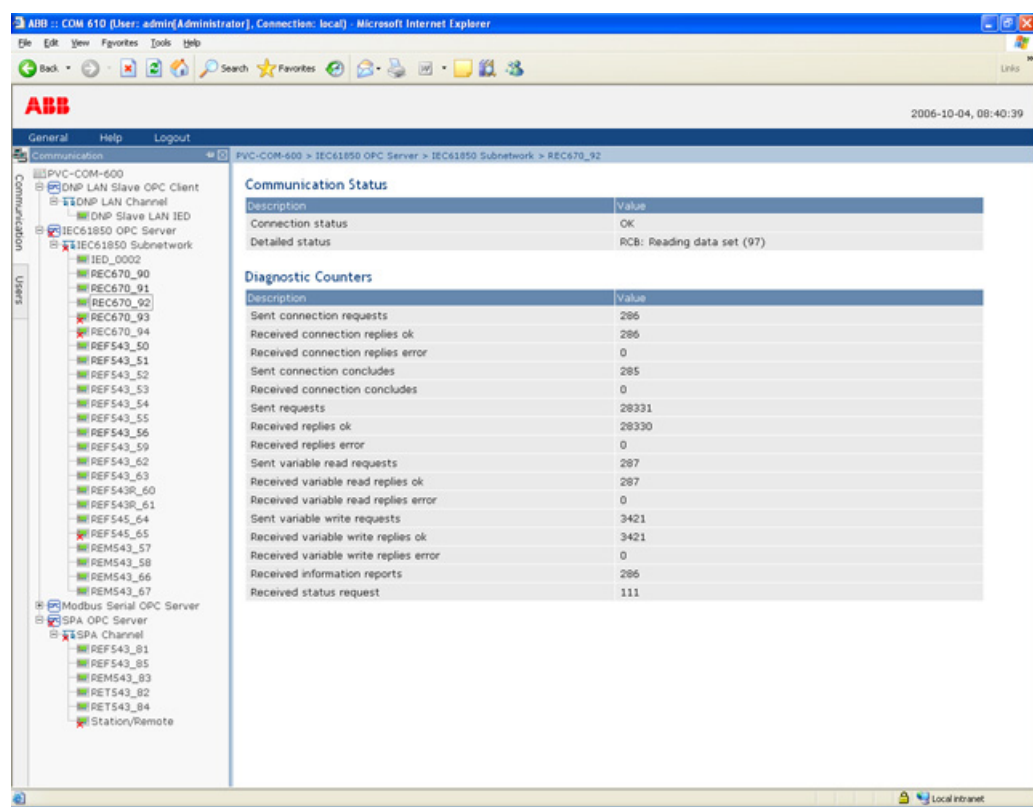


Figure 7.4.5-1 Example of Diagnostic AE client

7.4.6. Diagnostic Web Server

The Diagnostic Web Server of the Gateway provides an overall view of the communication status of the Gateway and the possibility to monitor the diagnostic counters of the communication channels/subnetworks and IED communication. Figure 7.4.6-1 displays the gateway objects in a tree view.

A red cross over the Gateway icon in the object tree indicates that there is a fault in the communication structure. Expand the tree to view the hierarchy deeper and to identify the device with a missing configuration or causing the error. The properties of a certain object in the communication structure can be seen on the right when clicking the object in the tree view.



COM610_HMI.jpg

Figure 7.4.6-1 An example of a web page from the Gateway diagnostic web server

Appendix 1

Goose from COM600 to RIO

This tutorial describes how GOOSE communication is established between COM600 and RIO600.

GOOSE from RIO600 to COM600

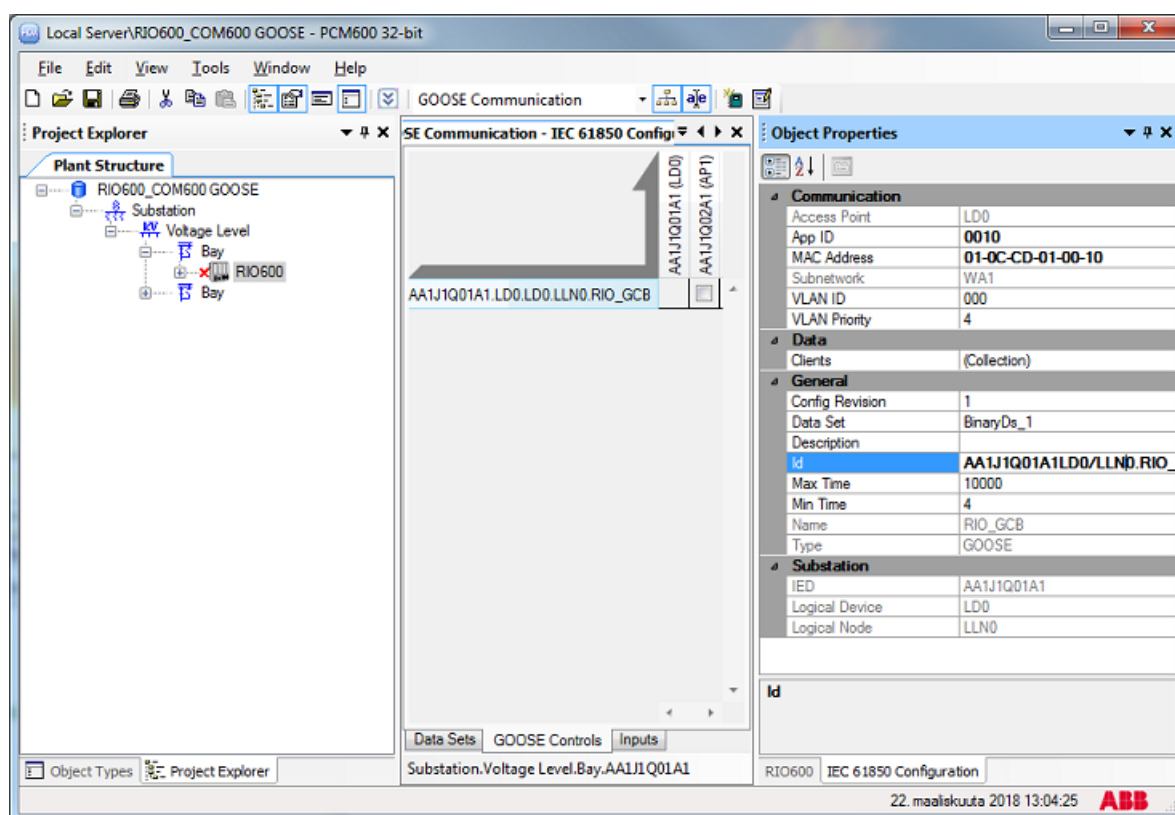
Binary input status information from RIO600 is transferred to COM600.

Create project in PCM600

1. Create a new project.
2. Add the RIO600 IED to the project.
3. Set the RIO600 IP address and technical key.

IEC 61850 Engineering in PCM600

1. Open the IEC 61850 Configuration tool.
2. Create a Goose control block (RIO_GCB) and connect it to the Data Set (BinaryDS_1). Set a unique MAC address, APP ID and Application ID to this GCB.
3. Save and close the IEC 61850 Configuration tool.



Finalize configuration in PCM600

1. Write configuration to RIO600.
2. Export the SCD file from PCM600.

Configure GOOSE receive in SAB600

1. Create a new IEC61850 OPC Server.
2. Import the previously exported SCD file.
3. Select Subnetwork properties, and make sure that Communication Port is set to the network adapter interface which is used to communicate with RIO600 (ETH0 Local by default). Set the IP Address to the value which is used by COM600 on this interface.
4. In **Data Subscribe Method to GOOSE** in RIO600 IED object properties. See image below.
5. Update and reload the configuration from the Gateway management tool to COM600.
6. Use data object Online diagnostics to verify that status information is correctly updated.



Notice that SAB600 must be paired with an actual COM600 device so that the network interface controller information is correctly available in the Subnetwork properties.

The screenshot displays the software interface with two main panels:

- Project Explorer:** Shows a hierarchical tree structure under the 'Communication' tab. The tree includes:
 - RIO600_COM600_GOOSE
 - Gateway 5.1.x
 - Process Event Definitions
 - Communication Diagnostic Event Definiti
 - Common Event Settings
 - Scale Definitions
 - OPCS1
 - WA1
 - AA1J1Q01A1
 - LD LD0
 - LN LLN0
 - LN LPHD1
 - LN DIM8GGIO1
 - ENC Mod
 - ENS Beh
 - ENS Health
 - LPL NamPlt
 - SPS Ind1
 - SPS Ind2
 - SPS Ind3
 - SPS Ind4
 - SPS Ind5
 - SPS Ind6
- Object Properties:** Displays the configuration for the selected object (AA1J1Q01A1). The properties are organized into sections:
 - [030] Communication Control:**
 - Configuration Revision Check: False
 - Data Subscribe Method: **GOOSE**
 - Data Variables In Read Rec: 0
 - Dynamically Create Data Se: False
 - Enable Entry/ID Check: False
 - MMS Keepalive Timeout: 60
 - MMS Request Timeout: 3000
 - Report Control Block Initializ: True
 - Send Single Message MMS: False
 - Use 32 Bit Entry ID: False
 - Use Sequence Number Che: True
 - [040] Polling:**
 - Polling Timeout: 0
 - [060] Control Authorization:**
 - Disable Interlockcheck for A: False
 - Disable Synchrocheck for A: False
 - Interlock Override Support: False
 - Station/Remote Switch OPC: False
 - Synchrocheck Override Sup: False
 - [070] OPC Alarm and Event:**
 - Area Description:
 - Area Name:

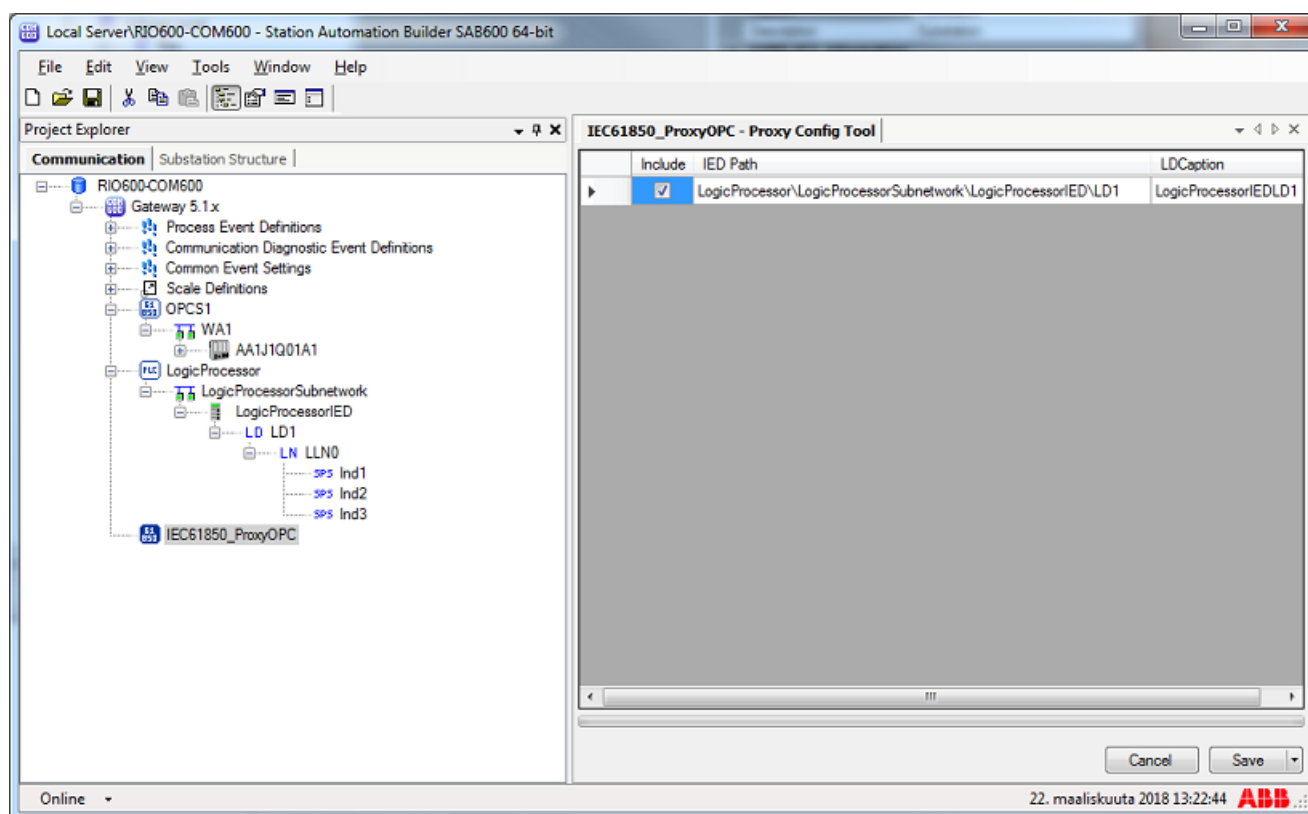
GOOSE from COM600 to RIO600

This tutorial describes how binary status information from the Logic Processor can be sent to RIO600 binary outputs via the IEC61850 Proxy Server of COM600.

Prerequisite is that the Logic Processor IED and needed data points have been configured.

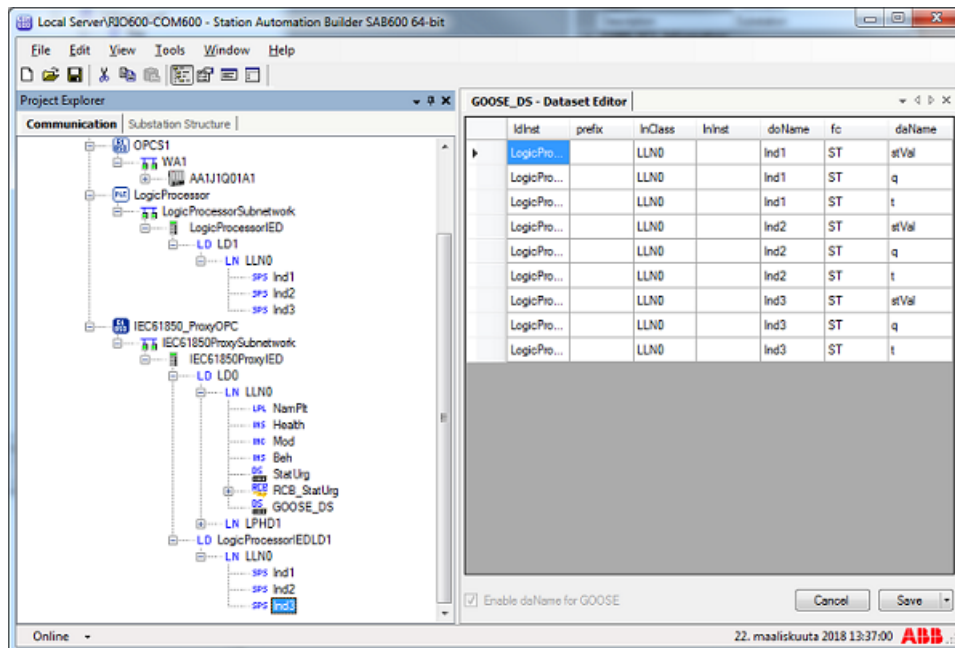
Create IEC6180 Proxy server in SAB600

1. Add the IEC61850 Proxy Server OPC Client to the SAB600 Project.
2. Launch the **Proxy Config Tool** from the IEC61850 Proxy Server context menu, select Logic Processor IED and press **Save**.



3. Create Dataset GOOSE_DS for Proxy IED.
4. Open the Dataset Editor and mark the **Enable daName for GOOSE** check box.

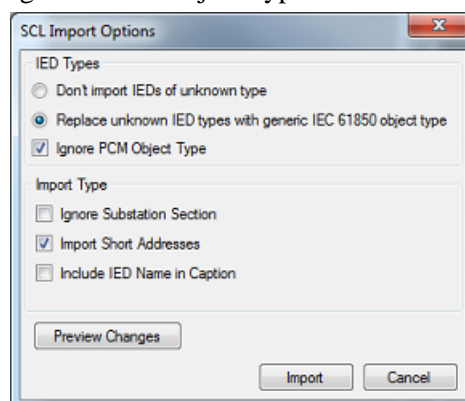
5. Drag and drop data objects from the Logic_Processor_IEDLD1 to the Dataset table. Click **Apply**.



6. Create a Goose Control Block, set a unique MAC address, APP ID and GoID and assign the GCB to a previously created GOOSE Dataset.
7. Update and reload the configuration from the Gateway management tool to COM600.
8. Export the CID file from IEC61850 Proxy Server IED object.

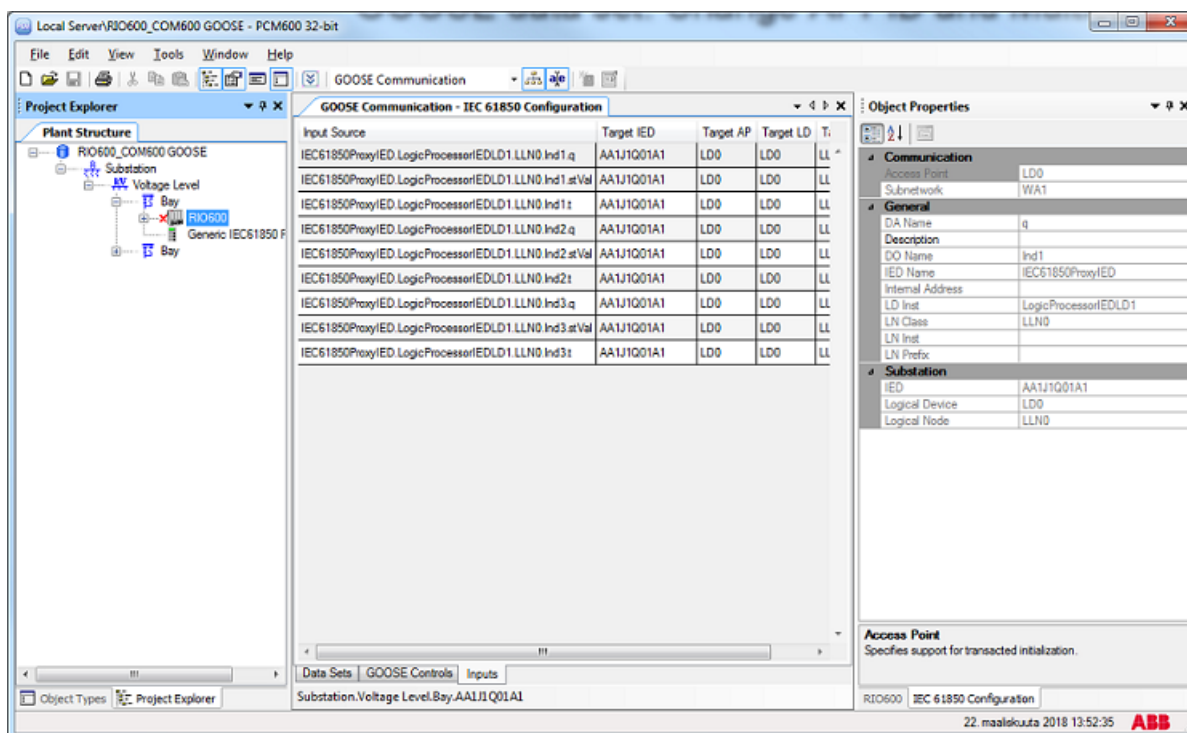
Subscribing GOOSE in PCM600

1. Create a Generic IEC61850IED in PCM600.
2. Import a CID file and select options:
 - Replace unknown IED types with generic IEC 61850 object type
 - Ignore PCM Object Type




User's Manual

- Open the IEC 61850 Configuration tool and subscribe the COM600 GOOSE signals for RIO600



- Open the Signal Matrix Tool and assign GOOSE signals to the GOOSE receive functions to be used in the Application Configuration.

RIO600 - Signal Matrix						
	<div>Logical Device : </div>	IED, Logical Device :	IEC61850ProxyIED, LogicProcessorIEDLD1			
		Data Object: Data Attribute:	LLN0			
				Ind1 stVal	Ind2 stVal	Ind3 stVal
- GOOSERCV_BIN:0						
GOOSERCV_BIN:0	IN		X			
- GOOSERCV_BIN:1						
GOOSERCV_BIN:1	IN			X		
- GOOSERCV_BIN:2						
GOOSERCV_BIN:2	IN					X
- GOOSERCV_BIN:3						
GOOSERCV_BIN:3	IN					
- GOOSERCV_BIN:4						
GOOSERCV_BIN:4	IN					
- GOOSERCV_BIN:5						
GOOSERCV_BIN:5	IN					

- Write configuration to RIO600.

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