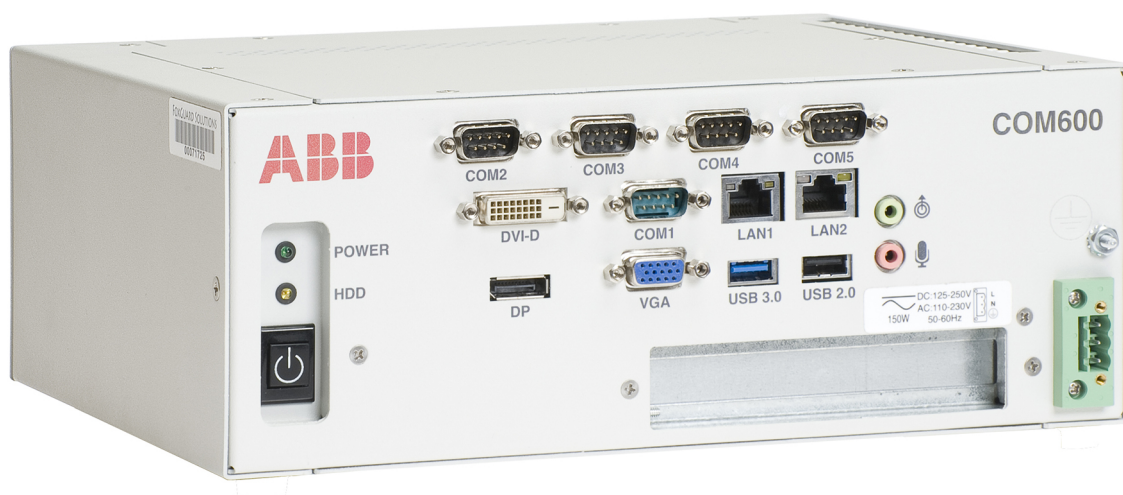

COM600 series 5.1

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



Contents:

1. About this manual	13
1.1. Copyright	13
1.2. Disclaimer	13
1.3. Conformity	14
1.4. Trademarks	14
1.5. General information	14
1.6. Document conventions	15
1.7. Use of symbols	16
1.8. Terminology	16
1.9. Abbreviations	17
1.10. Related documents	18
1.11. Document revisions	19
2. Introduction	20
2.1. General information about the COM600 series	20
2.2. COM600 product series variants and rationale	20
2.3. Functional overview	21
2.4. Master protocol OPC server features	23
2.4.1. IEC 61850 OPC Server features	23
2.4.2. IEC 60870-5-104 OPC Server features	24
2.4.3. DNP 3.0 OPC Server features	25
2.4.4. Modbus OPC Server features	25
2.4.5. External OPC Server features	26
2.4.6. SNMP features	26
2.4.7. SNTP features	27
3. IEC 61850 Master OPC server configuration	28
3.1. Overview of configuration	28
3.2. Building object tree	29
3.2.1. General information about building object tree	29
3.2.2. Adding Gateway or Computer Node object	31
3.2.3. Adding IEC 61850 OPC Server object	31
3.2.4. Adding IEC 61850 Subnetwork objects	33
3.2.5. Adding IEC 61850 IED objects	33
3.3. Configuring objects	34
3.3.1. Configuring object properties	34
3.3.2. Configuring IEC 61850 OPC Server properties	35
3.3.3. Configuring IEC 61850 Subnetwork properties	37
3.3.4. Configuring IEC 61850 device properties	38
3.3.5. Configuring Logical Device properties	43
3.3.6. Measurement limit supervision	45
3.3.6.1. Configuring OPC-based measurement limit supervision and units	45
3.3.6.2. Configuring MV properties	45

3.3.6.3.	Configuring CMV properties	46
3.3.6.4.	Configuring SAV properties	46
3.3.6.5.	Configuring SEQ properties	46
3.3.6.6.	Configuring DEL properties	47
3.3.6.7.	Configuring WYE properties	48
3.3.7.	Viewing data object configuration	49
3.3.8.	Configuring report control blocks	50
3.4.	IEC 61850 data publishing	52
3.4.1.	About data sets	52
3.4.2.	Configuring data sets	52
3.4.2.1.	Dataset Editor	52
3.4.2.2.	About data reporting	52
3.4.2.3.	Report control block	53
3.4.2.4.	Configuring reporting	56
3.5.	Configuring GOOSE Analyzer	57
3.5.1.	Configuring the GOOSE Analyzer using the Configuration Wizard	57
3.5.2.	Configuring GOOSE Analyzer properties	61
3.5.3.	Editing GOOSE connection	62
3.6.	Configuring condition monitoring and protection related applications	63
3.6.1.	3.6.1 Prerequisites	63
3.6.2.	Configuring condition monitoring and protection related applications in PCM600	63
3.6.3.	Configuring condition monitoring and protection related applications in SAB600	71
3.6.4.	Consistency check of condition monitoring and protection related applications	77
3.6.5.	Viewing condition monitoring and protection related applications reports in COM600	78
4.	IEC 104 OPC server configuration	80
4.1.	About this section	80
4.2.	Overview of configuration	80
4.3.	Building object tree	82
4.3.1.	General information about building object tree	82
4.3.2.	Adding Gateway object	82
4.3.3.	Adding IEC104 OPC Server object	83
4.3.4.	Adding IEC104 Channel objects	83
4.3.5.	Adding IEC104 Device objects	83
4.3.6.	Adding Logical Device objects	83
4.3.7.	Adding Logical Node objects	84
4.3.8.	Adding data objects	84
4.4.	Configuring objects	84
4.4.1.	General information about configuring objects	84
4.4.2.	IEC104 OPC Server properties	85
4.4.3.	Configuring IEC104 Channel Properties	86

4.4.4.	Configuring IEC104 Device properties	87
4.4.5.	Configuring data objects	91
4.4.5.1.	Directional protection activation information (ACD)	91
4.4.5.2.	Protection activation information (ACT)	92
4.4.5.3.	Analogue set point (APC)	93
4.4.5.4.	Binary counter reading (BCR)	94
4.4.5.5.	Binary controlled step position information (BSC)	94
4.4.5.6.	Complex measured value (CMV)	95
4.4.5.7.	Delta (DEL)	95
4.4.5.8.	Controllable double point (DPC)	96
4.4.5.9.	Device Name Plate (DPL)	97
4.4.5.10.	Double point status (DPS)	98
4.4.5.11.	Controllable integer status (INC)	98
4.4.5.12.	Integer status (INS)	99
4.4.5.13.	Integer controlled step position information (ISC)	100
4.4.5.14.	Logical Node Name Plate (LPL)	100
4.4.5.15.	Measured value (MV)	101
4.4.5.16.	Controllable single point (SPC)	101
4.4.5.17.	Single point status (SPS)	102
4.4.5.18.	WYE	103
5.	DNP3 LAN/WAN OPC server configuration	105
5.1.	About this section	105
5.2.	Overview of configuration	105
5.3.	Building object tree	106
5.3.1.	General information about building object tree	106
5.3.2.	Adding Gateway object	143
5.3.3.	Adding DNP OPC Server object	107
5.3.4.	Adding DNP Channel objects	107
5.3.5.	Adding DNP IED objects	107
5.3.6.	Adding Logical Device objects	108
5.3.7.	Adding Logical Node objects	144
5.3.8.	Adding data objects	145
5.4.	Configuring objects	109
5.4.1.	General information about configuring objects	109
5.4.2.	Configuring DNP OPC Server LAN Channel properties	110
5.4.3.	Configuring DNP LAN Device	111
5.4.4.	Configuring Logical Device properties	114
5.4.5.	Configuring Logical Node properties	212
5.4.6.	Configuring data objects for internal OPC data	115
5.4.6.1.	General information about configuring data objects for Internal OPC Data	115
5.4.6.2.	Integer status (INS)	116

5.4.6.3.	Controllable single point (SPC) for OPC internal data	154
5.4.6.4.	Single point status (SPS)	214
5.4.7.	Configuring data objects	117
5.4.7.1.	General information about configuring data objects	117
5.4.7.2.	Directional protection activation information (ACD)	118
5.4.7.3.	Protection activation information (ACT)	119
5.4.7.4.	Analog set point (APC)	121
5.4.7.5.	Binary counter reading (BCR)	121
5.4.7.6.	Binary controlled step position information (BSC)	122
5.4.7.7.	Complex measured value (CMV)	123
5.4.7.8.	Delta (DEL)	124
5.4.7.9.	Controllable double point (DPC)	125
5.4.7.10.	Device Name Plate (DPL)	126
5.4.7.11.	Double point status (DPS)	127
5.4.7.12.	Controllable integer status (INC)	128
5.4.7.13.	Integer status (INS)	129
5.4.7.14.	Integer controlled step position information (ISC)	129
5.4.7.15.	Logical Node Name Plate (LPL)	130
5.4.7.16.	Measured value (MV)	131
5.4.7.17.	Controllable single point (SPC)	132
5.4.7.18.	Single point status (SPS)	133
5.4.7.19.	WYE	134
5.4.8.	Event definitions	137
5.4.9.	Using scales	137
5.4.10.	Controllable Enumerated Status (ENC)	138
5.4.11.	Enumerated Status (ENS)	138
6.	MODBUS TCP server configuration	140
6.1.	About this section	140
6.2.	Overview of configuration	140
6.3.	Building object tree	142
6.3.1.	General information about building object tree	142
6.3.2.	Adding Gateway object	143
6.3.3.	Adding Modbus OPC Server object	143
6.3.4.	Adding Modbus Subnetwork objects	143
6.3.5.	Adding Modbus IED objects	144
6.3.6.	Adding Logical Device objects	144
6.3.7.	Adding Logical Node objects	144
6.3.8.	Adding data objects	145
6.4.	Configuring objects	145
6.4.1.	General information about configuring objects	145
6.4.2.	Configuring Modbus TCP OPC Server properties	146

6.4.3.	Configuring Modbus OPC Server Subnetwork properties	147
6.4.4.	Configuring Modbus TCP Device	148
6.4.5.	Configuring Logical Device properties	151
6.4.6.	Configuring Logical Node properties	212
6.4.7.	Configuring data objects for internal OPC data	153
6.4.7.1.	General information about configuring data objects for Internal OPC Data	153
6.4.7.2.	Integer status (INS)	153
6.4.7.3.	Controllable single point (SPC) for OPC internal data	154
6.4.7.4.	Single point status (SPS)	214
6.4.8.	Configuring data objects	155
6.4.8.1.	Directional protection activation information	155
6.4.8.2.	Protection activation information (ACT)	156
6.4.8.3.	Analog set point (APC)	157
6.4.8.4.	Binary counter reading (BCR)	159
6.4.8.5.	Binary controlled step position information (BSC)	159
6.4.8.6.	Complex measured value (CMV)	161
6.4.8.7.	Delta (DEL)	163
6.4.8.8.	Controllable double point (DPC)	166
6.4.8.9.	Device name plate (DPL)	177
6.4.8.10.	Double point status (DPS)	179
6.4.8.11.	Controllable integer status (INC)	181
6.4.8.12.	Integer status (INS)	183
6.4.8.13.	Integer controlled step position information (ISC)	184
6.4.8.14.	Logical node name plate (LPL)	186
6.4.8.15.	Measured value (MV)	187
6.4.8.16.	Controllable single point (SPC)	188
6.4.8.17.	Single point status (SPS)	191
6.4.8.18.	WYE	192
6.4.8.19.	Controllable Enumerated Status (ENC)	197
6.4.8.20.	Enumerated Status (ENS)	199
6.4.9.	Topic Generator	200
7.	External OPC server configuration	202
7.1.	About this section	202
7.2.	Overview of configuration	202
7.3.	Building object tree	204
7.3.1.	General information about building object tree	204
7.3.2.	Adding Gateway object	295
7.3.3.	Adding External OPC Server object	205
7.3.4.	Adding External OPC subnetwork objects	205
7.3.5.	Adding external OPC IED objects	205

7.3.6.	Adding Logical Device objects	206
7.3.7.	Adding Logical Node objects	206
7.3.8.	Adding data objects	206
7.4.	OPC Browser tool	206
7.5.	Configuring objects	210
7.5.1.	General information about configuring objects	210
7.5.2.	Configuring External OPC Server properties	211
7.5.3.	Configuring External OPC Server Subnetwork properties	211
7.5.4.	Configuring External OPC IED Device	211
7.5.5.	Configuring Logical Device properties	277
7.5.6.	Configuring Logical Node properties	212
7.5.7.	Configuring data objects for Internal OPC Data	213
7.5.7.1.	General information about configuring data objects for Internal OPC Data	213
7.5.7.2.	Integer status (INS)	214
7.5.7.3.	Single point status (SPS)	214
7.5.7.4.	Controllable single point (SPC) for OPC internal data	301
7.5.8.	Configuring data objects for External OPC Client	216
7.5.8.1.	General information about configuring data objects for External OPC Device	216
7.5.8.2.	Directional protection activation information	216
7.5.8.3.	Protection activation information (ACT) ...	220
7.5.8.4.	Analogue set point (APC)	224
7.5.8.5.	Binary counter reading (BCR)	224
7.5.8.6.	Binary controlled step position information (BSC)	225
7.5.8.7.	Complex measured value (CMV)	226
7.5.8.8.	Delta (DEL)	231
7.5.8.9.	Controllable double point (DPC)	235
7.5.8.10.	Device name plate (DPL)	237
7.5.8.11.	Double point status (DPS)	238
7.5.8.12.	Controllable integer status (INC)	239
7.5.8.13.	Integer status (INS)	240
7.5.8.14.	Integer controlled step position information (ISC)	240
7.5.8.15.	Logical node name plate (LPL)	241
7.5.8.16.	Measured value (MV)	242
7.5.8.17.	Controllable single point (SPC)	246
7.5.8.18.	Single point status (SPS)	247
7.5.8.19.	WYE	249
7.6.	Configuring DCOM	257
7.6.1.	Introduction	257
7.6.2.	Configuring DCOM	258
7.6.3.	Configuring COM600 and OPC server computers	258
7.6.3.1.	Configuring DCOM default properties	258

7.6.3.2.	Creating a common user account	259
7.6.3.3.	Local security policy settings	260
7.6.3.4.	Disabling firewalls and security software	260
7.6.3.5.	Restarting OPC programs	260
7.6.4.	Configuring DCOM on COM600 computer	261
7.6.5.	Configuring DCOM on OPC server computer	262
8.	SNMP OPC server configuration	269
8.1.	About this section	269
8.2.	Overview of configuration	269
8.3.	Building object tree	271
8.3.1.	General information about building object tree	271
8.3.2.	Adding Gateway object	295
8.3.3.	Adding SNMP OPC Server object	272
8.3.4.	Adding SNMP subnetwork objects	272
8.3.5.	Adding SNMP IED objects	272
8.3.6.	Adding Logical Device objects	273
8.3.7.	Adding Logical Node objects	273
8.3.8.	Adding data objects	273
8.4.	Configuring objects	273
8.4.1.	General information about configuring objects	273
8.4.2.	Configuring SNMP Server properties	274
8.4.3.	Configuring SNMP Subnetwork properties	274
8.4.4.	Configuring SNMP IED properties	275
8.4.5.	Configuring Logical Device properties	277
8.4.6.	Configuring Logical Node properties	277
8.4.7.	Configuring data objects for Internal OPC Data	278
8.4.7.1.	General information about configuring data objects for Internal OPC Data	278
8.4.7.2.	Integer status (INS) for OPC internal data	300
8.4.7.3.	Controllable single point (SPC) for OPC internal data	301
8.4.7.4.	Single point status (SPS) for OPC internal data	289
8.4.8.	Configuring data objects for SNMP Device	280
8.4.8.1.	General information about configuring data objects for SNMP Device	280
8.4.8.2.	Device name plate (DPL)	281
8.4.8.3.	Controllable integer status (INC)	282
8.4.8.4.	Integer status (INS)	282
8.4.8.5.	Logical Node name plate (LPL)	283
8.4.8.6.	Measured value (MV)	284
8.4.8.7.	Controllable Single point (SPC)	288
8.4.8.8.	Single point status (SPS) for OPC internal data	289

8.4.8.9.	Binary counter reading (BCR)	290
9.	SNTP OPC server configuration	291
9.1.	About this section	291
9.2.	Overview of configuration	291
9.3.	Configuring SNTP OPC Server properties	298
9.4.	Building object tree	294
9.4.1.	General information about building object tree	294
9.4.2.	Adding Gateway object	295
9.4.3.	Adding SNTP OPC Server object	295
9.4.4.	Adding SNTP Virtual Subnetwork objects (optional)	295
9.4.5.	Adding virtual IED objects (optional)	296
9.4.6.	Adding Logical Device objects (optional)	296
9.4.7.	Adding Logical Node objects (optional)	296
9.4.8.	Adding data objects (optional)	297
9.5.	Configuring objects	297
9.5.1.	Configuring object properties	297
9.5.2.	Configuring SNTP OPC Server properties	298
9.5.3.	Configuring data objects for Internal OPC Data	300
9.5.3.1.	General information about configuring data objects for Internal OPC Data	300
9.5.3.2.	Integer status (INS) for OPC internal data	300
9.5.3.3.	Controllable single point (SPC) for OPC internal data	301
9.5.3.4.	Single point status (SPS) for OPC internal data	301
10.	Redundant OPC server configuration	303
10.1.	Introduction	303
10.2.	Configuration	303
10.2.1.	General information about the configuration	303
10.2.2.	Configuration from SAB600 object tree	304
10.2.3.	Configuration using COM600 Configuration Wizard	307
10.3.	Active source	311
10.3.1.	General information about the active source	311
10.3.2.	External inputs	312
10.3.2.1.	General information about external inputs	312
10.3.2.2.	Internal data object	312
10.3.2.3.	Input signal	312
10.4.	Consistency checking	312
10.4.1.	Enable consistency checking	312
10.4.2.	Supported data object CDC types	313
10.4.3.	Consistency checking effects	313
11.	IEC 61850 OPC server operation	315

11.1.	Activating COM600 with new configuration	315
11.2.	IEC 61850 OPC Server diagnostics	315
11.3.	Diagnostic AE Client	315
11.4.	Monitoring and controlling IEC 61850 subnetwork activity	315
11.5.	Monitoring and controlling IEC 61850 device communication	316
11.6.	Monitoring and controlling IEC 61850 data object communication	316
12.	IEC 104 OPC server operation	317
12.1.	About this section	317
12.2.	Activating COM600 with new configurations	317
12.3.	IEC104 OPC Server diagnostics	317
12.4.	Monitoring and controlling IEC104 Channel Activity	319
12.5.	Monitoring and controlling IEC 104 Device communication	319
12.6.	Data object diagnostics	320
13.	DNP3 LAN/WAN OPC server operation	321
13.1.	About this section	321
13.2.	Activating COM600 with new configurations	321
13.3.	Server diagnostics	321
13.4.	DNP channel diagnostics	322
13.5.	Monitoring and controlling DNP communication	322
13.6.	Data object diagnostics	331
14.	External OPC server operation	323
14.1.	About this section	323
14.2.	Activating COM600 with new configurations	331
14.3.	External OPC Server diagnostics	323
14.4.	Data object diagnostics	331
15.	MODBUS TCP server operation	325
15.1.	About this section	325
15.2.	Activating COM600 with new configurations	331
15.3.	Modbus OPC Server diagnostics	325
15.4.	Modbus Channel diagnostics	325
15.5.	Monitoring and controlling Modbus Device communication	326
15.6.	Data object diagnostics	331
16.	SNMP OPC server operation	328
16.1.	About this section	328
16.2.	Activating COM600 with new configurations	331
16.3.	SNMP OPC Server diagnostics	328
16.4.	Monitoring and controlling SNMP IED communication	329
16.5.	Data object diagnostics	331
17.	SNTP OPC server operation	331

17.1. About this section	331
17.2. Activating COM600 with new configurations	331
17.3. SNTP OPC Server diagnostics	331
17.4. Data object diagnostics	331
18. Redundant OPC server operation	332
18.1. Switch-over	332
18.2. Parameter setting	332
18.3. Communication diagnostics	334
18.3.1. WebHMI communication diagnostics	334
18.3.2. SAB600 communication diagnostics	335
18.3.2.1. About the SAB600 communication diagnostics	335
18.3.2.2. Diagnostic AE Client	336
18.3.2.3. Monitoring and controlling Redundant IED communication	337
Index	339

1. About this manual

1.1. Copyright

This document and parts thereof must not be reproduced or copied without written permission from ABB, and the contents thereof must not be imparted to a third party, nor used for any unauthorized purpose.

The software or hardware described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

Warranty

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

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

1.2. Disclaimer

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 all the Ethernet-based Master protocols supported by the COM600 and their central concepts. You will find instructions on how to configure the related objects belonging to the different Ethernet-based master protocol servers. The basic operation procedures are also discussed.

Information in this user's manual is intended for application engineers.

As a prerequisite, you should understand the basic principles of the different Ethernet-based master protocols and the IEC 61850 standard.

This user's manual is divided into following sections:

Introduction

This section gives an overview of the Ethernet based master protocol servers and their features.

Configuration

In this section you will find an overview of configuration. You are given instructions on how to configure Master Protocol OPC Server related objects and the model of a substation or system.

Operation

This section covers the basic operation procedures you can carry out when transferring or activating COM600 with new configurations.

You are also given instructions on how to monitor and control the conditions of substation communication network.

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.

Term	Description
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.
SPA	ABB proprietary communication protocol used in substation automation.
SPA device	Protection and/or Control Product supporting the SPA protocol version 2.5 or earlier.
Substation Configuration Language; SCL	XML-based description language for configurations of electrical substation IEDs. Defined in IEC 61850 standard.

1.9. Abbreviations

The following is a list of abbreviations associated with COM600 that you should be familiar with. See also 1.8, Terminology.

Abbreviation	Description
AE	Alarms and Events
ASDU	Application Service Data Unit
BRCB	Buffered Report Control Block
DA	Data Access

Abbreviation	Description
DMCD	Data Message Code Definition
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
NUC	Norwegian User Convention
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
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
RCB	Report Control Block
URCB	Unbuffered Report Control Block
XML	eXtended Markup Language

1.10.

Related documents

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

1.11. Document revisions

Documentversion/date	Product revision	History
A/24.5.2017	5.0	Document created
B/9.4.2018	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.

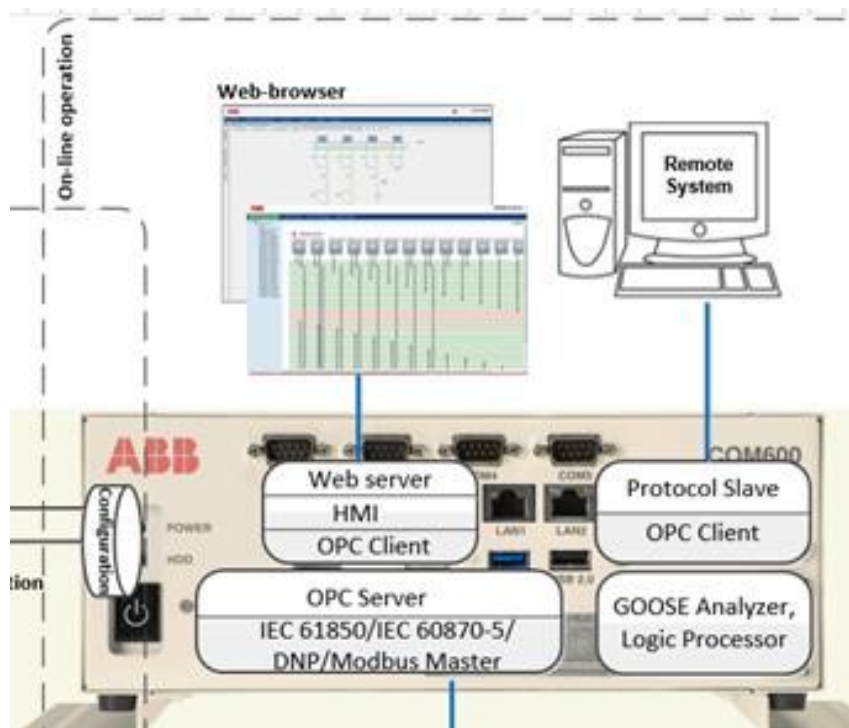
2.3. Functional overview

COM600 supports multiple master communication protocols by which it exchanges data with field devices such as protection and control IEDs, meters or other devices such as station controllers, Ethernet switches and WebHMIs. The data communication can be accomplished using Ethernet or serial interfaces such as RS 232 or RS 485. The following master protocols are supported by the COM600:

1. Ethernet-based protocols
 - IEC 61850-8-1
 - IEC 60870-5-104
 - DNP 3.0 LAN/WAN
 - Modbus
 - OPC
 - SNMP
2. Serial interface-based protocols
 - IEC 60870-5-101
 - IEC 60870-5-103
 - DNP 3.0 Serial
 - Modbus
 - SPA

COM600 converts all field data, acquired using the communication protocols listed above, into OPC items. An OPC server is dedicated to every supported protocol. This OPC server enables other OPC clients (internal) to access process data from slave devices.

This manual specifically covers the above listed Ethernet based master protocols.



SysConf.bmp

Figure 2.3-1 System overview

1. Network Control Center (NCC), Distributed Control System (DCS)
2. Station Automation Builder 600 (SAB600)
3. COM600 with Ethernet-based OPC Server (IEC 61850/IEC 60870-5-104/DNP3.0-LAN/MODBUS-TCP/OPC/SNMP/SNTP)
4. Ethernet switch (SNMP compliant)
5. Field devices like protection and control devices, PLCs, IO units etc.

The protocol handling, that is, configuration and operation aspects comprise of generic and specific aspects. These generic and specific parts will be described separately in this manual.

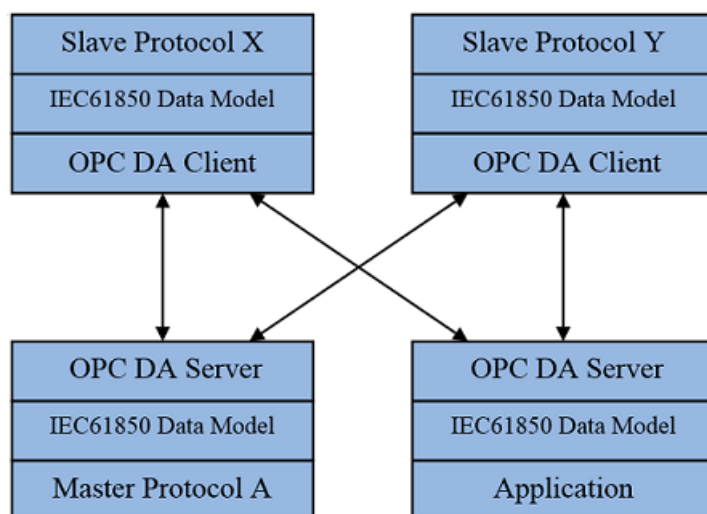
Handling in brief:

All master (client) protocols have two common aspects

- An OPC server layer
- Data modeling based on IEC 61850

While the OPC server layer provides access to data from the slave devices, the IEC 61850 data model creates a common and protocol-independent data interface between the OPC server and the Master protocol (client) layer. All the 3 layers together are referred

as a 'Master protocol OPC server'. Each master protocol OPC server is a separate identity.



handling_in_brief.png

Figure 2.3-2

The master protocol and OPC server layers are runtime software components. The IEC 61850 data model is built based on the imported SCL file using Station Automation Builder 600 (SAB600). To simplify the protocol conversion and the signal mapping, each master protocol OPC server uses the same common data modeling (common data classes and services) specified in the IEC 61850 standard. The COM600 configuration data is also in SCL (XML-based) format.

After the master protocol OPC server is launched, it reads the configuration data and establishes communication with the slave devices through the master (client) protocol stack. Configured slave devices and their data are then exposed to OPC clients (Web Server, slave protocols etc.) through the master protocol OPC server. The slave devices' reported data changes together with Data Access subscription are reported to the subscribing OPC clients.

The Master protocol OPC server component handles the data transfer and conversion between the underlying master protocol communication stack and OPC interfaces.

2.4. Master protocol OPC server features

2.4.1. IEC 61850 OPC Server features

The IEC 61850 standard is a set of specifications, which detail a layered approach to substation communication architecture. It specifies the usage of Manufacturing Message

Specification (MMS, ISO 9506) between the IEC 61850 server (slave devices) and IEC 61850 client (IEC 61850 OPC Server, master). The COM600 IEC 61850 OPC server can subscribe to both MMS and GOOSE based data. However, it can only send MMS based command information to the slave devices.

The IEC 61850 OPC Server supports the following features:

- OPC Data Access v. 1.0/2.0
- OPC Alarms and Events specifications v. 1.10
- Communication diagnostics
- IEC 61850 data modeling
- System supervision:
 - IEC 61850 device communication
- Command handling:
 - The IEC 61850 OPC Server supports the IEC 61850 command services.
- SPS, DPS, INS, ACT, ACD, SEC, BCR, MV, CMV, SAV, WYE, DEL, SEQ, SPC, DPC, BSC, ISC, APC, SPG, ING, ASG, CURVE, DPL, LPL.
- IEC 61850 buffered and unbuffered reporting services
- IEC 61850 File Transfer
- IEC 61850 GOOSE receive (received GOOSE data updated to OPC)
- Automatic Disturbance Recording upload using IEC 61850 file transfer or FTP
- SPA TCP
- SPA Parameter access (configured with Parameter Filtering Tool)
- Time synchronization:
 - The IEC 61850 OPC Server can act as an SNTP client and server for time synchronization. When the IEC 61850 OPC Server is configured for receiving time synchronization, it updates the operating system time of the PC.
- Multiple instance support
- GOOSE Analyzer support

2.4.2.

IEC 60870-5-104 OPC Server features

The IEC 60870-5-104 (IEC 104) protocol is a standard for power system monitoring, control and associated communications for telecontrol, protection and associated telecommunications for electric power systems. The IEC 104 master protocol implementation in the COM600 uses a TCP/IP interface for substation LAN (Local Area Network) connectivity and thereby to field slave devices supporting IEC 104. The application layer of IEC 104 is preserved same as that of IEC 101.

The IEC 104 OPC Server supports the following features:

- OPC Data Access v. 1.0/2.0
- OPC Alarms and Events specification v. 1.10
- IEC 61850 data modeling
- System supervision:
 - IEC 104 channel supervision
 - IEC 104 device communication
- Supported IEC 60870-5-104 data types and functions.

2.4.3. DNP 3.0 OPC Server features

DNP3 (Distributed Network Protocol) is a de-facto communication protocol for communication between SCADA master stations (control centres), RTUs, protection and control devices and meters. It is used mainly in electric and water utilities. The COM600 incorporates the DNP 3.0 master LAN/WAN for Ethernet based communication with station devices.

The DNP LAN/WAN OPC Server supports the following features:

- OPC Data Access v. 1.0/2.0
- OPC Alarms and Events specifications v. 1.10
- IEC 61850 data modeling
- System supervision:
 - DNP channel communication
 - DNP device communication
- Level of DNP implementation

2.4.4. Modbus OPC Server features

Modbus is a de-facto standard communication protocol used in electrical and industrial process data exchange between substation devices such as IEDs, meters or PLCs with COM600.

The Modbus OPC Server is intended for connecting simple Modbus devices like energy meters and input/output modules. As the protocol is based on scanning the state of the inputs of the device, it depends on the scan rate how short signal transients are registered. No events or time stamps are supported.

The Modbus messaging service provides a client/server communication between devices connected on an Ethernet TCP/IP network. This model is based on four types of messages: request, confirmation, indication, and response.

A system using Modbus TCP/IP can include different types of devices. There can be ModbusTCP/IP client and server devices connected to an TCP/IP network. There can also be devices such as bridges, routers and gateways for connections between the TCP/IP network and a serial line sub-network, permitting connections to Modbus serial line client and server end devices.

The Modbus OPC Server supports the following features:

- OPC Data Access v. 1.0/2.0
- OPC Alarms and Events specifications v. 1.10
- IEC 61850 data modeling
- System supervision:
 - Modbus channel communication
 - Modbus device communication

Supported transmission modes:

- Modbus RTU
- Modbus ASCII

Table 2.4.4-1 The function codes supported by Modbus OPC Server

Function code	Description	Memory area
01	Read coil status	00001 - 09999
02	Read input status	10001 - 19999
03	Read holding register	40001 - 49999
04	Read input registers	30001 - 39999
05	Force single coil	00001 - 09999
06	Write single register	40001 - 49999
16	Write multiple registers	40001 - 49999
21	Write General Reference	60001 - 65535

The following data formats are supported:

- Bit, one coil, or input status
- Word, one register in IED's memory. The data is used in an unsigned form
- Integer, one register in IED's memory. The MSB bit is used as a sign bit
- Long MSW last, signed 32-bit object, which needs two registers from IED's memory in lsw-msw order
- Long MSW first, signed 32-bit object which needs two registers from IED's memory in msw-lsw order.
- Float MSW last, floating point type which needs two input registers from IED's memory in lsw-msw order
- Float MSW first, floating point type which needs two input registers from IED's memory in msw-lsw order.

2.4.5. External OPC Server features

OPC Data Access is used for continuous, real-time data communication between PLC/DCS systems and COM600 communicating real-time data from data acquisition devices such as PLCs to display and interface devices like Web Human-Machine Interfaces (WebHMI). OPC DA is also used for inter-process communication in COM600.

2.4.6. SNMP features

The Simple Network Management Protocol (SNMP) is used to manage network connectivity of substation devices in the substation LAN network.

The SNMP OPC Server is intended for providing methods for OPC clients to monitor network-attached devices.

The SNMP OPC Server supports the following features:

- SNMP V1, SNMPv2c and SNMPV3 network monitoring
- IEC 61850 data modeling
- System supervision
 - SNMP channel communication
 - SNMP device communication

2.4.7.

SNTP features

The Simple Network Time Protocol (SNTP) is used for clock synchronization between substation devices. Specifically, COM600 can act as an SNTP master to synchronize the internal clocks of the protection and control IEDs (SNTP slaves), in the absence of a dedicated GPS (SNTP server).

The SNTP OPC Server supports the following features:

- OPC Data Access Server v. 1.0/2.0
- OPC Alarms and Events server v. 1.10
- SNTP client and server for time synchronization

3. IEC 61850 Master OPC server configuration

3.1. Overview of configuration

This chapter guides you in the configuration tasks required before you can start using the IEC 61850 OPC Server. For information on the IEC 61850 data modeling, refer to the respective standards and specifications.

Start SAB600 to open and name a project.

The configuration work can be divided into two separate tasks:

1. Building an object tree
2. Configuring object properties

Build an object tree by adding objects to the object tree, refer to 3.2.1, General information about building object tree. Connectivity Packages for certain protection and control products usually contain preconfigurations and tools to facilitate the building of the object tree.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

Table 3.1-1 describes the possible objects shown in the object tree. After you have added the necessary objects to the object tree in the Communication structure, configure them. Refer to 3.3.1, Configuring object properties.

Table 3.1-1 IEC 61850 OPC Server related objects

Object	Description
IEC 61850 OPC Server	Object representing the IEC 61850 OPC Server
Event Definitions	Object representing event definitions for IEC 61850 OPC Server diagnostics
IEC 61850 Subnetwork	Object representing a physical subnetwork. IEC 61850 OPC Server supports only one subnetwork.
IEC 61850 Device (IEC 61850 IED)	Object representing a physical IEC 61850 protection and control device. You should not have more than 30 devices per each subnetwork.
Attributes	Predefined object that contains items for controlling or retrieving status information for the parent object. The parent object can be the Server, a Subnetwork, or a Device object.
Logical Device (LD)	Object representing a group of functions, each function is defined as a logical node. A physical device consists of one or several LDs.
Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.

Object	Description
Data Object (DO)	A data object is an instance of one of the IEC 61850 Common Data Classes, for example single point status, measured value etc. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, for instance value, quality and control.
Data Set (DS)	The data set is the content basis for reporting and logging. The data set contains references to the data and data attribute values.
Report Control Block (RCB)	The report control block controls the reporting process for event data as they occur. The reporting process continues as long as the communication is available.

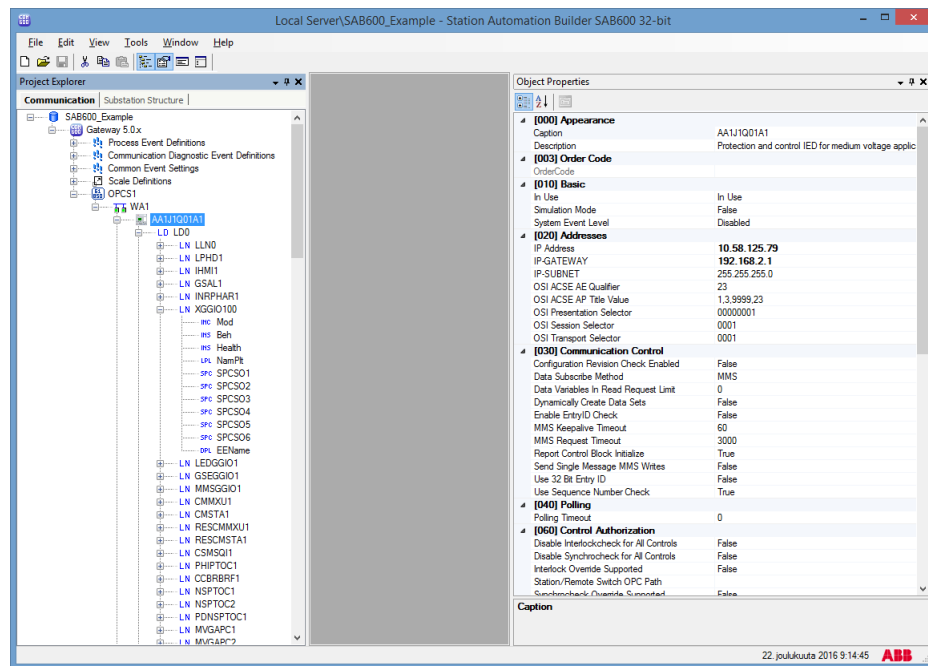
3.2. Building object tree

3.2.1. General information about building object tree

Before you can start using the IEC 61850 OPC Server, you must build and configure an object tree in SAB600 to define the Communication structure.

Figure 3.2.1-1 shows an example of an object tree after it has been built. In the example tree, you can see the IEC 61850 OPC Server object and its child objects like subnetworks, devices and data objects. Indentation is used to indicate the parent-child relationship between the objects.

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_Example_View.png

Figure 3.2.1-1 Example view of SAB600

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object.
- You can copy the object.
- You can drag and drop the object.

Add the objects in the following order:

1. Gateway (COM600) or Computer Node (MicroSCADA Pro)
2. IEC 61850 OPC Server
3. IEC 61850 Subnetwork
4. IEC 61850 Device (IEC 61850 IED)
5. Import device configurations.



If you want to connect Device Connection Status events to device objects at this point, make sure that you have already created and configured the event objects.

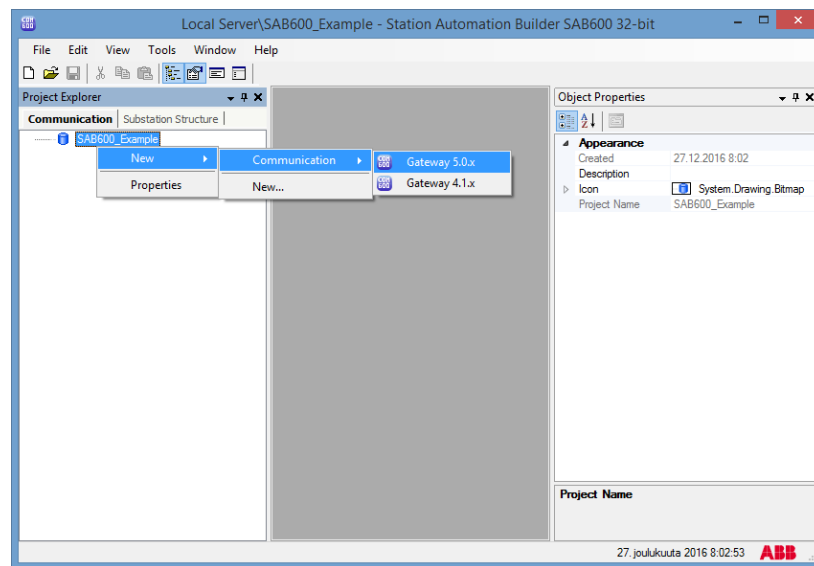
For information on building a substation structure, refer to COM600 HMI Configuration Manual.

3.2.2. Adding Gateway or Computer Node object

To add a Gateway or Computer Node object:

1. To start building the object tree, add a COM600 Gateway object in the Communication structure by selecting the project name.
2. Right-click the project name and select **New > Communication > Gateway**, see Figure 3.2.2-1.

Continue building the object tree in the same way until you have added all the necessary objects in your current project.



SAB600_Gateway.png

Figure 3.2.2-1 Adding COM600 Gateway object

3.2.3. Adding IEC 61850 OPC Server object

After the Gateway object has been successfully added, you can continue building the object tree by adding an IEC 61850 OPC Server object.

To add an IEC 61850 OPC Server object:

1. Select the Gateway object in the Communication structure.
2. Right-click the Gateway object.
3. Add an IEC 61850 OPC Server object.

By using the SCL Import function, it is possible to import configurations of an entire server or individual devices without having to insert them manually.

To open the SCL Import function:

1. Click the wanted object.
2. Select **Tools > SCL Import**.

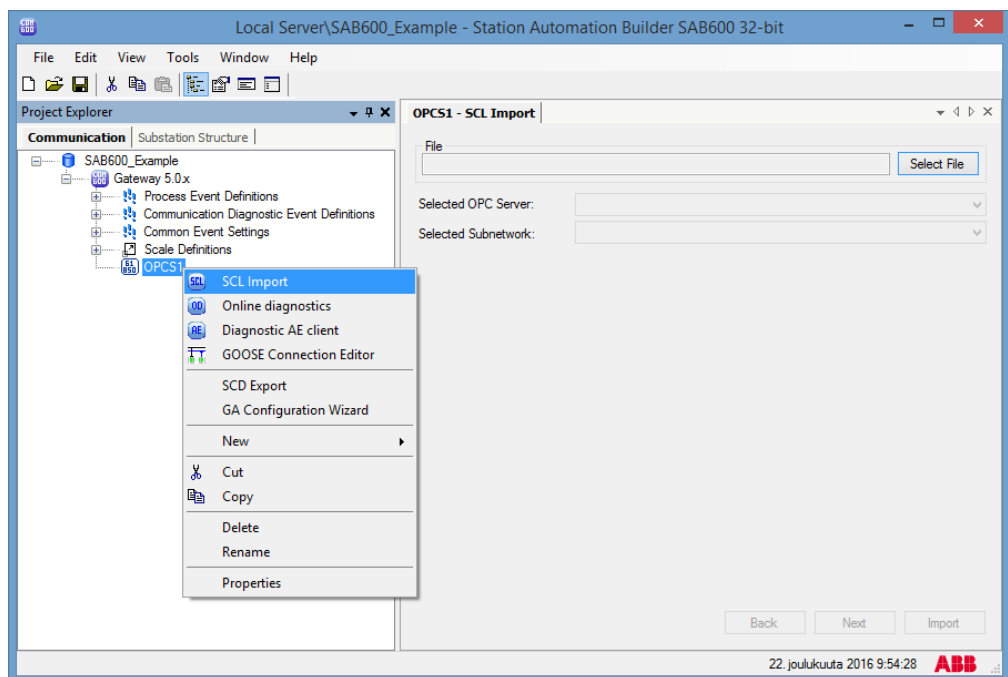
Connectivity Packages for certain protection and control devices may also support other ways to build this structure, depending on the configuration of an individual device, for example device-related object types and wizards. Typically, Connectivity Packages include SCL description files which must be installed. For further information on these Connectivity Packages, see the Connectivity Package of a certain device in the product documentation.

You can also import the whole communication structure under IEC 61850 OPC Server with new configurations from an existing file. The communication structure is imported using the SCL import function. The file extensions for the import files can be .icd, .cid, .scd, or .xml. Right-click the IEC 61850 OPC Server and select **SCL Import** from the shortcut menu, see Figure 3.2.3-1

To import a new configuration file:

1. Click **Select 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 OPC Server, right-click the OPC Server, select **SCL Import** again, and repeat the steps above.



SAB600_SCLImport_Example.png

Figure 3.2.3-1 IEC 61850 OPC Server SCL Import

For more information about the SCL Import function, see COM600 User's Manual.

3.2.4. Adding IEC 61850 Subnetwork objects

After the server object has been successfully added, you can continue building the object tree by adding IEC 61850 subnetwork objects.

To add an IEC 61850 subnetwork object:

1. Select an IEC 61850 OPC Server object.
2. Right-click the IEC 61850 OPC Server object.
3. Add an IEC 61850 subnetwork object.
4. Rename the new object. The names of the IEC 61850 subnetwork objects have to be unique.



You can define one subnetwork per OPC Server.

3.2.5. Adding IEC 61850 IED objects

After adding a subnetwork you can add device objects.

To add a Device object:

1. Select a Subnetwork object.
2. Add an IEC 61850 Device (IEC 61850 IED) object.
3. Rename the new object. The names of the devices within an IEC 61850 channel have to be unique.

The maximum number of devices per each subnetwork is 30.

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, see Figure 3.2.3-1

To import a new configuration file:

1. Click **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

For more information about the SCL Import function, see COM600 User's Manual.

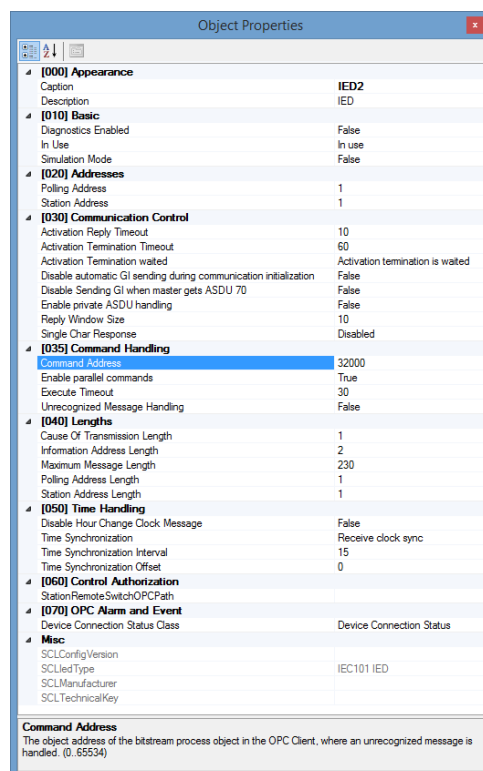
3.3. Configuring objects

3.3.1. Configuring object properties

After the objects have been added, you must 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 3.3.1-1. You can see the selected object on the left and the available properties on the right.
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.



SAB600_Object_Properties_Example.png

Figure 3.3.1-1 Example of object properties

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

3.3.2. Configuring IEC 61850 OPC Server properties

Table 3.3.2-1 lists the configurable IEC 61850 OPC Server properties and value ranges for them. The actual configuration by using SAB600 is performed as described in 3.3.1, Configuring object properties.

Table 3.3.2-1 IEC 61850 OPC Server properties

Name	Value/Value range	Description
Basic		
AE Prog ID		Prog ID for OPC Alarm and Event Server (Automatically generated by management function)
DA Prog ID		Prog ID for OPC Data Access Server
Enable reading of d-attribute (description) from IED	True False Default: False	Specifies whether the d attribute (description) is read from the IED. Normally d is not reported from the IED. It is only read if read operation is requested e.g. with Online Diagnostics. When set to false, the text of the data object Description property is used.
SNTP Client		
1. Address for SNTP Server		IP address or node name for SNTP Server (Primary)
1. Port Number	(1..65535) Default: 123	TCP/IP port number
1. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
2. Address for SNTP Server		IP address or node name for SNTP Server
2. Port Number	(1...65535) Default: 123	TCP/IP port number
2. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
3. Address for SNTP Server		IP address or node name for SNTP Server
3. Port Number	(1...65535) Default: 123	TCP/IP port number
3. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value/Value range	Description
4. Address for SNTP Server		IP address or node name for SNTP Server
4. Port Number	(1...65535) Default: 123	TCP/IP port number
4. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
SNTP Enable Client	True False Default: True	Controls if time synchronization client is initially in use or not
SNTP Server		
Enable Time Synchronization server	True False Default: True	Controls if time synchronization server is initially in use or not
Port Number For Time Synchronization Server	(1...65535) Default: 123	Port number for time synchronization server
Communication Control		
Report Control Identity	Default: Client1	Report Control Identity specifies, which report control block instance is used by the OPC Server. The value must match with the Report Client attribute under the Report Enabled attribute of the report control block to be used. To enable the IEC 61850 OPC Server to use the specific report control blocks and therefore receive spontaneous events, the Report Control Identity field must match with one of the Report enabled fields on device's report control block configurations. This dedicates a report control block's specific instance from the device to be used by the IEC 61850 OPC Server. If the fields do not match, the configured report control block is discarded.

Name	Value/Value range	Description
Server Originator Category	Control operation issued from an operator using a client located at station level Control operation issued from an unknown location Control operation from a remote operator outside the substation (for example network control center) Default: Control operation issued from an operator using a client located at station level	Specifies the default originator category that is used for changing values and IEC 61850 control services. This can be override by OPC client for DPC control.
Server Originator Identification	Free string (max length 64 characters). For numeric values hex code can be used (starting with "0x" e.g. 0xABB). Default: ABB	Specifies the default originator identification that is used for IEC 61850 control services.
System Event Level	Disabled Level 1 (main operation and errors) Level 2 (time synchronization errors) Level 3 (time synchronization done) Level 4 (reported local updates from devices) Level 5 (reported unconfigured updates from devices) Default: Disabled	Level of system event that are sent from the OPC Server. Amount of events sent is cumulative, higher level also contains lower level events. System event level configuration at OPC Server level overrides definitions at subnetwork and device levels.

3.3.3.**Configuring IEC 61850 Subnetwork properties**

The IEC 61850 Subnetwork properties that can be configured and value ranges for them can be found in Table 3.3.3-1. The actual configuration by using SAB600 is performed as described in 3.3.1, Configuring object properties.



Each IEC 61850 node of the system must have a unique subnet/node address.

Table 3.3.3-1 IEC 61850 Subnetwork properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
In Use	In Use Not In Use Default: In Use	Controls whether the device communication is initially in use or not
Communication Port		
IP Address	127.0.0.1	IP Address for communication channel. Dotted decimal to be used.
Communication Control		
System Event Level	Disabled Level 1 (main operation and errors) Level 2 (time synchronization errors) Level 3 (time synchronization done) Level 4 (reported local updates from devices) Level 5 (reported unconfigured updates from devices) Default: Disabled	Level of system event that are sent from the OPC Server. Amount of events sent is cumulative, higher level also contains lower-level events. System event level configuration at OPC Server level overrides definitions at subnetwork and device levels.
TCP/IP Keepalive Time-out	(1..3600) Default: 15	TCP/IP Keepalive time-out in seconds

3.3.4.**Configuring IEC 61850 device properties**

Table 3.3.4-1 lists the configurable properties for IEC 61850 Devices and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 3.3.1, Configuring object properties.



Each IEC 61850 node of the system must have a unique subnet or node address.

Table 3.3.4-1 IEC 61850 Device properties

Name	Value or Value range/ Default	Description
Basic		
In Use	In use Not in use Default: In use	Controls if the device communication is initially in use or not.
Simulation Mode	True False Default: False	Defines if the device is in simulation mode.
System Event Level	Level0=Dis-abled Level1=Level 1 (main operation, error replies, errors) Level2=Level 2 (information reports, OK replies, RCB initializing) Level3=Level 3 (sent requests (connect, read, write), transparent SPA messages) Level4=Level 4 (reported local updates) Level5=Level 5 (reported unconfigured updates)	Level of system events (OPC AE events) can be viewed with a SAB600 Diagnostic AE client for OPC Server or with an OPC AE client. Amount of events sent is cumulative: higher level also contains lower level events. System event level configuration at subnetwork overrides definitions at device level. The same or higher event level must be set for Subnetwork as for IED. System events can be used for debugging and event flow monitoring, see Table 3.3.3-1. Event level can be changed during the run time by using the Diagnostic events level attribute.
Addresses		
IP Address	127.0.0.1	IEC 61850 Node Number of the device
OSI ACSE AE Qualifier	23	IEC 61850 Subnet Number of the device
OSI ACSE AP Title Value	1,3,9999,23	OSI ACSE AP Title Value as defined in IEC 61850-8-1.
OSI Presentation Selector	00000001	OSI Presentation Selector as defined in IEC 61850-8-1.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value or Value range/ Default	Description
OSI Session Selector	0001	OSI Session Selector as defined in IEC 61850-8-1.
OSI Transport Selector	0001	OSI Transport Selector as defined in IEC 61850-8-1.
Communication Control		
Automatically set daylight saving time	True False Default: False	Automatically set daylight saving time (for SPAZC-40x only!)
Configuration Revision Check Enabled	True False Default: False	If enabled, checks configuration revisions from all logical devices (LDx.LLN0.NamPIt.configRev). If configuration revisions do not match between configuration and IED, communication to the IED is not established.
Dynamically Create Data Sets	True False Default: False	Specifies whether data sets and reporting are initialized dynamically.  Using static data sets is recommended. The IED needs to support this feature. If enabled, all configured data sets are created and report control blocks configured at runtime to the IED after connecting. The dynamic data sets must be configured with the Dataset Editor and designated to available report control blocks. The report control blocks must be configured and dedicated for the IEC 61850 OPC Server instance. Data sets used with buffered reporting are created once when the BRCB is first initialized. Data sets used with unbuffered reporting are created every time the URCB is initialized. Dynamic data sets are not removed.
Enable EntryID Check	True False Default: False	Enable reporting EntryID check. Report EntryIDs are used as sequence numbers for buffered reporting. A gap in sequence numbers caused a restart of reporting starting from lost sequence number.
MMS Request Timeout	0...65535 Default: 5000	Specifies the time out for MMS Request. If 0 it is not in use.

Name	Value or Value range/ Default	Description
Report Control Block Initialize	True False Default: True	Initialize to report control blocks and enable reporting.
Use 32 Bit Entry ID	True False Default: False	Enables or disables usage of 32 bit EntryIDs for information report sequence. The IEC 61850 standard defines 64 bit EntryID, but e.g. SPA-ZC 40x uses 32 bit EntryID.
Use Sequence Number Check	True False Default: False	Enables or disables sequence number checking information reports for the IEC 61850 OPC server.
Polling		
Polling Timeout	(0..3600) Default: 0 (disabled)	Polling Timeout in seconds. If the device does not support reporting, ST and MX attributes can be polled with this interval.
Control Authorization		
Disable Interlockcheck for All Controls	True False Default: False	Disables interlockcheck condition check for all select and operate controls.
Disable Synchrocheck for All Controls	True False Default: False	Disables synchrocheck condition check for all select and operate controls.
Interlock Override Supported	True False Default: False	Specifies whether Interlock Override is supported by this IED.
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this device. The format is #ProgID For OPC Server#Channel Name\\IED Name\\Logical Device Name\\Logical Node Name\\Data Object Name E.g. #ABB.IEC 61850_OPC_DA_Server.Instance[1]1#Channel1\\IED1\\LD1\\GGIO1\\loc

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value or Value range/ Default	Description
Synchrocheck Override Supported	True False Default: False	Specifies whether Synchrocheck Override is supported by this IED.
OPC Alarm and Event		
Area Description		Description of area.
Area Name		Specifies which area this IED belongs to.
Device Connection Status Class	Default: Device Connection Status	Device Connection Status Class definition used with current device.
Measurement Limit Supervision	IED Based limit supervision OPC Server based limit supervision	Specifies whether measurement limit supervision is performed by the IEC 61850 OPC Server.
Authentication		
Is Authentication Disabled	True False Default: True	Is Authentication Disabled?
Is Password used	True False Default: False	Is Password used?
Password	Default: None	Password used for authentication.
SPA Access		
SPA parameter for Close Password		SPA parameter for close Password.
SPA value for Open Password		SPA parameter value for open Password.
SPA Store parameter name		SPA store parameter name.
SPA Store parameter value	0...65536	SPA store parameter value.
SPA Value for Close Password	0...65536	SPA value for close password.
SPA value for Open Password	0...65536	SPA value for open password.
Disturbance Recording		
Disturbance Recorder Delete Recordings	Default: False	Specifies whether DRs are deleted from IED after upload.
Disturbance Recorder Enabled	Default: False	Specifies whether DR upload is enabled.

Name	Value or Value range/ Default	Description
Disturbance Recorder Local Directory		Specifies the folder where all disturbance recordings will be stored in COM600 computer. If left empty "C:\COMTRADE\IEDName" will be used.
Disturbance Recorder Maximum Total File Size	0 - 2147483647 0: no limit Default: 0	Specifies maximum size for folder where uploaded DRs are locally stored for this IED.
Disturbance Recorder Polling Period	0 - 2147483647 0: disabled Default: 120	DR polling period in seconds
Disturbance Recorder Remote Directory		Specifies the folder where all disturbance recordings will be stored in this IED.
Disturbance Recording via FTP		
Disturbance Recorder FTP Password		FTP password to be used with DR functionality
Disturbance Recorder FTP User Name		FTP username to be used with DR functionality
Disturbance Recorder Read Via FTP	False: MMS (IEC 61850) True: FTP Default: False	Specifies whether DRs shall be read using FTP.
Web Server Configuration		
Web Server Enabled	True False Default: False	Specifies whether IED Web Server is accessible from COM600 WebHMI.
Web Server IP Address		IP Address for Web Server. Dotted decimal or DNS name to be used. If omitted and Web Server is enabled, IED IP Address is used.

3.3.5. Configuring Logical Device properties

The logical devices are already configured when they are imported with IEC 61850 devices. The configurations can be monitored with viewers.



If SPA Access is configured on the logical device object, the logical device is shown as an own object in the COM600 WebHMI tree view. This is needed, for example, when multiple SPACOM modules are connected to a SPA-ZC 402 communication adapter.

Table 3.3.5-1 Logical Device properties

Name	Value or Value range/ Default	Description
Transparent SPA		
SPA Address	(0..999) Default: 0	The SPA address of the device connected via TCP/IP. By setting value >0 enables the built in TCP/SPA client, which can be used through the Transparent SPA attribute.
SPA TCP Port	(1..65535) Default: 7001	SPA TCP Port
SPA TCP Timeout	(1..65535) Default: 3	SPA TCP Timeout in seconds
Control Authorization		
Station/Remote Switch OPC Path		Station/Remote Switch OPC Path OPC path of the station remote switch position to be used with this device. The format is #ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name E.g. #ABB.IEC61850_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc
SPA Access		
SPA parameter for Close Password		SPA parameter for close Password.
SPA value for Open Password		SPA parameter value for open Password.
SPA Store parameter name		SPA store parameter name.
SPA Store parameter value	0...65536	SPA store parameter value.

Name	Value or Value range/ Default	Description
SPA Value for Close Password	0...65536	SPA value for close password.
SPA value for Open Password	0...65536	SPA value for open password.

3.3.6. Measurement limit supervision

3.3.6.1. Configuring OPC-based measurement limit supervision and units

Typically measurement limit value supervision is done by the IEC 61850 IED with the specified LNs. If the IED does not support limit value supervision or does not provide units for the measurements, it is possible to configure the OPC server instead to handle the limit value supervision and to publish units for the measurements to realize a common IEC 61850 substation supervision functionality for the 800xA operator workplaces. Supervision mode (IED or OPC) can be configured with the Measurement Limit Supervision property of the IEC 61850 device for each IED. If the IED based supervision mode is selected, the limit values can be configured with the properties described in the following sections.

The data objects MV, CMV, SEQ, DEL and WYE support measurement limit supervision. MV, CMV, SAV, SEQ, DEL and WYE measurement data objects support overriding unit and multiplier information.

3.3.6.2. Configuring MV properties

Table 3.3.6.2-1 Configurable limit supervision properties for the MV object

Property	Type
[060] Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[050] Scale and Unit	
SI Unit	Enum

Property	Type
Multiplier	Enum

3.3.6.3. Configuring CMV properties

Table 3.3.6.3-1 Configurable limit supervision properties for the CMV object

Property	Type
[060] Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[050] Scale and Unit	
SI Unit	Enum
Multiplier	Enum

3.3.6.4. Configuring SAV properties

Table 3.3.6.4-1 Configurable limit supervision properties for the SAV object

Property	Type
[050] Scale and Unit	
SI Unit	Enum
Multiplier	Enum

3.3.6.5. Configuring SEQ properties

Table 3.3.6.5-1 Configurable limit supervision properties for the SEQ object

Property	Type
[060] C1 Limit Value Supervision	
High	float
High-High	float
Low	float

Property	Type
Low-Low	float
Max	float
Min	float
[060] C2 Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[060] C3 Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[050] Scale and Unit	
C1 SI Unit	Enum
C1 Multiplier	Enum
C2 SI Unit	Enum
C2 Multiplier	Enum
C3 SI Unit	Enum
C3 Multiplier	Enum

3.3.6.6. Configuring DEL properties

Table 3.3.6.6-1 Configurable limit supervision properties for the DEL object

Property	Type
[060] Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float

Property	Type
Max	float
Min	float
[050] Scale and Unit	
Phase SI Unit	Enum
Multiplier	Enum

3.3.6.7.**Configuring WYE properties****Table 3.3.6.7-1 Configurable limit supervision properties for the WYE object**

Property	Type
[060] Phase Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[060] Net Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[060] Neut Limit Value Supervision	
High	float
High-High	float
Low	float
Low-Low	float
Max	float
Min	float
[060] Res Limit Value Supervision	
High	float
High-High	float

Property	Type
Low	float
Low-Low	float
Max	float
Min	float
[050] Scale and Unit	
Phase SI Unit	Enum
Phase Multiplier	Enum
Neut SI Unit	Enum
Neut Multiplier	Enum
Net SI Unit	Enum
Net Multiplier	Enum
Res SI Unit	Enum
Res Multiplier	Enum

3.3.7.**Viewing data object configuration**

IEC 61850 OPC Server supports data objects for status, measurand, controllable status, and controllable analog information. IEC 61850 OPC Server supports 28 data object types for an IEC 61850 device. The data objects are already configured when they are imported with IEC 61850 devices. The configurations can be monitored with viewers.

Data classes for status information:

- Single point status (SPS)
- Double point status (DPS)
- Enumeration status (ENS)
- Integer status (INS)
- Protection activation information (ACT)
- Directional protection activation information (ACD)
- Security violation counter (SEC)
- Binary counter reading (BCR)

Data classes for measurand information:

- Measured value (MV)
- Complex measured value (CMV)
- Sampled value (SAV)
- WYE
- Delta (DEL)
- Sequence (SEQ)

Data classes for controllable status information:

- Controllable single point (SPC)

- Controllable double point (DPC)
- Controllable enumerated status (ENC)
- Controllable integer status (INC)
- Binary controlled step position information (BSC)
- Integer controlled step position information (ISC)

Data classes for controllable analog information:

- Analog set point (APC)

Data objects classes for status settings:

- Single setting point (SPG)
- Integer status setting (ING)

Data classes for analogue settings:

- Analogue setting (ASG)
- Setting curve (CURVE)

Data classes for description information:

- Device name plate (DPL)
- Logical Node name plate (LPL)

Data classes for internal status information:

- Integer status (Internal INS)
- Single point status (Internal SPS)
- Controllable single point (Internal SPC)

The parameters are stored in object properties in SAB600. The actual configuration for data objects is not supported.

3.3.8.

Configuring report control blocks

A report control block (RCB) controls the spontaneous event reporting, and the client can modify report sending behavior by setting RCB attributes. Buffered Report Control Blocks (BRCB) and Unbuffered Report Control Blocks (URCB) are supported RCBs.

For BRCB, events issue immediate sending of reports or buffer the events for transmission, such that data values are not lost due to transport flow control constraints or loss of connection. For URCB, events issue immediate sending of reports on a best efforts basis. If no association exists or if the transport data flow is not fast enough to support it, events may be lost.

To allow multiple clients to receive the same data values, multiple instances of the report control classes must be made available. Report Enabled and Report Client definitions are used to specify RCB instances to clients. Report Enabled shows the maximum number of available RCB instances, and Report Client dedicates an instance to a client (see Report Control Identity in Table 3.3.2-1). All configured RCBs without IEC 61850 OPC Server specified instances are discarded.

Report Clients' order specifies the RCB instance used and the RCB name. IEC 61850 OPC Server builds the RCB instance name to type RCBName<xx>. Each RCB instance takes on the values from 01 to 99 as <xx>, for example the first Report Client uses RCBName01. The naming convention can also be overridden by removing the Report Enabled element. Now the RCBName is used as it is.

The control attribute values are received from the imported device configuration. Some values can be overridden with the IEC 61850 OPC Server configuration.

- **Buffer Time**
Controls the time interval in milliseconds when the BRCB buffers the events for inclusion into a single report. Overridable.
- **Buffered**
Controls RCB to buffered (true) or unbuffered (false). Must be true for BRCB.
- **Configuration Revision**
Represents the number of times that the configuration of the RCB has changed.
- **Data Set**
Specifies the data set being monitored and what values are reported.
- **Integrity period**
If this is set to integrity (>0), it indicates the period in milliseconds used for generating an integrity report. An integrity report reports the values of all members of the related data set. Overridable.
- **Report ID**
Report identifier is the BRCB's client-specified report identifier. Report identifier generates the report.
- **Option Fields**
Client specified optional fields included in the report issued by BRCB. This attribute defines the optional header fields' subset of the report that are included in the report. Refer to IEC 61850-7-2 and IEC 61850-8-1 standards. The IEC 61850 OPC Server uses a default value for option fields to receive the necessary information for event updates and event flow control (cannot be overridden): BRCB (Sequence Number, Reason Code, Buffer Overflow, Entry ID), URCB (Sequence Number, Reason Code). Overridable.
- **Trigger Options**
Specifies the trigger conditions which BRCB monitors. The following values are defined: Data Change(dchg), Quality Change(qchg), Data Update(dupd), Period.

Buffer time and Integrity period are overridable. Option fields are also overridable, except the default values that IEC 61850 OPC Server uses to receive the necessary information for event updates and event flow control.

3.4. IEC 61850 data publishing

3.4.1. About data sets

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

3.4.2. Configuring data sets

3.4.2.1. Dataset Editor

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

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

The Dataset object has a set of data attributes:

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

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

3.4.2.2. About data reporting

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

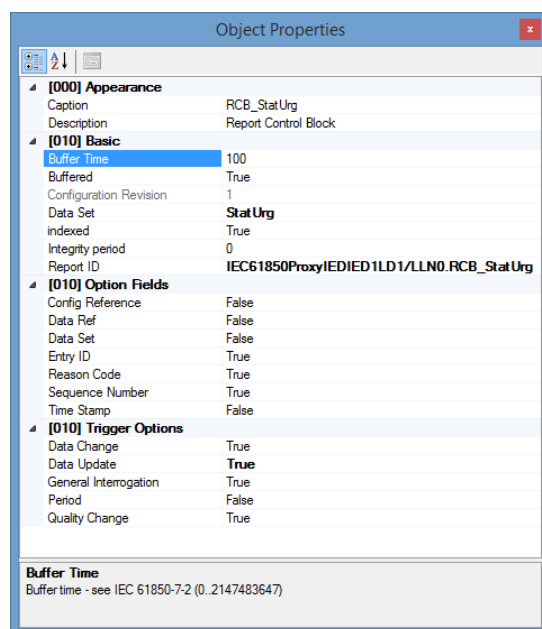
3.4.2.3.

Report control block

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

There are buffered and unbuffered report control blocks:

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



SAB600_Proxy_RCB_Properties.png

Figure 3.4.2.3-1 Report control block properties

Table 3.4.2.3-1 Report Control Block object properties

Property/Parameter	Value or value range/Default	Description
Basic		
Buffer Time	Default: 0 milliseconds	With this value, RCB can be configured to wait for other events after the first change before sending the report. Value 0 means that a new change is immediately reported to the client. Configurable.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

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

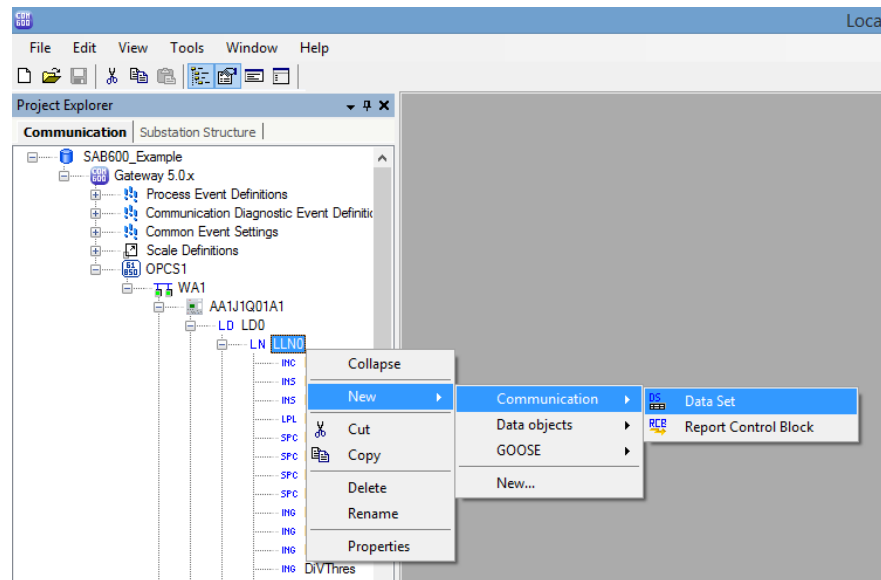
Property/Parameter	Value or value range/Default	Description
Data Set	True False Default: False	Data Set
Entry ID	True False Default: True	Entry ID
Reason Code	True False Default: True	Reason Code
Sequence Number	True False Default: True	Sequence Number
Time Stamp	True False Default: False	Time Stamp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

3.4.2.4. Configuring reporting

Some IEDs require that reporting is configured manually.

To configure reporting:

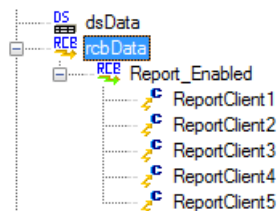
1. Create and configure a **Data Set** object.



SAB600_DataSet.png

Figure 3.4.2.4-1 Creating a new data set

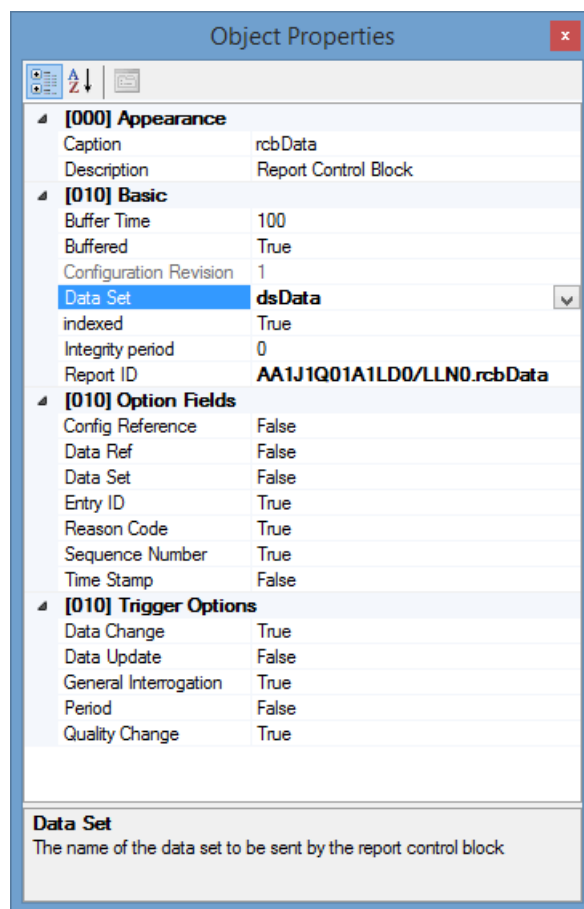
2. Create a **Report Control Block** object.
3. Add a **Report Enabled** object. Add a **ReportClient** object for each IEC 61850 client. ReportClients create the same amount of instances of the RCB, each dedicated for one client.



SAB600_ReportClient.png

Figure 3.4.2.4-2 Adding ReportClient objects

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



SAB600_RCB_Properties_DataSet.png

Figure 3.4.2.4-3 Configuring data set of the report control block

3.5. Configuring GOOSE Analyzer

3.5.1. Configuring the GOOSE Analyzer using the Configuration Wizard

GOOSE Analyzer must be configured through the Configuration Wizard for the IEC 61850 OPC Server.

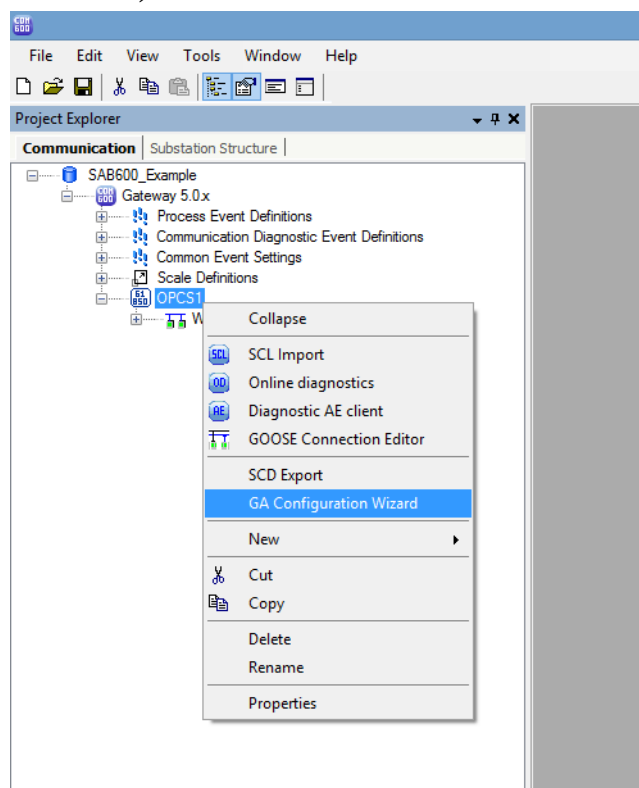
Before you start,

- build and configure the object tree as specified in 3.2, Building object tree and 3.3, Configuring objects, and
- open the management tool to connect to the remote COM600 device for accessing the Network Interface Card (NIC) information of COM600 to the local SAB600 computer for the configuration.

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

To configure the GOOSE Analyzer:

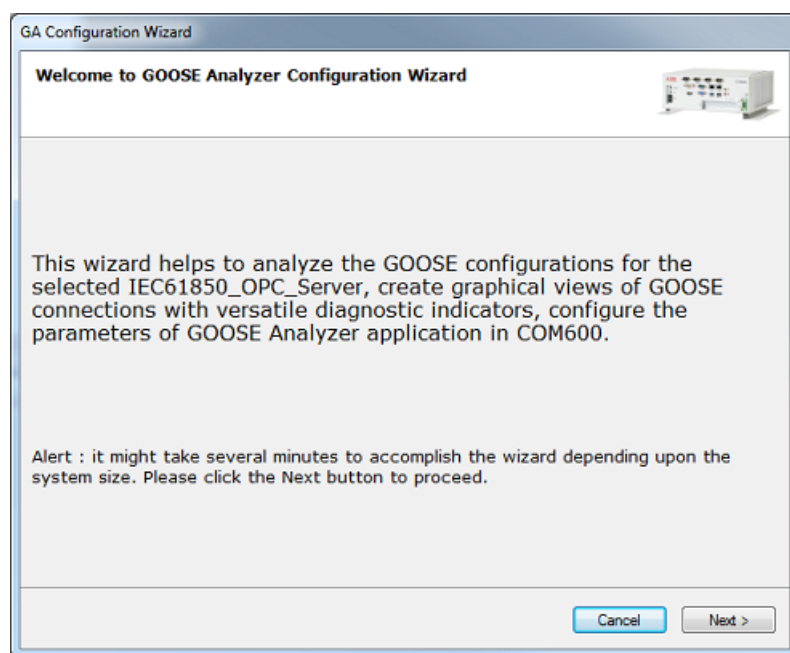
1. Right-click the IEC 61850 OPC Server to open its specific context menu (see Figure 3.5.1-1).



SAB600_GA_Configuration.png

Figure 3.5.1-1 GOOSE Analyzer configuration

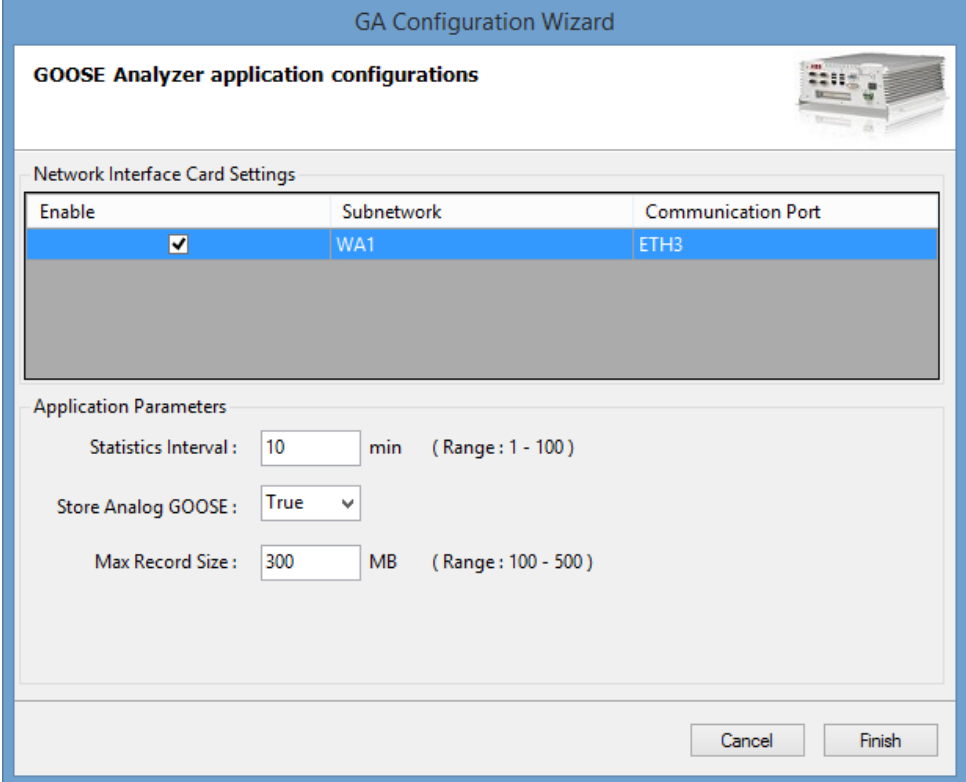
2. Select **GA Configuration Wizard** to open the wizard dialog (see Figure 3.5.1-2).



SAB600_GA_Configuration_Wizard.png

Figure 3.5.1-2 Wizard dialog

3. Click **Next**.
4. Configure the properties (see Figure 3.5.1-3). The descriptions for properties are listed in Table 3.5.2-1.



The screenshot shows the 'GA Configuration Wizard' window. The title bar says 'GA Configuration Wizard'. Below the title bar, there's a section titled 'GOOSE Analyzer application configurations' with a small image of a device. The main area is divided into two sections: 'Network Interface Card Settings' and 'Application Parameters'. The 'Network Interface Card Settings' section contains a table with three columns: 'Enable', 'Subnetwork', and 'Communication Port'. The first row has 'Enable' checked, 'Subnetwork' set to 'WA1', and 'Communication Port' set to 'ETH3'. The 'Application Parameters' section contains three settings: 'Statistics Interval' set to '10' min (Range: 1 - 100), 'Store Analog GOOSE' set to 'True' (dropdown), and 'Max Record Size' set to '300' MB (Range: 100 - 500). At the bottom right, there are 'Cancel' and 'Finish' buttons.

Enable	Subnetwork	Communication Port
☒	WA1	ETH3

Application Parameters

Statistics Interval : 10 min (Range : 1 - 100)

Store Analog GOOSE : True

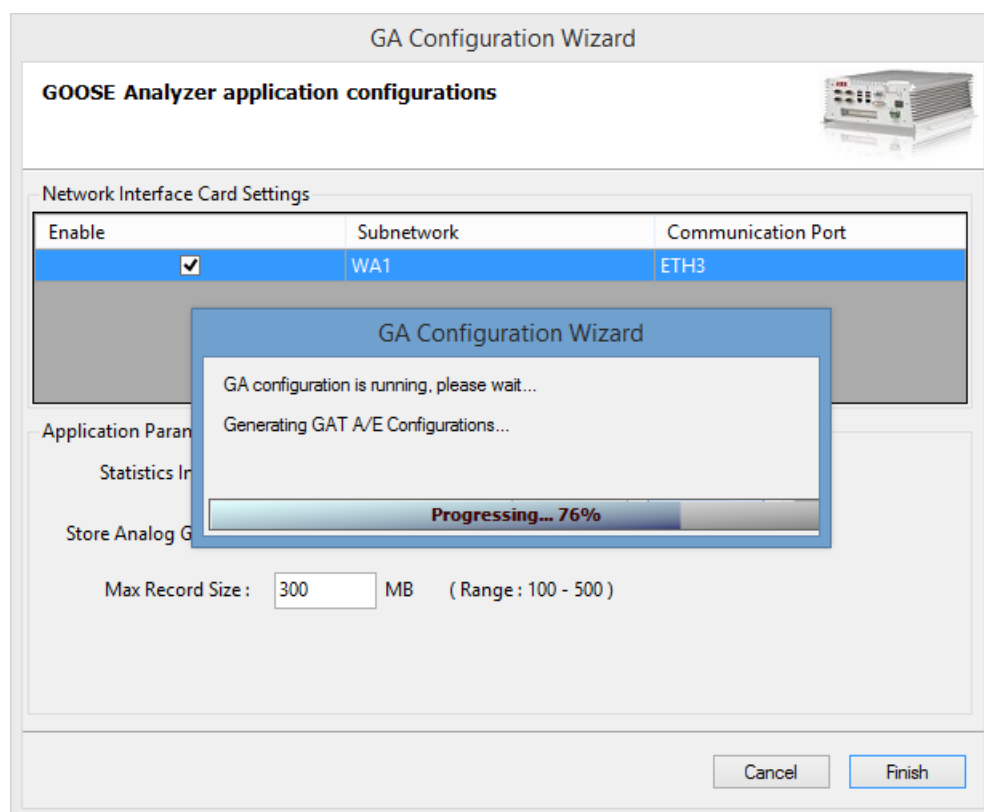
Max Record Size : 300 MB (Range : 100 - 500)

Cancel Finish

SAB600_GA_Configuration_Wizard_Properties.png

Figure 3.5.1-3 Parameter Setting

5. Click **Finish** to start the analysis and generate the corresponding GOOSE Analyzer configuration.



SAB600_GA_Configuration_Wizard_Generate.png

Figure 3.5.1-4 GOOSE Analyzer Generating Configuration



The user must run the GAT Server Config utility in the COM600 computer after the IP-address is changed.

3.5.2.

Configuring GOOSE Analyzer properties

Table 3.5.2-1 lists the configurable GOOSE Analyzer properties and value ranges.

Table 3.5.2-1 GOOSE Analyzer properties

Name	Value/Value range	Description
Enable	Enable/Disable	Enable/Disable the analysis of specific sub-network
Statistic interval	1...100 min Default: 10	Duration to do the calculations.
Store analogue GOOSE	True/False	Enable or disable the storing of analogue GOOSE.

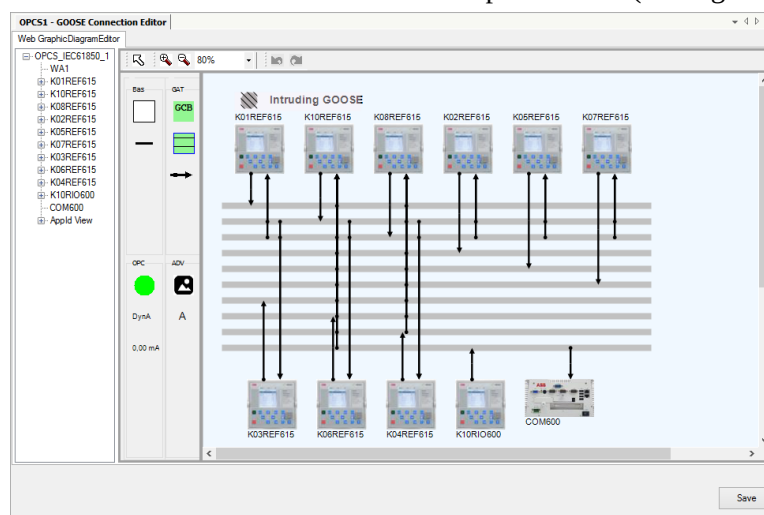
Name	Value/Value range	Description
Max. record size	100...500 Mb Default: 300 Mb	Maximum record size for GOOSE Tester.

3.5.3. Editing GOOSE connection

After the **GOOSE Analyzer** is configured with the **Configuration Wizard**, you can use the **GOOSE Connection Editor** tool.

To view and edit the GOOSE connections:

1. Right-click the IEC 61850 OPC Server to open its specific context menu (see Figure 3.5.1-1).
2. Select **GOOSE Connection Editor** to open the tool (see Figure 3.5.3-1).



GSAB600_GOOSE_Connection_Editor.png

Figure 3.5.3-1 GOOSE Connection Editor

3. Select different connection diagrams using the navigation tree on the left.
4. Make changes to the active diagram including moving the graph, modifying properties, and adding new graphs and texts. The default IED picture can be replaced from the properties window.
5. Click **Save** to save your changes.

3.6. Configuring condition monitoring and protection related applications

3.6.1. 3.6.1 Prerequisites

- **PCM600 2.8 32-bit with HF1** is needed for configuring condition monitoring and protection related applications to COM600 device.
- **COM600 connectivity package 5.0** is needed for COM600 IED object creation in PCM600.
- **SAB600 5.0** is needed for configuring OPC Server for condition monitoring and protection related applications.



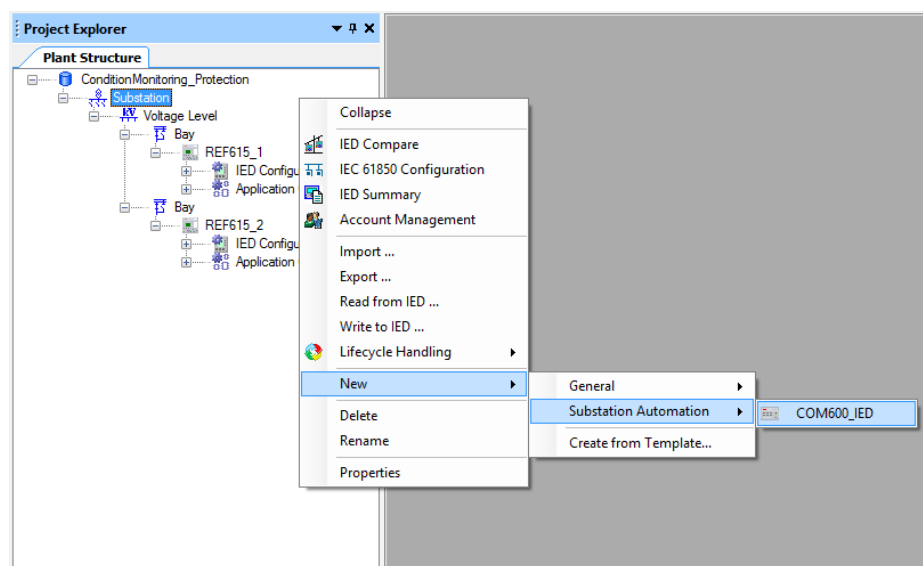
Condition monitoring and protection related applications are available only in COM600S IEC product.

3.6.2. Configuring condition monitoring and protection related applications in PCM600

PCM600 is used for configuration of condition monitoring and protection related applications and writing those to COM600 device. Condition monitoring and protection related applications must be configured through the COM600 IED Configuration Wizard in PCM600.

1. Create **COM600 IED** under **Substation** object.

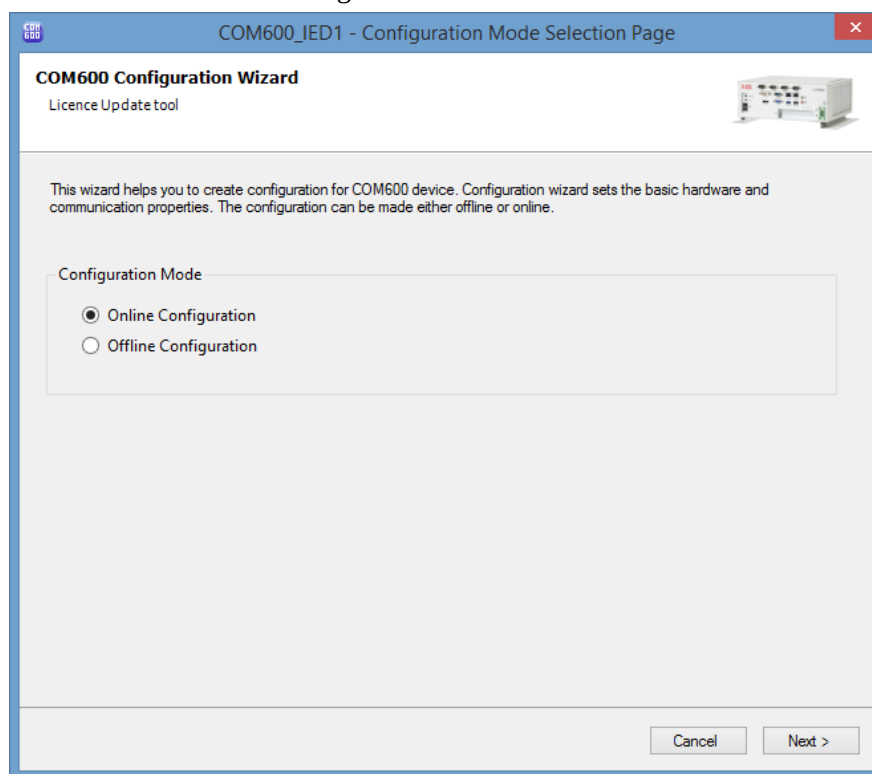
Master Protocols (Ethernet) and Applications Configuration and Operation Manual



COM600_IED_PCM600.png

Figure 3.6.2-1 COM600 IED object creation in PCM600

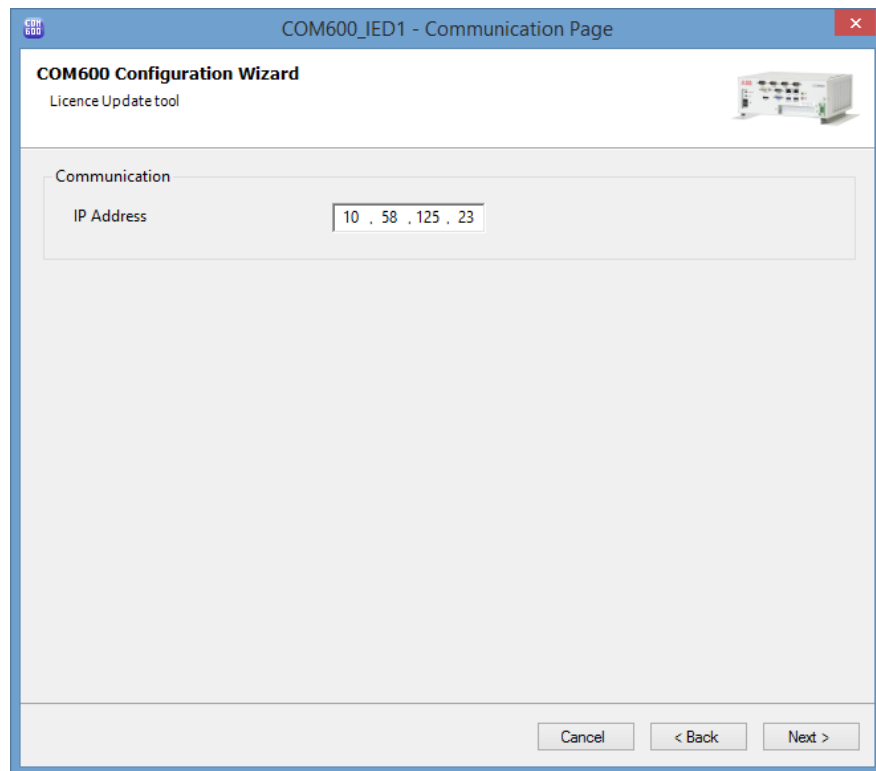
2. Select **Online Configuration** or **Offline Configuration** mode for creating COM600 IED in COM600 IED Configuration Wizard.



COM600_IED_Wizard_ModeSelection.png

Figure 3.6.2-2 COM600 Configuration Wizard Mode Selection Page in PCM600

3. Select IP address for COM600 device.



COM600_IED_Wizard_Communication.png

Figure 3.6.2-3 COM600 Configuration Wizard Communication Page in PCM600

4. Verify the order code of COM600 device. In online mode order code is read from COM600 device if a connection to the device is available. In offline mode order code should be set as it is in COM600 device.

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

COM600 Configuration Wizard
Order Code Selection Online Page

Online Mode
Please verify the order code in COM600 device

Order Code: S L R A 3 2 T A A A 3 F

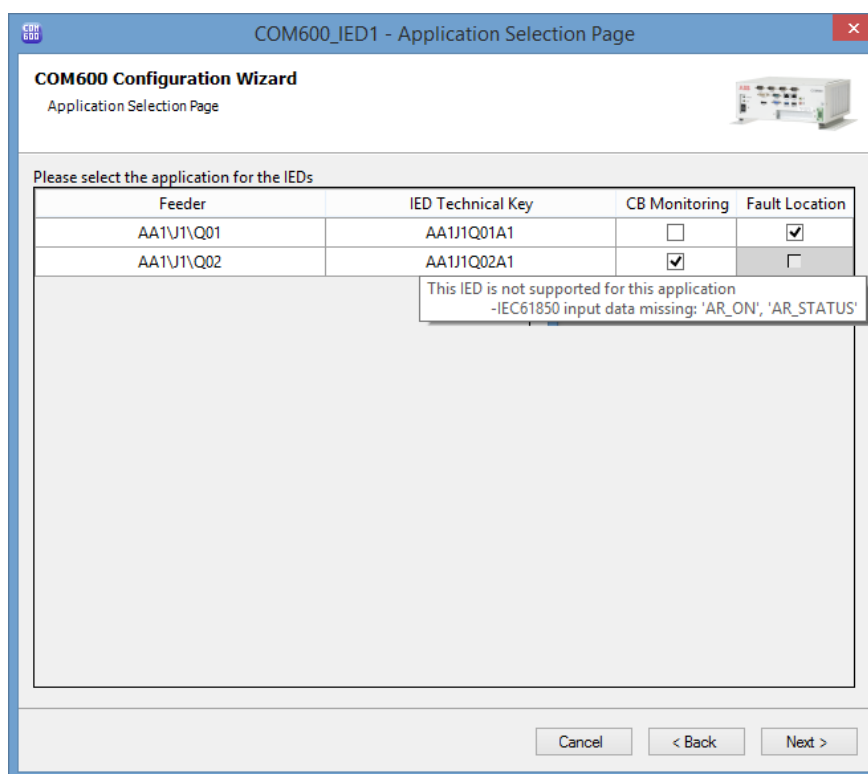
Order Code Selection	
Product	S COM600 IEC
Power supply	L 24 - 60 V AC
Optional communication cards (PCI)	R Ethernet card (RJ-45)
Application Category	A All applications
Additional number of Master protocols	3 Three master protocols
Number of Slave protocols	2 Two slave protocols
Optional software (advanced features)	T Data historian
Optional IEC 61850 functionality	A IEC 61850 proxy server and GOOSE send enabled + GOOSE Ans
Device integration	A Only with ABB relays
Mounting type	A Subplate mounting
Maximum number of application instances	3 Upto 30 instances
Version	F Version 5.0

Cancel < Back Next >

COM600_IED_Wizard_OrderCode.png

Figure 3.6.2-4 COM600 Configuration Wizard Order Code Page in PCM600

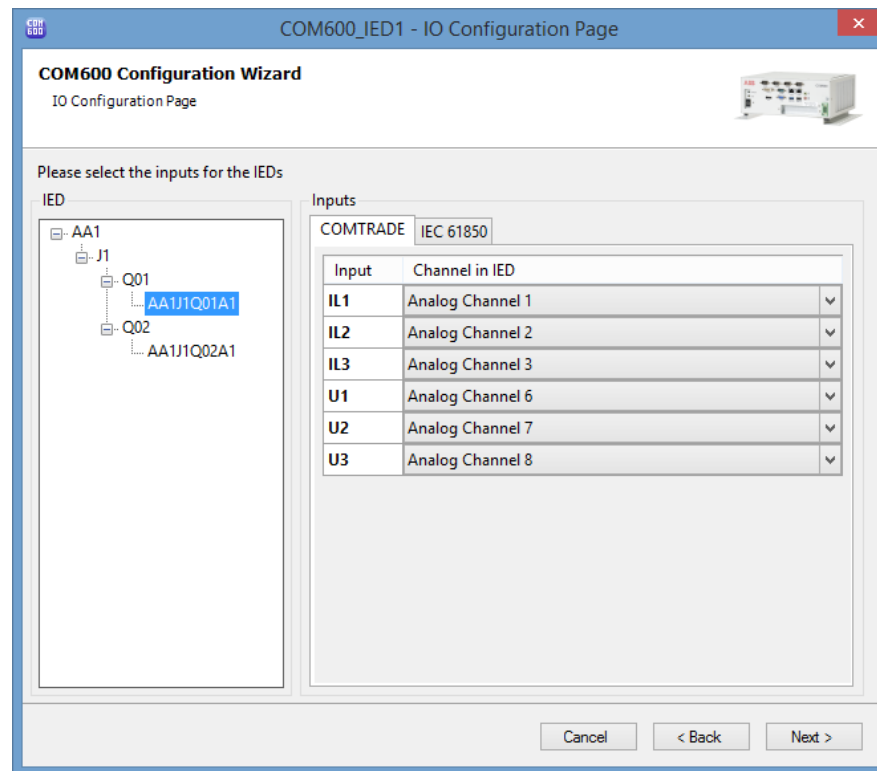
5. Select the applications for the IEDs. If the IED does not support the application, the table cell is not selectable and mouse-over shows the reason why the application is not supported.



COM600_IED_Wizard_ApplicationSelection.png

Figure 3.6.2-5 COM600 Configuration Wizard Application Selection Page in PCM600

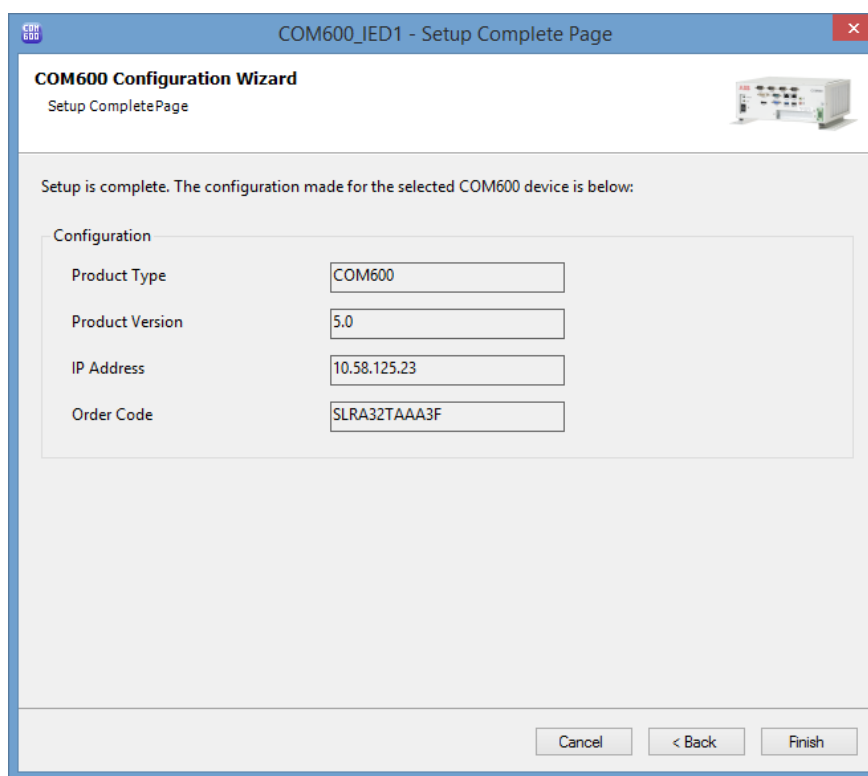
6. Select COMTRADE and IEC 61850 inputs for IEDs.



COM600_IED_Wizard_Inputs.png

Figure 3.6.2-6 COM600 Configuration Wizard IO Configuration Page in PCM600

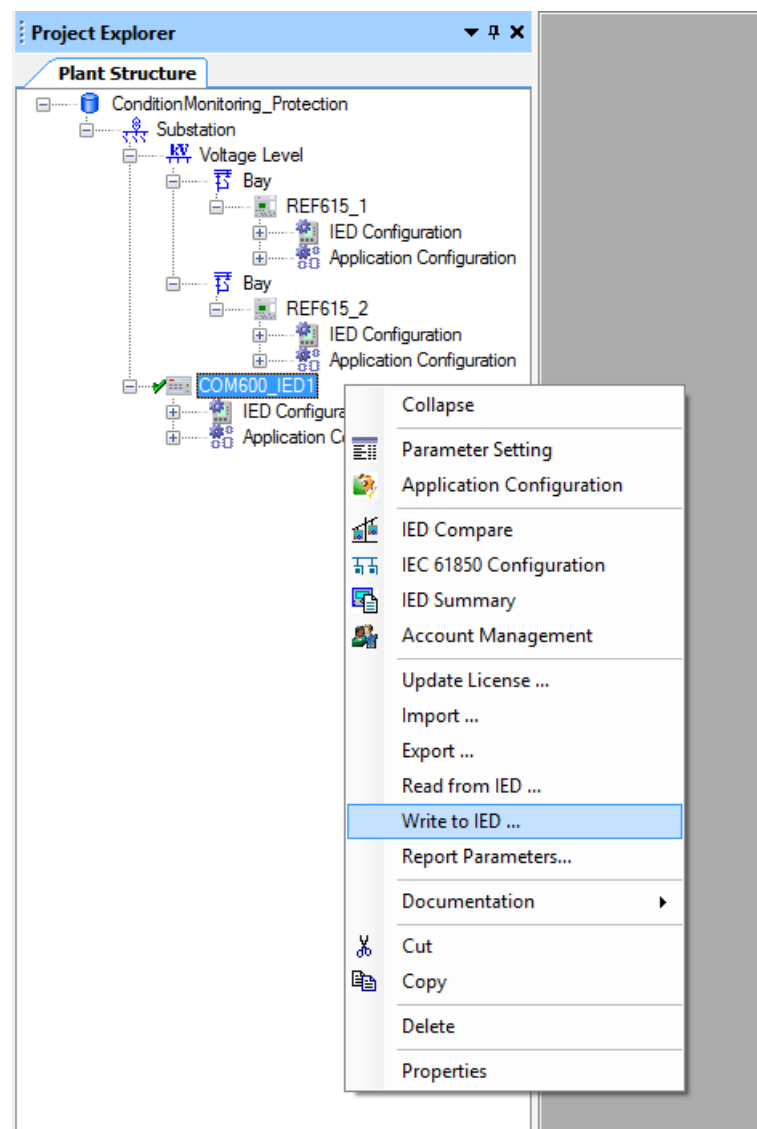
- Click **Finish** to finalize COM600 IED configuration.



COM600_IED_Wizard_Complete.png

Figure 3.6.2-7 COM600 Configuration Wizard Setup Complete Page in PCM600

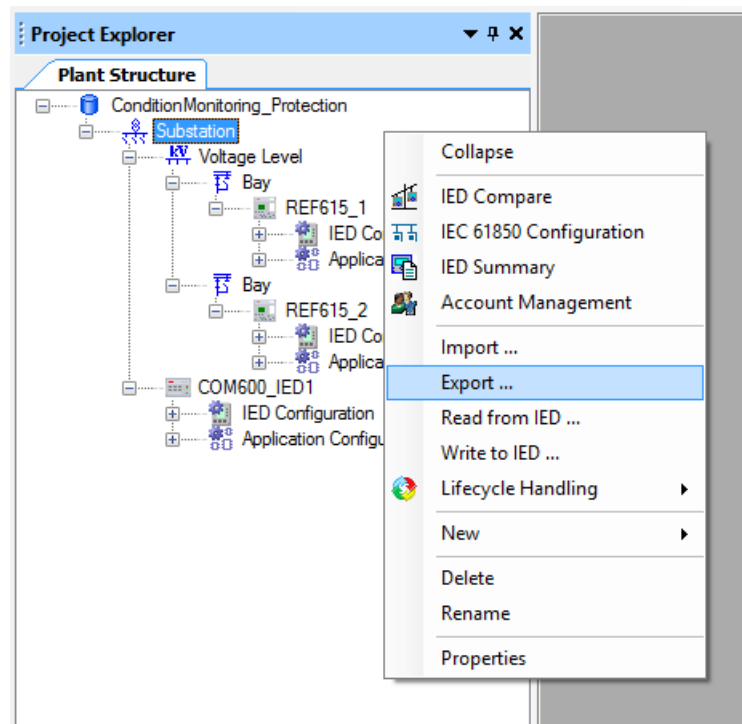
8. Right click COM600 and select **Write to IED** to write the COM600 IED configuration to COM600 device.



COM600_IED_Write_PCM600.png

Figure 3.6.2-8 COM600 Configuration writing in PCM600

- To export the SCD file from the Substation object, select **Export**. The exported SCD file is used in SAB600 to configure the OPC Server for condition monitoring and protection related applications.



COM600_IED_Export_PCM600.png

*Figure 3.6.2-9 COM600 Configuration exporting in PCM600***3.6.3.****Configuring condition monitoring and protection related applications in SAB600**

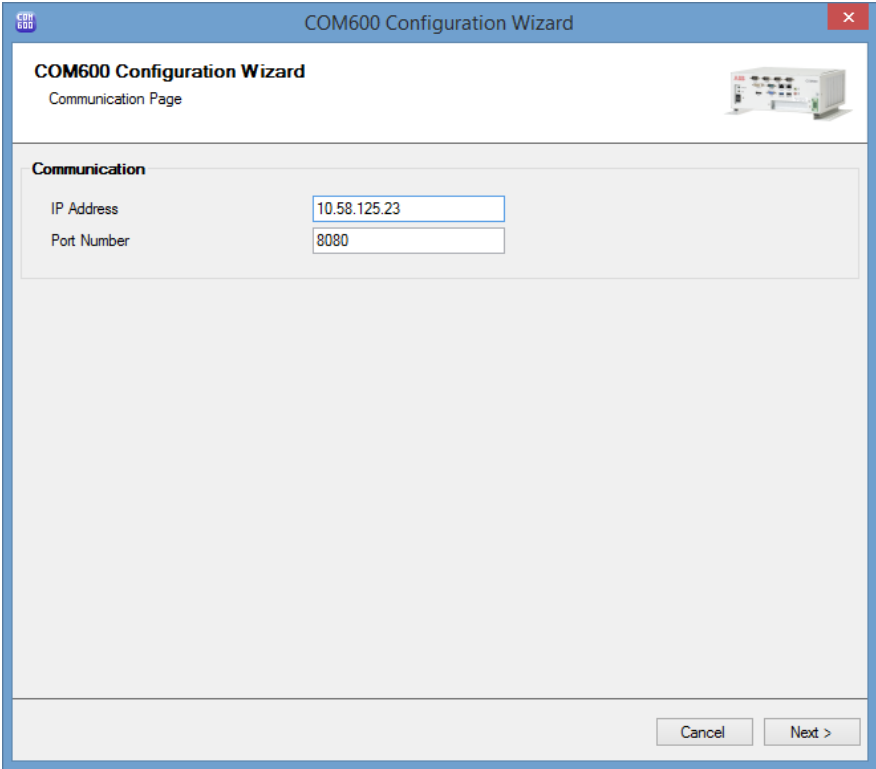
SAB600 is used for configuration of OPC Server for condition monitoring & protection related applications. This OPC Server configuration must be done through COM600 Configuration Wizard.



SCD file exported in PCM600 for condition monitoring and protection related applications cannot be imported using OPC Server object's SCL Import function because OPC Server parameters needed for condition monitoring and protection related applications are set correctly only in COM600 Configuration Wizard.

To configure condition monitoring & protection related applications in SAB600:

1. Create new project in SAB600.
2. fill IP address and Port number for COM600 device in COM600 Configuration Wizard.



COM600 Configuration Wizard

Communication Page

Communication

IP Address: 10.58.125.23

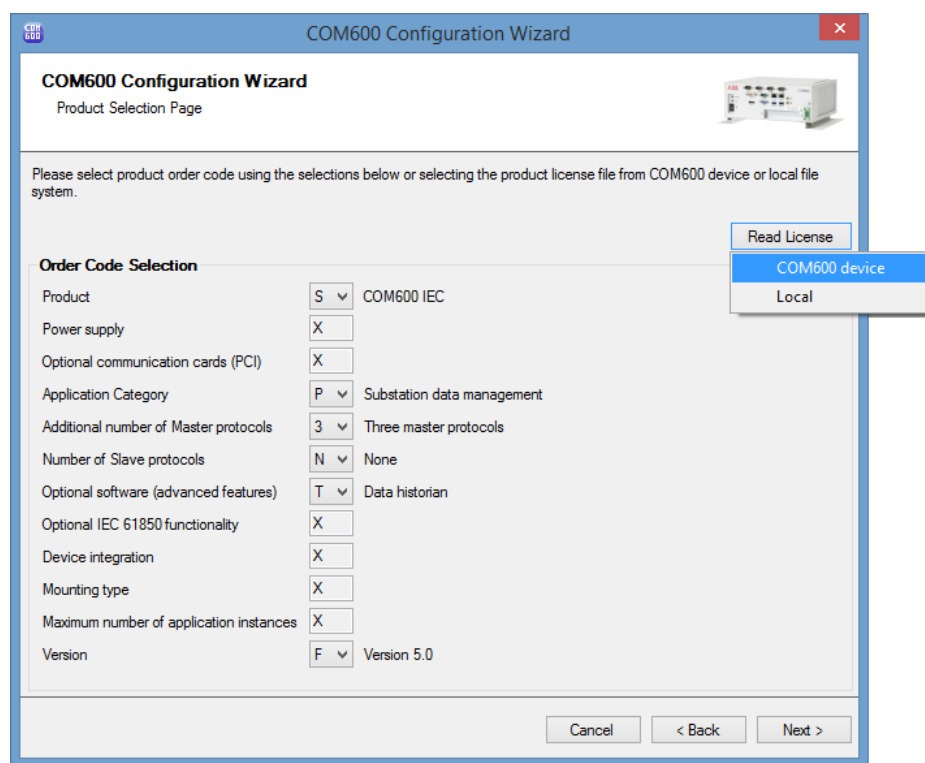
Port Number: 8080

Cancel Next >

SAB600_Wizard_Communication.png

Figure 3.6.3-1 COM600 Configuration Wizard Communication Page

3. Set order code of COM600 device or read it from COM600 device or from license file. Notice that the order code defined here should match to license in COM600 device.



SAB600_Wizard_OrderCode.png

Figure 3.6.3-2 COM600 Configuration Wizard Product Selection Page

4. Select SCD file exported from PCM600 to be imported as first IEC 61850 OPC Server.

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 Select File

Selected Subnetwork: WA1

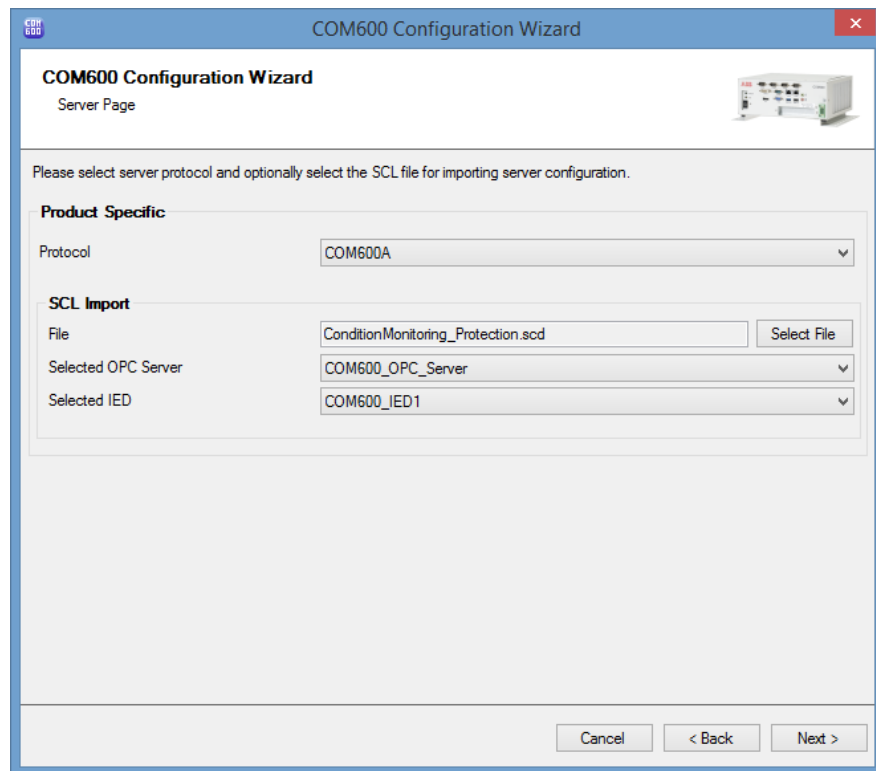
☐ Check Report Control Blocks for Client Identity

Cancel < Back Next >

SAB600_Wizard_Server.png

Figure 3.6.3-3 COM600 Configuration Wizard Server Page

5. Add Offside OPC server as underneath 61850 OPC server.
6. Select same SCD file exported from PCM600 to be imported as Product Specific Server.



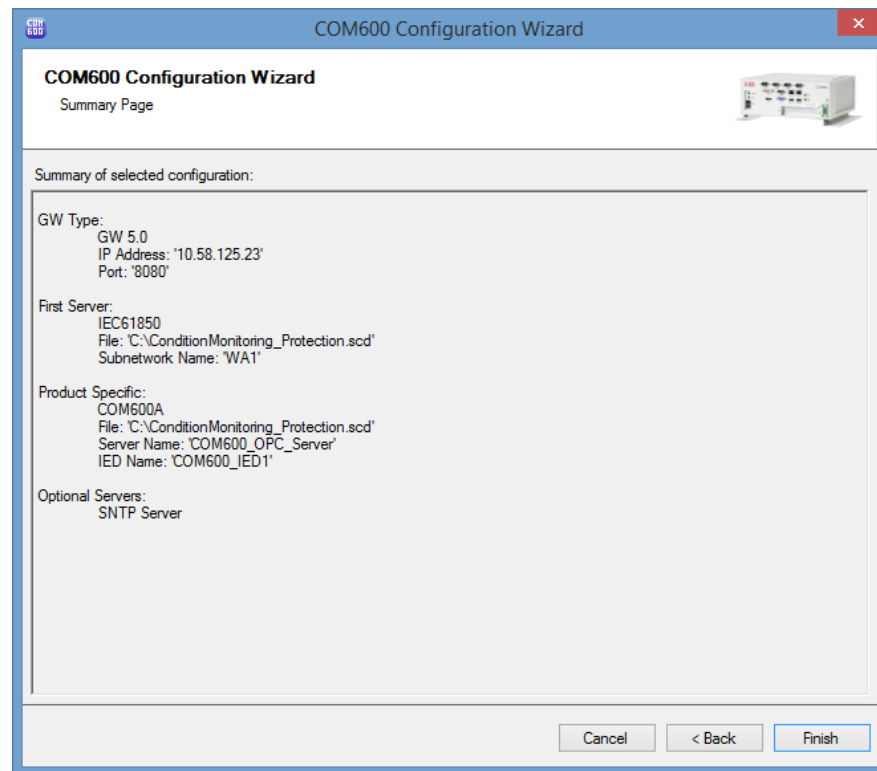
SAB600_Wizard_ProductSpecific.png

Figure 3.6.3-4 COM600 Configuration Wizard Product Specific Server Page

7. Click **Finish** to finalize COM600 configuration.



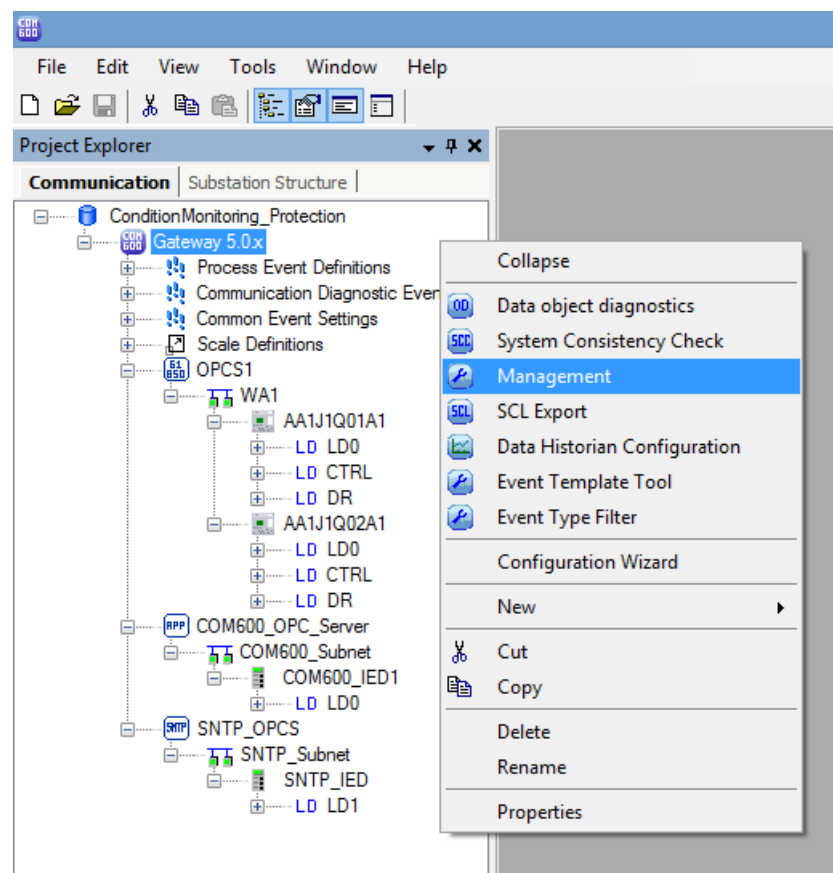
COM600 Configuration Wizard may contain other pages also, like other OPC Server and OPC Client pages, depending on COM600 order code but pages mentioned here are mandatory for configuring condition monitoring and protection related applications.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

SAB600_Wizard_Complete.png

Figure 3.6.3-5 COM600 Configuration Wizard Summary Page

8. Upload configuration to COM600 device using Management tool.



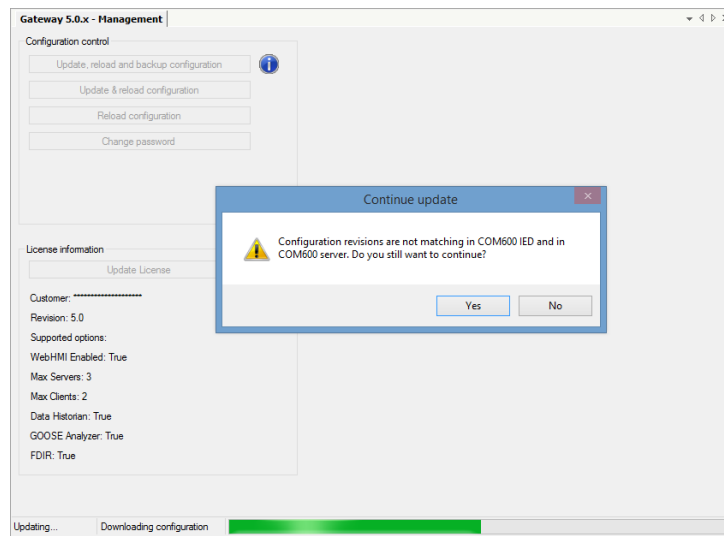
SAB600_Upload_Management.png

Figure 3.6.3-6 COM600 Configuration uploading to COM600 device

3.6.4. Consistency check of condition monitoring and protection related applications

The consistency of applications is checked when uploading a condition monitoring and protection related configuration to COM600 device in SAB600. If applications are not consistent, the message shown in Figure 3.6.4-1 is shown.

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_ConsistencyCheck.png

Figure 3.6.4-1 Condition monitoring and protection related applications consistency checking

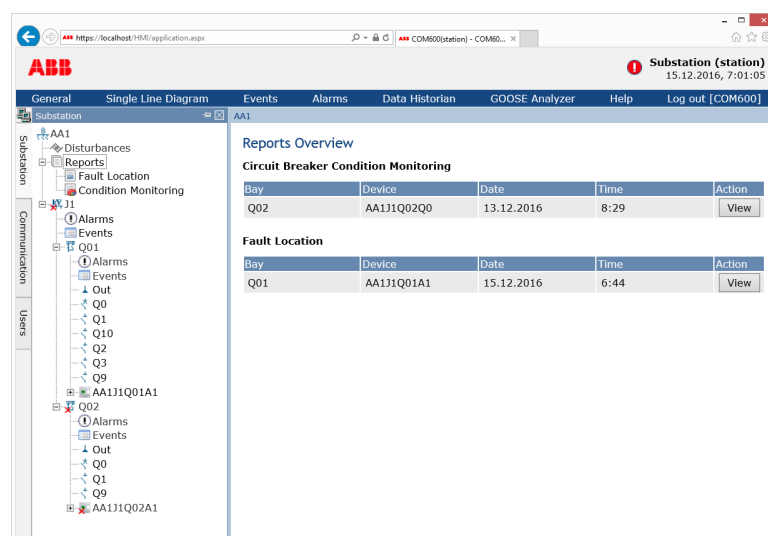
This means that configuration revisions in SCD file, imported to SAB600, and in COM600 device are not consistent. This can happen for example if SCD file is exported in PCM600 before configuration is written to COM600 device in PCM600, so configuration revision in COM600 device is higher than in SCD file.

3.6.5.

Viewing condition monitoring and protection related applications reports in COM600

To view the condition monitoring and protection related application reports in COM600 WebHMI, select **Reports** in the Substation tree.

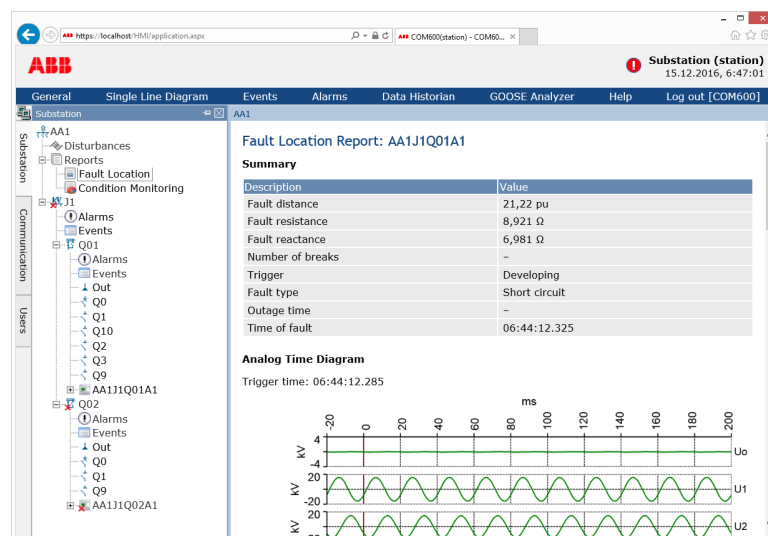
Master Protocols (Ethernet) and Applications Configuration and Operation Manual



COM600 WebHMI_reports.png

Figure 3.6.5-1 Condition monitoring and protection related applications reports

Click **View** to view the details of a specific report.



COM600 WebHMI_report_details.png

Figure 3.6.5-2 Condition monitoring and protection related applications report details

4. IEC 104 OPC server configuration

4.1. About this section

This section guides you in the configuration tasks required before you can start using the IEC104 OPC Server. For information on the IEC 61850 data modeling, refer to COM600 User's Manual.

Start SAB600 to 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**.

4.2. Overview of configuration

Before you can start using the IEC104 OPC Server, build and configure an object tree in SAB600 to define the Communication structure.

The possible objects are:

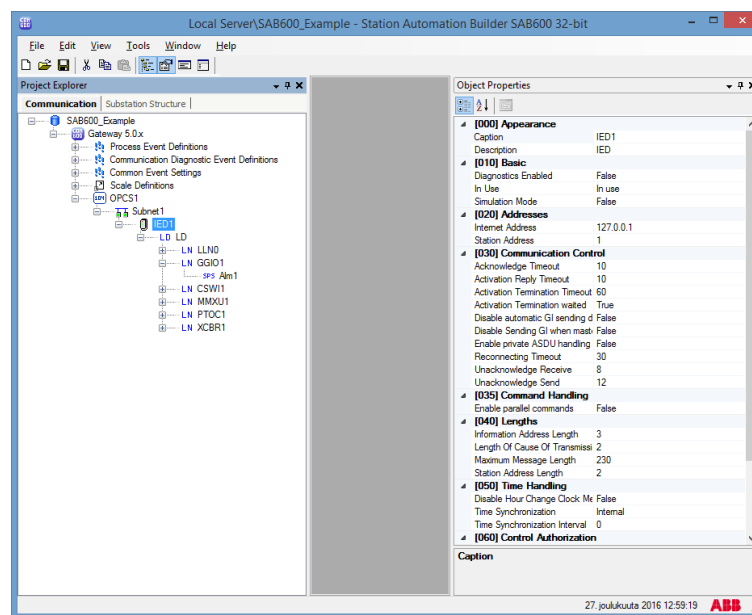
- Gateway
- IEC104 OPC Server
- IEC104 Channel
- IEC104 IED
- Logical Device objects
- Logical Node objects
- Data objects

Figure 4.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_IEC104_Example_View.png

Figure 4.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

First, build an object tree by adding objects to the object tree, see 4.3.1, General information about building object tree and 4.3.8, Adding data objects. Connectivity Packages for certain Protection and Control products usually contain preconfigurations and tools to facilitate the building of the object tree.

Figure 4.2-1 shows an example of how the object tree looks like after it has been built. In the example tree, you can see the IEC104 OPC Server object and its child objects like channels, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, configure them. See 4.4.1, General information about configuring objects.

Table 4.2-1 describes the objects shown in the object tree (Figure 4.2-1).

Table 4.2-1 IEC104 Server-related objects

Object	Description
IEC104 OPC Server	An object representing the IEC104 OPC Server.
IEC104 Channel	An object representing a physical communication channel. You can define up to three channels per OPC server.

IEC104 IED	An object representing a physical device. You should not have more than 30 devices per each channel.
Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A physical device consists of one or several LDs.
Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.
Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, for example, value, quality, and control.

4.3. Building object tree

4.3.1. General information about building object tree

The object tree is built in the Communication structure of the SAB600, see Figure 4.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree:

- You can right-click the object to which you want to add a child object. Select **New > Object type group > Object name**, for example, **New > IEC104 > IED**
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. IEC104 OPC Server
3. IEC104 Channel
4. IEC104 Device
5. Logical Device objects
6. Logical Node objects
7. Data objects

For information on building a substation structure, refer to COM600 HMI Configuration Manual.

4.3.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

4.3.3. Adding IEC104 OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding an IEC104 OPC Server object.

To add an IEC104 OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Add an IEC104 OPC Server object.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

Connectivity Packages for certain protection and control devices can also support other ways to build this structure, depending on the configuration of an individual device, for example device-related object types and wizards. Typically, Connectivity Packages include SCL description files which must be installed. For further information on these Connectivity Packages, see the Connectivity Package of a certain device in the product documentation.

4.3.4. Adding IEC104 Channel objects

To add an IEC104 Channel object:

1. Select an IEC104 OPC Server object and right-click it.
2. Add an IEC104 Channel object.
3. Rename the new object. The names of the IEC104 Channels have to be unique.

4.3.5. Adding IEC104 Device objects

To add an IEC104 Device object:

1. Select an IEC104 Channel object and right-click it.
2. Add an IEC104 Device object
3. Rename the new object. The names within IEC104 Devices within an IEC101 OPC Server have to be unique.

4.3.6. Adding Logical Device objects

To add a Logical Device object:

1. Select an IEC104 Device object and right-click it.
2. Add a Logical Device object.
3. Rename the new object. The names of the Logical Device objects have to be unique.



You should have at least one Logical Device object as a child object to each IEC104 physical device.

4.3.7. Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

4.3.8. Adding data objects

To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique.

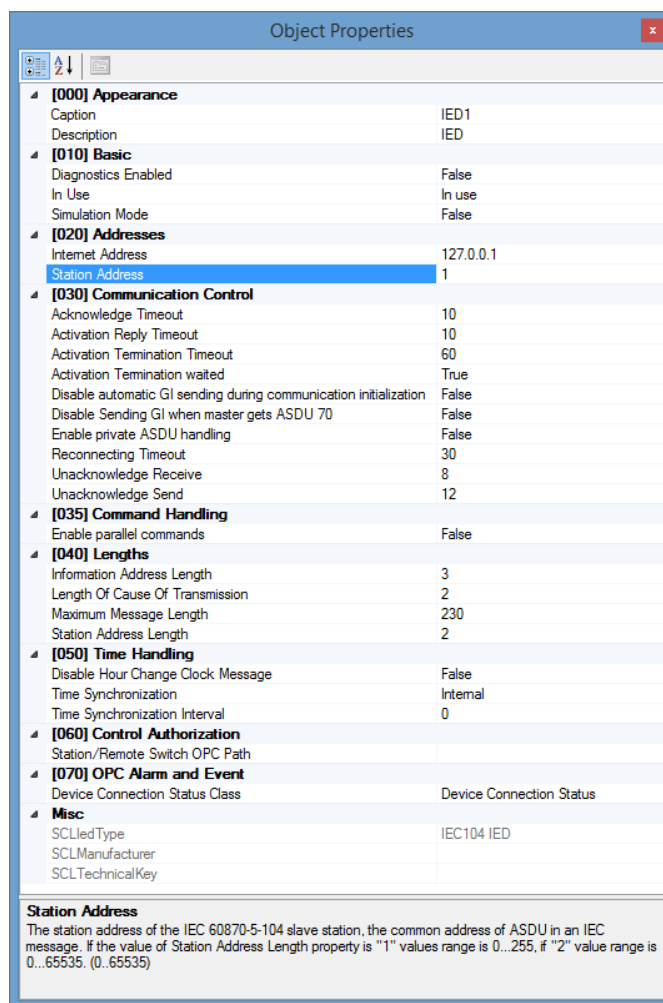
4.4. Configuring objects

4.4.1. General information about configuring objects

After the objects have been added, configure the object properties. Figure 4.4.1-1 shows an example of how to use SAB600 to configure the object properties for a IEC104 device.

To configure an object:

1. Select an object in the object tree of the communication structure.
 - a. The object properties appear now in the Object Properties window. The properties and their values can be viewed as shown in Figure 4.4.1-1



SAB600_IEC104_Object_Properties_Example.png

Figure 4.4.1-1 Example of object properties in the Objects Properties window

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

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

4.4.2. IEC104 OPC Server properties

Table 4.4.2-1 lists the IEC104 OPC Server properties, their value ranges, defaults, and descriptions. These properties are not configurable.

Table 4.4.2-1 IEC104 OPC Server properties

Name	Value or Value range/ Default	Description
Basic		
Prog ID AE	Default: None	Instance identification of diagnostic OPC alarm and event server.
Prog ID DA	Default: None	Instance identification of diagnostic OPC data access server.

4.4.3.**Configuring IEC104 Channel Properties**

The IEC104 Channel properties that can be configured and value ranges for them can be found in Table 4.4.3-1. The actual configuration by using SAB600 is performed as described in 4.4.1, General information about configuring objects.

Table 4.4.3-1 IEC104 Channel properties

Property / Parameter	Value or Value range/ Default	Description
Basic		
In Use	In use Not in use Default: In use	Specifies whether the channel is initially in use or not.
Protocol	IEC60870-5-104 Master	Protocol
Communication Control		
Communication Test Interval	0...65535 Default: 20	Time interval for communication test messages in seconds.
Connect Timeout	0...65535	Defines the timeout of the TCP Connect operation in milliseconds. This is meaningful especially in multidrop configurations, since no other device is served while the master is connecting to an unconnected device. The value depends on the network structure and load, device count, etc. The value should be defined together with the value of the IED's Reconnecting Timeout. Value 0 means that a blocking Connect is used. In this case, the used timeout value depends on the TCP/IP stack implementation.
Response Timeout	0...255 Default: 15	Timeout in seconds for send or test APDUs. If no response is received within this timeout, the connection will be closed.

Property / Parameter	Value or Value range/ Default	Description
Communication Port		
Local Address	Default: 127.0.0.1	The IP Address which is locally used in COM600.

4.4.4.**Configuring IEC104 Device properties**

Table 4.4.4-1 lists the configurable properties for IEC104 Device and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 4.4.1, General information about configuring objects.

Table 4.4.4-1 IEC104 Device properties

Name	Value/Value range	Description
Basic		
Diagnostics Enabled	True False Default: False	Specifies whether diagnostic AE events are sent for the station or not.
In Use	In use Not in use Default: In use	Controls if station communication is initially in use or not.
Simulation Mode	True False Default: False	Specifies whether the device is in simulation mode.
Addresses		
Internet Address	127.0.0.1	The IP address or the host name of the remote host. Port number can be configured by using semicolon (GW 4.0 or newer). For example, "127.0.0.1;8080".

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value/Value range	Description
Station Address	0...255 or 0...65535 Default: 1 The maximum value depends on the corresponding Station Address Length property value as follows: • when Station Address Length property value is 1, the value range for the Information Address is 0...255 and • when Station Address Length property value is 2, the value range for the Station Address is 0...65535	The station address of the IEC 60870-5-104 slave station, the common address of ASDU in an IEC message.
Communication Control		
Acknowledge Timeout	0...100 Default: 10	The timeout for sending an acknowledgement if the amount of APDUs defined by the Unacknowledge Receive property is not received.
Activation Reply Timeout	0...255 Default: 10	The maximum time the IEC master station waits for an activation confirmation message from the IEC slave.
Activation Termination Timeout	0...255 Default: 60	The maximum time the IEC master station waits for an activation termination message from the IEC slave.
Activation Termination waited	True False Default: True	The waiting of the activation termination message. With value false, the timer length defined with the CT attribute is not started. False is needed with some IEC60870-5-104 slave implementations, which do not send activation termination messages at all.

Name	Value/Value range	Description
Disable automatic GI sending during communication initialization	True False Default: False	Sending of the general interrogation command when the master gets the zero (OK) status. When this is false, a general interrogation command is always sent when the object status of the IEC master station gets the value zero, e.g. when set in use or after a suspension. When this is true, general interrogation is not sent automatically at zero status.
Disable Sending GI when master gets ASDU 70	True False Default: False	Sending of the general interrogation command when the master receives ASDU 70. When this is false, a general interrogation command is always sent when the end of initialization message (ASDU 70) is received from the IEC slave. When this is true, general interrogation is not sent automatically when receiving ASDU 70.
Enable private ASDU handling	True False Default: False	Private ASDU handling. When this is true, the private range ASDUs 146, 148 and 160 are handled as unknown ASDUs. Thus, the contents of these ASDUs are sent to a bitstream process object if the Unrecognized Command Handling is set to true.
Reconnecting Timeout	0...255 Default: 30	The interval of reconnecting attempt while communication is not established.
Unacknowledge Receive	0...65535 Default: 8	The maximum number of APDUs that are received without acknowledging them to the remote host.
Unacknowledge Send	0...65535 Default: 12	The maximum number of APDUs sent without receiving acknowledgment from the remote host.
Command Handling		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value/Value range	Description
Enable parallel commands	True False Default: False	Parallel commands. When this is true, the sending of parallel commands is possible. The control is returned immediately back to application and the return status of command must be checked from the command termination process object. When this is false, sending another command is not possible before the previous command has been completed or the confirmation timeout has occurred.
Lengths		
Information Address Length	1...3 Default: 3	The length of the information object address in octets. 1 = 0...255, 2 = 0...65535 3 = 0...16777215
Length of Cause of Transmission	1...2 Default: 2	The length of the Cause Of Transmission field in an IEC 60870-5-104 message.
Maximum Message Length	20...255 Default: 230	The maximum length of transmitted message in octets.
Station Address Length	1...2 Default: 2	The length of the station address in octets.
Time Handling		
Disable Hour Change Clock Message	True False Default: False	The hour transmission method of the events to the master. When this is false, the master gets the year, date, and hour from the slave as hourly clock synchronization (ASDU 103). When this is true, the master adds the year, date, and hour from its internal clock to the events. Minutes and seconds should be provided in time-tagged events by the slave.
Time Synchronization Interval	0...65535 Default: 0	Time synchronization interval in seconds.
OPC Alarm and Event		

Name	Value/Value range	Description
Device Connection Status Class	Device Connection Status	Device Connection Status Class is used for device connection status conditions.

4.4.5. Configuring data objects

4.4.5.1. Directional protection activation information (ACD)

Table 4.4.5.1-1 Configurable ACD properties for OPC servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACD	Common data class according to IEC 61850.
Addresses		
General Address	0...16777215 Default: 0	IEC Address for general indication.
Neutral Address	0...16777215 Default: 0	IEC Address for neutral (0 = Not in use).
Phase A Address	0...16777215 Default: 0	IEC Address for phase A (0 = Not in use).
Phase B Address	0...16777215 Default: 0	IEC Address for phase B (0 = Not in use).
Phase C Address	0...16777215 Default: 0	IEC Address for phase C (0 = Not in use).
OPC Alarm and Event		
Indication Event for General		Indication event used with general phase.
Indication Event for Neutral		Indication event used with neutral phase.
Indication Event for Phase A		Indication event used with phase A.
Indication Event for Phase B		Indication event used with phase B.
Indication Event for Phase C		Indication event used with phase C.

4.4.5.2.

Protection activation information (ACT)

Table 4.4.5.2-1 Configurable ACT properties for OPC client

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACT	Common data class according to IEC 61850.
Addresses		
General Index	0...65535 Default: 0	General Index
Neutral Index	0...65535 Default: 0	Neutral Index
Phase A Index	0...65535 Default: 0	Phase A Index
Phase B Index	0...65535 Default: 0	Phase B Index
Phase C Index	0...65535 Default: 0	Phase C Index
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.

Property/ Parameter	Value or Value range/ Default	Description
Send As Double Point	True False Default: False	Defines if a value is sent as double point.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

4.4.5.3. Analogue set point (APC)

Table 4.4.5.3-1 Configurable APC properties for OPC servers

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	APC	Common Data Class according to IEC 61850.
Addresses		
Command Address	0...16777215 Default: 0	IEC address for command.
Indication Address	0...16777215 Default: 0	IEC address for indication.
OPC Alarm and Event		
Command Tracking Event	Default: none	Command tracking event used with this data object.
Indication Event	Default: none	Indication event used with this data object.
Scale and Unit		
Command Scale	Default: none	Scale to be used when issuing command.

Property/Parameter	Value or Value range/ Default /Example	Description
Indication Scale	Default: none	Scale to be used with the indication value.

4.4.5.4. Binary counter reading (BCR)

Table 4.4.5.4-1 Configurable BCR properties for OPC servers

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	BCR	Common Data Class according to IEC 61850.
Addresses		
Indication Address	0...16777215 Default: 0	IEC address for indication.
Scale and Unit		
Multiplier	Default: None	Multiplier for counter.
Unit	Default: Dimensionless	Unit for counter.

4.4.5.5. Binary controlled step position information (BSC)

Table 4.4.5.5-1 Configurable BSC properties for OPC servers

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	BSC	Common Data Class according to IEC 61850.
Addresses		
Command Address	0...16777215 Default: 0	IEC address for command.
Position Address	0...16777215 Default: 0	IEC address for position.
OPC Alarm and Event		
Command Tracking Event		Command tracking event class used with this data object.
Indication Event		Indication event used with this data object.

4.4.5.6. Complex measured value (CMV)**Table 4.4.5.6-1 Configurable CMV properties for OPC servers**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	CMV	Common Data Class according to IEC 61850.
Sub Type		
Sub Type	MV Simple MV LIMITCHECK Default: MV Simple	Sub type description.
Addresses		
Indication Address	0...16777215 Default: 0	IEC address for indication.
Scale and Unit		
Multiplier	Default: Deka	Multiplier for measurement.
Scale	Default: None	Scale for measurement.
Unit	Default: Dimensionless	Unit for measurement.
Limit Value Supervision		
Max	Default: 20000	Maximum value for measurement.
Min	Default: 0	Minimum value for measurement.

4.4.5.7. Delta (DEL)**Table 4.4.5.7-1 Configurable DEL properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DEL	Common data class according to IEC 61850.
Sub-Type		
Sub Type	DEL Full DEL Simple Default: DEL Simple	Sub Type description.

Property/ Parameter	Value or Value range/ Default	Description
Addresses		
Phase AB Address	0...16777215 Default: 0	IEC Address for phase AB (0 = Not in use).
Phase BC Address	0...16777215 Default: 0	IEC Address for phase BC (0 = Not in use).
Phase CA Address	0...16777215 Default: 0	IEC Address for phase CA (0 = Not in use).
Scale and Unit		
Phase Multiplier	Default: Deka	Multiplier for phase.
Phase Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for phase.
Phase Unit	Default: Dimensionless	Unit for phase.
Limit Value Supervision		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

4.4.5.8.**Controllable double point (DPC)****Table 4.4.5.8-1 Configurable DPC properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPC	Common data class according to IEC 61850.
Sub-Type		
Sub Type	IEC style command Indication only IEC style command	Object subtype.
Addresses		
Command Address	0...16777215 Default: 8	IEC address for command.

Property/ Parameter	Value or Value range/ Default	Description
DMCD-Type	Single command Double command Default: Single command	DMCD-Type to be used.
Indication Address	0...16777215 Default: 0	IEC address for indication.
Selected Address	0...65535 Default: 0	IEC Address for selected.
OPC Alarm and Event		
Command Tracking Event	SwitchOperation TapchangerSingleParallelOperation	Command tracking event used with this data object.
Indication Event		Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication.

4.4.5.9.**Device Name Plate (DPL)****Table 4.4.5.9-1 Configurable DPL properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPL	Common data class according to IEC 61850.
Vendor		
Vendor	ABB	A simple text string, describing the vendor.
Hardware Revision		
Hardware Revision	0	A simple text string, describing the hardware revision.
Software Revision		
Software Revision	0	A simple text string, describing the software revision.
Serial Number		

Property/ Parameter	Value or Value range/ Default	Description
Serial Number	0	A simple text string, describing the serial number.
Location		
Location	0	A simple text string, describing the location.

4.4.5.10.**Double point status (DPS)****Table 4.4.5.10-1 Configurable DPS properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPS	Common data class according to IEC 61850.
Addresses		
Indication Address	0...16777215 Default: 0	IEC address for indication.
OPC Alarm and Event		
Indication Event		Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication

4.4.5.11.**Controllable integer status (INC)****Table 4.4.5.11-1 Configurable INC properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INC	Common data class according to IEC 61850.
Addresses		

Property/ Parameter	Value or Value range/ Default	Description
Command Address	0...16777215 Default: 0	IEC address for command.
Indication Address	0...16777215 Default: 0	IEC address for indication.
OPC Alarm and Event		
Command Tracking Event	SwitchOperation TapchangerSingleParallelOperation	Command tracking event used with this data object.
Indication Event		Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication.

4.4.5.12.**Integer status (INS)****Table 4.4.5.12-1 Configurable INS properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850.
Addresses		
Indication Address	0...16777215 Default: 0	IEC address for indication.
OPC Alarm and Event		
Indication Event		Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication.

4.4.5.13. Integer controlled step position information (ISC)**Table 4.4.5.13-1 Configurable ISC properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ISC	Common data class according to IEC 61850.
Addresses		
Command Address	0...16777215 Default: 0	IEC address for command.
Position Address	0...16777215 Default: 0	IEC address for position.
OPC Alarm and Event		
Command Tracking Event	DirectOperate TapchangerAutoManualOperation Default: None	Command tracking event used with this data object.
Indication Event		Indication event used with this data object.

4.4.5.14. Logical Node Name Plate (LPL)**Table 4.4.5.14-1 Configurable LPL properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	LPL	Common data class according to IEC 61850.
Vendor		
Vendor	ABB	A simple text string, describing the vendor.
Software Revision		
Software Revision		A simple text string, describing the software revision.
Description		
Description		A simple text string, describing the description for logical node.

4.4.5.15. Measured value (MV)**Table 4.4.5.15-1 Configurable MV properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	MV	Common data class according to IEC 61850.
Sub-Type		
Sub Type	MW LIMITCHECK MV Simple Default: MV Simple	Object subtype.
Addresses		
Indication Address	0...16777215 Default: 0	IEC address for indication.
Scale and Unit		
Multiplier	Default: Deka	Multiplier for measurement.
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement.
Unit	Default: Dimensionless	Unit for measurement.
Limit Value Supervision		
Max	Default: 20000	Maximum value for measurement.
Min	Default: 0	Minimum value for measurement.

4.4.5.16. Controllable single point (SPC)**Table 4.4.5.16-1 Configurable SPC properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850.
Sub-Type		

Property/ Parameter	Value or Value range/ Default	Description
Sub Type	Indication only IEC style command Default: IEC style command	Object subtype.
Addresses		
Command Address	0...16777215 Default: 0	IEC address for command.
DirectOperate	True False Default: False	DirectOperate description.
DMCD-Type	Single command Double command	DMCD-Type to be used.
Indication Address		IEC address for indication.
OPC Alarm and Event		
Command Tracking Event	DirectOperate TapchangerAutoManualOperation Default: None	Command tracking event used with this data object.
Indication Event	Default: None	Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement.

4.4.5.17. Single point status (SPS)

Table 4.4.5.17-1 Configurable SPS properties for OPC client

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	Common data class according to IEC 61850.
Addresses		

Property/ Parameter	Value or Value range/ Default	Description
Indication Address	0...16777215 Default: 0	IEC address for indication.
OPC Alarm and Event		
Indication Event		Indication event used with this data object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement.

4.4.5.18.**WYE****Table 4.4.5.18-1 Configurable WYE properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	WYE	Common data class according to IEC 61850.
Sub-Type		
Sub Type	WYE Full WYE Simple Default: WYE Simple	Object subtype.
Addresses		
NetAddress	0...16777215 Default: 0	NetAddress description.
Neutral Address	0...16777215 Default: 0	IEC Address for neutral (0 = Not in use).
Phase A Address	0...16777215 Default: 0	IEC Address for phase A (0 = Not in use).
Phase B Address	0...16777215 Default: 0	IEC Address for phase B (0 = Not in use).
Phase C Address	0...16777215 Default: 0	IEC Address for phase C (0 = Not in use).

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/ Parameter	Value or Value range/ Default	Description
ResAddress	0...16777215 Default: 0	ResAddress description.
Scale and Unit		
Net Multiplier	Default: Deka	Multiplier for net.
Net Scale	Default: None	Scale for net.
Net Unit	Default: Dimensionless	Unit for net.
Neutral Multiplier	Default: Deka	Multiplier for neutral.
Neutral Scale	Default: None	Scale for neutral.
Neutral Unit	Default: Dimensionless	Unit for neutral.
Phase Multiplier	Default: Deka	Multiplier for phase.
Phase Scale	Default: None	Scale for phase.
Phase Unit	Default: Dimensionless	Unit for phase.
Res Multiplier	Default: Deka	Multiplier for res.
Res Scale	Default: None	Scale for res.
Res Unit	Default: Dimensionless	Unit for res.
Net Limit Value Supervision		
Net Max Limit	Default: 20000	Max limit for net.
Net Min Limit	Default: 0	Min limit for net.
Phase Limit Value Supervision		
Max	Default: 20000	Maximum value for measurement.
Min	Default: 0	Minimum value for measurement.
Res Limit Value Supervision		
Res Max Limit	Default: 20000	Max limit for res.
Res Min Limit	Default: 0	Min limit for res.
Neutral Limit Value Supervision		
Max Limit	Default: 20000	Max limit for neutral.
Min Limit	Default: 0	Min limit for neutral.

5. DNP3 LAN/WAN OPC server configuration

5.1. About this section

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

Start Station Automation Builder 600 (later referred to as SAB600). Then either open a project where at least one DNP OPC server is present, or where a new DNP OPC server will be added. You can also open and name a new project to include one or more DNP OPC servers.

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**.

5.2. Overview of configuration

Before you can start using the DNP OPC Server, build and configure an object tree in Station Automation Builder 600 (SAB600) to define the Communication structure within the Gateway object. An object tree contains the following branches:

- Gateway
- DNP LAN OPC Server
- DNP LAN Channel
- Logical Device objects
- Logical Node objects
- Data objects

After you have added the necessary objects to the object tree in the communication structure, configure them.

The configuration work can basically be divided into two separate tasks:

1. building the object tree, and
2. configuring object properties.

First, build an object tree. This is done by adding objects to the object tree, see 5.3.1, General information about building object tree.

In the object tree communication view, you can see the DNP OPC Server object and its child objects such as channels, devices, and data objects. After you have added the necessary objects to the object tree in the communication structure, configure them, see 5.4.1, General information about configuring objects.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

5.3. Building object tree

5.3.1. General information about building object tree

The object tree is built in the Communication structure of SAB600. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. DNP LAN OPC Server
3. DNP LAN Channel
4. Logical Device objects
5. Logical Node objects
6. Data objects

For information on building a substation structure, see COM600 HMI Configuration Manual.

5.3.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

5.3.3. Adding DNP OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding a DNP OPC Server object.

To add a DNP OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Add a DNP OPC Server object.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

Connectivity Packages for certain protection and control devices can also support other ways to build this structure, depending on the configuration of an individual device, for example device-related object types and wizards. Typically, Connectivity Packages include SCL description files which must be installed. For further information on these Connectivity Packages, see the Connectivity Package of a certain device in the product documentation.

5.3.4. Adding DNP Channel objects

After the server object has been successfully added, you can continue building the object tree by adding DNP Channel objects.

To add DNP Channel object:

1. Select DNP OPC Server object.
2. Right-click the DNP OPC Server object.
3. Add DNP Channel object.
4. Rename the new object. The names of the DNP Channel objects have to be unique.

5.3.5. Adding DNP IED objects

After adding a subnetwork you can add device objects.

To add a Device object:

1. Select a Subnetwork object.
2. Add a DNP IED object.
3. Rename the new object. The names of the devices within a DNP channel have to be unique.

The maximum number of devices per each subnetwork is 30.

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 **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

5.3.6. Adding Logical Device objects

To add a Logical Device object:

1. Select a DNP IED object and right-click it.
2. Add a Logical Device object.
3. Rename the new object. The names of the Logical Device objects have to be unique.



Each physical device must have at least one Logical Device object as a child object.

5.3.7. Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

5.3.8. Adding data objects

To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique.

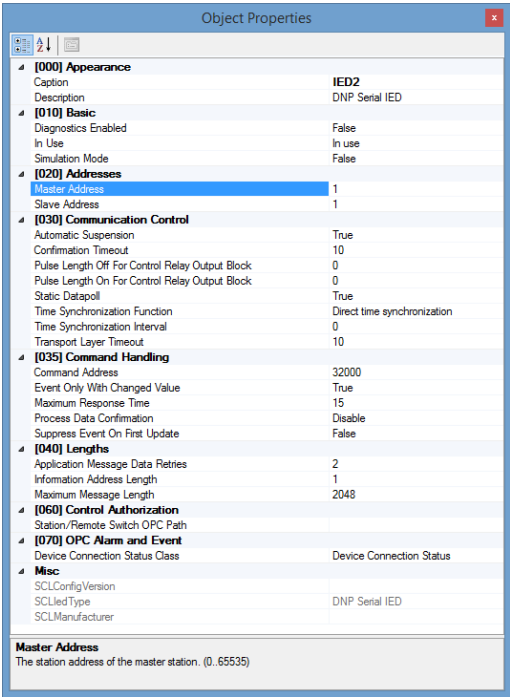
5.4. Configuring objects

5.4.1. General information about configuring objects

After the objects have been added, configure the object properties. Figure 5.4.1-1 shows an example of how to use SAB600 to configure the object properties for DNP OPC Server.

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. The properties and their values can be viewed as shown in Figure 5.4.1-1.



SAB600_DNP_Object_Properties_Example.png

Figure 5.4.1-1 Example of object properties in the Objects Properties window

- 3. Select the property you want to configure. Depending on the property value type, configure by:
 - Selecting a predefined value from a drop-down menu, or
 - Entering a text string or a numerical value in a text field.

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

5.4.2.**Configuring DNP OPC Server LAN Channel properties**

The DNP OPC Server LAN Channel properties that can be configured and value ranges for them can be found in Table 5.4.2-1. The actual configuration by using SAB600 is performed as described in 5.4.1, General information about configuring objects.

Table 5.4.2-1 DNP LAN Channel properties

Property/Parameter	Value or Value range/Default	Description
Basic		
In use	In Use Not In Use Default: In Use	Specifies if channel is in use or not.
Communication Port		
Local Address	127.0.0.1	IP address of Ethernet interface in COM600.
Communication Control		
Check Connection Request	True False Default: True	Specifies if incoming connection requests are checked.
Connection timeout	0 to 65535 Default: 500	Maximum time in milliseconds of the TCP connect operation.
Connection Type	TCP/IP UDP/IP Default: TCP/IP	Connection protocol used.
Disable Reset of the Remote Link	True False Default: False	Specifies if Reset of the Remote Link is disabled. Disabling this configuration is useful when the link initialization is not needed in both directions or if it is possible that this message collides with other transmitted frames from the IEDs sharing the channel.
Header Timeout	0 to 65535 Default: 2000	Maximum wait time in milliseconds within which the first byte of a link layer response should have been received.
Link Layer Confirmations Enabled	Not In Use In Use Default: In Use	Specifies whether the link layer confirmations are in use.

Property/Parameter	Value or Value range/Default	Description
Maximum Message Length	50 to 249 Default: 230	Maximum length of a data fragment.
Maximum Random Delay for Retransmission	0 to 65535 Default: 0	Delay in milliseconds between retransmissions.
Only One Active Application Layer Command Enabled	True False Default: False	Specifies if only one application layer command (e.g. poll) may be active at any time. Enabling this configuration is useful when the communication hardware does not support collision detection. The poll intervals defined with the topic configuration tool define the intervals the IED is tried to be polled. When multiple IEDs are connected, the actual polling interval may be longer. When multiple simultaneous application layer commands are allowed, the command's transmission is not related to the state of the other IEDs connected to the same communication channel. This mode of operation can be used in systems with collision detection.
Polling Period	0 to 255 Default: 10	Data polling period.
ResponseTimeout	0 to 255 Default: 15	The time in milliseconds that DNP3.0 link waits for received message.
Test Function for Link	True False Default: False	Specifies if 'Test Function for Link' is enabled.
Test Function for Link Interval	0 to 65535 Default: 20	Delay in milliseconds between test function of link commands. If value is zero (0), the test function of link command is not sent.

5.4.3. Configuring DNP LAN Device

Table 5.4.3-1 lists the configurable properties for DNP Devices and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 5.4.1, General information about configuring objects.

Table 5.4.3-1 DNP LAN IED properties

Name	Value or Value range/ Default	Description
Basic		
Diagnostics enabled	True False Default: False	Diagnostics Enabled
In Use	In use Not in use Default: In use	Controls whether the device communication is initially in use or not.
Simulation Mode	True False Default: False	Specifies whether the device is in simulation mode or not.
Event only with changed value	True False	If True, then no events are generated for IED if the new value and quality are the same as the current value and quality.
Suppress event on first update	True False	If True, no event is generated when the item tag is updated for the first time.
Addresses		
Internet Address	127.0.0.1	Defines the internet address of this IED. Port number can be configured by using semicolon (GW 4.0 or newer). For example, "127.0.0.1;8080".
Master Address	0 to 65535 Default: 1	Station address of the master station.
Slave Address	0 to 65535 Default: 1	Station address of the DNP 3.0 slave station.
Communication Control		
Allocating Application	0 to 32 Default: 0	Allocating application of the station.
Automatic Suspension	True False Default: False	When true, consequent application layer response timeouts set the station to suspended state and the corresponding process objects are set to invalid state.
Event Offset	0 to 65535 Default: 0	Address offset between the process objects for static data and events with the same DNP 3.0 address (index).

Name	Value or Value range/ Default	Description
Pulse Length Off For Control Relay Output	0 to 65535 Default: 0	Then length of pulse in milliseconds used in the output commands of the control relay.
Pulse Length On For Control Relay Output	0 to 65535 Default: 0	Then length of pulse in milliseconds used in the output commands of the control relay.
Static Datapoll	True False Default: True	When True, a static data (class 0) poll request is always sent when the object status of the DNP master station gets the value zero (0).
Time Synchronization Function	Direct time synchronization Delay compensated	Function code for Time Synchronization.
Time Synchronization Interval	0 to 65535 Default: 0	Time in seconds between device time updates.
Command Handling		
Maximum Response Time	0 to 600 Default: 15	Maximum time in seconds that the master station waits for a response to a command request from the slave.
Process Data Confirmation	Default: Disable	Defines application level confirmation handling.
Reply Timeout	0 to 65 Default: 10	Maximum time in seconds that the DNP 3.0 application layer waits for a reply from the slave.
Lengths		
Information Address Length	1 to 3 Default: 2	Length of data object address used in DNP 3.0 messages.
Control Authorization		
Station/Remote Switch OPC Path	User defined	OPC path of the station remote switch position used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name E.g. GW#ABB.MOD-BUS_SERIAL_OPC_DA_Server.Instance[1]#Channel[1\IED1\LD1\GGIO1\loc

5.4.4. Configuring Logical Device properties**Table 5.4.4-1 Logical Device properties**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name e.g. GW#ABB.Mod-bus_Serial_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc

5.4.5. Configuring Logical Node properties**Table 5.4.5-1 Configuring Logical Node properties**

Property/Parameter	Value or Value range/ Default	Description
Basic		
LLN0		
Logical Node Class	LLN0	Logical node class
GGIO1		

Property/Parameter	Value or Value range/ Default	Description
Logical Node Class	ANCR, ARCO, ATCC, AVCO, LPHD, CALH, CCGR, CILO, CPOW, CSWI, GAPC, GGIO, GSAL, IARC, IHMI, ITCI, ITMI, MDIF, MHAI, MHAN, MMTR, MMXN, MMXU, MSQI, MSTA, PDIF, PDIR, PDIS, PDOP, PDUP, PFRC, PHAR, PHIZ, PIOC, PMRI, PMSS, POPF, PPAM, PSCH, PSEF, PTEF, PTOC, PTOF, PTOV, PTRC, PTTR, PTUC, PTUV, PUPF, PTUF, PVOC, PVPH, PZSU, RDRE, RADR, RBDR, RDRS, RBRF, RDIR, RFLO, RPSB, RREC, RSYN, SARC, SIMG, SIML, SPDC, XCBR, XSWI, TCTR, TVTR, YEFN, YLTC, YPSH, YPTR, ZAXN, ZBAT, ZBSH, ZCAB, ZCAP, ZCON, ZGEN, ZGIL, ZLIN, ZMOT, ZREA, ZRRC, ZSAR, ZTCF, ZTCR Default: GGIO	Logical node class
Logical Node Instance	LN Inst Range is from 1 - 2147483647	Logical node instance number
Logical Node Prefix	Default: None	Prefix for logical node

5.4.6. Configuring data objects for internal OPC data

5.4.6.1. General information about configuring data objects for Internal OPC Data

Internal data objects describe internal status information of an OPC server, for example whether the connection between the OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

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

5.4.6.2. Integer status (INS)**Table 5.4.6.2-1 Configurable INS properties**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

5.4.6.3. Controllable single point (SPC) for OPC internal data**Table 5.4.6.3-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
61850-Type	SPC	61850-Type
Sub-Type		
Sub Type		Sub type of object
Addresses		
Control Coil	0...65535	Coil address for the control. Coil (0X reference) address range 1...9999. Address 0 equals to no information available.
Indication Coil/Input	0...65535	Coil or input address for the indication. Coil = 0X reference address range 1...9999 or input = 1X reference address range 10001...19999. Address 0 equals to no information available.

5.4.6.4. Single point status (SPS)**Table 5.4.6.4-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		
Item Tag Path	Default: Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes/Diagnostic counters/Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name/Attributes/Diagnostic counters/Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

5.4.7. Configuring data objects**5.4.7.1. General information about configuring data objects**

Object properties of the data objects are listed in the following tables.

When configuring address values for DNP IED data objects, the valid address range is 0 - 65535. If the value is -1, then the address is not available.

5.4.7.2.

Directional protection activation information (ACD)*Table 5.4.7.2-1 Configurable ACD properties for OPC client*

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACD	Common data class according to IEC 61850.
Addresses		
General Index	0...65535 Default: 0	General Index
Neutral Index	0...65535 Default: 0	Neutral Index
Phase A Index	0...65535 Default: 0	Phase A Index
Phase B Index	0...65535 Default: 0	Phase B Index
Phase C Index	0...65535 Default: 0	Phase C Index
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.

Property/ Parameter	Value or Value range/ Default	Description
Send As Double Point	True False Default: False	Defines if a value is sent as double point.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.3.**Protection activation information (ACT)****Table 5.4.7.3-1 Configurable ACT properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	ACT	Common data class according to IEC 61850.
Addresses		
General Index	0...65535 Default: 0	General Index
Neutral Index	0...65535 Default: 0	Neutral Index
Phase A Index	0...65535 Default: 0	Phase A Index
Phase B Index	0...65535 Default: 0	Phase B Index
Phase C Index	0...65535 Default: 0	Phase C Index

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/ Parameter	Value or Value range/ Default	Description
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.
Send As Double Point	True False Default: False	Defines if a value is sent as double point.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.4. Analog set point (APC)**Table 5.4.7.4-1 Configurable APC properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	APC	Common data class according to IEC 61850.
Addresses		
Control Index	-1...65535 Default: -1	Control index.
Indication Index	-1...65535 Default: -1	Indication index.
Data Class Specific		
Control Object	Default: Analog control output block (41).	Object number for control.
Control Variation	Default: 2	Variation for control.
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Control Scale	Default: None	Scale used with the control value.
Indication Scale	Default: None	Scale used with the indication value.

5.4.7.5. Binary counter reading (BCR)**Table 5.4.7.5-1 Configurable BCR properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	BCR	Common data class according to IEC 61850.
Addresses		
Indication Index	-1 to 65535 Default: -1	Indication index.

Property/ Parameter	Value or Value range/ Default	Description
Data Class Specific		
Counter Object	Binary counter (20) Frozen counter (21) Default: Binary counter (20)	Object number for counter.
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850

5.4.7.6. Binary controlled step position information (BSC)

Table 5.4.7.6-1 Configurable BSC properties

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	BSC	Common data class according to IEC 61850.
Addresses		
Control Index	-1 to 65535 Default: -1	Control index.
Indication Index	-1 to 65535 Default: -1	Indication index.
Data Class Specific		
Control Code Qualifier	Momentary Latched Pulsed Default: Momentary	Qualifier for control.
Control Variation	0 to 65535	Variation for control
Operate	Direct Operate Select Before Operate Default: Direct Operate	Specifies using two-step, select-before-operate method for issuing control request or not.
Scale and Unit		
Scale	Default: None	Scale used with this type.

5.4.7.7. Complex measured value (CMV)**Table 5.4.7.7-1 Configurable CMV properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	CMV	Common data class according to IEC 61850.
Addresses		
Index	-1 to 65535 Default: -1	Indication index.
Sub-Type		
Subtype	Simple	MV sub-type
Data Class Specific		
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Phase Number of Decimals	Default: 0	Specifies the number of decimals shown in HSI. (0 to 9)
Scale	Default: None	Scale used with this type.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850
Limit Value Supervision		
Max		Maximum value for measurement
Min		Minimum value for measurement

Table 5.4.7.7-2 Additional configurable properties for Sub-Type Limit Check

Property/ Parameter	Value or Value range/ Default	Description
Sub-Type	Limit Check	MVSubTypeDescription
Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.

Property/ Parameter	Value or Value range/ Default	Description
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.

5.4.7.8.**Delta (DEL)****Table 5.4.7.8-1 Configurable DEL properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DEL	Common data class according to IEC 61850.
Addresses		
Phase AB Index	-1 to 65535 Default: -1	Phase AB Index
Phase BC Index	-1 to 65535 Default: -1	Phase BC Index
Phase CA Index	-1 to 65535 Default: -1	Phase CA Index
Sub-Type		
Subtype	DEL Simple	DEL Subtype
Data Class Specific		
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Phase Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Phase Number of Decimals	0 to 9 Default: 0	Specifies the number of decimals shown in HSI.
Scale	Default: None	Scale used with this type.

Property/ Parameter	Value or Value range/ Default	Description
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850

Table 5.4.7.8-2 Additional configurable properties for Sub-Type Limit Check

Property/ Parameter	Value or Value range/ Default	Description
Sub-Type	DEL Full	Sub-type of current data object
Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.

5.4.7.9.**Controllable double point (DPC)****Table 5.4.7.9-1 Configurable DPC properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPC	Common data class according to IEC 61850.
Addresses		
Control Index	0...65535 Default: 0	Control index.
Indication Index	0...65535 Default: 0	Indication index.
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.

Property/ Parameter	Value or Value range/ Default	Description
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Control Object	Default: Binary control output block (12).	Object number for control.
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Send As Single Point	True False Default: False	Defines if a value is sent as single point.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.10.**Device Name Plate (DPL)****Table 5.4.7.10-1 Configurable LPL properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
61850 Data Object	DPL	61850 Data Object

Property/ Parameter	Value or Value range/ Default	Description
Data Class Specific		
Hardware revision	1.0	Text string describing hardware revision.
Location	User defined Default: Vaasa	Text string describing location.
Serial number	User defined. Default: ABB123456789	Text string describing serial number.
Software Revision	Default: 1.0	Text string describing software revision.
Vendor	ABB	Text string describing vendor.

5.4.7.11.**Double point status (DPS)****Table 5.4.7.11-1 Configurable DPS properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPS	Common data class according to IEC 61850.
Addresses		
Indication Index	0...65535 Default: 0	Indication index.
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/ Parameter	Value or Value range/ Default	Description
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Send As Single Point	True False Default: False	Defines if a value is sent as single point.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.12.

Controllable integer status (INC)

Table 5.4.7.12-1 Configurable INC properties

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INC	Common data class according to IEC 61850
Addresses		
Control Index	-1 to 65535 Default: -1	Control index.
Index	-1 to 65535 Default: -1	Index.
Data Class Specific		
Control Object	Default: Analog control output block (41).	Object number for control.

Property/ Parameter	Value or Value range/ Default	Description
Control Variation	0 to 65535 Default: 2	Variation for control.
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Scale	Default: None	Scale used with this type.

5.4.7.13. Integer status (INS)**Table 5.4.7.13-1 Configurable INS properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850.
Addresses		
Index	-1 to 65535 Default: -1	Index.
Data Class Specific		
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Scale	Default: None	Scale used with this type.

5.4.7.14. Integer controlled step position information (ISC)**Table 5.4.7.14-1 Configurable ISC properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		

Property/ Parameter	Value or Value range/ Default	Description
Common Data Class	ISC	Common data class according to IEC 61850.
Addresses		
Control Index	-1 to 65535 Default: -1	Control index.
Indication Index	-1 to 65535 Default: -1	Indication index.
Data Class Specific		
Control Object	Default: Analog control output block (41).	Object number for control.
Control Variation	0 to 65535 Default: 2	Variation for control.
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Scale	Default: None	Scale used with this type.

5.4.7.15.**Logical Node Name Plate (LPL)****Table 5.4.7.15-1 Configurable LPL properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
61850 Data Object	LPL	61850 Data Object
Data Class Specific		
Serial number	User defined. Default: ABB123456789	Text string describing serial number.
Software Revision	Default: 1.0	Text string describing software revision.
Vendor	ABB	Text string describing vendor.

5.4.7.16. Measured value (MV)**Table 5.4.7.16-1 Configurable MV properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	MV	Common data class according to IEC 61850.
Addresses		
Index	-1 to 65535 Default: -1	Indication index.
Sub-Type		
Subtype	Simple	MV Sub-type
Data Class Specific		
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Data object number for indication.
Scale and Unit		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Phase Number of Decimals	Default: 0	Specifies the number of decimals shown in HSI. (0..9)
Scale	Default: None	Scale used with this type
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850
Limit Value Supervision		
Max		Maximum value for measurement
Min		Minimum value for measurement

Table 5.4.7.16-2 Additional configurable properties for Sub-Type MV Limit Check

Property/ Parameter	Value or Value range/ Default	Description
Sub-Type	MV Limit Check	MVSubTypeDescription
Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.

Property/ Parameter	Value or Value range/ Default	Description
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.

5.4.7.17.

Controllable single point (SPC)*Table 5.4.7.17-1 Configurable SPC properties for OPC client*

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850.
Addresses		
Control Index	0...65535 Default: 0	Control index.
Indication Index	0...65535 Default: 0	Indication index.
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Control Object	Default: Binary control output block (12).	Object number for control.
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.

Property/ Parameter	Value or Value range/ Default	Description
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.
Send As Double Point	True False Default: False	Defines if a value is sent as double point.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.18.**Single point status (SPS)****Table 5.4.7.18-1 Configurable SPS properties for OPC client**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	Common data class according to IEC 61850
Addresses		
Indication Index	0...65535 Default: 0	Indication index.
Common		
Class	Class 0...3 Default: Class 0	Class of ASDU. Data sent from the slave to the master can be assigned to four classes. Data in class 1 is sent with higher priority than data in class 3.

Property/ Parameter	Value or Value range/ Default	Description
Update Rate	0...65535 Default: 0	Maximum update rate of signal state changes between the OPC server and client in milliseconds. 0 means that the server sends all the changes to the client.
Data Class Specific		
Indication Object	Binary input (1, 2) Binary output (10) Default: Binary input (1, 2)	Object number for indication.
Send All Updates	True False Default: False	Defines if all changes in value are sent to the master.
Send As Double Point	True False Default: False	Defines if a value is sent as double point.
Send As Inverse Value	True False Default: False	Defines if the value of a message is inverse.
Time And Type Variation	Send as static data (always without time) Event without time Event with time Event with relative time (valid for binary inputs only) Default: Event with time	Specifies the type of the timestamp a message is sent with.

5.4.7.19.**WYE****Table 5.4.7.19-1 Configurable WYE properties**

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	WYE	Common data class according to IEC 61850.
Sub-Type		

Property/ Parameter	Value or Value range/ Default	Description
Subtype	WYE Simple	Subtype of WYE
Addresses		
Neutral Index	-1 to 65535 Default: -1	Neutral Index
Phase A Index	-1 to 65535 Default: -1	Phase A Index
Phase B Index	-1 to 65535 Default: -1	Phase B Index
Phase C Index	-1 to 65535 Default: -1	Phase C Index
Net Index	-1 to 65535 Default: -1	Net Index
Res Index	-1 to 65535 Default: -1	Res Index
Data Class Specific		
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Neutral Multiplier	Default: Deka	Specifies the multiplier for the current SI unit.
Neutral Scale	Default: None	Scale for neutral used with this data object.
Neutral Unit	Default: Dimensionless	Unit for Neutral phase.
Neutral Number of Decimals	0 to 9 Default: 0	Specifies the number of decimals shown in HSI.
Phase Multiplier	Default: Deka	Specifies the multiplier for the current SI unit.
Phase Scale	Default: None	Scale for phases used with this data object.
Phase Unit	Default: Dimensionless	Unit for phases.
Phase Number of Decimals	0 to 9 Default: 0	Specifies the number of decimals shown in HSI.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/ Parameter	Value or Value range/ Default	Description
Net Multiplier	Default: Deka	Specifies the multiplier for the current SI unit.
Net Scale	Default: None	Scale for Net used with this data object.
Net Unit	Default: Dimensionless	Unit for Net.
Net Number of Decimals	0 to 9	Specified the number of decimals shown in HSI.
Res Multiplier	Default: Deka	Specifies the multiplier for the current SI unit.
Res Scale	Default: None	Scale for Res used with this data object.
Res Unit	Default: Dimensionless	Unit for Res.
Res Number of Decimals	0 to 9	Specified the number of decimals shown in HSI.
Phase Limit Value Supervision		
Max	Default: 20000	Maximum value for measurement.
Min	Default: 0	Minimum value for measurement.
Neutral Limit Value Supervision		
Max	Default: 20000	Maximum value for measurement.
Min	Default: 0	Minimum value for measurement.

Table 5.4.7.19-2 Additional configurable properties for Sub-Type WYE Full

Property/ Parameter	Value or Value range/ Default	Description
Sub-Type	WYE Full	Subtype of WYE.
Phase Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.
Neutral Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.

Property/ Parameter	Value or Value range/ Default	Description
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.

Table 5.4.7.19-3 Additional configurable properties for Sub-Type WYE Full

Property/ Parameter	Value or Value range/ Default	Description
Sub-Type	WYE Full	Subtype of WYE
Net Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.
Res Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created when value crosses the limit.

5.4.8. Event definitions

For information on event definitions, refer to COM600 User's Manual.

5.4.9. Using scales

For information on using scales, refer to COM600 User's Manual.

5.4.10. Controllable Enumerated Status (ENC)**Table 5.4.10-1 Configurable ENC properties**

Property/Parameter	Value or Value range/Default	Description
Basic		
Common Data Class	ENC	Common data class according to IEC 61850.
Addresses		
Control Index	-1..65535 Default: -1	Control index.
Indication Index	-1..65535 Default: -1	Indication Index.
Data Class Specific		
Control Object	Default: Analog control output block (41).	Object number for control.
Control Variation	Default: 2	Variation for control.
Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Scale	Default: None	Scale used with the control value.

5.4.11. Enumerated Status (ENS)**Table 5.4.11-1 Configurable ENS properties**

Property/Parameter	Value or Value range/Default	Description
Basic		
Common Data Class	ENS	Common data class according to IEC 61850.
Addresses		
Indication Index	-1 to 65535 Default: -1	Indication Index.
Data Class Specific		

Indication Object	Analog input (30, 32) Analog output (40) Default: Analog input (30, 32)	Object number for indication.
Scale and Unit		
Scale	Default: None	Scale used with the control value.

6. MODBUS TCP server configuration

6.1. About this section

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

Start SAB600 to 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**.

6.2. Overview of configuration

Before you can start using the Modbus OPC Server, you need to build and configure an object tree in SAB600 to define the Communication structure.

The possible objects are:

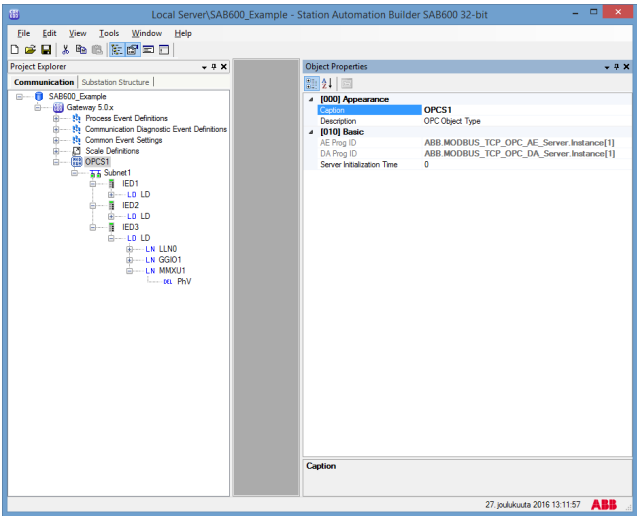
- Gateway
- Modbus OPC Server
- Modbus Subnetwork
- Modbus IED
- Logical Device objects
- Logical Node objects
- Data objects

Figure 6.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

For information about configuring parameters for Parameter Setting in WebHMI, see COM600 HMI Configuration Manual.



SAB600_ModbusTCP_Example_View.png

Figure 6.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

First, you need to build an object tree. This is done by adding objects to the object tree, see 6.3.1, General information about building object tree.

Figure 6.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the Modbus OPC Server object and its child objects like channels, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 6.4.1, General information about configuring objects.

Table 6.2-1 describes the objects shown in the object tree (Figure 6.2-1).

Table 6.2-1 Modbus OPC Server related objects

Object	Description
Modbus OPC Server	An object representing the Modbus OPC Server.
Modbus Subnetwork	Object representing a physical subnetwork.
Modbus IED	An object representing a physical device. You should not have more than 30 devices per each channel.
LON Star Coupler	An object representing a physical device that connects several protection and control devices together.
LON Clock Master	An object representing a physical device that is used for synchronization of the LON network.

LSG Device (LON SPA Gateway)	An object representing a physical device that connects SPA Devices to the LON Network.
LON SPA Device (with LSG Device object only)	An object representing a physical SPA protection and control device.
LON SPA Rack (with LSG Device object only)	Collection of SPA modules in one physical rack.
LON SPA Module (with LON SPA Rack object only)	An object representing a physical SPA protection and control module.
SPA Rack	Collection of SPA modules in one physical rack.
SPA Module (with SPA Rack object only)	An object representing a physical SPA protection and control module placed in a relay rack, for example, SPACOM modules.
Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A physical device consists of one or several LDs.
Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.
Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, e.g. value, quality, and control.

6.3. Building object tree

6.3.1. General information about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 6.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example **New > Modbus Serial > Modbus Serial OPC Server**.
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. Modbus TCP OPC Server
3. Modbus TCP Subnetwork
4. Modbus TCP IED
5. Logical Device objects

- 6. Logical Node objects
- 7. Data objects

For information on building a substation structure, refer to COM600 HMI Configuration Manual.

6.3.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

6.3.3. Adding Modbus OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding a Modbus OPC Server object.

To add a Modbus OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Add a Modbus OPC Server object.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

Connectivity Packages for certain protection and control devices can also support other ways to build this structure, depending on the configuration of an individual device, for example device-related object types and wizards. Typically, Connectivity Packages include SCL description files which must be installed. For further information on these Connectivity Packages, see the Connectivity Package of a certain device in the product documentation.

6.3.4. Adding Modbus Subnetwork objects

After the server object has been successfully added, you can continue building the object tree by adding Modbus subnetwork objects.

To add a Modbus subnetwork object:

1. Select a Modbus OPC Server object.
2. Right-click the Modbus OPC Server object.
3. Add a Modbus subnetwork object.
4. Rename the new object. The names of the Modbus subnetwork objects have to be unique.

6.3.5. Adding Modbus IED objects

After adding a subnetwork you can add device objects.

To add a Device object:

1. Select a Subnetwork object.
2. Add a Modbus IED object.
3. Rename the new object. The names of the devices within a Modbus channel have to be unique.

The maximum number of devices per each subnetwork is 30.

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 **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

6.3.6. Adding Logical Device objects

To add a Logical Device object:

1. Add a Modbus TCP IED object and right-click it.
2. Add a Logical Device object.
3. Rename the new object. The names of the Logical Device objects have to be unique.



Each TCP physical device must have at least one Logical Device object as a child object.

6.3.7. Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

6.3.8. Adding data objects

To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique.

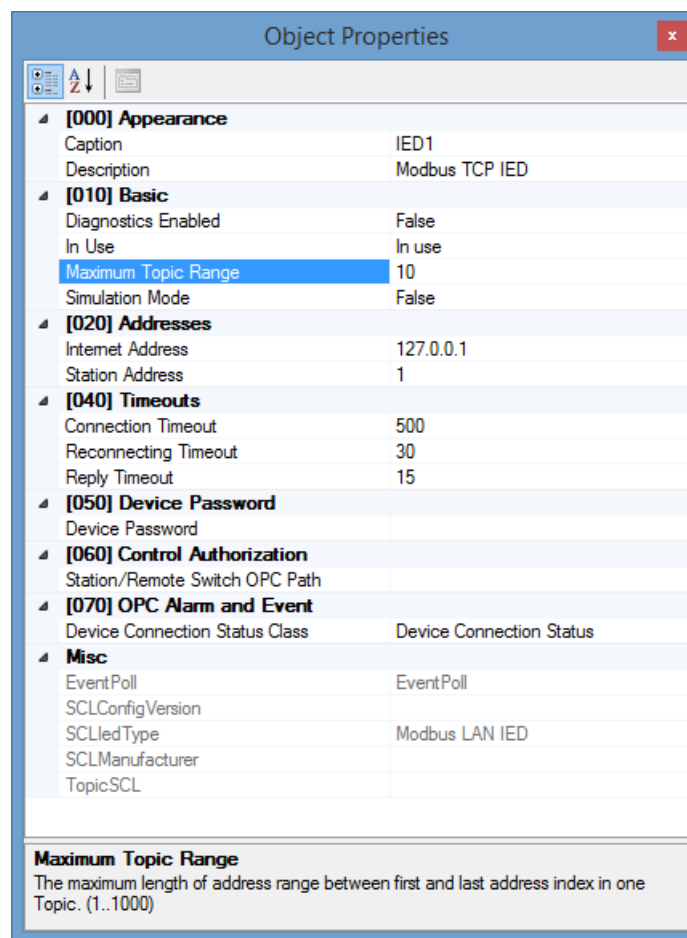
6.4. Configuring objects

6.4.1. General information about configuring objects

After the objects have been added, configure the object properties. Figure 6.4.1-1 shows an example of how to use SAB600 to configure the object properties for Modbus OPC Server.

To configure an object:

1. Select an object in the object tree of the communication structure.
 - The object properties appear now in the Object Properties window. The properties and their values can be viewed as shown in Figure 6.4.1-1



SAB600_ModbusTCP_Object_Properties_Example.png

Figure 6.4.1-1 Example of object properties in the Objects Properties window

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

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

6.4.2. Configuring Modbus TCP OPC Server properties

Table 6.4.2-1 OPC Server properties

Property/Parameter	Value or Value range/Default	Description
Basic		
AE Prog ID		Instance identification of diagnostic OPC alarm and event server.

Property/Parameter	Value or Value range/Default	Description
DA Prog ID		Instance identification of diagnostic OPC data access server.

6.4.3.**Configuring Modbus OPC Server Subnetwork properties**

The Modbus OPC Server subnetwork properties that can be configured and value ranges for them can be found in Table 6.4.3-1. The actual configuration by using SAB600 is performed as described in 6.4.1, General information about configuring objects.



Each Modbus OPC Server node of the system must have a unique subnet/node address.

Table 6.4.3-1 Modbus Subnetwork properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
In use	In Use Not In Use Default: In Use	Specifies if channel is in use or not.
Local Address	127.0.0.1	Specifies the IP address used by communication line.
Communication Control		
Buffer Pool Size	0..255 Default: 12	Specifies the number of message buffers reserved for the line.
Response Timeout	0..65535 Default: 2	Specifies the time (in seconds) that the Modbus 3.0 link waits for the end of the received message.
Header Timeout	0..65535 Default: 700	Specifies the maximum waiting time (in milliseconds within which the first byte of a link layer response should have been received).
Polling		
Poll Delay	0..65535 Default: 40	Delay between polling messages in milliseconds.

Property/Parameter	Value or Value range/ Default	Description
Polling Period	0..255 Default: 3	The polling frequency of suspended stations. 1 = each polling cycle, 2 = Every 2nd polling cycle, etc.

6.4.4. Configuring Modbus TCP Device

Table 6.4.4-1 lists the configurable properties for Modbus Devices and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 6.4.1, General information about configuring objects.

Table 6.4.4-1 Modbus TCP IED properties

Name	Value or Value range/ Default	Description
Basic		
Diagnostics enabled	True False Default: False	Diagnostics Enabled
In Use	In use Not in use Default: In use	Controls whether the device communications initially in use or not.
Maximum Topic Range	1..1000 Default: 10	The maximum length of address between first and last address index in one Topic.
Simulation Mode	True False Default: False	Specifies whether the device is in simulation mode or not.
Addresses		
Internet Address	127.0.0.1	Defines the internet address of this IED. Port number can be configured by using semicolon (GW 4.0 or newer). For example, "127.0.0.1;8080".
Station Address	0..255 Default: 1	Modbus address of the device.
Timeouts		
Connection Timeout	0..3600 Default: 500	Defines the timeout.

Name	Value or Value range/ Default	Description
Reconnecting Timeout	0..3600 Default: 30	Defines the timeout before attempting reconnection.
Reply Timeout	0..3600 Default: 15	Specifies the maximum time (in seconds) for waiting a reply to a command. If the time is exceeded, the command is considered as failed.
Control Authorization		
Station/Remote Switch OPC Path		OPC path of the station remote switch position used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name E.g. GW#ABB.MOD-BUS_LAN_OPC_DA_Server.Instance[1]#Channel[1]\IED1\LD1\GGIO1\loc
OPC Alarm and Event		
Device Connection Status Class	Device Connection Status	Device Connection Status Class

Table 6.4.4-2 Modbus Serial IED REF542+ properties

Name	Value or Value range/ Default	Description
Basic		
Diagnostic Enabled	True False Default: False	Diagnostics Enabled
In Use	In use Not in use Default: In use	In Use
Maximum Topic Range	1..1000 Default: 10	The maximum length of address range between first and last address index in one Topic.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value or Value range/ Default	Description
Running Mode	0..65535 Default: 0	If the value of this property is 0, the topics which are configured to have polling interval = 0, are not requested in any situation. This is the default mode. If this bit is 1, the topics which are configured to have polling interval = 0, are requested in communication startup situation and when the GI command is issued.
Simulation Mode	True False Default: False	Defines if this device is in simulation mode or not.
Addresses		
Station Address	0..255 Default: 1	The station address of the master station.
Timeouts		
Reply Timeout	0..3600 Default: 15	The maximum time (in milliseconds) that the station waits for a reply.
Control Authorization		
Station/Remote Switch OPC Path		OPC path of the station remote switch position used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name E.g. GW#ABB.MOD-BUS_SERIAL_OPC_DA_Server.Instance[1]#Channel[1]\IED1\LD1\GGIO1\loc
Alarm and Event		
Device Connection Status Class	Device Connection Status	Device Connection Status Class
SPAEvent Topic		
Deadband	0..65535 Default: 0	SPA Event Deadband

Name	Value or Value range/ Default	Description
First Index	RCEFileNumber2 RCEFileNumber5 RCEFileNumber11 RCEFileNumber12 Default: RCEFileNumber2	First index of addresses.
Interval	0..65535 Default: 100	Interval in milliseconds.
Disturbance Recording		
DisturbanceRecorderDirectory		Disturbance Recorder Directory
DisturbanceRecorderEnabled	True False Default: True	Disturbance Recorder Enabled
DisturbanceRecorderMaxTotal-FileSize	0..65535 Default: 1024	Disturbance Recorder Max Total File Size
DisturbanceRecorderNotifica-tionAddr	0..65535 Default: 0	Disturbance Recorder Notifica-tion Address
DisturbanceRecorderPolling-Period	0..65535 Default: 0	Disturbance Recorder Polling Period
TimeSynch Topic		
Deadband	0..65535 Deafault: 100	Deadband in milliseconds.
First Index	RCEFileNumber7	First index of address.
Interval	0..65535 Default: 100	Interval in milliseconds.

6.4.5. Configuring Logical Device properties

Table 6.4.5-1 Logical Device properties

Property/Parameter	Value or Value range/ Default	Description
Basic		

Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name e.g. GW#ABB.Mod-bus_LAN_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc
--------------------------------	--	---

6.4.6.

Configuring Logical Node properties

Table 6.4.6-1 Configuring Logical Node properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
LLN0		
Logical Node Class	LLN0	Logical node class
GGIO1		
Logical Node Class	ANCR, ARCO, ATCC, AVCO, LPHD, CALH, CCGR, CILO, CPOW, CSWI, GAPC, GGIO, GSAL, IARC, IHMI, ITCI, ITMI, MDIF, MHAI, MHAN, MMTR, MMXN, MMXU, MSQI, MSTA, PDIF, PDIR, PDIS, PDOP, PDUP, PFRC, PHAR, PHIZ, PIOC, PMRI, PMSS, POPF, PPAM, PSCH, PSEF, PTEF, PTOC, PTOF, PTOV, PTRC, PTTR, PTUC, PTUV, PUPF, PTUF, PVOC, PVPH, PZSU, RDRE, RADR, RBDP, RDRS, RBRF, RDIR, RFLO, RPSB, RREC, RSYN, SARC, SIMG, SIML, SPDC, XCBR, XSWI, TCTR, TVTR, YEFN, YLTC, YPSH, YPTR, ZAXN, ZBAT, ZBSH, ZCAB, ZCAP, ZCON, ZGEN, ZGIL, ZLIN, ZMOT, ZREA, ZRRC, ZSAR, ZTCF, ZTCR Default: GGIO	Logical node class
Logical Node Instance	LN Inst Range is from 1 - 2147483647	Logical node instance number

Property/Parameter	Value or Value range/ Default	Description
Logical Node Prefix	Default: None	Prefix for logical node

6.4.7. Configuring data objects for internal OPC data

6.4.7.1. General information about configuring data objects for Internal OPC Data

Internal data objects describe internal status information of an OPC server, for example whether the connection between the Modbus OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

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

6.4.7.2. Integer status (INS)

Table 6.4.7.2-1 Configurable INS (for OPC internal data) properties for OPC Servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

6.4.7.3. Controllable single point (SPC) for OPC internal data**Table 6.4.7.3-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
61850-Type	SPC	61850-Type
Sub-Type		
Sub Type		Sub type of object
Addresses		
Control Coil	0...65535	Coil address for the control. Coil (0X reference) address range 1...9999. Address 0 equals to no information available.
Indication Coil/Input	0...65535	Coil or input address for the indication. Coil = 0X reference address range 1...9999 or input = 1X reference address range 10001...19999. Address 0 equals to no information available.

6.4.7.4. Single point status (SPS)**Table 6.4.7.4-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		

Item Tag Path	Default: Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

6.4.8. Configuring data objects

6.4.8.1. Directional protection activation information

Table 6.4.8.1-1 Configurable ACD properties for OPC Servers with Modbus IED Device

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACD	61850-Type
Sub Type	BIT	Sub type for the object
Addresses		
General Coil/Input	0 to 65535 Default: 0	Coil or input address for General information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for Neutral information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase A Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase A information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase B Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase B information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase C Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase C information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

6.4.8.2.**Protection activation information (ACT)****Table 6.4.8.2-1 Configurable ACT properties for OPC Servers with Modbus IED Device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACT	61850-Type
Sub Type	BIT	Sub Type for the object
Addresses		
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for General information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Neutral Coil/Input	0 to 65535 Default: 0	Coil or input address for Neutral information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase A Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase A information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase B Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase B information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Phase C Coil/Input	0 to 65535 Default: 0	Coil or input address for Phase C information. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

6.4.8.3.**Analog set point (APC)**

Analog set point (APC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER_BASED_CONTROL
- DPU_REGISTER_BASED_CONTROL

Table 6.4.8.3-1 Configurable APC properties for OPC servers with Modbus device, subtype REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	APC	61850-Type
Subtype	REGISTERED_BASE_CONTROL	
Addresses		
Format	Float MSW first Float MSW last Default: Float MSW first	Data format of the control and the indication.
Indication Register	0-65535 Default: 0	Holding register address for indication. Holding register (4X reference) address range 40001-49999. Address 0 equals no information available.
Set Point Register	0-65535 Default: 0	Holding register address for the set point. Holding register (4X reference) address range 40001-49999. Address 0 equals no information available.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Scale and unit		
Control Scale	Default: None.	Scale to be used with the control value.
Indication Scale	Default: None.	Scale to be used with the indication value.

Table 6.4.8.3-2 Configurable APC properties for OPC servers with Modbus device, subtype DPU_REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	APC	61850-Type
Subtype	REGISTER_BASE_CONTROL	
Addresses		
Execute Register	0...65535 Default: 0	6x register address for execute command. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Format	Float MSW first Float MSW last Default: Float MSW first	Data format of the control and the indication.
Indication Register	0-65535 Default: 0	6x register address for indication register. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Set Point Register	0-65535 Default: 0	6x register address for set point register. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Password		
Address for password 1	0-65535 Default: 0	6x register address for password 1. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Address for password 2	0-65535 Default: 0	6x register address for password 2. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Password		Four character password. Default is empty string.
Scale and Unit		
Control Scale	Default: None.	Scale to be used with the control value.
Indication Scale	Default: None.	Scale to be used with the indication value.

6.4.8.4. Binary counter reading (BCR)**Table 6.4.8.4-1 Configurable BCR properties for OPC servers with Modbus IED device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BCR	61850-Type
Addresses		
Counter Register	0 to 65535 Default: 0	Holding or input register address for the counter value. Holding register (4X reference) address range 40001..49999 or input register (3X reference) address range 30001..39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
Scale and Unit		
Multiplier	Default: No multiplier	Multiplier
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850.

6.4.8.5. Binary controlled step position information (BSC)

Binary Controlled Step Position Information (BSC) for OPC server with Modbus IED supports two subtypes:

- COILED_BASE_CONTROL
- DPU_REGISTER_BASE_CONTROL

Table 6.4.8.5-1 Configurable BSC properties for OPC servers with Modbus device, subtype COILED_BASE_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BSC	61850-Type
Subtype	COILED_BASE_CONTROL	
Addresses		
Higher Coil	0 to 65535 Default: 0	Coil address for the higher command. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Lower Coil	0 to 65535 Default: 0	Coil address for the lower command. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Position Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the value.
Position Register	0 to 65535 Default: 0	Holding or input register address for the position. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Stop Coil	0 to 65535 Default: 0	Coil address for the stop command. Coil (0X reference) address range 1 to 9999. 0 equals to no information available.
Scale and Unit		
Scale for position	Default: None	Scale used with position information.

Table 6.4.8.5-2 Configurable BSC properties for OPC servers with Modbus device, subtype DPU_REGISTER_BASE_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BSC	61850-Type
Subtype	DPU_REGISTER_BASE_CONTROL	
Addresses		
Execute Register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Higher register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Lower register	0 to 65535	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Address for password 1	0 to 65535 ASCII – 2 Characters rightmost Digits	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Address for password 2	0 to 65535 ASCII – 2 Characters rightmost Digits	6x extended register. Extended register (6x reference) address range 60001 to 65535. Address 0 equals to no information available(0 to 65535).
Password	Default: empty string Length: 4 characters	IED device 4 character password. Default is empty string.

6.4.8.6.**Complex measured value (CMV)****Table 6.4.8.6-1 Configurable CMV properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	CMV	61850-Type
Sub Type		

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Sub Type	MV/CMV simple MV_LIMIT_CHECK Default: MV/CMV simple	Sub type for MV/CMV.
Addresses		
Measurement Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
Measurement Register	0 to 65535 Default: 0	Holding or input register address for the measurement. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
Scale and Unit		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used with this type.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850.
Limit Value Supervision		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

6.4.8.7. Delta (DEL)**Table 6.4.8.7-1 Configurable DEL properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DEL	61850-Type
Sub-Type		
Sub Type	DEL full DEL simple Default: DEL full	Sub type for DEL.
Phase AB Addresses		
Phase AB Angle	0 to 65535 Default: 0	Holding or input register address for the phase AB angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase AB Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase AB angle.
Phase AB Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase AB Magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Phase AB Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase AB magnitude.
Phase BC Addresses		
Phase BC Angle	0 to 65535 Default: 0	Holding or input register address for the phase BC angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase BC Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase BC angle.
Phase BC Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase BC magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase BC Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase BC magnitude.
Phase CA Addresses		
Phase CA Angle	0 to 65535 Default: 0	Holding or input register address for the phase CA angle. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.
Phase CA Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase CA angle.
Phase CA Magnitude	0 to 65535 Default: 0	Holding or input register address for the phase CA magnitude. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase CA Magnitude Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase CA magnitude.
Scale and Unit		
Multiplier	Default: Kilo	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used for the measurements.
Unit	Default: Volt	SI unit for measurement as described in IEC 61850.
Phase Limit Value Supervision		
High	Default: 0	High limit for measurement. Event is created, when value crosses the limit.
High-High	Default: 0	High-high limit for measurement. Event is created, when value crosses the limit.
Low	Default: 0	Low limit for measurement. Event is created, when value crosses the limit.
Low-Low	Default: 0	Low-low limit for measurement. Event is created, when value crosses the limit.
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

6.4.8.8. Controllable double point (DPC)

Controllable Double Point (DPC) for OPC servers with Modbus IED supports the following subtypes:

- BIT_DO
- SACE
- GENERIC_CONTROL
- BIT_DPU_SBO

- BIT_DPU_MCD_SBO
- BIT_DPU_IN_REGISTER_SBO

Table 6.4.8.8-1 Configurable DPC properties for OPC servers with Modbus device

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Sub-Type		
Sub Type	BIT_DO SACE	Sub type for command.
Addresses		
Address For Command	0 to 65535 Default: 0	Holding register address for the control. Holding register (4x reference) address range 40001 to 49999. Address 0 equals to no information available.
Address For Status and Intermediate	0 to 65535 Default: 0	Holding or input register address for the open, close, and intermediate indication. Holding register = 4x reference address range 40001 to 49999 or input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available.
Bit Mask For Intermediate Status	0 to 65535 Default: 0	Bit mask for intermediate status.
Bit Mask For Status	0 to 65535 Default: 0	Bit mask for status.
Close Command Type	0 to 65535 Default: 0	Close command type.
Close Control Coil	0 to 65535 Default: 0	Coil address for the close control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Close Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the close indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Command Parameter	0 to 65535 Default: 0	Command parameter.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Fail Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the fail indication (optional). Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.
Open Command Type	0 to 65535 Default: 0	Open command type.
Open Control Coil	0 to 655359 Default: 0	Coil address for the open control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Open Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the open indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

Table 6.4.8.8-2 Configurable DPC properties for OPC servers with Modbus device, subtype *GENERIC_CONTROL*

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Subtype	GENERIC_CONTROL	
Addresses		
Address for password 1	0 to 65535 Up to 4 ASCII Characters Leftmost Digits	starting address of password 1
Address for password 2	0 to 65535 Up to 4 ASCII Characters rightmost Digits	Starting address of password 2
Password 1	Default: empty string.	IED device password. Default is empty string. This password is written to up to 2 register starting from the one specified from Address for password 1. Example: 1234
Password 2	Default: empty string.	IED device password. Default is empty string. This password is written to up to 2 register starting from the one specified from Address for password 2. Example: 1234

Property/Parameter	Value or Value range/ Default /Example	Description
Open Control Address	0 to 65535	Change initiate input mask for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Open Control Value	0 to 65535 Default: 1	Value written to open control address. Example: 1 = Control bit state 0 = No Control
Open Confirm Address	0 to 65535	Confirm initiate input mask for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Open Confirm Value	0 to 65535 Default: 1	Value written to open confirms address. Example: 1 = Control bit state 0 = No Control
Open Execute Address	0 to 65535	Execute register for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Open Execute Value	0 to 65535 Default: 1	Value written to open executes address. Example: 1 = Execute 0 = No Action
Open Control 4	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Open Control 4	0 to 65535 Default: 1	Value to write to control 4 address
Open Control 5	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Open Control 5 value	0 to 65535 Default: 1	Value to write to control 5 address
Close Control Address	0 to 65535	Change initiate input mask for close command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Close Control Value	0 to 65535 Default: 1	Value written to Close control address. Example: 1 = Control bit state 0 = No Control
Close Confirm Address	0 to 65535	Confirm initiate input mask for Close command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Close Confirm Value	0 to 65535 Default: 1	Value written to Close confirms address. Example: 1 = Control bit state 0 = No Control
Close Execute Address	0 to 65535	Execute register for Close command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)
Close Execute Value	0 to 65535 Default: 1	Value written to Close executes address. Example: 1 = Execute 0 = No Action
Close Control 4	0 to 65535 Default: 0	Address 0 equals to no information available (0 to 65535)
Close Control 4 value	0 to 65535 Default: 1	Value to write to control 4 address
Close Control 5	0 to 65535 Default: 0	Initiate input mask for open command. Coil/Holding/Extend register. Address 0 equals to no information available (0 to 65535)

Property/Parameter	Value or Value range/ Default /Example	Description
Close Control 5 value	0 to 65535 Default: 1	Value to write to control 5 address
Password 1 ordinal	0 to 7 Default: 1	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, password 2 is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth
Password 2 ordinal	0 to 7 Default: 2	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, password 2 is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Control ordinal	0 to 7 Default: 3	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, initiate input mask is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth
Confirm ordinal	0 to 7 Default: 4	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, initiate input mask is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth
Execute ordinal	0 to 7 Default: 5	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, initiate input mask is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth

Property/Parameter	Value or Value range/ Default /Example	Description
Command 4 ordinal	0 to 7 Default: 0	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, command 4 initiate input mask is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth
Command 5 ordinal	0 to 7 Default: 0	7 = Last Order of execution in a command chain (Password, Control, Confirm, Execute, Command 4, Command 5) 0 = Not in use. (When this value is 0, command 5 initiate input mask is not used) 1 = First in command chain 2 = Second 3 = Third 4 = Forth 5 = Fifth 6 = Sixth
Address For Fail Alarm	0 to 65535 Default: 0	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)
Address For Inverse Status	0 to 65535 Default	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Address For Status	0 to 65535 Default	Coil/Input/Holding register address. Coil = 0x reference address range 1 to 9999 Or input = 1x reference address range 10001 to 19999 Or holding register = 4x reference range 40001 to 49999 or Input register = 3x reference address range 30001 to 39999. Address 0 equals to no information available (0 to 65535)
Bit Mask for Fail Alarm	0 to 65535 Default	Bit mask for fail alarm
Bit Mask for Inverse status	0 to 65535 Default	Bit mask for inverse status
Bit Mask for status	0 to 65535 Default	Bit mask for status

Table 6.4.8.8-3 Configurable DPC properties for OPC servers with Modbus device, subtype BIT_DPU_SBO/ BIT_DPU_MCD_SBO

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Subtype	BIT_DPU_SBO BIT_DPU_MCD_SBO	
Addresses		
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Open command value	0 to 65535 Default: 0	Open command type
Close command value	0 to 65535 Default: 0	Close command type

Property/Parameter	Value or Value range/ Default /Example	Description
Status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Inverse status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Fail alarm Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	Bit mask
Address for Password 1	0 to 65535 Default: 0	Holding address for password 1. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address for Password 2	0 to 65535 Default: 0	Holding address for password 2. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

Table 6.4.8.8-4 Configurable DPC properties for OPC servers with Modbus device, subtype BIT_DPU_IN_REGISTER_SBO

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Subtype	BIT_DPU_IN_REGISTER_SBO	
Addresses		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available.
Open command value	0 to 65535 Default: 1	Open command type
Close command value	0 to 65535 Default: 2	Close command type
Status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Inverse status Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Fail alarm Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Bit mask for status	0 to 65535 Default: 0	Bit mask for status
Bit mask for inverse status	0 to 65535 Default: 0	Bit mask for inverse status
Bit mask for fail alarms	0 to 65535 Default: 0	Bit mask for fail alarms
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available

Property/Parameter	Value or Value range/ Default /Example	Description
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	
Address for Password 1	0 to 65535 Default: 0	Holding address for in password 1. Holding register = 4x reference address Range 40001 to 49999. Address 0 equals to no information available.
Address for Password 2	0 to 65535 Default: 0	Holding address for in password 2. Holding register = 4x reference address Range 40001 to 49999. Address 0 equals to no information available.
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

6.4.8.9. Device name plate (DPL)

Device Name Plate (DPL) for OPC server with Modbus IED supports two subtypes:

- PLATE_FIXED
- PLATE_IED_DPU

Table 6.4.8.9-1 Configurable DPL properties for OPC servers with Modbus device, subtype PLATE_FIXED

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPL	61850-Type
Sub Type	PLATE_FIXED	
Vendor		
Vendor		Vendor as text.
Hardware revision		
Hardware Revision		Hardware revision as text.
Software Revision		
Software Revision	0	Software revision as text.
Serial Number		
Serial Number	0	Serial number as text.
Location		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Location		Location as text.

Table 6.4.8.9-2 Configurable DPL properties for OPC servers with Modbus device, subtype PLATE_FIXED

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPL	61850-Type
Sub Type	PLATE_IED_DPU	
Address		
Leftmost Register for Vendor name	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Rightmost Register for Vendor name	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Hardware Revision Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Software Revision Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Serial Number Address	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Topic format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication

Property/Parameter	Value or Value range/ Default /Example	Description
Leftmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Rightmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Indication scale	Lookup table scale Stepwise Linear scale Default: NONE	Scale to be used with the indication value

6.4.8.10.**Double point status (DPS)**

Double Point Status (DPS) for OPC server with Modbus IED supports the following subtypes:

- BIT
- BIT_IN_REGISTER_WITH_INTERMEDIATE_BIT
- BIT_DPU
- BIT_DPU_MCD
- BIT_DPU_INREGISTER

Table 6.4.8.10-1 Configurable DPS properties for OPC servers with Modbus device, subtype BIT, BIT_IN_REGISTER_WITH_INTERMEDIATE_BIT, BIT_DPU, BIT_DPU_MCD

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPS	61850-Type
Subtype	BIT BIT_DPU BIT_DPU_MCD BIT_IN_REGISTER_WITH_INTERMEDIATE_BIT BIT_DPU_INREGISTER	
Addresses		
Address For Status and Intermediate	0 - 65535 Default: 0	Address for status and intermediate.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Bit Mask for Fail Alarm	0 - 65535 Default 0	Bit mask for fail alarm
Bit Mask for Inverse status	0 - 65535 Default 0	Bit mask for inverse status
Bit Mask For Intermediate Status	0 - 65535 Default: 0	Bit mask for intermediate status.
Bit Mask For Status	0 - 65535 Default: 0	Bit mask for status.
Close Indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the close indication. Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.
Fail Alarm register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Fail Indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the fail indication (optional). Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.
Indication Register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Inverse status register	0 - 65535	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Open indication Coil/Input	0 - 65535 Default: 0	Coil or input address for the open indication. Coil (0X reference) address range 1 - 9999 or input (1X reference) address range 10001 - 19999 . Address 0 equals to no information available.

Table 6.4.8.10-2 Configurable DPS properties for OPC servers with Modbus device, subtype BIT_DPU_IN_REGISTER

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPS	61850-Type
Subtype	BIT_DPU_IN_REGISTER	
Addresses		
Bit Mask for Fail Alarm	0 - 65535 Default 0	Bit mask for fail alarm
Bit Mask for Inverse status	0 - 65535 Default 0	Bit mask for inverse status
Bit Mask For Status	0 - 65535 Default: 0	Bit mask for status.
Fail Alarm register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Indication Register	0 - 65535 Default 0	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Inverse status register	0 - 65535	Holding address for the Fail alarm. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.

6.4.8.11.**Controllable integer status (INC)**

Controllable Integer Status (INC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER_BASED_CONTROL
- DPU_REGISTER_BASED_CONTROL

Table 6.4.8.11-1 Configurable INC properties for OPC servers with Modbus device, subtype REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	INC	61850-Type
Subtype	REGISTER_BASED_CONTROL	
Addresses		
Control Register	0 - 65535 Default: 0	Holding register address for the control. Holding register (4X reference) address range 40001 - 49999 . Address 0 equals to no information available.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
Scale and Unit		
Indication Scale	Default: None	Scale to be used with the indication value.

Table 6.4.8.11-2 Configurable INC properties for OPC servers with Modbus device, subtype DPU_REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	INC	61850-Type
Subtype	DPU_REGISTER_BASED_CONTROL	
Addresses		

Property/Parameter	Value or Value range/ Default /Example	Description
Control register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Execute register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Indication register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication
Address for password 1	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Address for password 2	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

6.4.8.12.**Integer status (INS)****Table 6.4.8.12-1 Configurable INS properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	INS	61850-Type

Property/Parameter	Value or Value range/ Default /Example	Description
Addresses		
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
Scale and Unit		
Scale	Default: None	Scale to be used with the indication value.

6.4.8.13.**Integer controlled step position information (ISC)**

Integer controlled step position information (ISC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER_BASED_CONTROL
- DPU_REGISTER_BASED_CONTROL

Table 6.4.8.13-1 Configurable ISC properties for OPC servers with Modbus device, subtype REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ISC	61850-Type
Subtype	REGISTER_BASED_CONTROL	
Addresses		

Property/Parameter	Value or Value range/ Default /Example	Description
Control Register	0 - 65535 Default: 0	Holding register address for the control. Holding register (4X reference) address range 40001 - 49999 . Address 0 equals to no information available.
Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0 - 65535 Default: 0	Holding or input register address for the indication. Holding register (4X reference) address range 40001 - 49999 or input register (3X reference) address range 30001 - 39999 . Address 0 equals to no information available.
Scale and Unit		
Indication Scale	Default: None	Scale to be used with the indication.

Table 6.4.8.13-2 Configurable ISC properties for OPC servers with Modbus device, subtype DPU_REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ISC	61850-Type
Subtype	DPU_REGISTER_BASED_CONTROL	
Addresses		
Control register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Execute register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)

Property/Parameter	Value or Value range/ Default /Example	Description
Indication register	0 - 65535 Default: 0	6x extended control register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for the indication
Address for password 1	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535. Address 0 equals to no information available (0 - 65535)
Address for password 2	60001 – 65535 ASCII – 2 Characters Leftmost Digits	6x extended register. Extended register (6x reference) address range 60001 - 65535 . Address 0 equals to no information available (0 - 65535)
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

6.4.8.14. Logical node name plate (LPL)

Table 6.4.8.14-1 Configurable LPL properties for OPC servers with Modbus device

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	LPL	61850-Type
Sub Type	PLATE_FIXED	
Vendor		
Vendor		Vendor as text.
Software Revision		
Software Revision	Default: 0	Software revision as text

Table 6.4.8.14-2 Configurable LPL properties for OPC servers with Modbus device, subtype PLATE_IED_DPU

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	LPL	61850-Type
Sub Type	PLATE_IED_DPU	
Addresses		
Leftmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Rightmost register for Vendor location	40001 - 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Software Revision Address	40001 to 49999	Holding address for the Serial number. Holding register = 4x reference address range 40001 - 49999 . Address 0 equals to no information available.
Indication scale	Default: none	Scale to be used with the indication value

6.4.8.15.**Measured value (MV)****Table 6.4.8.15-1 Configurable MV properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	MV	61850-Type
Sub-Type		
Sub Type	MV/CMV simple MV_LIMIT_CHECK Default: MV/CMV simple	Sub type for MV/CMV.
Addresses		

Property/Parameter	Value or Value range/ Default /Example	Description
Measurement Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the value.
Measurement Register	0 to 65535 Default: 0	Holding or input register address for the measurement. Holding register (4X reference) address range 40001 to 49999 or input register (3X reference) address range 30001 to 39999. Address 0 equals to no information available. If format requiring two registers is used, then the lower address must be entered.
Scale and Unit		
Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Scale	Default: None	Scale used with this type.
Unit	Default: Dimensionless	SI unit for measurement as described in IEC 61850.
Limit Value Supervision		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

6.4.8.16. Controllable single point (SPC)

Controllable single point (SPC) for OPC server with Modbus IED supports the following subtypes:

- BIT_DO
- SACE
- BIT_DPU_SBO
- BIT_DPU_MCD_SBO
- BIT_DPU_IN_REGISTER_SBO

Table 6.4.8.16-1 Configurable SPC properties for OPC servers with Modbus device, subtype BIT_DO, and SACE

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPC	61850-Type
Sub-Type		
Sub Type	BIT_DO SACE	Sub type of object.
Addresses		
Address For Command	0 to 65535 Default: 0	Address for command.
Address For Status	0 to 65535 Default: 0	Address for status.
Bit Mask For Status	0 to 65535 Default: 0	Bit mask for status.
Command Parameter	0 to 65535 Default: 0	Command parameter.
Control Coil	0 to 65535 Default: 0	Coil address for the control. Coil (0X reference) address range 1 to 9999. Address 0 equals to no information available.
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available.
Off Command Type	0 to 65535 Default: 0	Command type for OFF command.
On Command Type	0 to 65535 Default: 0	Command type for ON command.

Table 6.4.8.16-2 Configurable SPC properties for OPC servers with Modbus device, subtype BIT_DPU_SBO, BIT_DPU_MCD_SBO, and BIT_DPU_IN_REGISTER_SBO

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPC	61850-Type

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Subtype	BIT_DPU_SBO BIT_DPU_MCD_SBO BIT_DPU_IN_REGISTER_SBO SACE	
Address For Control Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Address For Confirm Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Address For Execute Register	0 to 65535 Default: 0	Holding address for the Vendor name. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Open command value	0 to 65535 Default: 1	Open command type
Close command value	0 to 65535 Default: 2	Close command type
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999. Address 0 equals to no information available
Address for status	0 to 65535 Default: 0	Holding address for indication. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Bit mask of status	0 to 65535 Default: 0	Status bit mask
Bit mask	0 to 65535 Default: 0	

Property/Parameter	Value or Value range/ Default /Example	Description
Address for Password 1	0 to 65535 Default: 0	Holding address for password 1. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Address for Password 2	0 to 65535 Default: 0	Holding address for password 2. Holding register = 4x reference address range 40001 to 49999. Address 0 equals to no information available
Password	Default: empty string. Length: 4 characters	IED device 4 character password. Default is empty string.

6.4.8.17. Single point status (SPS)

Single Point Status (SPS) for OPC server with Modbus IED supports the following subtypes:

- BIT
- BIT_DPU_MCD
- BIT_IN_REGISTER

Table 6.4.8.17-1 Configurable SPS properties for OPC servers with Modbus device, subtype BIT AND BIT_IN_REGISTER

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPS	61850-Type
Sub-Type	BIT BIT_IN_REGISTER Default: BIT	Sub type for SPS.
Addresses		
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil (0X reference) address range 1 to 9999 or input (1X reference) address range 10001 to 19999. Address 0 equals to no information available.

Table 6.4.8.17-2 Configurable SPS properties for OPC servers with Modbus device, subtype BIT_DPU_MCD

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPS	61850-Type
Subtype	BIT BIT_DPU_MCD	
Indication Coil/Input	0 to 65535 Default: 0	Coil or input address for the indication. Coil = 0X reference address range 1 to 9999 or input = 1X reference address range 10001 to 19999 Address 0 equals to no information available
Bit mask	0 to 65535	Bit mask for indication

6.4.8.18.**WYE****Table 6.4.8.18-1 Configurable WYE properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	WYE	61850-Type
Sub Type		
Sub Type	WYE full WYE simple Default: WYE full	Sub type for WYE.
Phase A Addresses		
Phase A Angle	0 to 65535 Default: 0	Holding or input register address for the phase A angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase A Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase A angle.
Phase A Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase A magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase A Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase A Magnitude.
Phase B Addresses		
Phase B Angle	0 to 65535 Default: 0	Holding or input register address for the Phase B angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Phase B Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Phase B angle.
Phase B Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase B magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase B Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Ib magnitude.
Phase C Addresses		
Phase B Angle	0 to 65535 Default: 0	Holding or input register address for the Phase C angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default /Example	Description
Phase C Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for phase C angle.
Phase C Magnitude	0 to 65535 Default: 0	Holding or input register address for the Phase C magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Phase C Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for Ic magnitude.
Neural Addresses		
Neutral Angle	0 to 65535 Default: 0	Holding or input register address for the neutral angle. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Angle Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for neutral angle.
Neutral Magnitude	0 to 65535 Default: 0	Holding or input register address for the Neutral magnitude. Holding register = 4X reference address range 40001 to 49999 or input register = 3X reference address range 30001 to 39999. Address 0 equals to no information available.
Neutral Magnitude Topic Format	Default Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format for In magnitude.
Scale and Unit		
Neutral Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Neutral Scale	Default: None	Scale for neutral to be used with this data object.
Neutral Unit	Default: Dimensionless	Unit for neutral.
Phase ABC Scale	Default: None	Scale used with ABC phases.
Phase ABC Unit	Default: Dimensionless	Unit for ABC phases.
Phase Multiplier	Default: Deka	Specifies the multiplier for current SI unit.
Phase Limit Value Supervision		

Property/Parameter	Value or Value range/ Default /Example	Description
High	0	High limit measurement. Event is created, when value crosses the limit.
High-High	0	High-high limit for measurement. Event is created, when value crosses the limit.
Low	0	Low limit for measurement. Event is created, when value crosses the limit.
Low-Low	0	Low-low limit for measurement. Event is created, when value crosses the limit.
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.
Neutral Limit Value Supervision		
Neutral High	0	High limit for measurement. Event is created, when value crosses the limit.
Neutral High-High	0	High-high limit for measurement. Event is created, when value crosses the limit.
Neutral Low	0	Low limit for measurement. Event is created, when value crosses the limit.
Neutral Low-Low	0	Low-low limit for measurement. Event is created, when value crosses the limit.
Neutral Max	20000	Maximum value for measurement.
Neutral Min	0	Minimum value for measurement.

6.4.8.19.**Controllable Enumerated Status (ENC)**

Controllable Enumerated Status (ENC) for OPC server with Modbus IED supports the following subtypes:

- REGISTER_BASED_CONTROL
- DPU_REGISTER_BASED_CONTROL

Table 6.4.8.19-1 Configurable ENC properties for OPC servers with Modbus device, subtype REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default	Description
Basic		
61850-Type	ENC	61850-Type
Subtype	REGISTER_BASE_CONTROL	
Addresses		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default	Description
Control Register	0-65535 Default: 0	Holding register address for the control. Holding register (4X reference) address range 40001-49999. Address 0 equals no information available.
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0-65535 Default: 0	Holding register address for indication. Holding register (4X reference) address range 40001-49999. Address 0 equals no information available.
Scale and unit		
Indication Scale	Default: None.	Scale to be used with the indication value.

Table 6.4.8.19-2 Configurable ENC properties for OPC servers with Modbus device, subtype DPU_REGISTER_BASED_CONTROL

Property/Parameter	Value or Value range/ Default	Description
Basic		
61850-Type	ENC	61850-Type
Subtype	REGISTER_BASE_CONTROL	
Addresses		
Control Register	0...65535 Default: 0	6x register address for control command. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Execute Register	0...65535 Default: 0	6x register address for execute command. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.

Property/Parameter	Value or Value range/ Default	Description
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0-65535 Default: 0	6x register address for indication register. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Password		
Address for password 1	0-65535 Default: 0	6x register address for password 1. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Address for password 2	0-65535 Default: 0	6x register address for password 2. Extended register (6X reference) address range 60001...65535. Address 0 equals to no information available.
Password		Four character password. Default is empty string.
Scale and Unit		
Indication Scale	Default: None.	Scale to be used with the indication value.

6.4.8.20.**Enumerated Status (ENS)****Table 6.4.8.20-1 Configurable ENS properties for OPC servers with Modbus device**

Property/Parameter	Value or Value range/ Default	Description
Basic		
61850-Type	ENS	61850-Type
Addresses		

Property/Parameter	Value or Value range/ Default	Description
Format	Word Integer Long MSW first Long MSW last Float MSW first Float MSW last Bit Default: Word	Data format of the control and the indication.
Indication Register	0-65535 Default: 0	Holding register address for indication. Holding register (4X reference) address range 40001-49999. Address 0 equals no information available.
Scale and unit		
Indication Scale	Default: None.	Scale to be used with the indication value.

6.4.9.

Topic Generator

When data objects have been configured with Modbus addresses, use the Topic Generator function to specify how data is requested from Modbus devices. A topic definition for an indication address specifies start and end of address, data format, deadband, and polling interval in milliseconds. However, a topic definition for a controllable point only specifies address range and its data format.

To generate topic definitions:

1. Select the Communication tab on the Project Explore window.
2. Right-click a Modbus OPC Server node or a Modbus IED node and select the Topic Generator function on the context menu.
3. Click the **Generate** button to make the Topic Generator function browse through all data objects configurations and create topic definitions for the data request. If the Topic Generator is opened from a Modbus OPC Server node, topics are generated for all IEDs connecting to the selected server.

In most cases, modifications to the automatically generated topics are not required. However, some topic definitions may need to be changed, polling interval for example, for some devices to work properly.

To add a new topic:

1. Open the Topic Generator from a Modbus OPC Server node or a Modbus IED node.
2. Click the **Add Topic** button.

3. Click the **Add** button to add the new topic to the data grid. New topic is added to the data table and the dialog is closed.
4. Click **Apply** to save.



Each time a change is made to data object Modbus addresses or a new address is added, use the Topic Generator to update the topic definitions.

	IED Name	First address	Last address	Format	Deadband	Interval
▶	IED1	40001	40067	Word	0	100
	IED1	1	21	Bit	0	100

SAB600_ModbusTCP_Topic_Generator.png

Figure 6.4.9-1 Topic generator

7. External OPC server configuration

7.1. About this section

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

Start SAB600 to open a project. You can also open and name a new 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**.

7.2. Overview of configuration

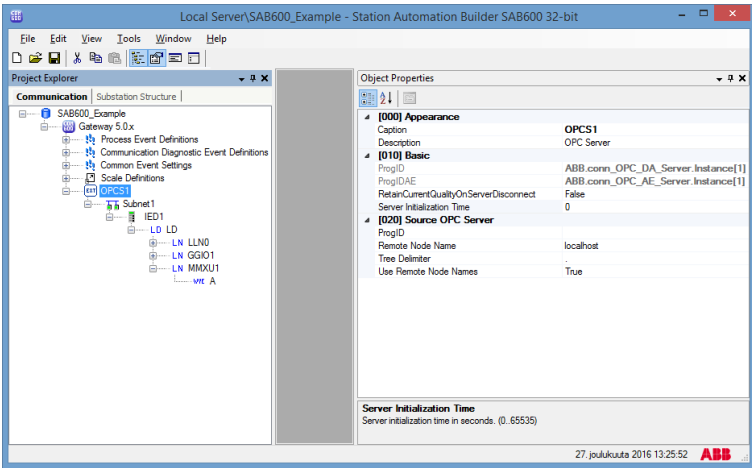
Before you can start using the External OPC Server, you need to build and configure an object tree in SAB600 to define the Communication structure within the Gateway object.

The possible objects are:

- Gateway
- External OPC Server
- External OPC Subnetwork
- External OPC IED
- Logical Device objects
- Logical Node objects
- Data objects



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #



SAB600_ExternalOPC_Example_View.png

Figure 7.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

For information on how to enable configuring of OPC item paths in the data objects with SAB600 with the OPC Browser tool, see 7.4, OPC Browser tool.

First, you need to build an object tree. This is done by adding objects to the object tree, see 7.3.1, General information about building object tree.

Figure 7.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the External OPC Server object and its child objects like subnetworks, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 7.5.1, General information about configuring objects.

Table 7.2-1 External OPC Server related objects

Object	Description
External OP Server	An object representing the External OPC Server.
External OPC Subnetwork	Object representing a physical subnetwork.
External OPC IED	The IED object presents a physical device in the 3rd party system.
External OPC Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A device consists of one or several LDs.

Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.
Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, e.g. value, quality, and control.

7.3. Building object tree

7.3.1. General information about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 7.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example **New > OPC > External OPC Server**.
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. External OPC Server
3. External OPC Subnetwork
4. External OPC IED
5. Logical Device objects
6. Logical Node objects
7. Data objects

7.3.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

7.3.3. Adding External OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding an External OPC Server object.

To add External OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Select **New > OPC > External OPC Server**.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

7.3.4. Adding External OPC subnetwork objects

After the server object has been successfully added, you can continue building the object tree by adding External OPC subnetwork objects.

To add External OPC subnetwork object:

1. Select the External OPC Server object.
2. Right-click the External OPC Server object.
3. Select **New > New** or **New > OPC > External OPC Subnetwork**.

7.3.5. Adding external OPC IED objects

After adding a subnetwork you can add device objects.

To add an external subnetwork object:

1. Select a Subnetwork object.
2. Right-click on the Subnetwork object and select **New > OPC > External OPC IED**.

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 **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

For more information about the SCL Import function, see COM600 User's Manual.

7.3.6. Adding Logical Device objects

To add a Logical Device object:

1. Select an External OPC IED object and right-click it.
2. Select **New > New** or **New > Communication > External OPC LD**.



Each External OPC IED must have at least one Logical Device object as a child object.

7.3.7. Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

7.3.8. Adding data objects

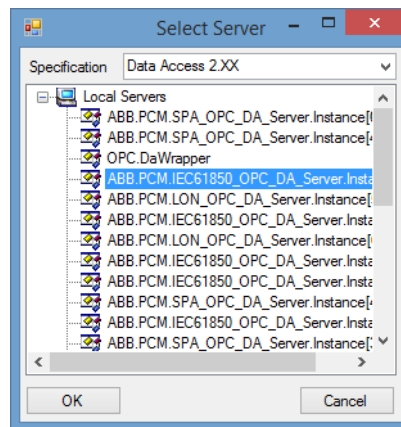
To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique. However, you can have a data object with same name under a different Logical Node.

7.4. OPC Browser tool

The OPC Browser tool is a standalone software that can be used to read and save the OPC namespace of the external OPC Server that is connected to COM600. The saved namespace information can be later used to configure the OPC item paths in the data objects with SAB600.

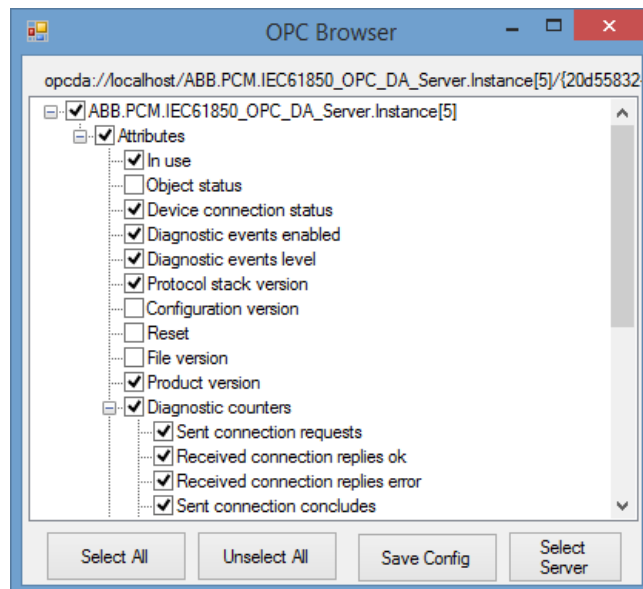
1. Copy the OPC Browser tool to the computer, where the OPC Server is running. The OPC Browser software can be found from the **Utilities** folder of the installation DVD.
2. Start the OPC Browser software.
3. Click **Select Server** and select the OPC server from the list, see Figure 7.4-1.



OPC_Browser_Select_Server.png

Figure 7.4-1 Select Server dialog

4. Select the items to be added to the namespace file, see Figure 7.4-2. **Select All** selects all nodes in the tree. **Unselect All** clears all selections.

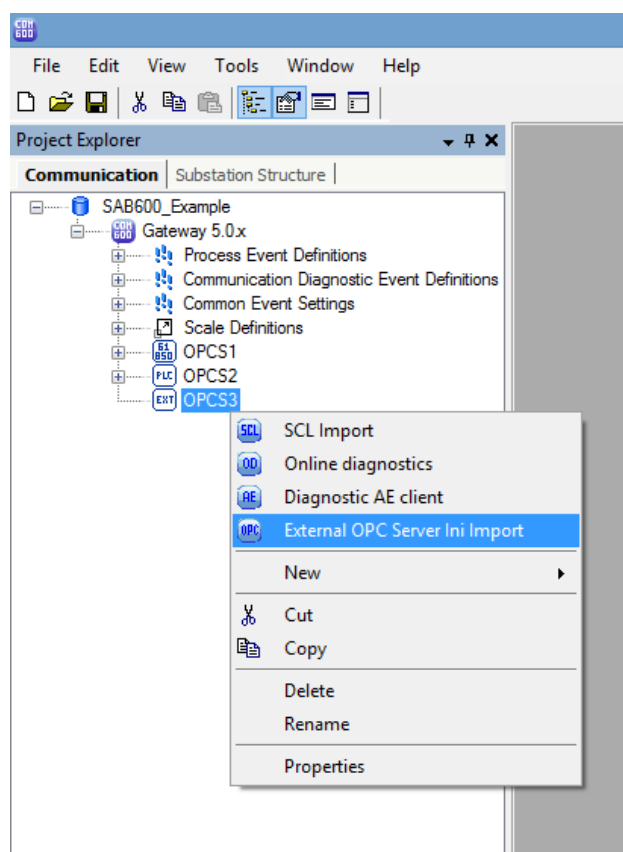


OPC_Browser_Attributes.png

Figure 7.4-2 Selecting items to the namespace file

5. In SAB600, right-click the External OPC Server object and select the **External OPC Server Ini Import**, see Figure 7.4-3.

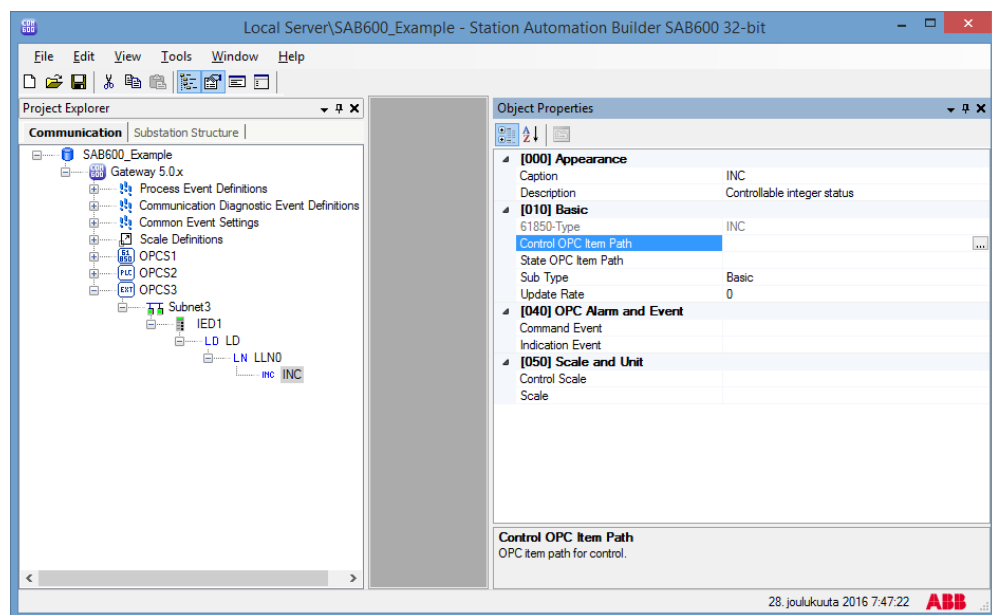
Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_External_OPCTServer_Ini_Import.png

Figure 7.4-3 External OPC Server Ini Import tool

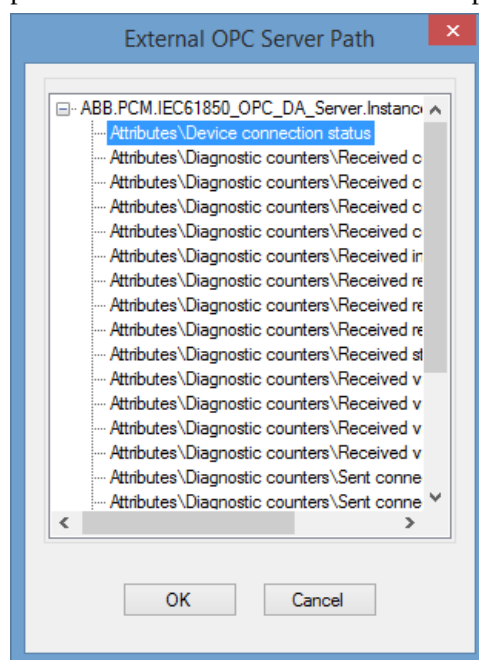
6. Click **Select File** in the External OPC Server Ini Import tool to select the file created with the OPC Browser.
7. Click **Apply**.
8. In the Data Object properties, click the button with three dots in the **Control OPC Item Path** property, see Figure 7.4-4.



SAB600_External_OPCTServer_Control_OPC_Item_Path.png

Figure 7.4-4 Control OPC Item Path properties

9. A new dialog showing the namespace created with the OPC Browser opens, see Figure 7.4-5. Select the correct OPC item from the tree view and click **OK**. The path of the selected OPC item will be updated to the property.



SAB600_External_OPCTServer_Path.png

Figure 7.4-5 External OCP server path

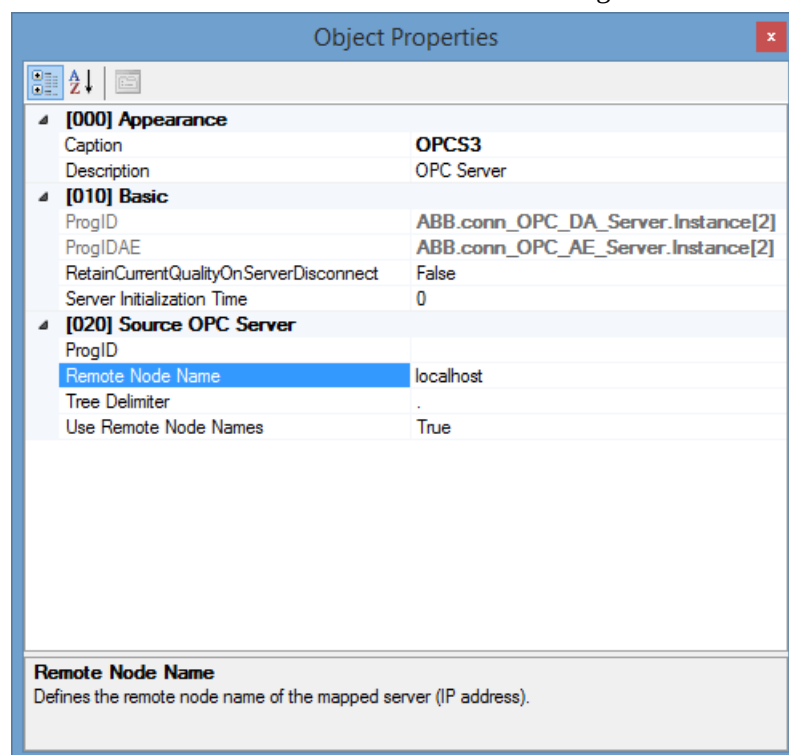
7.5. Configuring objects

7.5.1. General information about configuring objects

After the objects have been added, configure the object properties. Figure 7.5.1-1 shows an example of how to use SAB600 to configure the object properties for External OPC Server.

To configure an object:

1. Select an object in the object tree of the communication structure.
 - The object properties appear now in the Object Properties window. The properties and their values can be viewed as shown in Figure 7.5.1-1



SAB600_External_OPCTServer_Object_Properties.png

Figure 7.5.1-1 Example of object properties in the Objects Properties window

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

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

7.5.2. Configuring External OPC Server properties**Table 7.5.2-1 External OPC Server properties**

Property/Parameter	Value or Value range/Default	Description
Source OPC Server		
ProgID		Defines the ProgID of the mapped server.
Remote Node Name	localhost	Defines the remote node name of the mapped server (IP address).
Tree Delimiter	Default value is "." character.	Defines the tree delimiter mapped server uses.
Use Remote Node Names	True False Default: True	Enables the use of remote node names.

7.5.3. Configuring External OPC Server Subnetwork properties

There are no configurable subnetwork properties in the External OPC Server.

7.5.4. Configuring External OPC IED Device

Table 7.5.4-1 lists the configurable properties for virtual object presenting the possible physical devices on the 3rd party system, and value ranges for these properties. The actual configuration by using SAB600 is performed as described in 7.5.1, General information about configuring objects.

Table 7.5.4-1 External OPC IED properties

Name	Value or Value range/Default	Description
Basic		
In Use	In use Not in use Default: In use	Specifies whether IED is in use or not.
Simulation Mode	True False Default: False	Defines whether IED is used in simulation mode.

Name	Value or Value range/ Default	Description
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this logical device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name For example: GW#ABB.conn_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc
Simulation Mode		Defines whether device is in simulation mode.

7.5.5. Configuring Logical Device properties

Table 7.5.5-1 Logical Device properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this logical device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name For example: GW#ABB.conn_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc

7.5.6. Configuring Logical Node properties

Table 7.5.6-1 Configuring Logical Node properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
LLN0		
Logical Node Class	LLN0	Logical node class
GGIO1		

Property/Parameter	Value or Value range/ Default	Description
Logical Node Class	ANCR, ARCO, ATCC, AVCO, LPHD, CALH, CCGR, CILO, CPOW, CSWI, GAPC, GGIO, GSAL, IARC, IHMI, ITCI, ITMI, MDIF, MHAI, MHAN, MMTR, MMXN, MMXU, MSQI, MSTA, PDIF, PDIR, PDIS, PDOP, PDUP, PFRC, PHAR, PHIZ, PIOC, PMRI, PMSS, POPF, PPAM, PSCH, PSEF, PTEF, PTOC, PTOF, PTOV, PTRC, PTTR, PTUC, PTUV, PUPF, PTUF, PVOC, PVPH, PZSU, RDRE, RADR, RBDR, RDRS, RBRF, RDIR, RFLO, RPSB, RREC, RSYN, SARC, SIMG, SIML, SPDC, XCBR, XSWI, TCTR, TVTR, YEFN, YLTC, YPSH, YPTR, ZAXN, ZBAT, ZBSH, ZCAB, ZCAP, ZCON, ZGEN, ZGIL, ZLIN, ZMOT, ZREA, ZRRC, ZSAR, ZTCF, ZTCR Default: GGIO	Logical node class
Logical Node Instance	LN Inst Range is from 1 - 2147483647	Logical node instance number
Logical Node Prefix	Default: None	Prefix for logical node

7.5.7. Configuring data objects for Internal OPC Data

7.5.7.1. General information about configuring data objects for Internal OPC Data

Internal data objects describe internal status information of an OPC server, for example whether the connection between the External OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

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

7.5.7.2. Integer status (INS)

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

7.5.7.3. Single point status (SPS)**Table 7.5.7.3-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		

Item Tag Path	Default: Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

7.5.7.4.**Controllable single point (SPC) for OPC internal data****Table 7.5.7.4-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850.
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line and IED nodes. When an attribute tag is referred to in the internal item definitions below it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED) e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used it must be preceded by a slash (/) character e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

7.5.8. Configuring data objects for External OPC Client

7.5.8.1. General information about configuring data objects for External OPC Device



Use the OPC Browser tool to configure the OPC item paths in the data objects with SAB600. For more information, see 7.4, OPC Browser tool.

The available properties for different objects are listed in the following subsections. The parameters are stored in Object Properties in SAB600.

The actual configuration by using SAB600 is performed as described in 7.5.1, General information about configuring objects.

7.5.8.2. Directional protection activation information

Table 7.5.8.2-1 Configurable ACD properties for External OPC Clients, subtype Basic

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACD	61850-Type
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Paths		
General OPC Item Path		OPC item path for general phase
Neutral OPC Item Path		OPC item path for neutral phase
Phase A OPC Item Path		OPC item path fo phase A
Phase B OPC Item Path		OPC item path for phase B
Phase C OPC Item Path		OPC item path for phase C

**Table 7.5.8.2-2 Configurable ACD properties for External OPC Clients, subtype
BIT_MASK**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACD	61850-Type
Sub Type	BIT_MASK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
General Bitmask	0 to 65535 Default: 0	Bitmask for general phase
General Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type if used bitmask for General
General OPC Item Path		OPC item path for general phase
Neutral Bitmask	0 to 65535 Default: 0	Bitmask for neutral

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type if used bitmask for Neutral
Neutral OPC Item Path		OPC item path for neutral phase
Phase A Bitmask	0 to 65535 Default: 0	Bitmask for phase A
Phase A Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of bitmask used for Phase A
Phase A OPC Item Path		OPC item path fo phase A

Property/Parameter	Value or Value range/ Default /Example	Description
Phase B Bitmask	0 to 65535 Default: 0	Bitmask for phase B
Phase B Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of bitmask used for Phase B
Phase B OPC Item Path		OPC item path for phase B
Phase C Bitmask	0 to 65535 Default: 0	Bitmask for phase C
Phase C Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of used bitmask for Phase C

Property/Parameter	Value or Value range/ Default /Example	Description
Phase C OPC Item Path		OPC item path for phase C

7.5.8.3.**Protection activation information (ACT)****Table 7.5.8.3-1 Configurable ACT properties for External OPC Clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACT	61850-Type
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Paths		
General OPC Item Path		OPC item path for general phase
Neutral OPC Item Path		OPC item path for neutral phase
Phase A OPC Item Path		OPC item path fo phase A
Phase B OPC Item Path		OPC item path for phase B
Phase C OPC Item Path		OPC item path for phase C

Table 7.5.8.3-2 Configurable ACT properties for External OPC Clients, subtype BIT_MASK

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ACT	61850-Type
Sub Type	BIT_MASK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.

Property/Parameter	Value or Value range/ Default /Example	Description
General Bitmask	0 to 65535 Default: 0	Bitmask for general phase
General Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type if used bitmask for General
General OPC Item Path		OPC item path for general phase
Neutral Bitmask	0 to 65535 Default: 0	Bitmask for neutral
Neutral Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type if used bitmask for Neutral

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral OPC Item Path		OPC item path for neutral phase
Phase A Bitmask	0 to 65535 Default: 0	Bitmask for phase A
Phase A Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of bitmask used for Phase A
Phase A OPC Item Path		OPC item path fo phase A
Phase B Bitmask	0 to 65535 Default: 0	Bitmask for phase B

Property/Parameter	Value or Value range/ Default /Example	Description
Phase B Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of bitmask used for Phase B
Phase B OPC Item Path		OPC item path for phase B
Phase C Bitmask	0 to 65535 Default: 0	Bitmask for phase C
Phase C Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of used bitmask for Phase C
Phase C OPC Item Path		OPC item path for phase C

7.5.8.4. Analogue set point (APC)**Table 7.5.8.4-1 Configurable ACP properties for External OPC client**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	APC	61850-Type
Control OPC Item Path		OPC item path for control
Position OPC Item Path		OPC item path for position
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Input Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for input signal

7.5.8.5. Binary counter reading (BCR)**Table 7.5.8.5-1 Configurable BCR properties for External OPC clients**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BCR	61850-Type
State OPC Item Path		OPC item path for state
Sub type	Basic	Object subtype
Update rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		

Property/Parameter	Value or Value range/ Default /Example	Description
Scale	Lookup Table Scale Stepwise Linear Scale Default: 0	Scale

7.5.8.6.**Binary controlled step position information (BSC)****Table 7.5.8.6-1 Configurable BSC properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BSC	61850-Type
Control OPC Item Path		OPC item path for control
Position OPC Item Path		OPC item path for position
Subtype	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for control signal
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal

Table 7.5.8.6-2 Configurable BSC properties for External OPC clients, subtype MULTI_ITEM

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	BSC	61850-Type

Property/Parameter	Value or Value range/ Default /Example	Description
Higher Control OPC Item Path		OPC item path for higher control
Lower Control OPC Item Path		OPC item path for lower control
Position OPC Item Path		OPC item path for position
Stop Control OPC Item Path		OPC item path for stop control
Subtype	MULTI_ITEM	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Higher Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for higher control
Lower Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for lower control
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal
Stop Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for stop control

7.5.8.7.**Complex measured value (CMV)****Table 7.5.8.7-1 Configurable CMV properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	CMV	61850-Type

Property/Parameter	Value or Value range/ Default /Example	Description
Angle OPC Item Path		OPC item path for angle
Magnitude OPC Item Path		OPC item path for magnitude
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for angle
Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for magnitude

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius, sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for measurement
Limit Value Supervision		
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

Table 7.5.8.7-2 Configurable CMV properties for External OPC clients, subtype LIMIT_CHECK

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	CMV	61850-Type
Angle OPC Item Path		OPC item path for angle

Property/Parameter	Value or Value range/ Default /Example	Description
Magnitude OPC Item Path		OPC item path for magnitude
Sub Type	LIMIT_CHECK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for angle
Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for magnitude

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius, sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz	Unit for measurement
Limit Value Supervision		
Hi Limit	0	Hi limit for measurement
HiHi Limit	0	HiHi limit for measurement
Lo Limit	0	Lo limit for measurement
LoLo Limit	0	LoLo limit for measurement
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

7.5.8.8.**Delta (DEL)****Table 7.5.8.8-1 Configurable DEL properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DEL	61850-Type
V ab Angle OPC Item Path		OPC item path for ab V angle
V ab Magnitude OPC Item Path		OPC item path for ab V magnitude
V bc Angle OPC Item		OPC item path for bc V angle
V bc Magnitude OPC Item		OPC item path for bc V magnitude
V ca Angle OPC Item Path		OPC item path for ca V angle
V ca Magnitude OPC Item		OPC item path for ca V magnitude
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Angle Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for angle
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius, sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for measurement
Limit Value Supervision		
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

Table 7.5.8.8-2 Configurable DEL properties for External OPC clients, subtype LIMIT_CHECK

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DEL	61850-Type
V ab Angle OPC Item Path		OPC item path for ab V angle

Property/Parameter	Value or Value range/ Default /Example	Description
V ab Magnitude OPC Item Path		OPC item path for ab V magnitude
V bc Angle OPC Item		OPC item path for bc V angle
V bc Magnitude OPC Item		OPC item path for bc V magnitude
V ca Angle OPC Item Path		OPC item path for ca V angle
V ca Magnitude OPC Item		OPC item path for ca V magnitude
Sub Type	LIMIT_CHECK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Angle Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for angle
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius, sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for measurement
Limit Value Supervision		
Hi Limit	0	Hi limit for measurement
HiHi Limit	0	HiHi limit for measurement
Lo Limit	0	Lo limit for measurement
LoLo Limit	0	LoLo limit for measurement
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

7.5.8.9. Controllable double point (DPC)**Table 7.5.8.9-1 Configurable DPC properties for External OPC Clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Cancel OPC Item Path		OPC item path for cancel
Close Execute OPC Item Path		OPC item path for close execute
Close Select OPC Item Path		OPC item path for close select
Faulty OPC Item Path		OPC item path for faulty
Intermediate OPC Item Path		OPC item path for intermediate
Open Execute OPC Item Path		OPC item path for open execute
Open Select OPC Item Path		OPC item path for open select
State OPC Item Path		OPC item path for state
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Cancel Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for cancel signal
Close Execute Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for close execute
Close Select Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for close select

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Open Execute Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for open execute
Open Select Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for open select
State Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for state

Table 7.5.8.9-2 Configurable DPC properties for External OPC clients, subtype OPEN_CLOSED_ITEMS

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPC	61850-Type
Cancel OPC Item Path		OPC item path for cancel
Close Execute OPC Item Path		OPC item path for close execute
Close Select OPC Item Path		OPC item path for close select
Closed OPC Item Path		OPC item path for closed
Faulty OPC Item Path		OPC item path for faulty
Intermediate OPC Item Path		OPC item path for intermediate
Open Execute OPC Item Path		OPC item path for open execute
Open OPC Item Path		OPC item path for open
Open Select OPC Item Path		OPC item path for open select
Sub Type	OPEN_CLOSED_ITEMS	Object subtype

Property/Parameter	Value or Value range/ Default /Example	Description
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Cancel Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for cancel signal
Close Execute Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for close execute
Close Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for close signal
Close Select Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for close select
Open Execute Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for open execute
Open Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for open signal
Open Select Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for open select

7.5.8.10. Device name plate (DPL)**Table 7.5.8.10-1 Configurable DPL properties for External OPC clients**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		

Property/Parameter	Value or Value range/ Default /Example	Description
61850-Type	DPL	61850-Type
HW Revision OPC Item Path		OPC item path for HW revision
Location OPC Item Path		OPC item path for location
Serial Number Register OPC Item Path		OPC item path for serial number register
Sub type	Basic	Object subtype
SW Revision OPC Item Path		OPC item path for SW revision
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Vendor Register OPC Item Path		OPC item path for vendor register

7.5.8.11.

Double point status (DPS)**Table 7.5.8.11-1 Configurable DPS properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPS	61850-Type
State OPC Item Path		OPC item path for state
Sub Type	Basic	Object subtype
Update Rate	0 - 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

**Table 7.5.8.11-2 Configurable DPS properties for External OPC clients, subtype
OPEN_CLOSED_ITEMS**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	DPS	61850-Type
Closed OPC Item Path		OPC item path for closed
Open OPC Item Path		OPC item path for open
Sub Type	OPEN_CLOSED_ITEMS	Object subtype
Update Rate	0 - 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
ClosedScale	Lookup Table Scale Stepwise Linear Scale Default: None	
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

7.5.8.12.**Controllable integer status (INC)****Table 7.5.8.12-1 Configurable INC properties for External OPC client**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	INC	61850-Type
Control OPC Item Path		OPC item path for control
State OPC Item Path		OPC item path for state
Sub Type	Basic	Object subtype
Update Rate	0 - 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.

Property/Parameter	Value or Value range/ Default /Example	Description
Scale and Unit		
Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for control signal
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal

7.5.8.13. Integer status (INS)

Table 7.5.8.13-1 Configurable INS properties for External OPC clients

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	INS	61850-Type
State OPC Item Path		OPC item path for scale
Sub Type	Basic	Object subtype
Update Rate	0 - 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

7.5.8.14. Integer controlled step position information (ISC)

Table 7.5.8.14-1 Configurable ISC properties for External OPC clients

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	ISC	61850-Type

Property/Parameter	Value or Value range/ Default /Example	Description
Control OPC Item Path		OPC item path for control
State OPC Item Path		OPC item path for state
Sub Type	Basic	Object subtype
Update Rate	0 - 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for control signal
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal

7.5.8.15.**Logical node name plate (LPL)****Table 7.5.8.15-1 Configurable LPL properties for OPC servers with External device**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	LPL	61850-Type
Sub Type	Basic	Object Subtype
SW Revision OPC Item Path		OPC item path for SW revision
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Vendor OPC Item Path		OPC item path for vendor

7.5.8.16.

Measured value (MV)**Table 7.5.8.16-1 Configurable MV properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	MV	61850-Type
Magnitude OPC Item Path		OPC item path for magnitude
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius), sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VlSin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for measurement
Limit Value Supervision		
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

Table 7.5.8.16-2 Configurable MV properties for External OPC clients, subtype LIMIT_CHECK

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	MV	61850-Type
Magnitude OPC Item Path		OPC item path for magnitude

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Sub Type	LIMIT_CHECK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for measurement
Number of Decimals	0 to 9 Default: 0	Number of decimals
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for measurement

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius), sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VlSin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for measurement
Limit Value Supervision		
Hi Limit	0	Hi limit for measurement
HiHi Limit	0	HiHi limit for measurement
Lo Limit	0	Lo limit for measurement
LoLo Limit	0	LoLo limit for measurement
Max Limit	20000	Maximum limit for measurement.
Min Limit	0	Minimum limit for measurement.

7.5.8.17. Controllable single point (SPC)**Table 7.5.8.17-1 Configurable SPC properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPC	61850-Type
Control OPC Item Path		OPC item path for control
State OPC Item Path		OPC item path for state
Sub Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for control signal
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal

Table 7.5.8.17-2 Configurable SPC properties for External OPC clients, subtype TWO_CONTROL_TAGS

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPC	61850-Type
Off Control OPC Item Path		OPC item path for off control
On Control OPC Item Path		OPC item path for on control
State OPC Item Path		OPC item path for state
Sub Type	TWO_CONTROL_TAGS	Object subtype

Property/Parameter	Value or Value range/ Default /Example	Description
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Control Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for control signal
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for indication signal

7.5.8.18.**Single point status (SPS)****Table 7.5.8.18-1 Configurable SPS properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	SPS	61850-Type
State OPC Item path		OPC item path for state
Sub-Type	Basic	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

Table 7.5.8.18-2 Configurable SPS properties for External OPC clients, subtype Bit Mask

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
61850-Type	SPS	61850-Type
Bitmask Type	BITMASK_OR BITMASK_AND BITMASK_XOR BITMASK_BOOL_ALL BITMASK_BOOL_NONE BITMASK_BOOL_ANY BITMASK_BOOL_ANYNOT-SET BITMASK_BOOL_SOMENOT-SET BITMASK_BOOL_ONLY BITMASK_BOOL_EXACTLY Default: BITMASK_OR	Defines the type of used bitmask
State OPC Item Path		OPC item path for state
StateBitMaskValue	0 to 65535 Default: 0	
Sub-Type	Bit Mask	Object subtype
Update Rate	0 to 65535 Default: 0	Defines the requested shortest interval in milliseconds at which the source OPC server should report that an OPC item's value has changed.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

7.5.8.19.**WYE****Table 7.5.8.19-1 Configurable WYE properties for External OPC clients, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	WYE	61850-Type
I a Angle OPC Item Path		OPC item path for a I angle
I a Magnitude OPC Item Path		OPC item path for a I magnitude
I b Angle OPC Item Path		OPC item path for b I angle
I b Magnitude OPC Item Path		OPC item path for b I magnitude
I c Angle OPC Item Path		OPC item path for c I angle
I c Magnitude OPC Item Path		OPC item path for c I magnitude
I n Angle OPC Item Path		OPC item path for n I angle
I n Magnitude OPC Item Path		OPC item path for n I magnitude
I net Angle OPC Item Path		I net angle OPC item path
I net Magnitude OPC Item Path		I net magnitude OPC item path
I res Angle OPC Item Path		I res angle OPC item path
I res Magnitude OPC Item Path		I res magnitude OPC item path
OPC Server ID	Default	ID of the connected OPC Server
Sub Type	BASIC LIMIT_CHECK Default: BASIC	Object subtype
Update Rate	0 to 65535 Default: 0	Defines how often the value is updated.
Scale and Unit		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Net Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for net
Net Number Of Decimals	0 to 9 Default: 0	Number of decimals for net
Net Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for net angle
Net Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for net magnitude

Property/Parameter	Value or Value range/ Default /Example	Description
Net Unit	dimensionless, meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius, sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s²), hertz, lux (lm/m²)lx, lumen (cd sr), weber (V s), tesla (Wb / m²), watt (J/s), pascal (N/m²), square meter (m²), cubic meter (m³), meters per second (m/s), meters per second² (m/s²), cubic meters per second (m³/s), mass per cubic meter (kg/m³), kilogram meter (kg m), kilogram per cubic meter (kg/m³), meter square / second (m²/s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I²R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W² / A²), amp second (As), amp square (A²), amp square second (A²s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	Unit for net
Neutral Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for neutral
Neutral Number Of Decimals	0 to 9 Default: 0	Number of decimals for neutral
Neutral Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for neutral angle

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for neutral magnitude
Neutral Unit	See Net Unit	Unit for neutral
Phase Multiplier	See Net Multiplier	Multiplier for phase
Phase Number Of Decimals	0 to 9 Default: 0	Number of decimals for phase
Phase Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for phase angle
Phase Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for phase magnitude
Phase Unit	See Net Unit	Unit for phase
Res Multiplier	See Net Multiplier	Multiplier for res
Res Number Of Decimals	0 to 9 Default: 0	Number of decimals for res
Res Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for res angle
Res Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for res magnitude
Res Unit	See Net Unit	Unit for res
Limit Value Supervision		
Net Max Limit	20000	Max limit for net
Net Min Limit	0	Min limit for net
Neutral Max Limit	20000	Max limit for neutral
Neutral Min Limit	0	Min limit for neutral
Phase Max Limit	20000	Max limit for phase
Phase Min Limit	0	Min limit for phase

Property/Parameter	Value or Value range/ Default /Example	Description
Res Max Limit	20000	Max limit for res
Res Min Limit	0	Min limit for res

Table 7.5.8.19-2 Configurable WYE properties for External OPC clients, subtype LIMIT_CHECK

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
61850-Type	WYE	61850-Type
I a Angle OPC Item Path		OPC item path for a I angle
I a Magnitude OPC Item Path		OPC item path for a I magnitude
I b Angle OPC Item Path		OPC item path for b I angle
I b Magnitude OPC Item Path		OPC item path for b I magnitude
I c Angle OPC Item Path		OPC item path for c I angle
I c Magnitude OPC Item Path		OPC item path for c I magnitude
I n Angle OPC Item Path		OPC item path for n I angle
I n Magnitude OPC Item Path		OPC item path for n I magnitude
I net Angle OPC Item Path		I net angle OPC item path
I net Magnitude OPC Item Path		I net magnitude OPC item path
I res Angle OPC Item Path		I res angle OPC item path
I res Magnitude OPC Item Path		I res magnitude OPC item path
OPC Server ID	Default	ID of the connected OPC server.
Sub Type	LIMIT_CHECK	Object subtype
Update Rate	0 to 65535 Default: 0	Defines how often the value is updated.
Scale and Unit		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Net Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, deka, hecto, kilo, mega, giga, tera, peta, exa, zetta, yotta Default: No multiplier	Multiplier for net
Net Number Of Decimals	0 to 9 Default: 0	Number of decimals for net
Net Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for net angle
Net Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for net magnitude

Property/Parameter	Value or Value range/ Default /Example	Description
Net Unit	dimensioless, meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees Celsius), sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s²), hertz, lux (lm/m²)lx, lumen (cd sr), weber (V s), tesla (Wb / m²), watt (J/s), pascal (N/m²), square meter (m²), cubic meter (m³), meters per second (m/s), meters per second² (m/s²), cubic meters per second (m³/s), mass per cubic meter (kg/m³), kilogram meter (kg m), kilogram per cubic meter (kg/m³), meter square / second (m²/s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I²R), volt ampere reactive (VISin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W² / A²), amp second (As), amp square (A²), amp square second (A²s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensioless	Unit for net
Neutral Multiplier	See Net Multiplier	Multiplier for neutral
Neutral Number Of Decimals	0 to 9 Default: 0	Number of decimals for neutral
Neutral Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for neutral angle
Neutral Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for neutral magnitude
Neutral Unit	See Net Unit	Unit for neutral

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Phase Multiplier	See Net Multiplier	Multiplier for phase
Phase Number Of Decimals	0 to 9 Default: 0	Number of decimals for phase
Phase Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for phase angle
Phase Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for phase magnitude
Phase Unit	See Net Unit	Unit for phase
Res Multiplier	See Net Multiplier	Multiplier for res
Res Number Of Decimals	0 to 9 Default: 0	Number of decimals for res
Res Scale Ang	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for res angle
Res Scale Mag	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for res magnitude
Res Unit	See Net Unit	Unit for res
Limit Value Supervision		
Net Hi Limit	0	Hi limit for net
Net HiHi Limit	0	HiHi limit for net
Net Lo Limit	0	Lo limit for net
Net LoLo Limit	0	LoLo limit for net
Net Max Limit	20000	Max limit for net
Net Min Limit	0	Min limit for net
Neutral Hi Limit	0	Hi limit for neutral
Neutral HiHi Limit	0	HiHi limit for neutral
Neutral Lo Limit	0	Lo limit for neutral
Neutral LoLo Limit	0	LoLo limit for neutral

Property/Parameter	Value or Value range/ Default /Example	Description
Neutral Max Limit	20000	Max limit for neutral
Neutral Min Limit	0	Min limit for neutral
Phase Hi Limit	0	Hi limit for phase
Phase HiHi Limit	0	HiHi limit for phase
Phase Lo Limit	0	Lo limit for phase
Phase LoLo Limit	0	LoLo limit for phase
Phase Max Limit	20000	Max limit for phase
Phase Min Limit	0	Min limit for phase
Res Hi Limit	0	Hi limit for res
Res HiHi Limit	0	HiHi limit for res
Res Lo Limit	0	Lo limit for res
Res LoLo Limit	0	LoLo limit for res
Res Max Limit	20000	Max limit for res
Res Min Limit	0	Min limit for res

7.6. Configuring DCOM

7.6.1. Introduction

DCOM is a Microsoft technology that allows COM (OPC) servers and clients to communicate with each other while running on separate computers. DCOM must be enabled by making the proper DCOM configuration for the OPC server, OPC client and general DCOM settings on both computers.

There are several ways to configure DCOM depending on the needs of the applications, users and network administration structure. The following sections provide instructions on DCOM configuration when the COM600 computer and OPC server computer are part of different Windows domains, or are not part of any domain. This kind of configuration provides relatively good security by not allowing more users than necessary to access the OPC server.

DCOM is configured using a shared user account on both computers for authentication between the OPC client running on COM600 computer and the OPC server running on the OPC server computer. Authorization for the user account must be configured on both computers. On the COM600 computer, the shared user account must be granted remote access rights so that OPC callbacks from the remote OPC server work. On the OPC server computer, the shared user account must be granted rights to launch, activate and access the OPC server. Additionally, similar access rights are needed for the OpcEnum

component from OPC Foundation. The OpcEnum component is used for browsing OPC servers on a computer and for mapping progIds to CLSIDs. ProIds are used to configure the remote OPC server on COM600. CLSIDs are needed to start the OPC server via DCOM.

For more information on setting up the DCOM, see Microsoft and OPC Foundation web sites.

7.6.2. Configuring DCOM

The DCOM settings are configured with the DCOMCNFG program.

To configure the DCOM settings:

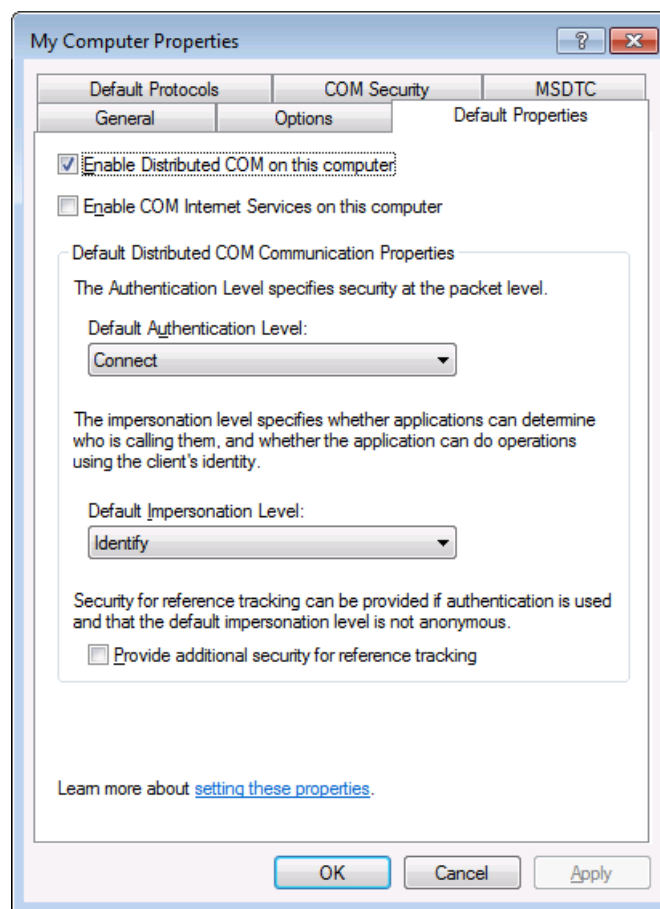
1. Execute the DCOMCNFG program by selecting **Start > Run As** menu or via a command prompt.
2. Select **Component Services > Computers > My Computer**.
3. Right-click **My Computer** and select **Properties** to open the DCOM settings property sheet.

7.6.3. Configuring COM600 and OPC server computers

7.6.3.1. Configuring DCOM default properties

To configure the DCOM default properties:

1. In the My Computer Properties dialog, select the **Default Properties** tab.
2. Select **Enable Distributed COM**.
3. Set the default authentication level to **Connect** from the drop-down menu.
4. Set the default impersonation level to **Identify** from the drop-down menu.



DCOM_default_properties.png

Figure 7.6.3.1-1 Configuring DCOM default properties

7.6.3.2. Creating a common user account

The COM600 local user account will be used for authentication between the two computers. The user account is already included on the COM600 computer, thus it only needs to be created on the OPC server computer. Make sure that the account on the OPC server computer has exactly the same password as on the COM600 computer.



If the password on the COM600 computer is changed, remember to change it on the OPC server computer as well. Change the password via the SAB Management tool.



The shared account is used for logging on to both computers. Make sure that the account will not be locked out by the

Windows security policy, for example, because of too many failed login attempts.

7.6.3.3. Local security policy settings

Depending on the current Windows security policy settings and Windows version, remote users may be authenticated as Guest. As a Guest, the remote user is not authorized to use OPC via DCOM unless the Guest account is given authorization (not recommended). You can prevent remote users from being authenticated as Guest by modifying the local security settings.

To modify the local security policy settings:

1. Select **Start > Control Panel > Administrative Tools**.
2. Open the Local Security Settings window.
3. Expand the tree view and select **Security Options** in the left-hand pane.
4. In the right-hand pane, scroll down to **Network Access: Sharing and security settings for local accounts** and right-click it.
5. Select **Properties**.
6. Select **Classic - local users authenticate as themselves**.

7.6.3.4. Disabling firewalls and security software

Firewalls and other security software may block the connections needed by DCOM. Therefore, you may need to disable them while configuring and testing DCOM. After you have completed the DCOM configuration, enable needed firewalls and security software again and make sure that DCOM communication still works. If the DCOM communication does not work, the security software must be disabled or configured to allow DCOM communication.

A built-in Windows firewall is enabled in COM600 by default. It should be disabled before taking DCOM into use. For information on configuring the Windows firewall to allow DCOM, see MSDN Library web site.

7.6.3.5. Restarting OPC programs

After you have configured all DCOM settings, close or terminate all affected programs:

- the OPC client OPCS_CONN on the COM600 computer
- the OPC server processes and OpcEnum component on the OPC server computer

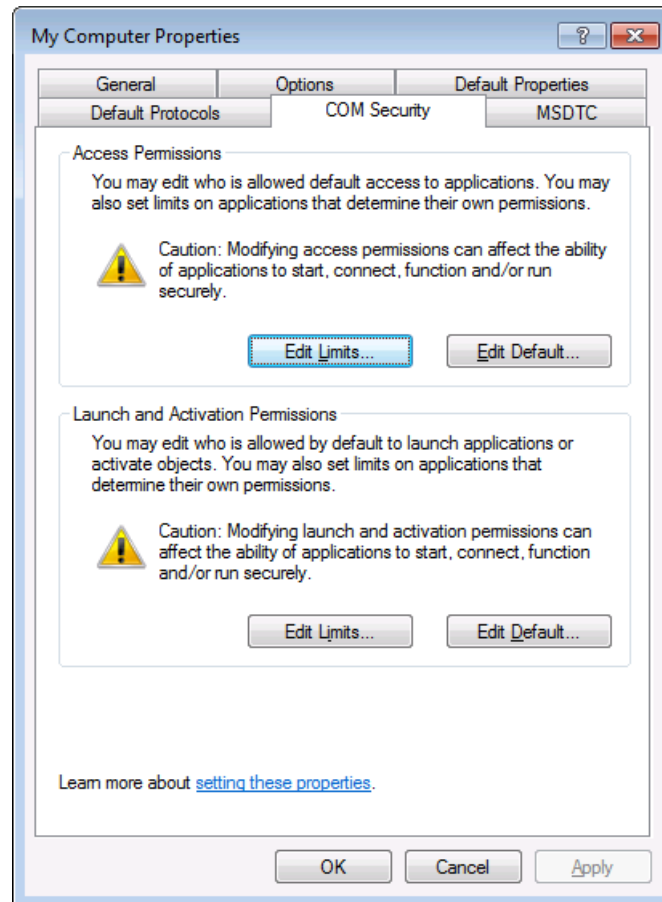
The existing DCOM connections with old security tokens may still be in use instead of new ones created with the current DCOM settings from the Windows registry. Restart both computers to ensure that the new settings are taken into use.

7.6.4. Configuring DCOM on COM600 computer

To be able receive incoming data callbacks from the OPC server to the COM600 computer, you must enable remote access permissions for the COM600 user account.

To configure DCOM access permissions on COM600 computer:

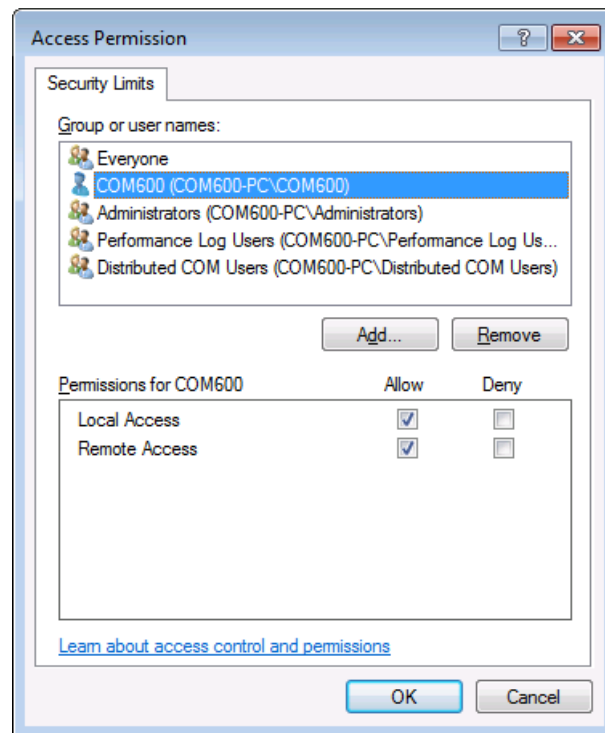
1. Select **Component Services > Computers > My Computer**.
2. In the My Computer Properties dialog, select the COM Security tab.
3. Click **Edit Limits** in the Access Permissions section of the dialog, see Figure 7.6.4-1.



COM_security.png

Figure 7.6.4-1 Editing COM600 Security settings

4. In the Access Permission dialog, allow Local Access and Remote Access for COM600, see Figure 7.6.4-2.



COM600_permissions.png

Figure 7.6.4-2 Adding permissions for COM600 computer

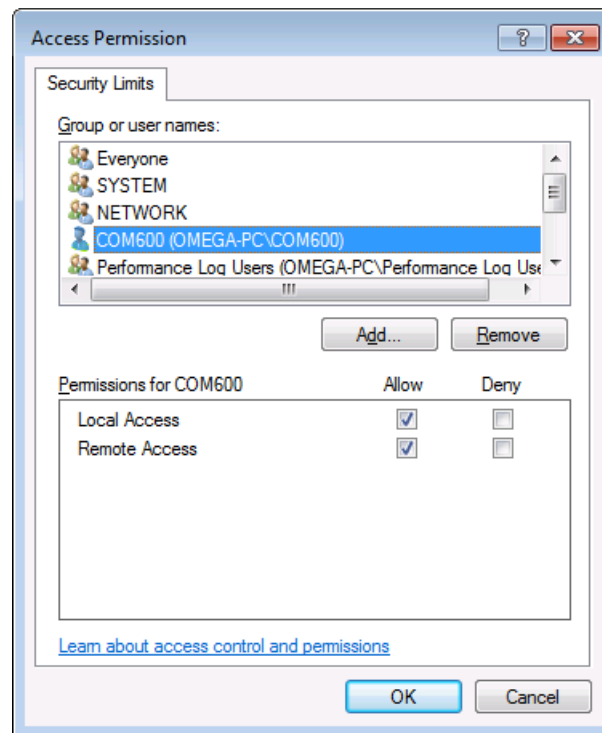


If you want to run the remote OPC server on a different user account, you must create the additional user account on the COM600 computer with same password as on the OPC server computer including the same remote access rights as the COM600 user account. Even if you create the additional user account with the same access rights, the COM600 user account is still required.

7.6.5. Configuring DCOM on OPC server computer

To configure COM600S permissions on the OPC server computer:

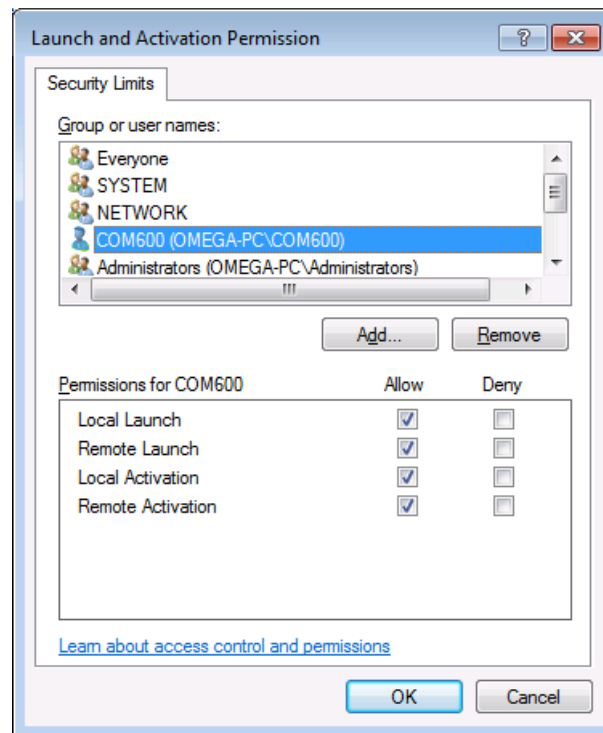
1. Select **Component Services > Computers > My Computer**.
2. In the My Computer Properties dialog, select the COM Security tab.
3. Click **Edit Limits** in the Access Permissions section of the dialog, see Figure 7.6.4-1.
4. In the Access Permission dialog, allow Local Access and Remote Access for COM600 and click **OK** (see Figure 7.6.5-1).



COM600_permissions_OPC.png

Figure 7.6.5-1 Adding permissions for COM600 computer

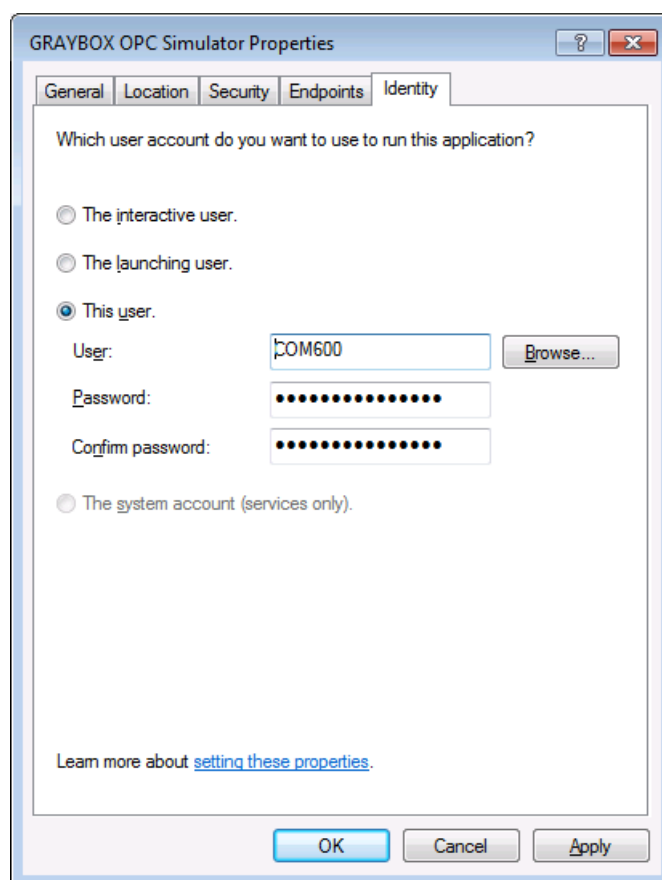
5. Click **Edit Limits** in the Launch and Activation Permissions section of the dialog, see Figure 7.6.4-1.
6. In the Launch and Activation Permission dialog, allow Local Launch, Remote Launch, Local Activation and Remote Activation for COM600 and click **OK** (see Figure 7.6.5-2).



launch_permission.png

Figure 7.6.5-2 Adding launch and activation permissions for COM600

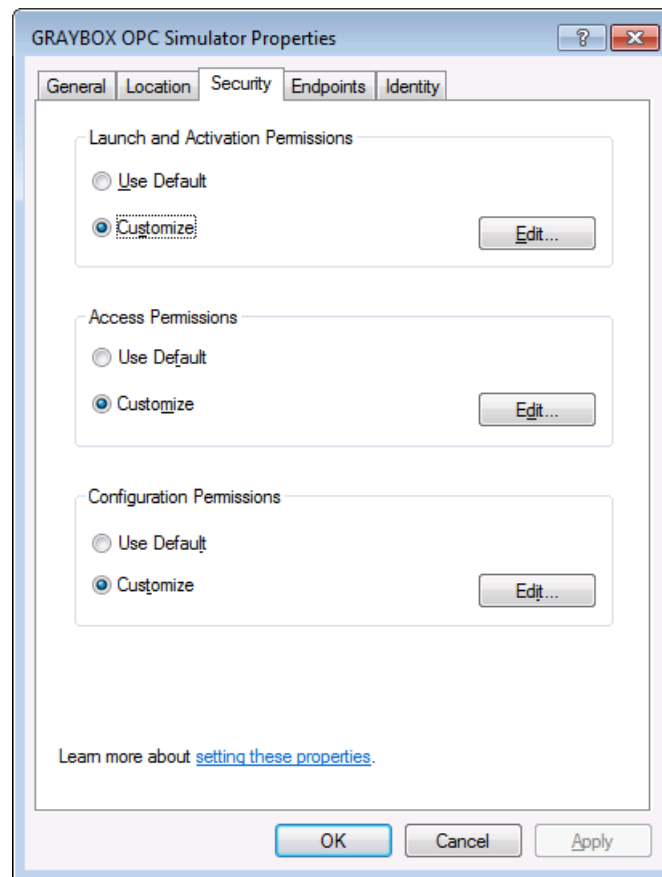
7. Configure the OPC server to run as the (local) COM600 user created on the computer for this purpose. Select **My Computer** > **DCOM Config** > **OPC server** to open the properties.
8. Select the Identity tab. Enter the COM600 user name and password and click **OK** (see Figure 7.6.5-3).



identity_tab.png

Figure 7.6.5-3 Configuring the COM600 user to run the OPC server

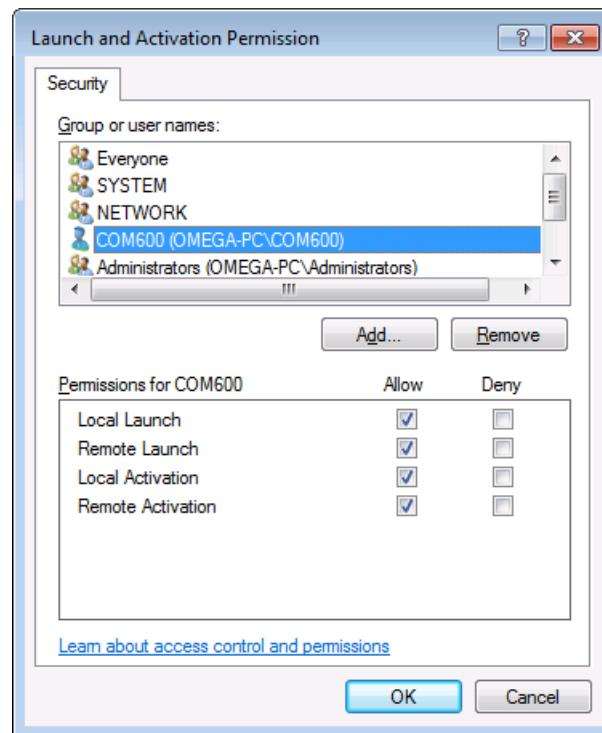
9. Select the Security tab and click **Edit** in the Launch and Activation Permissions section of the dialog, see Figure 7.6.5-4.



customizing_launch_permissions.png

Figure 7.6.5-4 Customizing launch and activation permissions

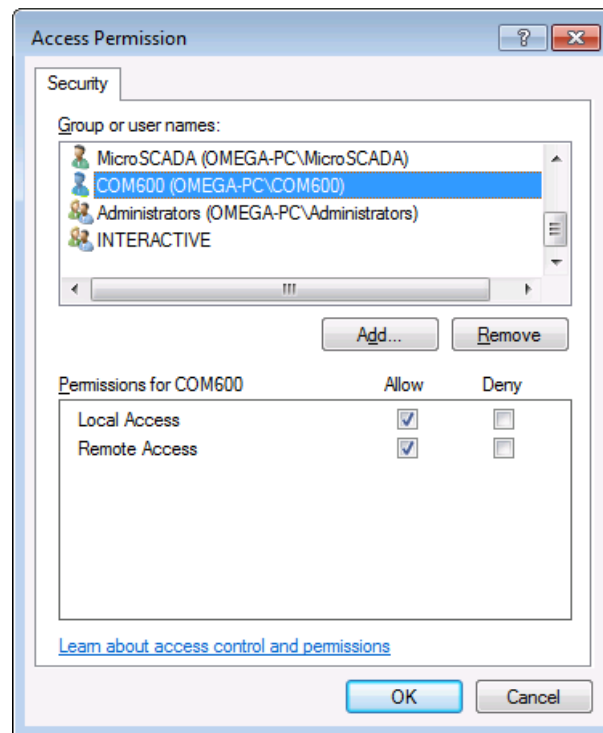
10. In the Access Permission dialog, allow Local Launch, Remote Launch, Local Activation and Remote Activation for the OpcEnum component and click **OK** (see Figure 7.6.5-5).



allowing_launch_and_activation.png

Figure 7.6.5-5 Adding launch and activation permissions for the OpcEnum component

11. Click **Edit** in the Access Permissions section of the dialog, see Figure 7.6.5-4.
12. In the Access Permission dialog, allow Local Access and Remote Access for the OpcEnum component and click **OK** (see Figure 7.6.5-6).



allowing_access_permissions.png

Figure 7.6.5-6 Adding local and remote access permissions for the OpcEnum component

8. SNMP OPC server configuration

8.1. About this section

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

Start SAB600 to open a project. You can also open and name a new 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**.

8.2. Overview of configuration

Before you can start using the SNMP OPC Server, you need to build and configure an object tree in SAB600 to define the Communication structure within the Gateway object.

The possible objects are:

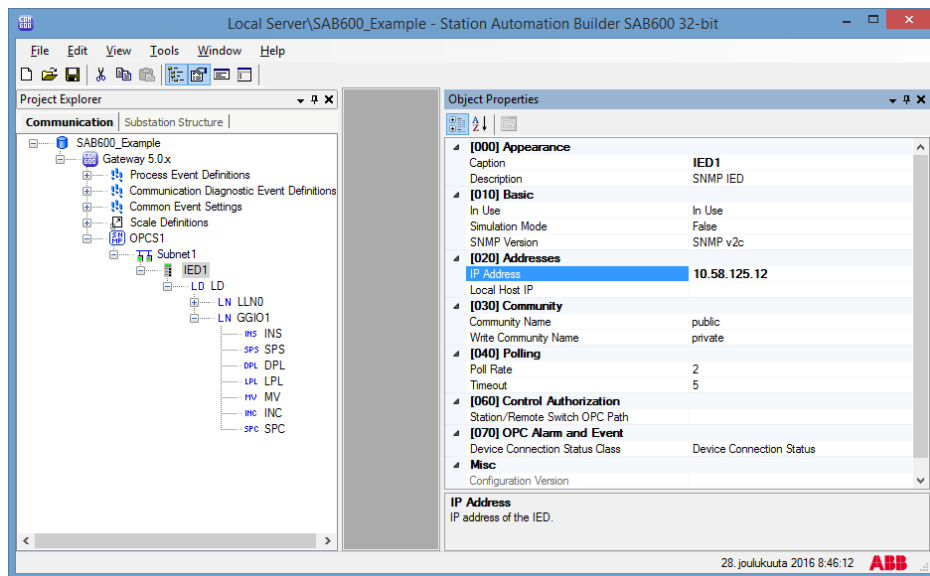
- Gateway
- SNMP OPC Server
- SNMP Subnetwork
- SNMP IED
- Logical Device objects
- Logical Node objects
- Data objects

Figure 8.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_SNMP_Example_View.png

Figure 8.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

First, you need to build an object tree. This is done by adding objects to the object tree, see 8.3.1, General information about building object tree.

Figure 8.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the SNMP OPC Server object and its child objects like subnetworks, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 8.4.1, General information about configuring objects.

Table 8.2-1 SNMP OPC Server related objects

Object	Description
SNMP OP Server	An object representing the SNMP OPC Server.
SNMP OPC Subnetwork	An object representing the network which the SNMP device resides.
SNMP IED	An object representing a network device that supports SNMP protocol.
SNMP OPC Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A device consists of one or several LDs.

Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.
Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, e.g. value, quality, and control.

8.3. Building object tree

8.3.1. General information about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 8.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example **New > SNMP > SNMP OPC Server**.
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. SNMP OPC Server
3. SNMP Subnetwork
4. SNMP IED
5. Logical Device objects
6. Logical Node objects
7. Data objects

8.3.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

8.3.3. Adding SNMP OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding an SNMP OPC Server object.

To add SNMP OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Select **New > SNMP > SNMP OPC Server**.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

8.3.4. Adding SNMP subnetwork objects

After the server object has been successfully added, you can continue building the object tree by adding subnetwork objects.

To add SNMP OPC subnetwork object:

1. Select the SNMP OPC Server object.
2. Right-click the SNMP OPC Server object.
3. Select **New > New** or **New > SNMP > SNMP Subnetwork**.

8.3.5. Adding SNMP IED objects

After adding a subnetwork you can add device objects.

To add an SNMP subnetwork object:

1. Select a Subnetwork object.
2. Right-click on the Subnetwork object and select **New > New** or **New > SNMP > SNMP IED**.

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 **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

For more information about the SCL Import function, see COM600 User's Manual.

8.3.6. Adding Logical Device objects

To add a Logical Device object:

1. Select an SNMP IEC object and right-click it.
2. Select **New > New** or **New > Communication > SNMP LD**.



Each SNMP IED must have at least one Logical Device object as a child object.

8.3.7. Adding Logical Node objects

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

8.3.8. Adding data objects

To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique. However, you can have a data object with same name under a different Logical Node.

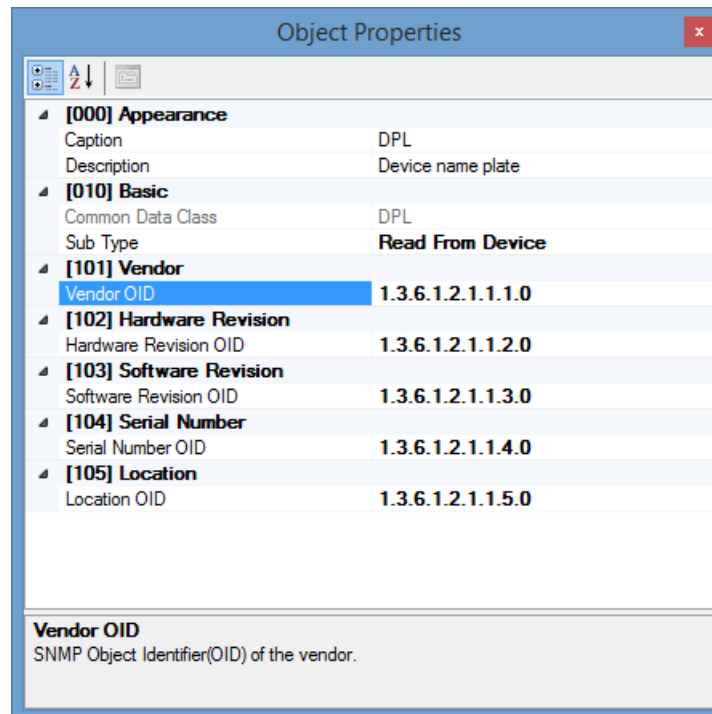
8.4. Configuring objects

8.4.1. General information about configuring objects

After the objects have been added, configure the object properties. Figure 8.4.1-1 shows an example of how to use SAB600 to configure the object properties for SNMP OPC Server.

To configure an object:

1. Select an object in the object tree of the communication structure.
 - The object properties appear now in the Object Properties window. The properties and their values can be viewed as shown in Figure 8.4.1-1



SAB600_SNMP_Object_Properties_Example.png

Figure 8.4.1-1 Example of object properties in the Objects Properties window

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

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

8.4.2. Configuring SNMP Server properties

SNMP OPC Server does not have any configurable properties.

8.4.3. Configuring SNMP Subnetwork properties

The SNMP OPC Server subnetwork properties that can be configured and value ranges for them can be found in Table 8.4.3-1. The actual configuration by using SAB600 is performed as described in 8.4.1, General information about configuring objects.

Table 8.4.3-1 SNMP Subnetwork properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
In Use	In Use Not In use Default: In Use	Controls if the device communication is initially in use or not.

8.4.4.**Configuring SNMP IED properties**

The SNMP OPC Server IED properties that can be configured and value ranges for them can be found in Table 8.4.4-1. The actual configuration by using SAB600 is performed as described in 8.4.1, General information about configuring objects.

Table 8.4.4-1 SNMP IED properties

Property/Parameter	Value or Value range/ Default	Description
Basic		
In Use	In Use Not In use Default: In Use	Specifies whether IED is in use or not.
Simulation Mode	False True Default: False	Defines whether IED is used in simulation mode.
SNMP Version	SNMP v1 SNMP v2c SNMP v3 Default: SNMP v2c	SNMP version supported by the network device.
Addresses		
IP Address	127.0.0.1	IP address of the IED.
Community		
Community Name	public	Community name defined on the network device. Community name is used to authenticate SNMP packets, which must match the community name that is specified on the agent.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default	Description
Write Community Name	private	Community name used for the writing operation. The community name is used to authenticate SNMP packets, which must match the community name that is specified on the agent.
Polling		
Poll Rate	0 to 3600 Default: 2	Polling rate in seconds.
Timeout	0 to 3600 default: 5	A timeout of the component in seconds. Timeout property is set to 0, all operations return immediately. If the timeout is set to a positive value, the system will wait for the operation to complete before returning.
Security		
Authentication Password		The password used for SNMPv3 authentication.
Authentication Protocol	Not Used MD5 SHA Default: Not Used	The authentication protocol used for SNMPv3.
Encryption Algorithm	Not Used DES AES 3DES Default: Not Used	The encryption algorithm used for SNMPv3 packets.
Encryption Password		The encryption password used for SNMPv3 privacy.
User name		The user name used for SNMPv3 authentication.
Control Authorization		
Station/Remote Switch OPC Path		Station/Remote Switch OPC Path OPC Path of the station remote switch position to be used with this device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name E.g. GW#ABDNP_LAN_OPC_DA_Server1#Channel1\IED1\LD1\GGI01\loc

8.4.5. Configuring Logical Device properties**Table 8.4.5-1 Logical Device properties**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Station/Remote Switch OPC Path		OPC path of the station remote switch position to be used with this logical device. The format is Node#ProgID For OPC Server#Channel Name\IED Name\Logical Device Name\Logical Node Name\Data Object Name For example: GW#ABB.conn_OPC_DA_Server.Instance[1]#Channel1\IED1\LD1\GGIO1\loc

8.4.6. Configuring Logical Node properties**Table 8.4.6-1 Logical Node properties**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Logical Node Class	LLN0 and Logical Node	Logical node class.

Property/Parameter	Value or Value range/ Default	Description
Logial Node Class	ANCR, ARCO, ATCC, AVCO, LPHD, CALH, CCGR, CILO, CPOW, CSWI, GAPC, GGIO, GSAL, IARC, IHMI, ITCI, ITMI, MDIF, MHAI, MHAN, MMTR, MMXN, MMXU, MSQI, MSTA, PDIF, PDIR, PDIS, PDOP, PDUP, PFRC, PHAR, PHIZ, PIOC, PMRI, PMSS, POPF, PPAM, PSCH, PSEF, PTEF, PTOC, PTOF, PTOV, PTRC, PTTR, PTUC, PTUV, PUPF, PTUF, PVOC, PVPH, PZSU, RDRE, RADR, RBDR, RDRS, RBRF, RDIR, RFLO, RPSB, RREC, RSYN, SARC, SIMG, SIML, SPDC, XCBR, XSWI, TCTR, TVTR, YEFN, YLTC, YPSH, YPTR, ZAXN, ZBAT, ZBSH, ZCAB, ZCAP, ZCON, ZGEN, ZGIL, ZLIN, ZMOT, ZREA, ZRRC, ZSAR, ZTCF, ZTCR Default: GGIO	Logical node class.

8.4.7. Configuring data objects for Internal OPC Data

8.4.7.1. General information about configuring data objects for Internal OPC Data

Internal data objects describe internal status information of an OPC server, for example whether the connection between the SNMP OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

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

8.4.7.2. Integer status (INS) for OPC internal data

Table 8.4.7.2-1 Configurable INS (for OPC internal data) properties for OPC Servers

Property/Parameter	Value or Value range/ Default	Description
Basic		

Property/Parameter	Value or Value range/ Default	Description
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

8.4.7.3.**Controllable single point (SPC) for OPC internal data****Table 8.4.7.3-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850.
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line and IED nodes. When an attribute tag is referred to in the internal item definitions below it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED) e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used it must be preceded by a slash (/) character e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

8.4.7.4.**Single point status (SPS) for OPC internal data****Table 8.4.7.4-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		
Item Tag Path	Attributes\Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

8.4.8.**Configuring data objects for SNMP Device****8.4.8.1.****General information about configuring data objects for SNMP Device**

Object Identifiers (OIDs) are used in data object configuration. Each OID identifies a variable that can be read or set via SNMP. The SNMP device uses a hierarchical namespace Management Information Base (MIB) to contain OIDs. You can find all available OIDs from the MIB file published by the device. The MIB files have the extension .mib and are generally distributed with the device.

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

The parameters are stored in Object Properties in SAB600, see the tables for each data object type. The actual configuration by using SAB600 is performed as described in 8.4.1, General information about configuring objects.

8.4.8.2. Device name plate (DPL)

Table 8.4.8.2-1 Configurable DPL properties for SNMP OPC Server, subtype Basic

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPL	Common data class according to IEC 61850
Sub Type	Basic	Object subtype.
Vendor		
Vendor	ABB	Text string describing the vendor.
Hardware Revision		
Hardware Revision	1.0	Text string describing the hardware revision.
Software Revision		
Software Revision	1.0	Text string describing the software revision.
Serial Number		
Serial Number	ABB123456789	Text string describing the serial number.
Location		
Location	Vaasa	Textstring describing the location.

Table 8.4.8.2-2 Configurable DPL properties for SNMP OPC Server, subtype Read From Device

Property/ Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	DPL	Common data class according to IEC 61850
Sub Type	Read From Device	Object subtype.
Vendor		
Vendor OID		SNMP Object Identifier (OID) of the vendor.
Hardware Revision		
Hardware Revision OID		SNMP Object Identifier (OID) of the device hardware revision.

Property/ Parameter	Value or Value range/ Default	Description
Software Revision		
Software Revision OID		SNMP Object Identifier (OID) of the device software revision.
Serial Number		
Serial Number OID		SNMP Object Identifier (OID) of the device serial number.
Location		
Location OID		SNMP Object Identifier (OID) of the device location.

8.4.8.3. Controllable integer status (INC)

Table 8.4.8.3-1 Configurable INC properties for OPC servers with SNMP device

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	INC	Common data class according to IEC 61850.
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Output Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for output.
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for status.

8.4.8.4. Integer status (INS)



You can select the subtype in the Object Properties of SAB600.

Table 8.4.8.4-1 Configuring INS properties for OPC Servers with SNMP Device

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850.
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale to be used with this type.

8.4.8.5.**Logical Node name plate (LPL)****Table 8.4.8.5-1 Configurable LPL properties for SNMP OPC Server, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	LPL	Common data class according to IEC 61850.
Sub Type	Basic	Object subtype.
Vendor		
Vendor	ABB	A text string describing the vendor.
Software Revision		
Software Revision	1.0	A text string describing software revision.

Table 8.4.8.5-2 Configurable LPL properties for SNMP OPC Server, subtype Read From Device

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	LPL	Common data class according to IEC 61850.
Sub Type	Read From Device	Object subtype.
Vendor		
Vendor OID	Default: None	SNMP Object Identifier (OID) of the vendor.

Property/Parameter	Value or Value range/ Default /Example	Description
Software Revision		
Software Revision OID	Default: None	SNMP Object Identifier (OID) of device software revision.

8.4.8.6.**Measured value (MV)****Table 8.4.8.6-1 Configurable MV properties for SNMP OPC Servers, subtype MV Simple**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	MV	Common data class according to IEC 61850
Sub Type	MV Simple	Object subtype.
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, No multiplier, deka, hecto, kilo, mega, giga, tera, petra, exa, zetta, yotta Default: Deka	Specifies the multiplier for current SI unit.
Number of Decimals	Default: 0	Specifies the number of decimals shown in HSI. (0..9)
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale to be used with this type.

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees (Celsius), sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VIsin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	SI unit for measurement as described in IEC 61850.
Limit Value Supervision		
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

Table 8.4.8.6-2 Configurable MV properties for SNMP OPC Servers, subtype MV Limit Check

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	MV	Common data class according to IEC 61850
Sub Type	MV Limit Check	Object subtype.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Property/Parameter	Value or Value range/ Default /Example	Description
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Multiplier	yocto, zepto, atto, femto, pico, nano, micro, milli, centi, deci, No multiplier, deka, hecto, kilo, mega, giga, tera, petra, exa, zetta, yotta Default: Dekka	Specifies the multiplier for current SI unit.
Number of Decimals	0 to 9 Default: 0	Specifies the number of decimals shown in HSI.
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	

Property/Parameter	Value or Value range/ Default /Example	Description
Unit	meter, kilogram, second, ampere, kelvin, mole, candela, degrees, radian, steradian, gray (J/Kg), becquerel (l/s), degrees (Celsius), sievert (J/Kg), farad, coulomb, siemens, henry, volt, ohm, joule (Nm), newton (kg m/s ²), hertz, lux (lm/m ²)lx, lumen (cd sr), weber (V s), tesla (Wb / m ²), watt (J/s), pascal (N/m ²), square meter (m ²), cubic meter (m ³), meters per second (m/s), meters per second ² (m/s ²), cubic meters per second (m ³ /s), mass per cubic meter (kg/m ³), kilogram meter (kg m), kilogram per cubic meter (kg/m ³), meter square / second (m ² /s), watt per meter kelvin (W / m K), joule per kelvin (J / K), parts per million, rotations per second (1 / s), radian per second (rad / s), volt ampere (VA), watts (I ² R), volt ampere reactive (VlSin), degrees, (dimensionless) Cos, volt seconds (Ws / A), volt square (W ² / A ²), amp second (As), amp square (A ²), amp square second (A ² s), volt ampere hours, watt hours, volt ampere reactive hours, volts per hertz Default: Dimensionless	SI unit for measurement as described in IEC 61850.
Limit Value Supervision		
High	0	High limit for measurement. Event is created, when value crosses the limit.
High-High	0	High-high limit for measurement. Event is created, when value crosses the limit.
Low	0	Low limit for measurement. Event is created, when value crosses the limit.
Low-Low	0	Low-low limit for measurement. Event is created, when value crosses the limit.
Max	20000	Maximum value for measurement.
Min	0	Minimum value for measurement.

8.4.8.7. Controllable Single point (SPC)**Table 8.4.8.7-1 Configurable SPC properties for OPC servers with SNMP device, subtype Basic**

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850
Sub Type Basic	Bit Mask Default: Basic	Object subtype
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Output Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for output.
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for status.

Table 8.4.8.7-2 Additional configurable properties for Sub-Type Bit Mask

Property/Parameter	Value or Value range/ Default /Example	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850
Sub Type	Bit Mask	Object subtype.
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	Object Identifier (OID) of the managed object.
Addresses		
Output Bit Mask	0..65535 Default: 1	Bit Mask for output.
Status Bit Mask	0..65535 Default: 1	Bit Mask for status.
Scale and Unit		

Property/Parameter	Value or Value range/ Default /Example	Description
Output Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for output.
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale for status.

8.4.8.8.**Single point status (SPS) for OPC internal data****Table 8.4.8.8-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		
Item Tag Path	Attributes\Device connection status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

8.4.8.9. Binary counter reading (BCR)**Table 8.4.8.9-1 Configuring BCR properties for OPC Servers with SNMP Device**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	BCR	Common data class according to IEC 61850.
Object Identifier		
Object Identifier	1.3.6.1.2.1.25	SNMP Object Identifier (OID) of the managed object.
Scale and Unit		
Scale	Lookup Table Scale Stepwise Linear Scale Default: None	Scale to be used with this type.

9. SNTP OPC server configuration

9.1. About this section

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

Start SAB600 to open a project. You can also open and name a new 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**.

9.2. Overview of configuration

Before you can start using the SNTP OPC Server, you need to build and configure an object tree in SAB600 to define the Communication structure within the Gateway object.

The possible objects are:

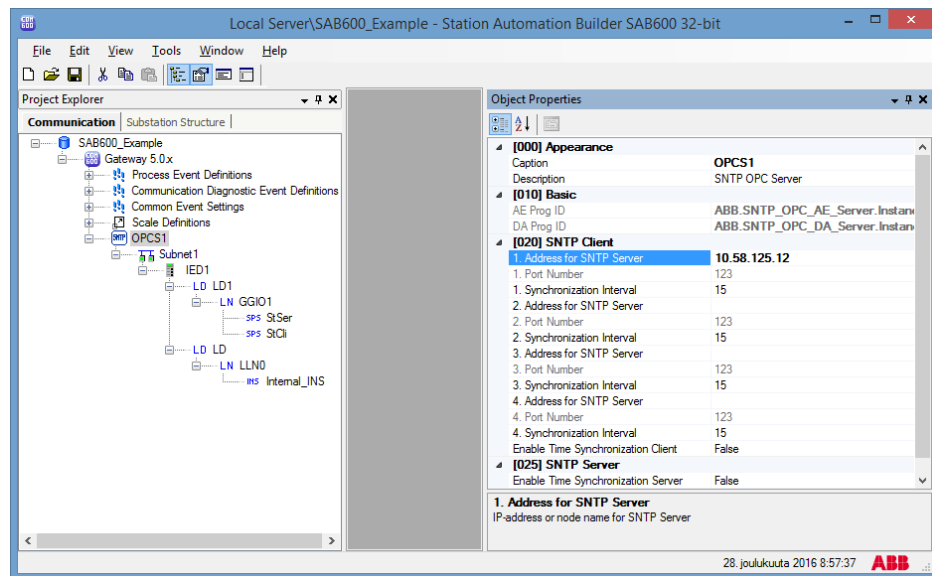
- Gateway
- SNTP OPC Server
- SNTP Virtual Subnetwork
- SNTP Virtual IED
- Logical Device objects
- Logical Node objects
- Data objects

Figure 9.2-1 shows an example view of SAB600 including an object tree in the communication structure on the left and Object Properties window displaying the object properties on the right.



When configuring OPC servers the following characters cannot be used in object names: \ ` ' ' #

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



SAB600_SNTP_Example_View.png

Figure 9.2-1 Example view of SAB600

The configuration work can basically be divided into two separate tasks:

1. building an object tree, and
2. configuring object properties.

First, you need to build an object tree. This is done by adding objects to the object tree, see 8.3.1, General information about building object tree.

Figure 9.2-1 shows an example of how the object tree may look like after it has been built. In the example tree you can see the SNMP OPC Server object and its child objects like subnetworks, devices, and data objects. Indentation is used to indicate the parent-child relationship between the objects.

After you have added the necessary objects to the object tree in the communication structure, you need to configure them, see 9.5.1, Configuring object properties.

Table 9.2-1 SNMP OPC Server related objects

Object	Description
SNTP OP Server	An object representing the SNMP OPC Server.
SNTP Virtual Subnetwork	Object representing a physical subnetwork.
SNTP Virtual IED	The IED object presents a virtual device.
SNTP Virtual Logical Device (LD)	An object representing a group of functions. Each function is defined as a Logical Node. A device consists of one or several LDs.
Logical Node (LN)	An object defined by its data and methods. LN is the smallest part of a function that exchanges data.

Data Object (DO)	Data object is an instance of one of the IEC 61850 Data Object Classes such as Single point status and Measured Value. Depending on the class, each data object has a set of attributes for monitoring and controlling the object, e.g. value, quality, and control.
------------------	--

9.3. Configuring SNTP OPC Server properties

Table 9.3-1 lists the configurable SNTP OPC Server properties and value ranges for them. The actual configuration by using SAB600 is performed as described in 9.5.1, Configuring object properties.

Table 9.3-1 SNTP OPC Server properties

Name	Value/Value range	Description
SNTP Client		
1. Address for SNTP Server		IP address or node name for SNTP Server (Primary)
1. Port Number	(1..65535) Default: 123	TCP/IP port number
1. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
2. Address for SNTP Server	Default: None	IP address or node name for SNTP Server.
2. Port Number	(1..65535) Default: 123	TCP/IP port number
2. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
3. Address for SNTP Server		IP address or node name for SNTP Server.
3. Port Number	(1..65535) Default: 123	TCP/IP port number.
3. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
4. Address for SNTP Server	Default: None	IP address or node name for SNTP Server.
4. Port Number	(1..65535) Default: 123	TCP/IP port number.

Name	Value/Value range	Description
4. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.
Enable Time Synchronization Client	True False Default: False	Controls if time synchronization client is initially in use or not.
SNTP Server		
Enable Time Synchronization Server	True False Default: False	Controls if time synchronization server is initially in use or not.
Port Number For Time Synchronization Server	(1...65535) Default: 123	Port number for time synchronization server

9.4. Building object tree

9.4.1. General information about building object tree

The object tree is built in the Communication structure of SAB600, see Figure 9.2-1. It is built by adding objects in a logical order starting from the Gateway.

You have several possible ways to add objects to the object tree in the Communication structure:

- You can right-click the object to which you want to add a child object. Then select **New > Object type group > Object name**, for example **New > Time Synchronization > SNTP OPC Server**.
- You can right-click the object type and select **New > New**. A New Object window appears. Select the object type you want to add and click **OK** or double-click it.
- You can copy the object.

Add the objects in the following order:

1. Gateway
2. SNTP OPC Server
3. SNTP Virtual Subnetwork (optional)
4. SNTP Virtual IED (optional)
5. Logical Device objects (optional)
6. Logical Node objects (optional)
7. Data objects (optional)



Virtual Subnetwork and objects below it are only needed for diagnostic purpose.

9.4.2. Adding Gateway object

To start building the object tree, add a Gateway object in the Communication structure by selecting the project name, right-click it and select **New > Communication > Gateway**.

9.4.3. Adding SNTP OPC Server object

After the Gateway object has successfully been added, you can continue building the object tree by adding an SNTP OPC Server object.

To add SNMP OPC Server object:

1. Select the Gateway object in the communication structure and right-click it.
2. Select **New > Time Synchronization > SNTP OPC Server**.

By using the SCL Import function, it is possible to import an entire server's or individual device's configurations without having to insert them manually. To open the SCL Import function, right-click the desired object, and select **SCL Import**.

For more information about the SCL Import function, see COM600 User's Manual.

9.4.4. Adding SNTP Virtual Subnetwork objects (optional)



Virtual Subnetwork and the objects below it are only used to provide diagnostic status information about the SNTP server or client for the COM600 WebHMI or other applications.

After the server object has been successfully added, you can continue building the object tree by adding subnetwork objects.

To add SNTP Virtual subnetwork object:

1. Select the SNTP OPC Server object.
2. Right-click the SNTP OPC Server object.
3. Select **New > New** or **New > Virtual > SNTP Virtual Subnetwork**.

9.4.5. Adding virtual IED objects (optional)

After adding a subnetwork you can add virtual device objects.

To add a virtual device object:

1. Select a Subnetwork object.
2. Right-click on the Subnetwork object and select **New > New** or **New > Virtual > SNTTP Virtual IED**.

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 **Select 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 may take time. To import a configuration file for a different device, right-click the device, select **SCL Import** again and repeat the steps above.

For more information about the SCL Import function, see COM600 User's Manual.

9.4.6. Adding Logical Device objects (optional)

Virtual subnetwork and the objects below it are only used for diagnostic purpose. Once a Virtual IED object is added, two data objects representing **Server Status** and **Client Status** are pre-populated and included in the object tree.

To add a Logical Device object:

1. Select an SNTTP Virtual IED object and right-click it.
2. Select **New > New** or **New > Communication > SNTTP Virtual LD**.



Each SNTTP IED must have at least one Logical Device object as a child object.

9.4.7. Adding Logical Node objects (optional)

To add a Logical Node:

1. Select a Logical Device object and right-click it.
2. Add a Logical Node object.
3. Rename the new object. The names of the Logical Node objects have to be unique.



You should have only one Logical Node 0 (LLN0) as a child object to a Logical Device object.

9.4.8. Adding data objects (optional)

To add a data object:

1. Select a Logical Node object and right-click it.
2. Add a data object.
3. Rename the new object. The names of the data objects have to be unique. However, you can have a data object with same name under a different Logical Node.

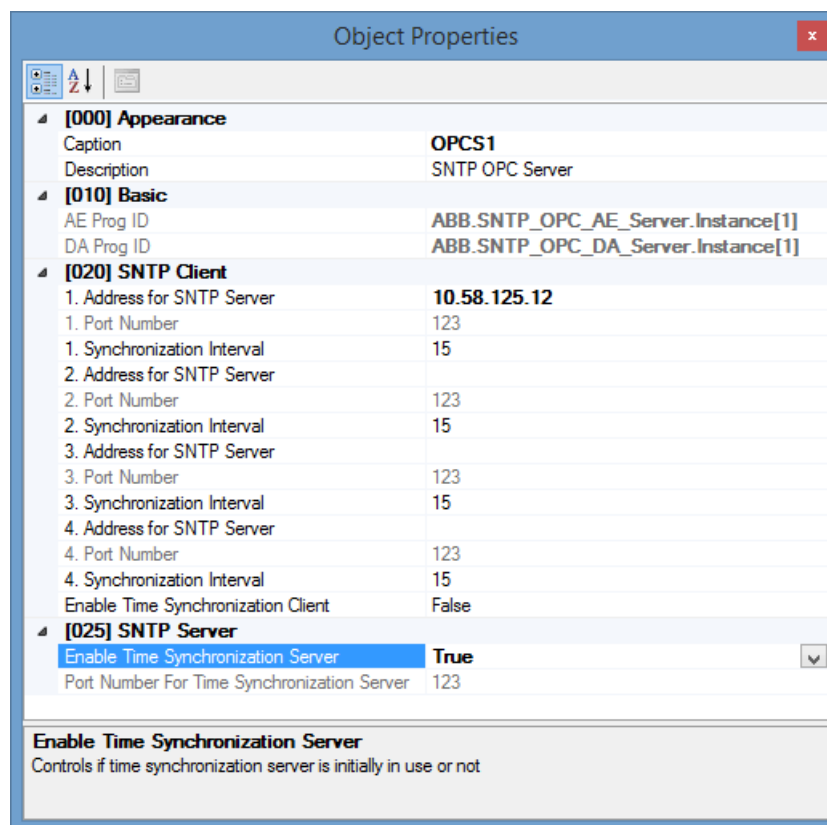
9.5. Configuring objects

9.5.1. Configuring object properties

After the objects have been added, you must 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 9.5.1-1. You can see the selected object on the left and the available properties on the right.
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.



SAB600_SNTP_Object_Properties_Example.png

Figure 9.5.1-1 Example of object properties

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

9.5.2.

Configuring SNTP OPC Server properties

Table 9.3-1 lists the configurable SNTP OPC Server properties and value ranges for them. The actual configuration by using SAB600 is performed as described in 9.5.1, Configuring object properties.

Table 9.5.2-1 SNTP OPC Server properties

Name	Value/Value range	Description
SNTP Client		
1. Address for SNTP Server		IP address or node name for SNTP Server (Primary)
1. Port Number	(1..65535) Default: 123	TCP/IP port number
1. Synchronization Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time synchronization will be done.

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Name	Value/Value range	Description
2. Address for SNTP Server	Default: None	IP address or node name for SNTP Server.
2. Port Number	(1...65535) Default: 123	TCP/IP port number
2. Synchroniza- tion Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time syn- chronization will be done.
3. Address for SNTP Server		IP address or node name for SNTP Server.
3. Port Number	(1...65535) Default: 123	TCP/IP port number.
3. Synchroniza- tion Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time syn- chronization will be done.
4. Address for SNTP Server	Default: None	IP address or node name for SNTP Server.
4. Port Number	(1...65535) Default: 123	TCP/IP port number.
4. Synchroniza- tion Interval	(0..3600) Default: 15	Time synchronization interval in seconds. If value is 0, no time syn- chronization will be done.
Enable Time Syn- chronization Cli- ent	True False Default: False	Controls if time synchronization client is initially in use or not.
SNTP Server		
Enable Time Syn- chronization Server	True False Default: False	Controls if time synchronization server is initially in use or not.
Port Number For Time Synchroniza- tion Server	(1...65535) Default: 123	Port number for time synchronization server

9.5.3. Configuring data objects for Internal OPC Data**9.5.3.1. General information about configuring data objects for Internal OPC Data**

Internal data objects describe internal status information of an OPC server, for example whether the connection between the SNTOP OPC Server and the device (IED) is working or not. When internal information of an OPC server needs to be transferred, that is information that does not originate from a device, to an OPC Client, virtual data objects must be created.

The SNTOP OPC Server supports three internal data object types that provide status information:

- 8.4.7.2, Integer status (INS) for OPC internal data
- 7.5.7.4, Controllable single point (SPC) for OPC internal data
- 9.5.3.4, Single point status (SPS) for OPC internal data

9.5.3.2. Integer status (INS) for OPC internal data

Table 9.5.3.2-1 Configurable INS (for OPC internal data) properties for OPC Servers

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	INS	Common data class according to IEC 61850
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); for example, Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, for example, /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

9.5.3.3. Controllable single point (SPC) for OPC internal data**Table 9.5.3.3-1 Configurable SPC (for OPC internal data) properties for OPC Servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPC	Common data class according to IEC 61850.
Addresses		
Item Tag Path	Default: None	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line and IED nodes. When an attribute tag is referred to in the internal item definitions below it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED) e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used it must be preceded by a slash (/) character e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.

9.5.3.4. Single point status (SPS) for OPC internal data**Table 9.5.3.4-1 Configurable SPS (for OPC internal data) properties for OPC servers**

Property/Parameter	Value or Value range/ Default	Description
Basic		
Common Data Class	SPS	
Addresses		

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

Item Tag Path	Client Status: Attributes\TimeSync\Timesync client\In use Attributes\TimeSync\Timesync client\Timesync status Server Status: Attributes\TimeSync\Timesync server\In use Attributes\TimeSync\Timesync server\Timesync status	Item tag path for the internal status information. The internal server tags that can be used are located in the Attributes nodes that are located under the root, line, and IED nodes. When an attribute tag is referred to in the internal item definitions below, it is possible to use either the whole tag path or just the path relative to the IED (the internal tags are configured per IED); e.g. Attributes\Diagnostic counters\Transmitted data messages. When the whole path is used, it must be preceded by a slash (/) character, e.g. /Channel Name\Attributes\Diagnostic counters\Transmitted data messages.
Alarm and Event		
Indication Event	Default: Empty string	Indication event used with this data object.

10. Redundant OPC server configuration

10.1. Introduction

The Redundant OPC server allows the user to have Redundant IED objects, where each Redundant IED object encapsulates the data of two source IED objects with an identical data object configuration.

One of the source IEDs is set as the active source of the Redundant IED, which will then act as if it was that source IED. The Redundant IED forwards indication and measurement data from the active source IED, and sends received commands to it.

It's possible for the user to switch the active source between the two source IEDs on demand, for example when the currently active source IED loses connection or has some other mishap, or is simply taken down for maintenance.

The source OPC server and IEDs are required to follow the common IEC-61850 data object model used in COM600, otherwise there are no limitations. There is special support in SAB600 for making redundant configurations with SSC600, though.

10.2. Configuration

10.2.1. General information about the configuration

The Redundant OPC server and IED are configured like any other OPC server in COM600. The needed objects are added to the communication tree in SAB600 and their properties are configured.

The starting point of the SCC600 redundancy configuration is to export the SSC600 configuration from PCM600 as an SCD file, importing that to SAB600 and transferring the configuration to COM600.

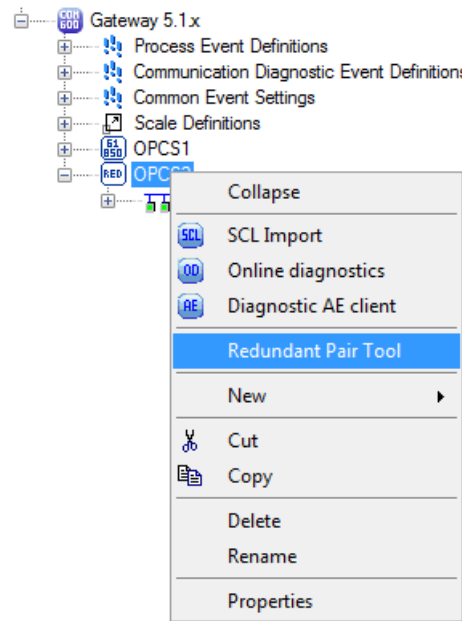
The SAB600 configuration can be done via the COM600 configuration wizard or from an SAB600 object tree. In both cases IEC61850 configuration is created first. After IEC61850 configuration has been created.



Use the IED compare tool in PCM600 to verify that IEDs are identical. SAB600 prevents from creating a redundant pair in case IEDs in the SCD file are not consistent.

10.2.2. Configuration from SAB600 object tree

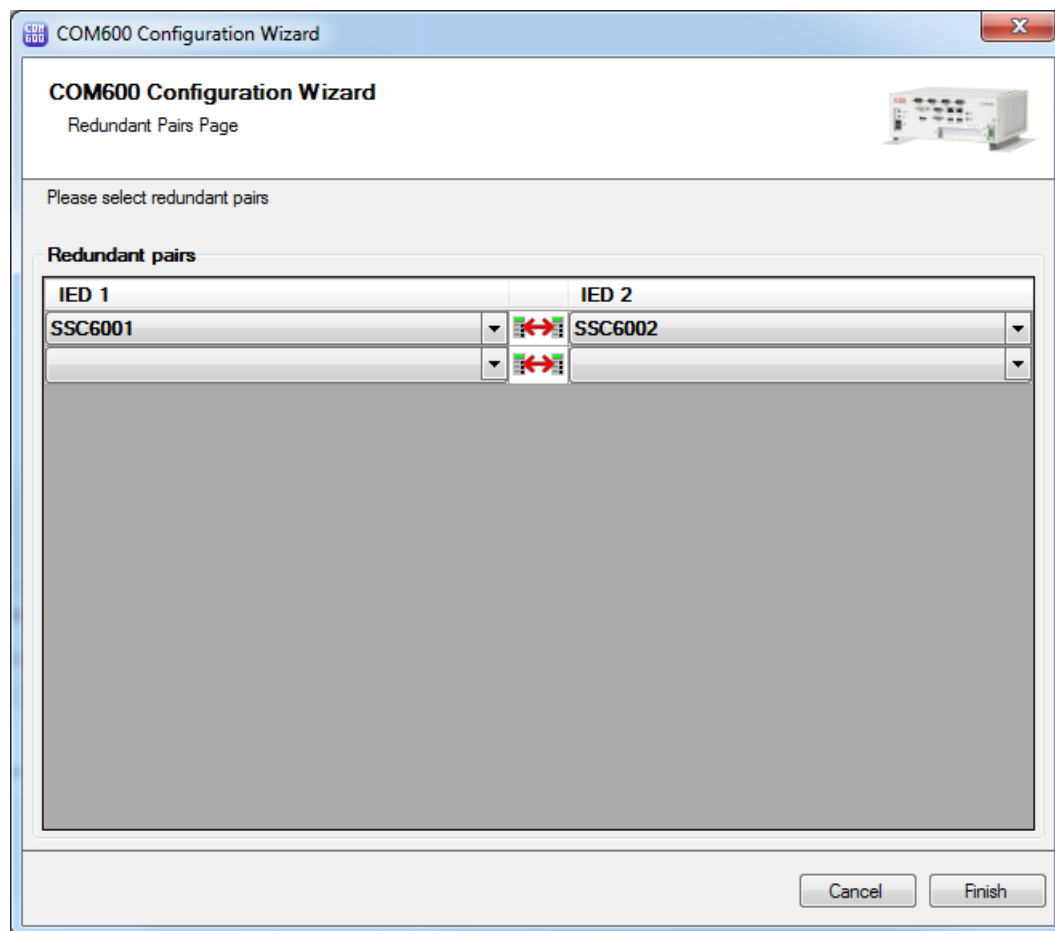
1. Import IEC61850 OPC Configuration
2. Create Redundant OPC Server object
3. Select “Redundant Pair Tool” from the context menu of the Redundant OPC object.



SAB600_launch_redundant_pair_tool.png

Figure 10.2.2-1 SAB600 launch Redundant Pair Tool

4. Select pairs

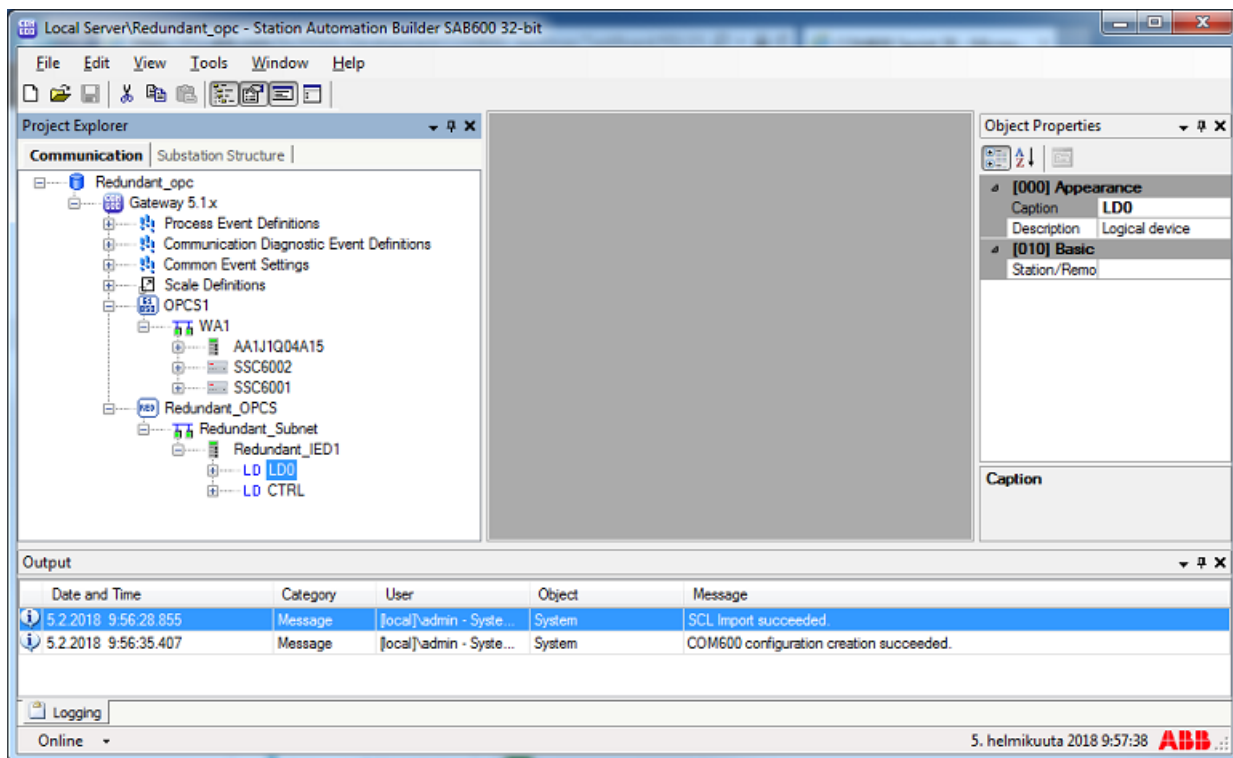


Configuration_wizard_select_redundant_pair.png

Figure 10.2.2-2 Configuration Wizard select redundant pair

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

5. Click **Finish**.
6. Admire configuration.

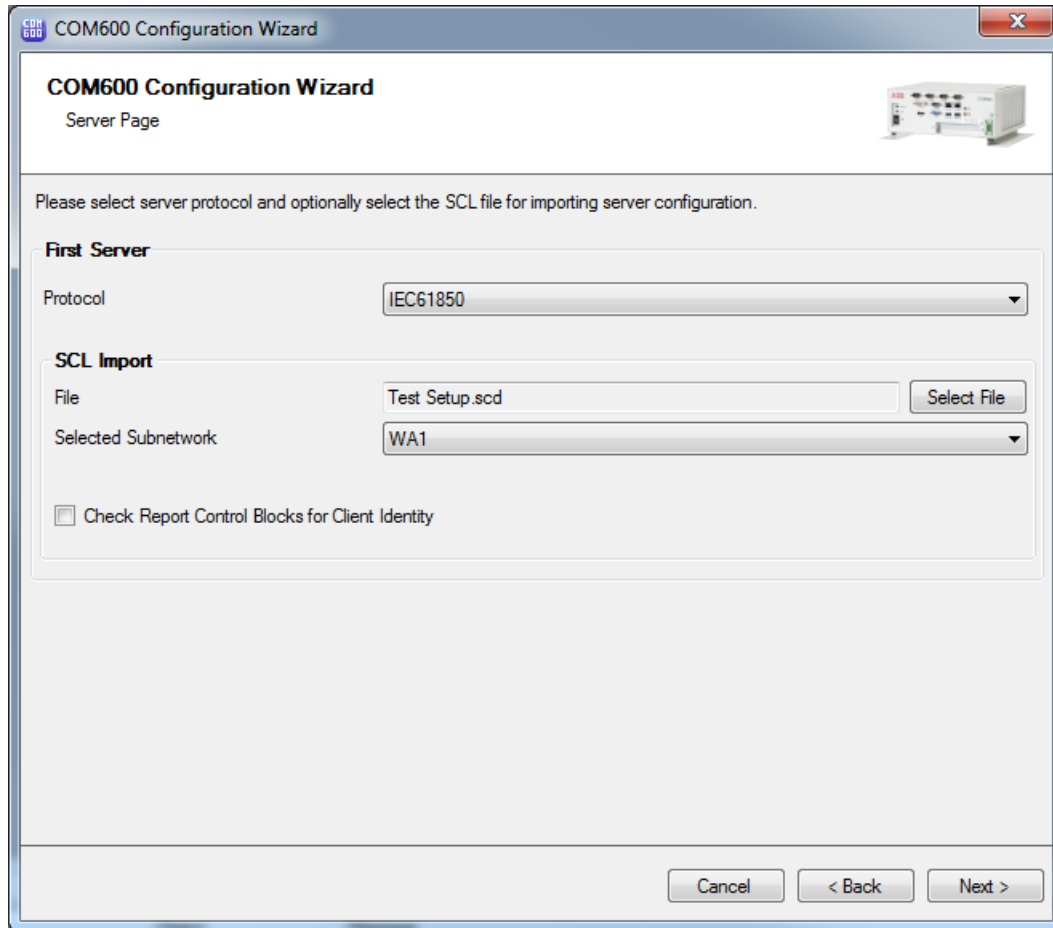


SAB600_Project_created.png

Figure 10.2.2-3 SAB600 Project created

10.2.3. Configuration using COM600 Configuration Wizard

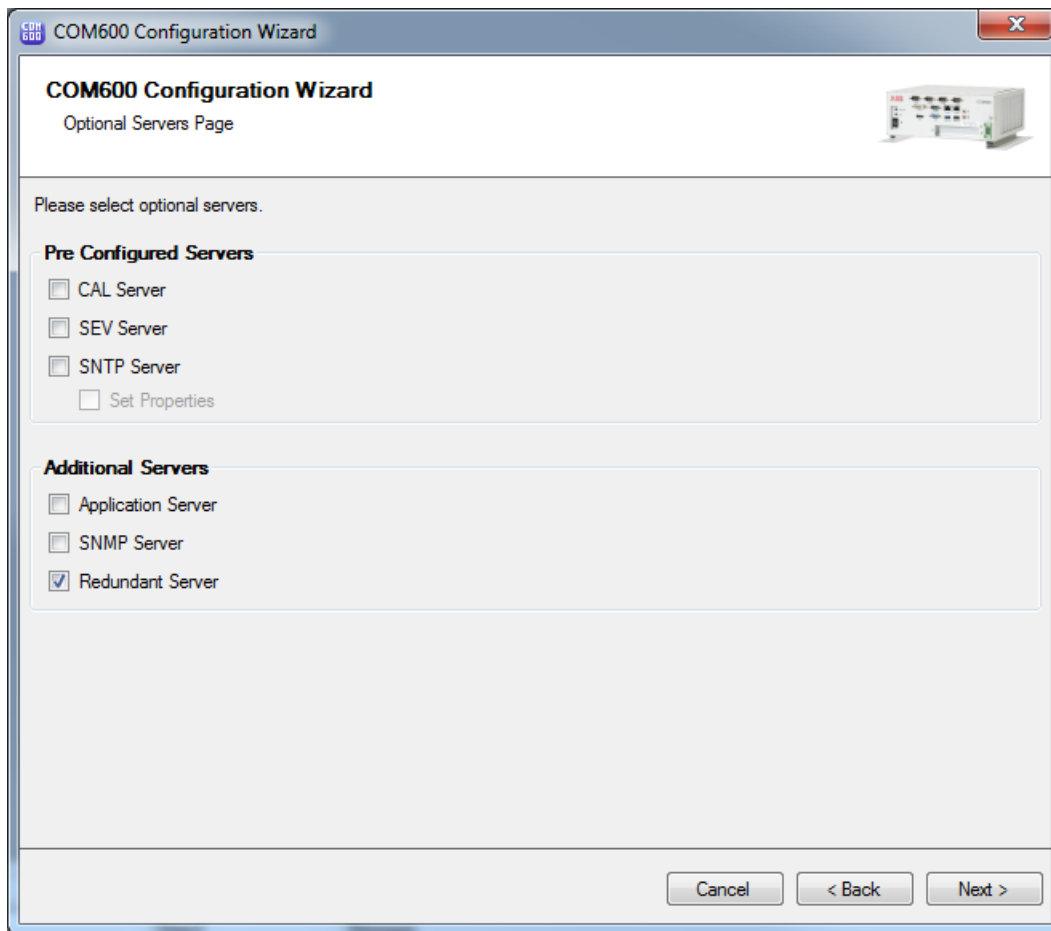
1. Import IEC61850 configuration.



Configuration_wizard_first_server_SCL_import.png

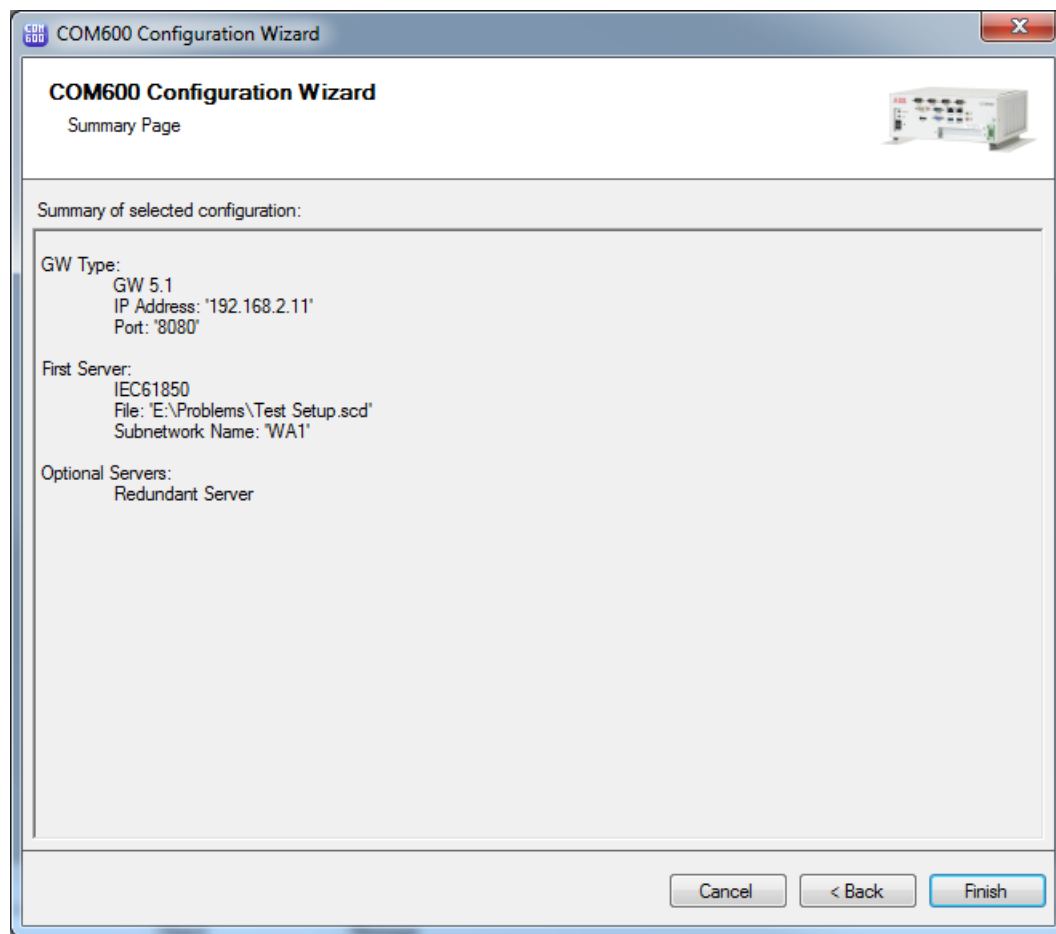
Figure 10.2.3-1 Configuration Wizard First Server SCL Import

2. Select **Redundant Server** from the Optional Servers Page.



Configuration_wizard_optional_servers.png

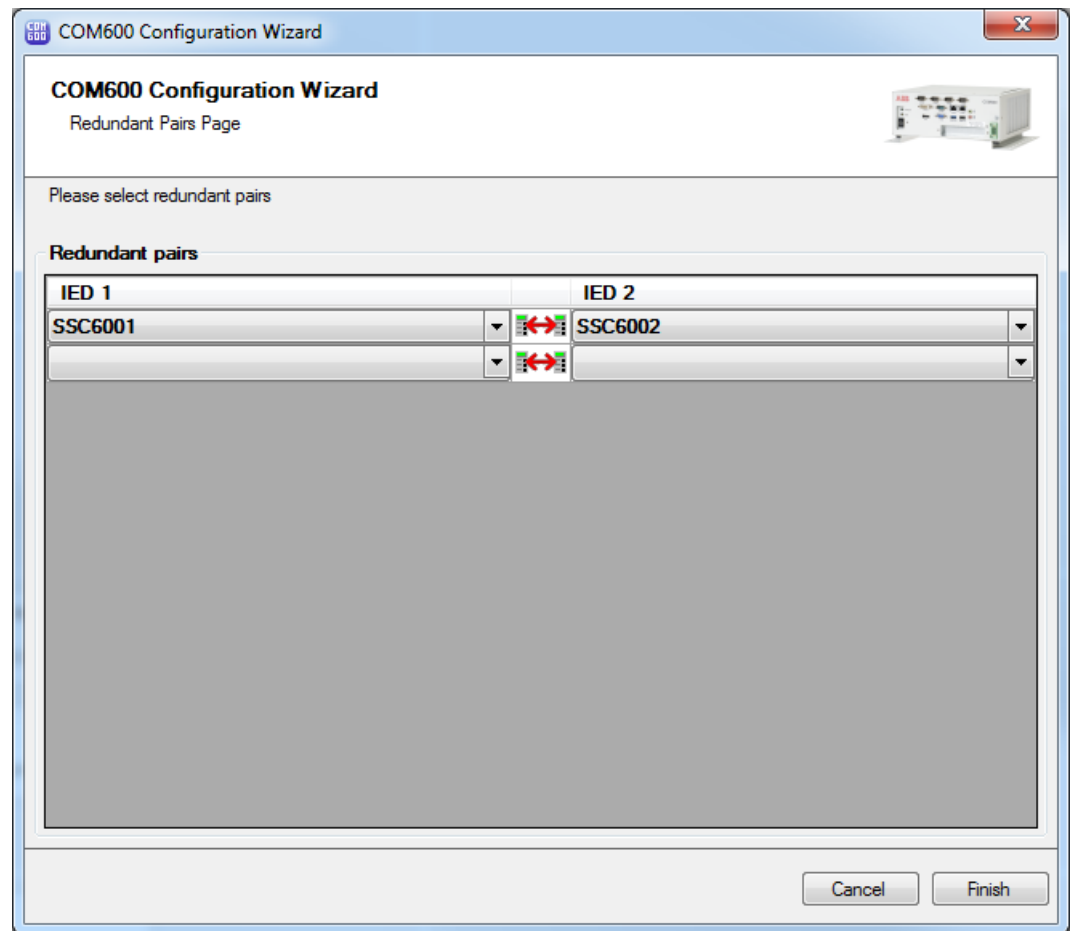
Figure 10.2.3-2 Configuration Wizard optional servers

3. Click **Finish**.

Configuration_wizar_summary.png

Figure 10.2.3-3 Configuration Wizard summary

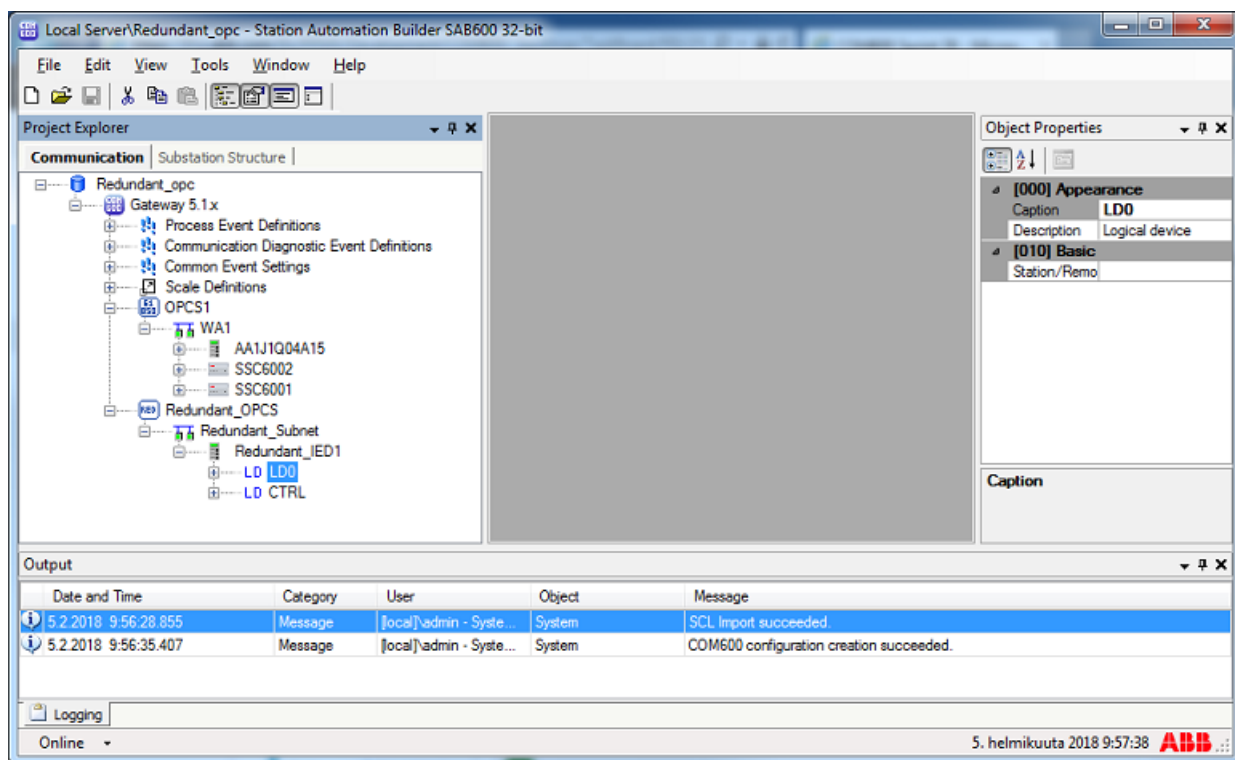
4. Select pairs when needed.



Configuration_wizard_select_redundant_pair.png

Figure 10.2.3-4 Configuration Wizard select redundant pair

5. Admire configuration.



SAB600_Project_created.png

Figure 10.2.3-5 SAB600 Project created

10.3. Active source

10.3.1. General information about the active source

Active source determines which of the two source IEDs is currently active. This can be both configured in SAB600 and changed dynamically at runtime.

The configuration is done via the **Active Source Default** property of the redundant IED. It's also possible to define an event class for a generated event when the active source is changed and a refresh interval to automatically re-send this event with the current active source after a specified interval. This might be useful to ensure the current active source shows up at a regular interval in the COM600 event list.

10.3.2. External inputs

10.3.2.1. General information about external inputs

It's possible to change the active source from the external input signals. This can either be done by modifying **Attributes\Active** source directly via e.g. an **Internal data object**, or by defining an active source input signal via the Redundant IED properties.

10.3.2.2. Internal data object

To update the active source via an internal data object, simply add an Internal SPC data object under the Redundant IED and set its Item Tag Path to **Attributes\Active source**. The added SPC data object can be updated from external data sources like the COM600 cross-reference or from COM600 OPC clients as needed.

It will still be possible to update the active source from other signals, or directly from COM600 WebHMI as well.

10.3.2.3. Input signal

To update the active source from a specific input signal, such a signal must first be configured as a data object in an OPC server reachable from COM600. Then, simply specify this OPC server ProgID and the OPC path of the data object in the server to the Redundant IED properties for **Active Source – Input Signal**. A scale can additionally be defined in case the input signal does not have the interval 0...1.

When this is done, the active source can only be updated from this specific input signal and not from any other ones, the COM600 WebHMI as well will not be able to update the active source.

10.4. Consistency checking

10.4.1. Enable consistency checking

When enabled, there are several options to control how consistency checking is performed. First, which CDC types will be consistency checked and second, how the checks will be performed. This is done via the three **Consistency Compare For** properties of the Redundant IED. They allow the user to configure whether **value**, **value + quality** or **value + quality + time** is compared for the specified CDC types.

Additionally, it's possible to configure the timestamp epsilon to define the range in which two timestamp values are considered equal. Timestamp is only compared for indication CDC types, never for measurements. Instead, for measurements it's possible to configure

a value epsilon to define a range in which two values (direct value without considering multiplier) are considered equal.

Finally, a minimum check age is defined. This determines how much time must elapse since the last update to a data object until it can be checked for consistency. This is done to ensure that the “same” values from the two source IEDs are compared, as there are no sequence numbers for the updated OPC data and no guaranteed update order.

10.4.2. Supported data object CDC types

These indication CDC types support consistency checking: ACD, ACT, BCR, BSC, DPC, DPS, ENC, ENS, INC, INS, ISC, SEC, SPC and SPS.

These measurement CDC types support consistency checking: APC, CMV, DEL, MV, SEQ and WYE.

10.4.3. Consistency checking effects

When consistency checking fails there are a number of actions that can be taken. There are Redundant IED properties to enable/disable all of these:

- Quality for the data object in the Redundant IED is set to **UNCERTAIN**
- An event is generated to the COM600 event list
 - Can have an event generated for each inconsistent update of a specific data object
 - Or only for the first inconsistent update and no more until the object gets consistent again first
 - This event shows the inconsistent data object, the specific attribute and the value, quality or timestamp values from the source IEDs
 - It's possible to filter the event list to show only this event type
- An alarm is generated to the COM600 event list

Master Protocols (Ethernet) and Applications Configuration and Operation Manual

- This alarm affects the Redundant IED itself and is activated when there is any inconsistent data

General Single Line Diagram Events Alarms Data Historian FDIR GOOSE Analyzer Help Log out [com600]							
Ristinummi							
Save Filter Freeze View Alarms 20 Newest Goto Day							
Events *** 2.12.2014 - 16.2.2018 *** 1074,83 / 1550MB							
Date	Time	Bay	Device	Object Text	Event	Quality	
16.2.2018	14.04.00.875		RedIED, LD, LN, sps		stVal: 2018-02-16 11:50:53.858 <> 2018-02-16 12:04:00.825		^
16.2.2018	14.04.00.875		RedIED, LD, LN, spc		stVal: 2018-02-16 11:50:53.858 <> 2018-02-16 12:04:00.825		
16.2.2018	14.04.00.875		RedIED, LD, LN, dpc		stVal: 2018-02-16 11:50:53.858 <> 2018-02-16 12:04:00.819		
16.2.2018	14.04.00.875		RedIED, LD, ATCC1, ParOp		stVal: 2018-02-16 11:50:53.858 <> 2018-02-16 12:04:00.819		
13.2.2018	12.16.23.766		RedIED, LD, LN, dpc		stVal: 1 <> 2		
13.2.2018	12.16.23.766		RedIED, LD, ATCC1, ParOp		stVal: 1 <> 2		
13.2.2018	12.16.04.891		RedIED, LD, LN, dpc		stVal: 1 <> 2		
13.2.2018	12.16.04.891		RedIED, LD, ATCC1, ParOp		stVal: 1 <> 2		v

COM600-Redundant_OPC_server-Event_list-inconsistent_data_events.png

Figure 10.4.3-1 Inconsistent event in COM600 event list

Filter

Event Type: Inconsistent

Object Text:

Event:

Severity Greater Than: (1-999)

Severity Less Than: (2-1000)

Enable Disable Cancel

COM600_Redundant_OPC_server-Event_list-filter-inconsistent.png

Figure 10.4.3-2 Filtering inconsistent events from the event filter

11. IEC 61850 OPC server operation

11.1. Activating COM600 with new configuration

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

11.2. IEC 61850 OPC Server diagnostics

After the IEC 61850 OPC Server has been installed and configured, you can, for example, monitor and control the condition of connections in an IEC 61850 network.

This is done by using the Online Diagnostics function in , select **Tools > Online Diagnostics** or select the object, right-click the IEC 61850 Server object and select **Online Diagnostics** from the shortcut menu.

The server, a device, or data object is dragged and dropped from the Project Explorer's Communication structure under the Online Diagnostics function. Select the Project Explorer from the **View** menu if it is not already open.

You have the following alternatives:

- to reset counters (restart the OPC server)
- to view the event log file
- to clear the log file
- to reconnect the online diagnostics
- to enable or disable the SNTP client

11.3. Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this device

To enable diagnostic events:

1. Right-click the device.
2. Select **Diagnostic AE client**.

11.4. Monitoring and controlling IEC 61850 subnetwork activity

The IEC 61850 subnetwork activity can be monitored with the Online Diagnostics function.

You can also take a subnetwork into use or out of use.

To monitor and control IEC 61850 subnetwork activity:

1. Select the subnetwork you want to monitor in the object tree of .
2. Right-click the channel.
3. Select **Online Diagnostics**.

In the Diagnostic counters field, you can monitor the subnetwork activity and the available properties. To reset Diagnostic counters, click **Reset counters**.

You can take an IEC 61850 subnetwork into use by selecting the **In use** check box. If you clear the check box, the subnetwork is taken out of use. To update the diagnostic counters click **Refresh**.

11.5. Monitoring and controlling IEC 61850 device communication

The IEC 61850 device communication can be monitored with the Online Diagnostics function.

To monitor and control IEC 61850 device communication:

1. Select the device you want to monitor in the object tree of .
2. Right-click the device.
3. Select **Online Diagnostics**.

In the Status information field, you can monitor the device status. The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**. To update the diagnostic counters click **Refresh**.

You can take an IEC 61850 device into use by selecting the **In Use** check box. If you clear the check box, the device is taken out of use.

11.6. Monitoring and controlling IEC 61850 data object communication

The IEC 61850 data object diagnostics can be monitored with the Online Diagnostics function.

To monitor and control IEC 61850 data object communication:

1. Select the data object you want to monitor in the object tree.
2. Right-click the device.
3. Select **Online Diagnostics**.

In the Status information field, you can monitor and set attribute values and use control services. The Diagnostic counters field provides information on device activity.

12. IEC 104 OPC server operation

12.1. About this section

This section describes the basic operation procedures you can carry out after the IEC104 OPC Server has been configured.

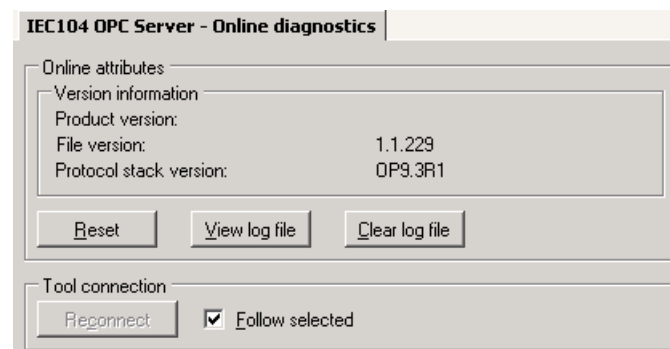
After this, you can, for example, monitor and control the condition of connections in an IEC104 network by using the Online diagnostics function SAB600.

12.2. Activating COM600 with new configurations

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

12.3. IEC104 OPC Server diagnostics

To view the IEC104 OPC Server diagnostics, right-click the IEC104 OPC Server object and select **Online diagnostics**, see Figure 12.3-1.



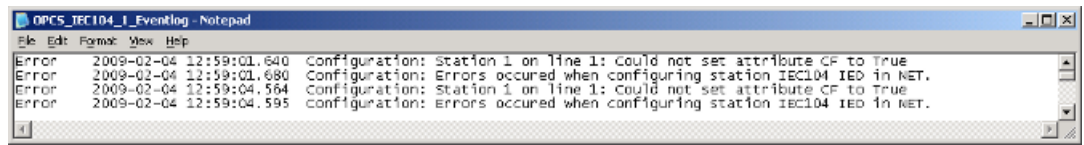
IEC104_OPC_Server_Online_diagnostics.bmp

Figure 12.3-1 IEC104 OPC Server Online diagnostics

You have the following alternatives:

- to view version information
- to reset the IEC104 OPC Server
- to view the event log file, see Figure 12.3-2
- to clear the log file

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



IEC104_OPC_Server_Event_Log.bmp

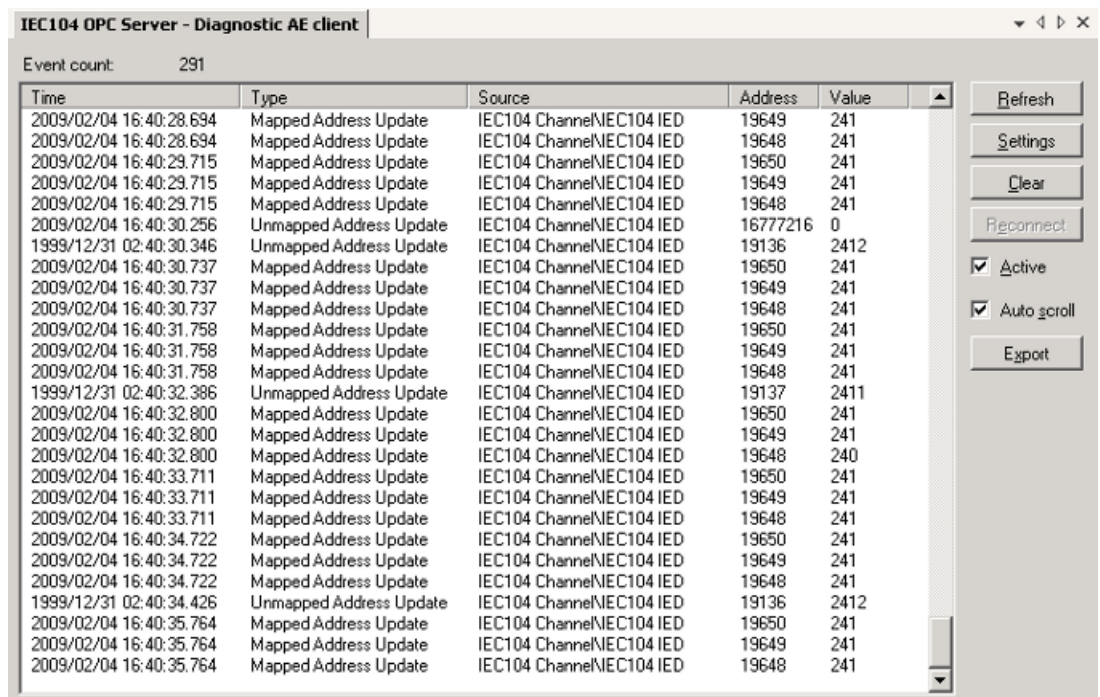
Figure 12.3-2 Event log file

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function, see Figure 12.3-3. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

1. Right-click the device.
2. Select **Online diagnostics**.
3. Mark the Diagnostic events enabled check box. See Figure 12.3-3 for example.



IEC104_OPC_Server_Diagnostic_AE_Client.bmp

Figure 12.3-3 IEC104 OPC Server Diagnostic AE client

12.4. Monitoring and controlling IEC104 Channel Activity

The IEC104 Channel activity can be monitored with the Online diagnostics function.

You can also take a channel into use or out of use as described in this section.

To monitor and control IEC104 channel activity:

1. Select the channel you want to monitor in the object tree of SAB600.
2. Right-click the channel.

In the Diagnostic counters field, you can monitor the channel activity. To reset Diagnostic counters, click **Reset counters**.

You can take an IEC104 Channel into use by marking the **In use** check box. If you unmark the check box, the channel is taken out of use. Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.

For more information on the channel online diagnostics with the Analyzer function, see COM600 User's manual.

12.5. Monitoring and controlling IEC 104 Device communication

The IEC104 Device communication can be monitored with the Online diagnostics function. You can also take a device into use or out of use as described in this section.

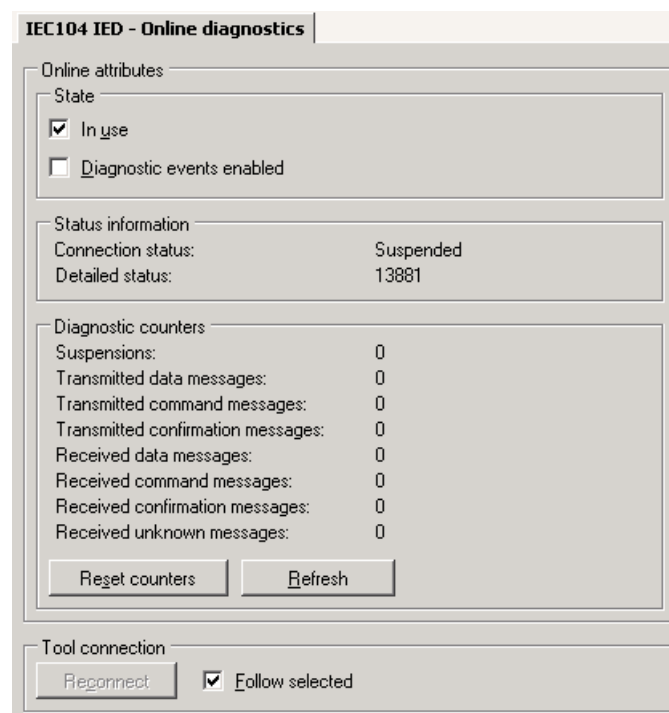
To monitor and control IEC104 Device communication:

1. Select the device you want to monitor in the object tree of SAB600.
2. Right-click the device.
3. Select **Online diagnostics**.

In the Status information field, you can monitor the device status.

The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**.

You can take an IEC104 Device into use by marking the **In use** check box. If you unmark the check box, the device is taken out of use. To update diagnostic counters manually, click **Refresh**.



IEC104_OPC_IED_Online_Diagnostics.bmp

Figure 12.5-1 IEC104 IED Online Diagnostics

12.6. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

13. DNP3 LAN/WAN OPC server operation

13.1. About this section

This section describes the basic operation procedures you can carry out after the server has been configured.

After reading this section, you can, for example, monitor and control network connections. Monitoring and controlling is done by using the Online diagnostics function in SAB600.

13.2. Activating COM600 with new configurations

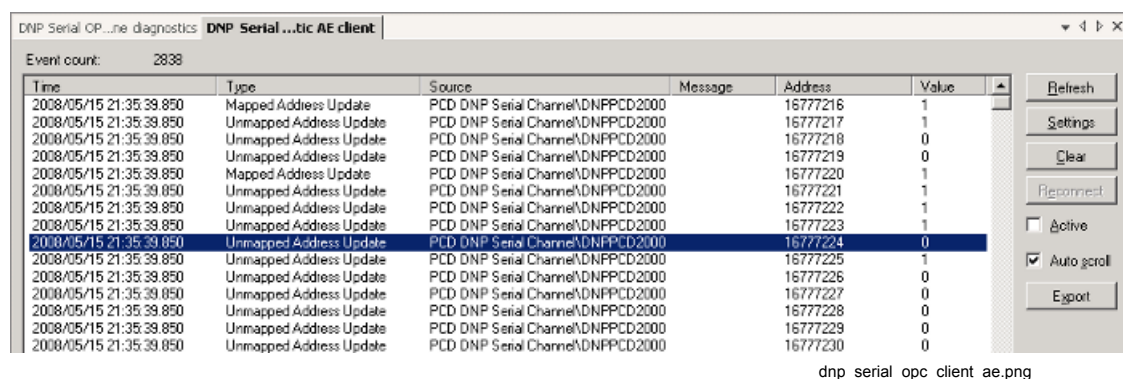
For information about activating COM600 with new configuration, see COM600 User's Manual.

13.3. Server diagnostics

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

You have the following alternatives:

- View version information
- Reset the OPC Server
- View the event log file
- Clear the log file



The screenshot shows a window titled "DNP Serial OPC Client" with a tab labeled "DNP Serial ...tic AE client". It displays a table of diagnostic events with columns for Time, Type, Source, Message, Address, and Value. The table contains 15 rows of data, with the 10th row highlighted. To the right of the table are buttons for Refresh, Settings, Clear, Reconnect, and Export, along with checkboxes for Active and Auto scroll.

Time	Type	Source	Message	Address	Value
2008/05/15 21:35:39.850	Mapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777216	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777217	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777218	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777219	0
2008/05/15 21:35:39.850	Mapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777220	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777221	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777222	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777223	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777224	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777225	1
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777226	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777227	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777228	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777229	0
2008/05/15 21:35:39.850	Unmapped Address Update	PCD DNP Serial Channel\DNPPCD2000		16777230	0

dnp_serial_opc_client_ae.png

Figure 13.3-1 DNP OPC Client Diagnostic AE client

13.4. DNP channel diagnostics

The DNP channel activity can be monitored with the Online diagnostics function. You can also take a channel into use or out of use as described in this section.

To monitor and control DNP Channel activity:

1. Select the channel you want to monitor in the object tree of SAB600.
2. Right-click the channel.
3. Select **Online diagnostics**.

In the Diagnostic counters field, you can monitor the channel activity. To reset Diagnostic counters, click **Reset counters**.

You can take a DNP channel into use by marking the **In use** check box. If you unmark the check box, the channel is taken out of use.

For more information on the channel online diagnostics with the Analyzer function, see COM600 User's manual.

13.5. Monitoring and controlling DNP communication

The DNP device communication can be monitored with the Online diagnostics function. You can also take a device or module into use or out of use as described in this section.

To monitor and control DNP device communication:

1. Select the device/ module you want to monitor in the object tree of SAB600.
2. Right-click the device.
3. Select **Online diagnostics**.

In the Status information field, you can monitor the device status.

The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**.

You can take a DNP device into use by marking the **In use** check box. If you unmark the check box, the device is taken out of use.

Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.

13.6. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

14. External OPC server operation

14.1. About this section

This section describes the basic operation procedures you can carry out after the object properties for the External OPC Server have been configured.

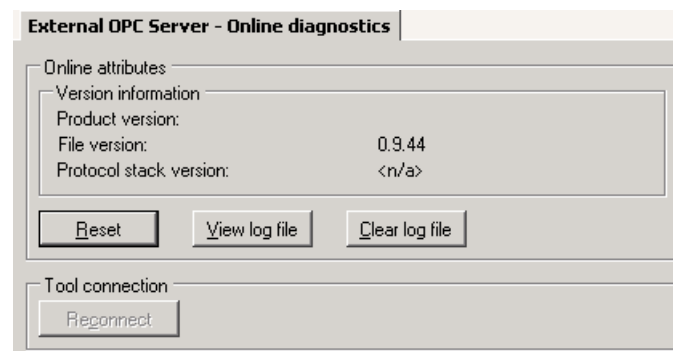
After this, you can, for example, monitor and control the condition of connections in an OPC network. This is done by using the Online diagnostics function in SAB600.

14.2. Activating COM600 with new configurations

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

14.3. External OPC Server diagnostics

To view the External OPC Server diagnostics, right-click the External OPC Server object and select **Online diagnostics**, see Figure 14.3-1.



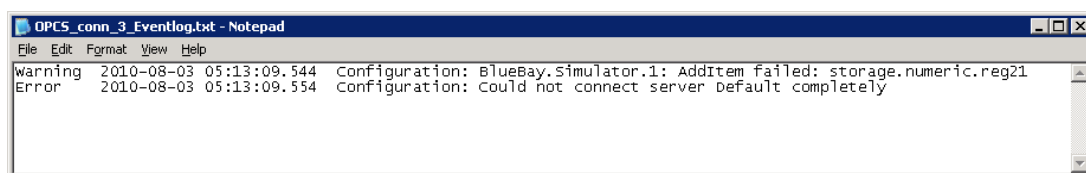
Ext_OPC_Server_Diagnostics.png

Figure 14.3-1 External OPC Server diagnostics

You have the following alternatives:

- to view version information
- to reset the External OPC Server
- to view the event log file
- to clear the log file

Master Protocols (Ethernet) and Applications Configuration and Operation Manual



Ext_Event_log_file.png

Figure 14.3-2 Event log file

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

1. Right-click the device.
2. Select **Online diagnostics**.
Select **Diagnostic AE Client**.

lisää kuva

Figure 14.3-3 OPC Server Diagnostic AE client

14.4. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

15. MODBUS TCP server operation

15.1. About this section

This section describes the basic operation procedures you can carry out after the object properties for the Modbus OPC Server have been configured.

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

15.2. Activating COM600 with new configurations

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

15.3. Modbus OPC Server diagnostics

To view the Modbus OPC Server diagnostics, right-click the Modbus OPC Server object and select **Online diagnostics**.

You have the following alternatives:

- to view version information
- to reset the OPC Server
- to view the event log file
- to clear the log file

15.4. Modbus Channel diagnostics

The Modbus Channel activity can be monitored with the Online diagnostics function.

You can also take a channel into use or out of use as described in this section.

To monitor and control Modbus Channel activity:

1. Select the channel you want to monitor in the object tree of SAB600.
2. Right-click the channel.
3. Select **Online diagnostics**.

In the Diagnostic counters field, you can monitor the channel activity. To reset Diagnostic counters, click **Reset counters**.

You can take a Modbus Channel into use by marking the **In use** check box. If you unmark the check box, the channel is taken out of use. To update diagnostic counters, click **Refresh**.

For more information on the channel online diagnostics with the Analyzer function, see COM600 User's manual.

15.5. Monitoring and controlling Modbus Device communication

The Modbus device communication can be monitored with the Online diagnostics function. You can also take a device or module into use or out of use as described in this section.

To monitor and control Modbus Device communication:

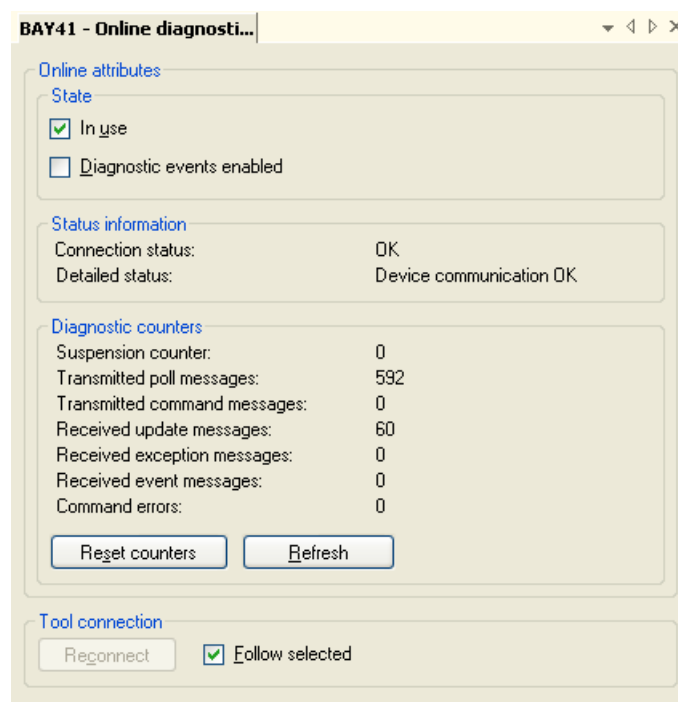
1. Select the device/ module you want to monitor in the object tree of SAB600.
2. Right-click the device.
3. Select **Online diagnostics**.

In the Status information field, you can monitor the device status.

The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**.

You can take a Modbus device into use by marking the **In use** check box. If you unmark the check box, the device is taken out of use.

Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.



Modbus_Device_online_diagnostics.bmp

Figure 15.5-1 Modbus Device Online diagnostics

15.6. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

16. SNMP OPC server operation

16.1. About this section

This section describes the basic operation procedures you can carry out after the SNMP OPC Server has been configured.

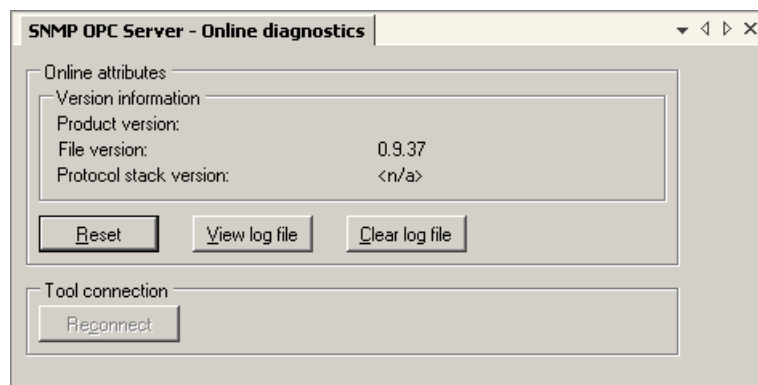
After this, you can, for example, monitor and control the condition of connections in an SNMP network. This is done by using the Online diagnostics function in SAB600.

16.2. Activating COM600 with new configurations

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

16.3. SNMP OPC Server diagnostics

To view the SNMP OPC Server diagnostics, right-click the SNMP OPC Server object and select **Online diagnostics**, see Figure 16.3-1.

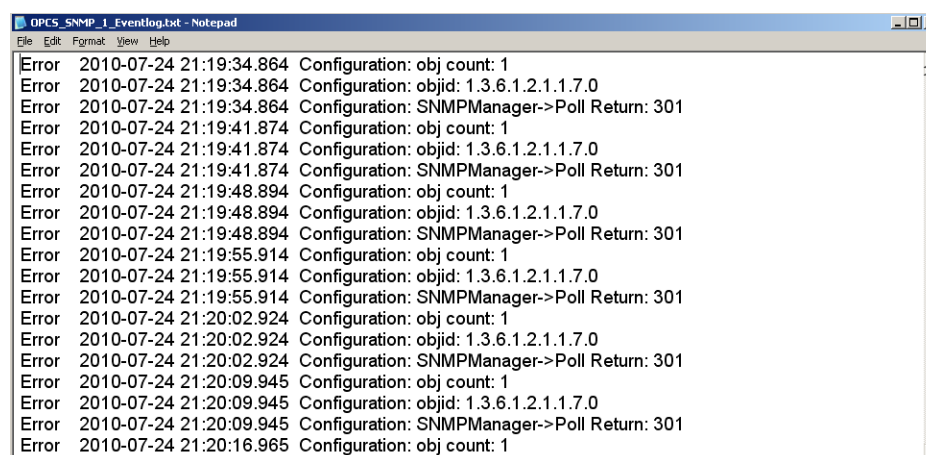


SNMP_Online_diagnostics.png

Figure 16.3-1 SNMP OPC Server diagnostics

You have the following alternatives:

- to view version information
- to reset the SNMP OPC Server
- to view the event log file
- to clear the log file



SNMP_event_log.png

Figure 16.3-2 Event log file

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

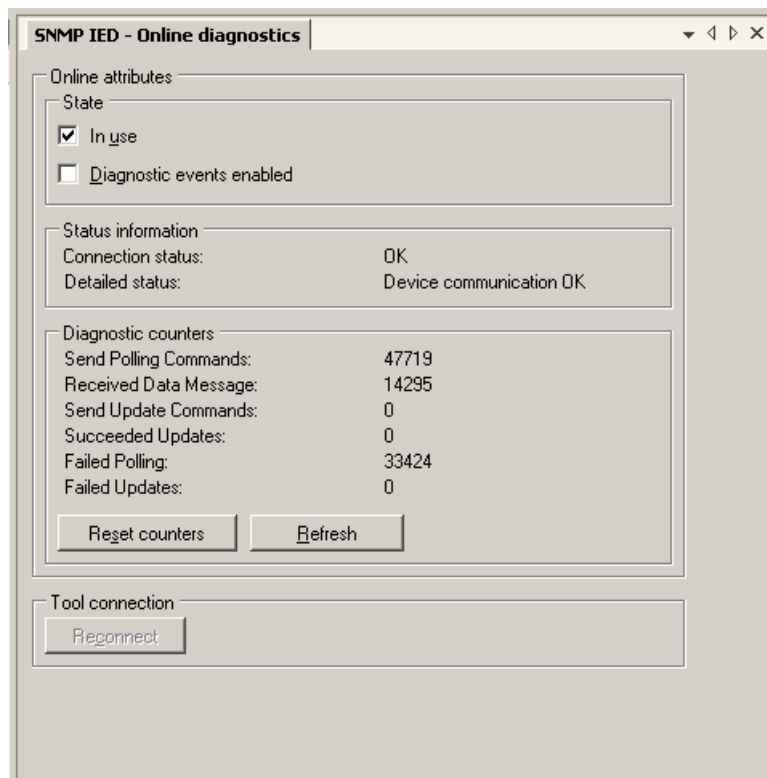
1. Right-click the device.
2. Select **Online diagnostics**.

16.4. Monitoring and controlling SNMP IED communication

The SNMP IED communication can be monitored with the Online diagnostics function. You can also take a device or module into use or out of use as described in this section.

To monitor and control SNMP IED communication:

1. Select the device you want to monitor in the object tree of SAB600.
2. Right-click the device.
3. Select **Online diagnostics**.
 - In the Status information field, you can monitor the device status.
 - The Diagnostic counters field provides information on device activity. To reset diagnostic counters, click **Reset counters**.
 - Take the SNMP device into use by selecting the **In use** check box. If you clear the check box, the device is taken out of use.
 - Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.



SNMP_IED_online_diagnostics.png

Figure 16.4-1 SNMP IED Online diagnostics

16.5. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

17. SNTP OPC server operation

17.1. About this section

This section describes the basic operation procedures you can carry out after the SNTP OPC Server has been configured.

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

17.2. Activating COM600 with new configurations

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

17.3. SNTP OPC Server diagnostics

You have the following alternatives:

- to view version information
- to reset the SNTP OPC Server
- to view the event log file
- to clear the log file

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the Diagnostic AE Client function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

1. Right-click the device.
2. Select **Diagnostic AE Client**.

17.4. Data object diagnostics

For information on data object diagnostics, refer to COM600 User's Manual.

18. Redundant OPC server operation

18.1. Switch-over

Switch-over happens when the active source is changed from one source IED to the other.

Currently switch-over is only done manually (though it would be possible to define external rules in e.g. the COM600 Logic Processor to automatically do it when, say, the connection status of the current source IED becomes bad).

When switch-over is executed, the Redundant IED will update its data objects to be consistent with the data objects in the new active source IED. The time and value epsilons defined for consistency checking are used when these switch-over checks are done.

Generally, value, quality and time will be compared for indications, while for measurements only value and quality will be compared. If the redundant IED data object is not consistent with the new active source IED data object, then the former will be updated with the values of the latter.

18.2. Parameter setting

The COM600 WebHMI has special support for Redundant IEDs in its Parameter setting tool.



This feature is only supported when the source IEDs are IEC 61850 IEDs.

When opening the Redundant IED parameter setting tool, it will display the source IED names in the header. The currently active source IED will be marked with bolded text.

Changing parameters for the Redundant IED will automatically change them in both source IEDs at the same time. Parameters in the source IEDs that have inconsistent values will be clearly marked with yellow for the user to address. For those parameters the

values from both source IEDs are displayed, in the same order as the source IED names in the header.

Ristinummi > V1 > H1 > Redundant_IED1

☐ Enable Write
 ☒ Refresh Values
 ☐ Expand all
 ☐ Collapse all
 1* Setting group

Parameter Setting (SSC6001 / SSC6002)

Group/Parameter Name	Current Value	New Value	Unit	Min.	Max.
[+] _PARAMETERS_					
[+] Clear					
[+] Configuration					
[+] Tests					
[+] Language					
[+] Settings					
[-] Monitoring					
[-] » Recorded data					
[-] » » Measurements					
[-] » » » CMMXU1					
Max demand IL1	257,79		A	0	40
Max demand IL2	254,03		A	0	40
Max demand IL3	258,76		A	0	40
Time max demand IL1	2018-02-15T04:05:00.2Z / 2018-02-15T04:05:00.1Z				
Time max demand IL2	2018-02-10T21:15:00.2Z / 2018-02-10T21:15:00.1Z				
Time max demand IL3	2018-02-11T00:01:00.2Z / 2018-02-11T00:01:00.1Z				
Min demand IL1	1,76		A	0	40
Min demand IL2	1,73		A	0	40
Min demand IL3	1,76		A	0	40
Time min demand IL1	2018-02-15T14:06:00.2Z				
Time min demand IL2	2018-02-15T14:06:00.2Z				
Time min demand IL3	2018-02-15T14:06:00.2Z				
[+] » » » PEMMXU1					
[+] » » » RESCMMXU1					
[+] » Communication					
[+] » I/O status					
[-] Information					
[+] » Product identifiers					
[+] » Site identifiers					
[-] » System identifiers					
Technical key	SSC6001 / SSC6002				

COM600-Redundant_OPC_server-PST-Redundant_IED.png

Figure 18.2-1 Redundant IED with inconsistent data

18.3. Communication diagnostics

18.3.1. WebHMI communication diagnostics

Communication diagnostics for the Redundant IED is shown in the WebHMI communication structure for the IED.

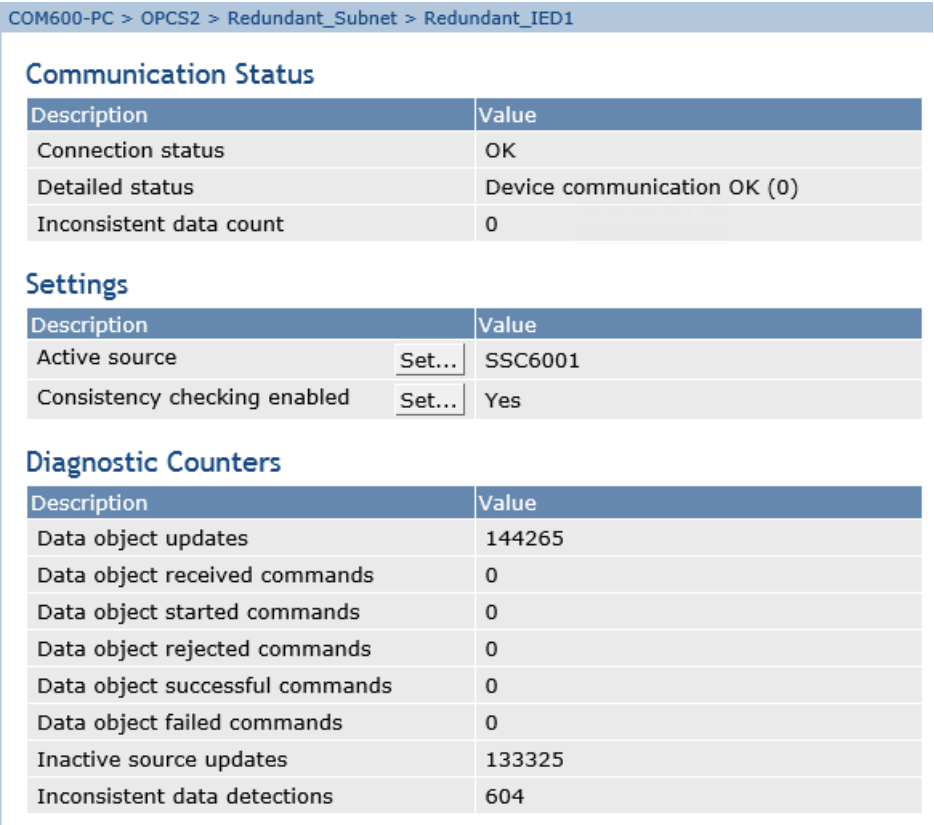
In addition to the standard **Connection status** and **Detailed status** there is also **Inconsistent data count**, which shows the current number of inconsistent data objects. Assuming consistency checking is enabled.

It also offers the option to change the active source (providing no active source input signal has been defined) and to enable/disable consistency checking.

To the normal diagnostic counters for data objects it adds **Inactive source updates** and **Inconsistent data detections**.

Inactive source updates is the other side of Data object updates, it shows the number of updates for the inactive source IED.

Inconsistent data detections shows the total number of inconsistent data updates so far.



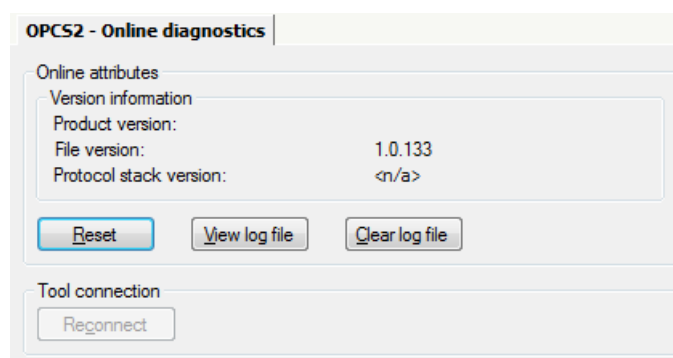
COM600-Redundant_OPC_server-Redundant_IED-comm_diagnostics.png

Figure 18.3.1-1 Redundant IED communication diagnostics

18.3.2. SAB600 communication diagnostics

18.3.2.1. About the SAB600 communication diagnostics

Redundant OPC Server diagnostics use the connectivity OPC Server. To view the Redundant OPC Server diagnostics, right-click the **Redundant OPC Server** object and select online diagnostics.



SAB600_Redundant_OPC_server_online_diagnostics.png

Figure 18.3.2.1-1 Redundant OPC server online diagnostics

You have the following alternatives:

- View version information
- Reset the Redundant OPC Server
- View the event log file
- Clear the log file

18.3.2.2.

Diagnostic AE Client

Diagnostic events can be monitored and controlled using the **Diagnostic AE Client** function. Click **Refresh** to update the status information. To be able to receive events from a certain device, diagnostic events must be enabled for this respective device.

To enable diagnostic events:

1. Right-click the device
2. Select **Online diagnostics**
3. Select **Diagnostic AE Client**.

OPCS2 - Diagnostic AE client

Event count: 3

Time	Type	Source	Message	Addr
2018.02.05 11:50:26....	Device Connection Status	Redundant_Subnet\Redundant_SSC600\Device Connection Status	Connection OK	
2017.10.28 01:54:09....	ConditionDiscreteEvent	Redundant_Subnet\Redundant_SSC600\LD0\PHPTUV1\Op\general	Inactive	
2017.10.28 01:54:09....	ConditionDiscreteEvent	Redundant_Subnet\Redundant_SSC600\LD0\LEDPTRC1\Op\general	Inactive	

Refresh
Settings
Clear
Reconnect
☒ Active
☒ Auto scroll
Export

18.3.2.3. Monitoring and controlling Redundant IED communication

The Redundant IED communication can be monitored with the **Online diagnostics** function. You can also take an IED into use or out of use as described in this section.

To monitor and control Redundant IED communication:

1. Select the IED you want to monitor in the object tree of SAB600.
2. Right-click the device.
3. Select **Online diagnostics**.

In the **Status information** field, you can monitor the device status.

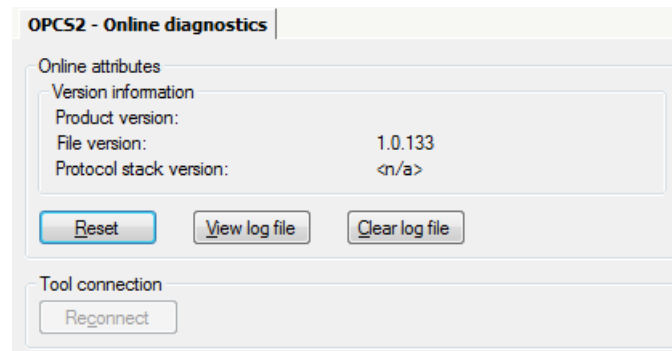
In the **Inconsistent data count** field, you can monitor the number of inconsistent data.

Active source defines the currently active SSC600 unit.

Consistency checking enabled defines whether consistency is checked between the data provided from SSC600 units.

The **Diagnostic counters** field provides information on device activity. To reset diagnostic counters, click **Reset counters**.

Diagnostic counters are updated every 2 seconds. To update them manually, click **Refresh**.



SAB600_Redundant OPC_server_online_diagnostics.png

Figure 18.3.2.3-1 Redundant IED online diagnostics

Index

A

activating COM600	317
activation information	
properties	92, 119
active source	
redundant	311
adding	
channel object	83
Computer Node object	31
data object	84
Data object	108, 145, 206, 273, 297
device object	83
Gateway	31
Gateway object	82, 106, 143, 204, 271, 295
Logical device	108, 144, 206, 273, 296
Logical Device object	83
Logical node	84, 108, 144, 206, 273, 296
OPC Server object	83, 107, 143, 205, 272, 295
analog set point	
properties	93, 121

B

Binary controlled step position information (BSC)	
properties	94, 122
Binary counter reading (BCR)	
properties	94, 121, 290

C

channel	
diagnostics	319, 322, 325
properties	86
channel object	
adding	83
COM600 configuration wizard	307
Complex measured value (CMV)	
properties	95, 123
Computer Node object	
adding	31
configuration	
IEC 61850 OPC Server	28
object properties	34, 297
configuring	
data object	117

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

DCOM	257–258
DCOM default properties	258
DCOM on COM600S computer	261
DCOM on OPC server computer	262
object	84, 109, 145, 210, 273
reporting	56
Controllable double point (DPC)	
properties	96, 125
Controllable Enumerated Status (ENC)	
properties	138
Controllable integer status (INC)	
properties	98, 128
Controllable single point (SPC)	
properties	101, 116, 132, 154, 215, 279, 301
creating	
topic	200

D

data object	
adding	84
configuring	117
data classes	49
diagnostics	320, 322, 324, 327, 330–331
Data object	
adding	108, 145, 206, 273, 297
data reporting	52
configuring	56
report control block	53
data set	52
configuring	52
reporting	52, 56
Dataset Editor	52
DCOM	
common user account	259
configuring	257–258
configuring default properties	258
configuring on COM600 computer	261
configuring on OPC server computer	262
disabling firewall	260
local security policy	260
restarting OPC	260
Delta (DEL)	
properties	95, 124
device	
diagnostics	319
properties	87
device communication	
monitoring and controlling	322, 326, 329
device name plate	
properties	97, 126

Device name plate (DPL)	
properties	281
device object	
adding	83
diagnostics	
channel	319, 322, 325
device	319
server	317, 323, 325, 328, 331
diagnostics events	
Diagnostic AE Client	315
monitoring	315
Directional protection activation information (ACD)	
properties	91, 118
DNP	
Channel object	107
device properties	111
DNP 3.0 OPC Server	
features	25
Double point status (DPS)	
properties	98, 127

E

Enumerated Status (ENS)	
properties	138
External OPC	
IED object	205
subnetwork	205
External OPC Server	
features	26
External OPCs	
device properties	211

F

features	
IEC 60870-5-104 OPC Server	24
SNTP	27
functional overview	21

G

Gateway	
adding	31
Gateway object	
adding	82, 106, 143, 204, 271, 295

I

IEC 60870-5-104 OPC Server	
----------------------------	--

Master Protocols (Ethernet) and Applications Configuration
and Operation Manual

features	24
IEC 61850	
data object	316
device	316
device properties	38
IED object	33
OPC Server object	31
subnetwork activity	315
subnetwork object	33
subnetwork properties	37
IEC 61850 OPC Server	
features	23
Integer controlled step position (ISC)	
properties	100, 129
Integer status (INS)	
properties	99, 116, 129, 153, 214, 278, 283, 300

L

Logical device	
adding	108, 144, 206, 273, 296
properties	43
Logical Device	
properties	114, 151, 212, 277
Logical Device object	
adding	83
Logical node	
adding	84, 108, 144, 206, 273, 296
properties	114, 152, 212
logical node name plate	
properties	100, 130
Logical node name plate (LPL)	
properties	283

M

Management Information Base	280
Measured value (MV)	
properties	101, 131, 284
MIB	280
Modbus	
device properties	148
IED object	144
subnetwork	143
Modbus OPC Server	
features	25

O

object

configuring	84, 109, 145, 210, 273
object identifier	280
object properties	
configuration	34, 297
object tree	
building	29, 106, 142, 204, 271, 294
OID	280
OPC Server	
diagnostics	315
properties	35, 85, 293, 298
OPC server	
redundant	303
OPC Server object	
adding	83, 107, 143, 205, 272, 295

P

properties	
activation information	92, 119
analog set point	93, 121
Binary controlled step position (BSC)	94, 122
Binary counter reading (BCR)	94, 121, 290
channel	86
Complex measured value (CMV)	95, 123
Controllable double point (DPC)	96, 125
Controllable Enumerated Status (ENC)	138
Controllable integer status (INC)	98, 128
Controllable single point (SPC)	101, 116, 132, 154, 215, 279, 301
Delta (DEL)	95, 124
device	87
device name plate	97, 126
Device name plate (DPL)	281
Directional protection activation information (ACD)	91, 118
Double point status (DPS)	98, 127
Enumerated Status (ENS)	138
Integer controlled step position (ISC)	100, 129
Integer status (INS)	99, 116, 129, 153, 214, 278, 283, 300
Logical device	43
Logical Device	114, 151, 212, 277
Logical Node	114, 152, 212
logical node name plate	100, 130
Logical node name plate (LPL)	283
Measured value (MV)	101, 131, 284
OPC Server	35, 85, 293, 298
Single point status (SPS)	102, 117, 133, 154, 214, 280, 289, 301
WYE	103, 134

R

report control block	53
report control block (RCB)	50

S

server	
diagnostics	317, 323, 325, 328, 331
Single point status (SPS)	
properties	102, 117, 133, 154, 214, 280, 289, 301
SNMP	
IED object	272
subnetwork	272
SNTP	
features	27
subnetwork	295
SNTP Virtual	
IED object	296
subnetwork	
configuring	110, 147
External OPC	205
IEC 61850	33
SNMP	272
SNTP	295

T

Topic generator	200
-----------------------	-----

W

WYE	
properties	103, 134



ABB Distribution Solutions
Distribution Automation

P.O. Box 699
FI-65101 Vaasa, Finland
Phone: +358 10 22 11

ABB Distribution Automation

4300 Coral Ridge Drive
Coral Springs, Florida 33065
Phone: +1 954 752 6700

www.abb.com/mediumvoltage
www.abb.com/substationautomation