

Remote I/O RIO600 Communication Configuration Manual





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Section 1 Introduction

1.1 This manual

The communication configuration manual contains information on how to engineer the device using the different tools in PCM600. The manual provides information for IEC 61850 engineering with PCM600 and IET600. For more details on tool usage, see the PCM600 documentation.

1.2 Intended audience

This manual addresses system and project engineers involved in the engineering process of a project.

Understanding the communication properties of the IED is a prerequisite before making any connections to RIO600. The connection details of the IED are available in the respective manuals.

1.3 Product documentation

1.3.1 Product documentation set

The installation and commissioning manual contains information on how to install and commission the device. The manual provides an introduction to engineering tasks and a description of the basic operations.

The communication configuration manual contains information on how to engineer the device using the different tools in PCM600. The manual provides information for IEC 61850 engineering with PCM600 and IET600. For more details on tool usage, see the PCM600 documentation.

The user manual (online help) contains instructions on how to use the RIO600 Configuration Wizard. The Configuration Wizard helps configure RIO600 for different system products and tools with the help of the connectivity package. See the product documentation for more information on handling the connectivity packages in different system products and tools.

Document revision/date	Product version	History
A/2011-12-23	1.0	First release
B/2012-12-18	1.1	Content updated to correspond to the product version
C/2013-09-30	1.2	Content updated to correspond to the product version
D/2014-09-29	1.5	Content updated to correspond to the product version
E/2015-08-31	1.6	Content updated to correspond to the product version
F/2016-06-09	1.7	Content updated to correspond to the product version
G/2019-05-17	1.7	Content updated
H/2019-12-16	1.8	Content updated to correspond to the product version

1.3.3 Related documentation

Name of the document	Document ID
RIO600 Installation and Commissioning Manual	1MRS757488
Specific Communication Service Mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3	IEC 61850-8-1



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1.4 Symbols and conventions

1.4.1 Symbols



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 might 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 of important facts and conditions.



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

Although warning hazards are related to personal injury, it is necessary to understand that under certain operational conditions, operation of damaged equipment may result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2 Document conventions

A particular convention may not be used in this manual.

- Abbreviations and acronyms are spelled out in the glossary. The glossary also contains definitions of important terms.
- Menu paths are presented in bold. Select Main menu/Settings.
- WHMI menu names are presented in bold. Click **Information** in the WHMI menu structure.
- Parameter names are shown in italics. The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks. The corresponding parameter values are "On" and "Off".

Section 2 RIO600 overview

2.1 Overview

RIO600 is designed to expand the digital and analog I/O of ABB's Relion[®] protection and control relays and to provide I/O for the COM600 substation automation unit using the IEC 61850 and Modbus TCP communication. Both galvanic RJ-45 and optical LC connectors are supported for Ethernet station bus communication. RIO600 can also be used in secondary substations for fault passage indication and power measurements reporting values directly to a peer protection relay or to an upper level system. RIO600 accepts three-phase sensor signals (voltage and current) and provides fault detection and metering functions.

RIO600 allows flexible I/O assignment and provides seamless IEC 61850 connectivity between the substation's input and output signals and the protection relay or the COM600 substation gateway ensuring improved functionality and performance. RIO600 supports both Edition 1 and Edition 2 versions of the IEC 61850 standard. RIO600 can also be used as a standalone device in grid automation applications.



Figure 1: RIO600

RIO600 helps in simplifying and decreasing the wiring inside the substation by digitizing the hardwired signals. The fully hardwired traditional medium-voltage switchgear/substation control and protection system results in extensive I/O wiring, connecting devices in switchgear signaling to the external systems, for example, to the remote terminal unit (RTU) or other higher-level automation systems.

RIO600 provides additional I/O within the switchgear using Ethernet communication. The I/O signals can be efficiently transmitted between the protection relay or COM600 with fast, high performance IEC 61850 GOOSE communication. Alternatively, RIO600 can communicate with an upper level automation system using the widely accepted Modbus TCP automation protocol.

The binary input module can be used for sending binary input values from primary equipment or secondary systems to peer protection relays or an upper-level system. The binary output modules can be used to control equipment based on the control signal received from communication.

The smart control module (SCM) can be used for different switchgear applications to drive primary switches. The module enables the control of a combined three-position switch (disconnector and earthing switch) used in gas insulated switchgears or standard two-position switches such as disconnector or earthing switches. Alternatively, the heavy-duty output contacts of the SCM can be used as power outputs for circuit breaker trip circuits to make, carry and break the belonging trip coil current. The trip circuit supervision function is designed to supervise the control circuit of the circuit breaker. Furthermore, the SCM can be used as a generic module with four binary inputs and four fast power outputs.

With the RTD/mA module, RIO600 can be used in different monitoring applications. RIO600 can receive temperatures (°C) via RTDs or analog input signals (mA) from various transducers or devices. The input current (mA) can be linearly scaled for various applications, for example, transformer tap changer position indication. The input value is forwarded to a peer protection relay or to an upper-level system. With the analog output module (AOM), RIO600 can control an external device having an mA input.

RIO600 also includes a measurement module with fault passage indication (FPI) functionality. This module is intended for grid automation applications where RIO600 enables accurate current and voltage measurements or only current measurement from a MV network using ABB's accurate and lightweight sensor technology. With this measurement module, RIO600 can be used as a stand-alone fault passage indicator unit. Based on the measured MV values, it can give voltage presence and directional FPI and report them to an upper-level system. This also enables power flow and power quality monitoring. The typical accuracy of line voltages, currents and active power is better than 0.5% and for other power measurements better than 1%.

The FPI functionality can be based on phase current measurements only. It provides a selective fault passage indicator for single phase earth faults in high-impedance earth networks, that is, in compensated, unearthed and high-resistance earthed systems. It can be applied as single-phase earth-fault FPI in case of overhead lines and underground cables, regardless of the earth-fault type (continuous, transient or intermittent) or the fault resistance value (low or high ohmic).

The FPI module incorporates the latest fault-detection algorithms used in the Relion family. With an easy-to-use multifrequency admittance-based (MFA) earth-fault detection algorithm, it accurately detects solid, resistive and intermittent earth faults. Practical sensitivity of up to 10 k Ω of the fault resistance can be achieved in symmetrical networks. This new functionality is suitable for high-impedance earthed networks, and especially for compensated and unearthed networks where accurate and selective earth-fault detection is more challenging due to low fault currents. With the use of the negative-sequence overcurrent protection function, it is easier to detect single-phase and phase-to-phase faults or unbalanced loads which are due to broken conductors or unsymmetrical feeder voltages, for example. The selective FPI functionality for single-phase earth faults in high-impedance earthed networks (that is, in compensated, unearthed and high-resistance earthed systems) is available. FPI functionality can be applied as single-phase earth-fault FPI in case of overhead lines and underground cables and is based on phase current measurements only which can be done with conventional current transformers (CTs) or with sensors (Rogowski coils). With the fault passage information, the faulted line section can be quickly identified, and manual or automatic fault isolation and supply restoration can be initiated. The three-phase inrush detector function INRPHAR can be used to coordinate transformer inrush situations in distribution networks. The fuse failure supervision function SEQSPVC can be used to block the voltage measuring functions when failure occurs in the secondary circuits between the voltage transformer (or combi sensor or voltage sensor) and the protection relay to avoid misoperations of the voltage protection functions.

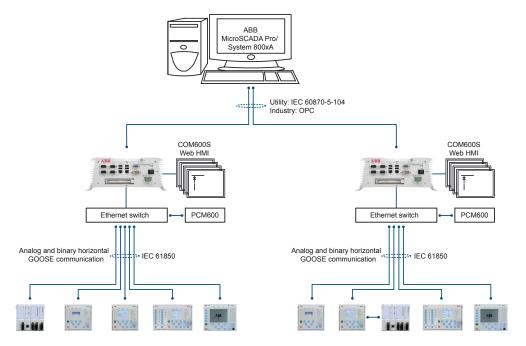


Figure 2:

Conceptual picture of a typical system setup

- IEC 61850 connectivity with support of standard versions Edition 1 and Edition 2
- IEC 61850 GOOSE for real-time information exchange on the Ethernet station bus
- Modbus TCP/IP support for one client
- Standard RJ-45 interface with 10/100 Mbits/s or 100 Mbit/s multimode fiberoptic LC Ethernet interface
- Auxiliary power supply
- Easy-to-use configuration tool for the IEC 61850 data mapping
- Reduced conventional cabling
- Up to 40 configurable binary and analog I/O channels
- DIN rail mountable modules
- Support of two SNTP servers
- WHMI-based monitoring
- Subscribes and publishes GOOSE messages from/to multiple IEDs as configured
- "Stand-alone" operation, with support of intermodule logic

2.1.1 Module configuration

RIO600 uses a modular architecture where the I/O control functionality is built on modules. The modules can be stacked on a standard DIN rail to achieve the required configuration. The minimum configuration required for RIO600 contains a power supply module, a communication module and an I/O module.

Module type		Description	
Power supply modules PSMH		High-voltage range power supply module	
	PSML	Low-voltage range power supply module	
Communication modules	LECM	Communication module with Ethernet port	
	LECM	Communication module with optical Ethernet port	
Table continues on next page			

Module type			Description		
I/O modules	Digital input module	DIM8H	High-voltage range, eight optically isolated binary inputs with common return for two inputs		
		DIM8L	Low-voltage range, eight optically isolated binary inputs with common return for two inputs		
	Digital output module	DOM4	Four output contacts in each digital output module with two pairs of potential free contacts with common return		
	RTD module	RTD4	Four optically isolated channels supporting RTD sensors (Pt100, Pt250, Ni100, Ni120 and Ni250) and an mA input (020 mA configurable). Individual channels are non-isolated from each other.		
	Analog output module	AOM4	Four individually isolated channels of configurable mA outputs driving 020 mA signals		
	Sensor input module	SIM8F	Sensor input module with combined three-phase current and voltage signals		
	Sensor input module	SIM4F	Sensor input module with three-phase current signals		
	Smart control module	SCM8H	 High-voltage range, SCM with five application types 4I4O – four input and four output channels Three-position switch Disconnector Circuit breaker Earthing switch 		
		SCM8L	 Low-voltage range, SCM with five application types 4I4O – four input and four output channels Three-position switch Disconnector Circuit breaker Earthing switch 		

The availability and combination of RIO600 modules and channels depend on the number of power supplies connected.

Table 2:	Maximum number of modules and channels available when one power supply module
	is connected

	LECM with copper interface		LECM with fiber interface	
Description	Modules	Channels	Modules	Channels
Digital input modules (DIM8H/ DIM8L)	5	40	5	40
Digital output modules	5	20	4	16
RTD4 modules	5	20	4	16
Table continues on next page		·		1

	LECM with copper interface		LECM with fiber interface	
Description	Modules	Channels	Modules	Channels
Analog output modules	2	8	1	4
SIM8F/SIM4F modules	5	-	4	-
Smart control module (SCM8H/ SCM8L)	3	24	2	16

Table 3: Maximum number of modules and channels available when two power supply modules are connected

	LECM with o	opper interface	LECM with fiber interface			
Description	Modules	Channels	Modules	Channels		
Digital input modules (DIM8H/ DIM8L)	5	40	5	40		
Digital output modules	10	40	9	36		
RTD4 modules	10	40	9	36		
Analog output modules	4	16	3	12		
SIM8F/SIM4F modules	5	-	5	-		
Smart control module (SCM8H/ SCM8L)	5	40	5	40		

A combination of all the modules can be used in a single RIO600 stack. The number of modules supported by a number of power supply modules is automatically checked by PCM600. If the selected combination of modules exceeds the number of supported modules related to power consumption, the configuration tool gives an indication and does not configure the stack.

2.2 PCM600 tool

PCM600 with the RIO600 connectivity package is used for configuring RIO600.

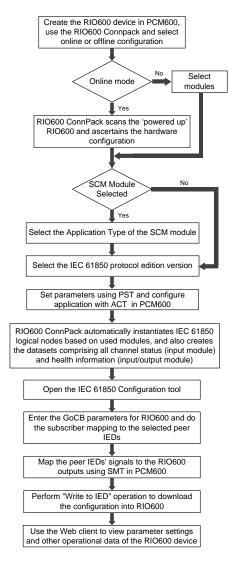
- Configuring RIO600 in the online and offline modes
- Setting the operating parameters for the modules using Parameter Setting
- Performing the I/O mapping across the modules using Signal Matrix
- Reading and writing the configuration and the parameter file to RIO600
- Setting the password using IED Users
- Establishing the GOOSE communication between the devices configured in PCM600 using IEC 61850 configuration
- Configuring the Modbus communication settings for connection with Modbus TCP client
- Updating composition of existing RIO600 in online and offline modes
- Migrating from older version of RIO600 to the higher version using IED Configuration Migration
- Generating Modbus address point list for the configured modules
- Creating graphical logic configuration with Application Configuration

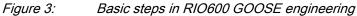
- Support for IEC 61850 Edition 1 and Edition 2 enabling the creation of IED objects in PCM600 with the selected protocol standard version
- Exporting configuration files to a local machine
- Establishing GOOSE communication between the devices configured in PCM600 using IEC 61850 Configuration or Goose Engineering through Application Configuration or both

2.2.1 PCM600 and RIO600 connectivity package version

- Protection and Control IED Manager PCM600 Ver.2.9 Hotfix 2 or later
- RIO600 Connectivity Package Ver.1.8 or later

Section 3 RIO600 engineering flow





Section 4 IEC 61850 overview

The international IEC 61850 standard defines a framework for substation communications networks and systems. The standard consists of several parts ranging from the requirements on substation automation systems to the details of a communication protocol. Its main goal is interoperability; the ability for IEDs from one or different manufacturers to exchange information and use the information for their own functions.

IEC 61850 standard for communication networks and systems in substations has been out since 2005 and used successfully in ABB products. IEC 61850 standard is updated with a new version, Edition 2. Edition 2 extends to new application areas in transmission and distribution power systems and also defines a new functionality to Edition 1 functionality.

Edition 2 is a new version of IEC 61850 standard and it adds new functionality which is not supported by the Edition 1 devices. Therefore it is recommended to always use the same standard version in all devices and not to mix different versions in the same project.

A major difference between the other communication protocols applied in substation automation and IEC 61850 is that the latter is not only a communication protocol, but a whole framework for specifying, engineering and operating substation automation systems. The communication part covers the connection between the IEDs and the substation clients, for example, SCADA and gateways.

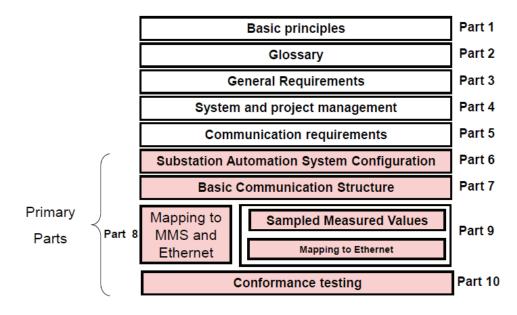


Figure 4:

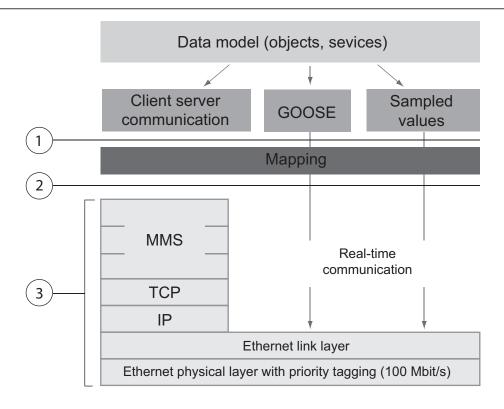
Structure and parts of the IEC 61850 standard

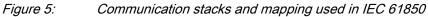
The IEC 61850 standard specifies an expandable object-oriented data model and wide set of protocol services for substation automation (standard parts 7-x). The standard does not specify any protection or control functions, but specifies how the functions expose their information to a communication network.

The standard supports free allocation of functions to devices. With efficient communication facilities, the functions can be located anywhere in the system, that is, an interlocking function can reside in the IED or on the station level. Additionally, the standard is open for different system implementations, that is, different integration levels and allocation of functions to different devices is supported.

The standard also defines an XML description language for substation automation systems. The language facilitates efficient integration of devices into systems in an automated fashion. Additionally the standard supports a comprehensive and consistent system definition and engineering, which makes not only the devices, but also their tools and systems interoperable (standard part 6).

The standard uses Ethernet and TCP/IP for communication. Since Ethernet and TCP/ IP are widely accepted and used, the application of these technologies provide a broad range of features from mainstream communication (standard parts 8-1, 9-2).Communication profiles in IEC 61850 can be divided to vertical and horizontal. The vertical profile uses MMS over TCP/IP and vertical communication Layer 2 Ethernet multicast messages. The standard separates the functionality represented by the data model and the related communication services from the communication implementation thus being open for possible new communication concepts in the future.





- 1 Abstract communication services interface (ACSI)
- 2 Stack interface
- 3 ISO/OSI stack

Section 5 Setting up a project

5.1 Handling connectivity packages

Uninstall the old RIO600 connectivity package before installing a new version. The product code has changed in the latest release.

5.1.1 Uninstalling connectivity packages

- 1. To uninstall a connectivity package version, click Start, click Control Panel.
- 2. In the **Control Panel**, double-click **Add or Remove Programs**.
 - 3. Select the connectivity package and click **Remove**.

Name	Publisher	Installed On	Size	Version
ABB IED Connectivity Package RIO600 Ver. n	ABB Oy, Distribution Automation	MM/DD/YYYY	X.Y MB	n

Figure 6: Selecting the RIO600 connectivity package

4. In the **Add or Remove Programs** dialog box, click **Yes** to confirm the uninstallation.

5.1.2 Installing connectivity packages

- 1. Close PCM600.
- 2. Run the **ABB RIO600 Connectivity Package Ver. n.msi** installer (n = version number).

To install the connectivity package, follow the below steps.



Figure 7: Running RIO600 installation wizard

- 2.1. Click Cancel to exit the installation.
- 2.2. Click **Resume** to revert back to the installation or **Exit Setup** to confirm the cancellation.
- 3. Select I accept the license agreement and click Next.

nd-User License Agreement Please read the following license agreement carefully	BI
License Agreement	•
IMPORTANT! READ CAREFULLY BEFORE USING	
This License Agreement is a legal agreement between you, the user, and ABB Oy for thi software product including software, electronic documentation and printed materials.	s
The software product is protected by copyright laws and international copyright treaties. ABB Oy draws your attention to the fact that you may be held legally responsible for any	
✓ I accept the terms in the License Agreement	
20-20	

Figure 8: Accepting the License Agreement before installation

4. Click **Browse** to select the file destination and click **Next**.

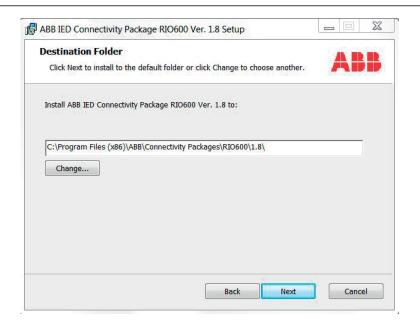


Figure 9: Selecting the folder for installation

5. Click **Install** to start the installation.

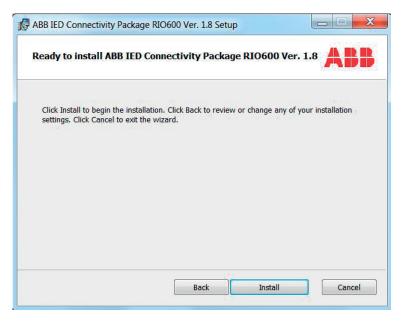


Figure 10: Starting the installation

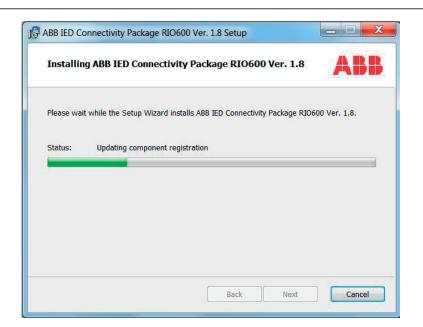


Figure 11: Installation progress

6. After the installation is complete, click **Finish** to exit the setup program.

ABB IED Connectivity Packag	je RIO600 Ver. 1.8 Setup
	Completed the ABB IED Connectivity Package RIO600 Ver. 1.8 Setup Wizard Click the Finish button to exit the Setup Wizard.
	Back Finish Cancel

Figure 12: Completing the installation

5.1.3 Activating connectivity packages

The connectivity package has to be installed before it can be activated.

1. In the Update Manager, activate the appropriate connectivity package.

The **Update Manager** shows the connectivity packages that are compatible with the installed PCM600 version.

2. Select the **ABB RIO600 Connectivity Package Ver. n** (n = version number). Always use the latest version of the connectivity package.

Home	IED Type	Active Connectivity Packaç	Compatibility	Digital Signing
	PCM600 2.7			
Software Updates (10)	- PCM600 2.8			
Get Connectivity Packages	PCM600 2.9			
Export Software Packages	630			
Manage Connectivity Packages	B 620			
	₩-615			
Settings	B 600			
	RIO600	1.8 -	Supports PCM600 32-bit, 64-bit	
	₩- GenericIEC61850IED	15 172 173 16 None		
				Restore To Previo

Figure 13: Selecting the connectivity package

5.2 Creating a new project

- 1. Start PCM600.
- To see the projects that are currently available in the PCM600 database, click File and select Open/Manage Project. The Open/Manage Project dialog box opens.

🔤 Loo	al Server	r\Metsak	allio - PC	M600			
<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp	_	
: D	<u>N</u> ew Pr	oject		Ctrl	+N		
r 😂	<u>O</u> pen/N	/lanage l	Project	Ctrl	+0		→ ∓ X
1	<u>C</u> lose P	roject					
	<u>S</u> ave			Ctr	I+S		
P a a	<u>E</u> xit						
	<u>1</u> : Local	Server\I	Metsakalli	io			

Figure 14: Managing projects

3. Select **Projects on my computer**.

• If there are currently any projects or object tools open, close them.

4. Click **New Project**. The **Create New Project** dialog box opens.

Open/Manage P	roject	×
	Currently available projects:	
New Project	Projects on my computer Metsakallio Projects on network	
Delete Project		
Ch.		
Import Project		
	Project name:	
Export Project	IN-L-BTXI011022\PCMSERVER\Metsakallio	Open Project
	Date created:	Close
	12/8/2011 10:24:22 PM	
	Project description:	
	project	

Figure 15: Creating new projects

- 5. In the **Project Name** box, give a name for the project.
 - Optionally, write a description of the project in the **Description** box.

Create New Project
Server name:
My computer [IN-L-BTXI011022\PCMSERVER]
Project name:
Metasakallio
Description:
Project
Create Cancel

Figure 16: Naming the project

6. Click Create.

PCM600 sets up a new project that is listed under Projects on my computer.

5.3

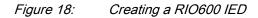
Building the plant structure

- 1. Create a new plant structure in PCM600.
 - 1.1. In the Plant Structure, right-click and select New/General.
 - 1.2. Select the element like Substation, Voltage level and Bay.

Project Explorer		→ 4 ×					
Plant Structure							
E Metsakallio							
Substation	- 1						
Voltag	()	Site Information Tool	1				
		New •		Create from Template			
	Ж	Cut		General	•	₽	Bay
	e.	Сору					
		Delete					
		Rename					
		Properties					

Figure 17: Creating a bay

Project Explorer		→ ∓ X				
Plant Structure						
E Substation E Voltage E Voltage E Free Participation E Free	e Leve	I				
P I		Import				
	0	Site Information Tool				
		New •	Create from Template			
	Ж	Cut	Generic IEC61850 IED	•		
		Сору	Feeder IEDs	•		
		Delete	Remote I/O IEDs	•		RIO600
		Rename			_	
		Properties				





RIO600 is available only if the connectivity package is installed and activated successfully.

- 2. Rename each level in the structure by the names or identifications used in the grid.
 - 2.1. Right-click the level and select Rename.
 - 2.2. Rename the levels in the **Object Properties** view.

5.4 Inserting IEDs

IEDs can be inserted to the project either in offline or online mode.

When the physical device is not available or not connected to PCM600, the engineering is done without any synchronization with the device. The offline configuration in PCM600 can be synchronized with the physical device later by connecting the device to PCM600. Working in the offline mode has an advantage compared to online mode that the preparation for the configuration can be started even though the device is not available.

When the device is already connected to PCM600 and the communication is established, PCM600 can read the configuration directly from the physical device. This is useful when an order-specific device is used.

If the device is not configured or it contains an invalid configuration, select **Write to IED** before any other operations in the online mode. If the device has a valid configuration, select **Read from IED** directly after the device instance has been created to retain the communication parameter's value. In Parameter Setting tool, the communication parameters are then updated according to the device configuration. Otherwise, the Parameter Setting tool contains the default data, for example, the default IP Address *192.168.2.10*.



Check that the selected order and amount of modules corresponds to the actual one when configuring IED in offline mode. If module configuration does not match, the IEC 61850 data model is not valid and the RIO600 horizontal communication part must be reconfigured.

5.4.1 Inserting an IED in offline mode

- 1. In the **Plant Structure**, right-click the bay and point to **New**, point to **Remote I**/ **O IEDs** and then click **RIO600**.
 - The **Configuration mode selection page** dialog box opens.
- 2. Under Configuration mode, select Offline Configuration and click Next.

RIO600 - Configuration mode selection page
RIO600 - Configuration Wizard Configuration mode selection page
This wizard helps you to create configuration for your IED. Configuration wizard sets the basic hardware and communication properties. The configuration can be made either online or offline.
Configuration mode
Online configuration
Offline configuration
Cancel Next >

Figure 19: Selecting offline configuration mode

3. In the IED protocol list, select the protocol, for example, IEC 61850 and click Next.

RIO600 - Config Communication protoc		
IED protocol:	IEC 61850	•
	Cancel	ck Next>

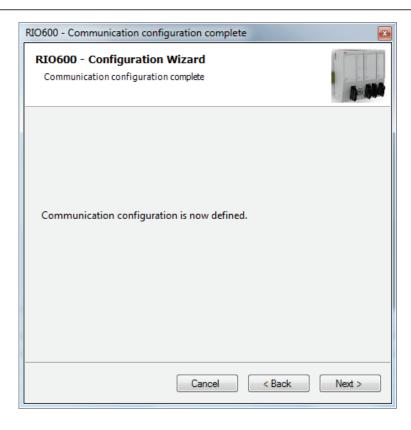
Figure 20: Selecting the IED protocol in offline mode

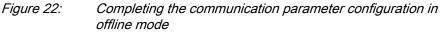
4. Under **PCM600 communication**, define the communication parameters and click **Next**.

RIO600 - IEC61850 cor	mmunication protocol	E
RIO600 - Config IEC 61850 communi		
PCM600 communi	cation	
Port:	Port 1 💌	
IP address:	192.168.2.10	
	-	
		Nexts
	Cancel < Back	Next >

Figure 21: Defining the communication parameters in offline mode

- 4.1. In the Port list, only Port 1 can be selected as the communication port.
- 4.2. In the **IP Address** box, enter the correct IP address.
- 5. In the **Communication configuration complete** dialog box, click **Next**.





6. In the **Composition selection page** dialog box, configure the channels and generate the order code.

By default, the channels are not configured.

RIO600 - Configurat Composition selection page	ion Wizard					
Composition selection						
	Module type		Hardware type		Module version	
Power supply 1	PSM	•	High voltage	•	Not applicable	•
Power supply 2	PSM	•	High voltage	•	Not applicable	•
Communication module	LECM	•	Electrical	•	G	•
Position 1	SIM8F	•	Sensor input	•	A	*
Position 2	SIM4F	•	Sensor input	•	A	•
Position 3	SCM	•	High voltage	•	A	•
Position 4	DIM8	•	High voltage		A	•
Position 5	DOM	•	Contact		A	•
Position 6	RTD	•	RTD/mA in	•	A	•
Position 7	Not configured	•	Not configured		Not configured	•
Position 8	Not configured	•	Not configured	•	Not configured	•
Position 9	Not configured	•	Not configured	•	Not configured	•
Position 10	Not configured	•	Not configured	-	Not configured	-
Number of configured cha	nnel(s): 40					

Figure 23: Selecting the composition in offline mode

- 6.1. In the **Hardware Type** list, select the correct hardware type for the communication module (**Electrical/Optical**).
- 6.2. In the **Module Type** lists, select the correct module types for each used channel (position). The corresponding hardware type choices are enabled.
- 6.3. Click Next to go to the Application Type selection page.



The **Application Type selection page** dialog box opens only, if at least one SCM module has been selected in the **Composition selection page**.

7. In **Application Type selection page** dialog box, configure the application types of all the SCM modules in the stack.

	on Type selection page nfiguration Wizard selection page		
Application Type	Selection		
Position	Module Type	Hardware Type	Application Type
6	SCM	High voltage	Not configured
			Not configured 4I4O 3 Position Switch Disconnector Earthing Switch Circuit Breaker
		Cancel	<back next=""></back>

Figure 24: Selecting the application types of SCM modules

- 7.1. In the **Application Type** list, select the correct option for each SCM module.
- 7.2. Click Next to go to the Version Selection page.
- 8. In the Version Selection dialog box, select the IED's IEC 61850 protocol edition and click Next.

RIO600 - Version Selection	
RIO600 - Configuration Wizard Version Selection Page	
Note SCL Edition and click the 'Next' button to generate the configuration.	
IEC 61850 protocol edition	
Cancel < Back N	ext >

Figure 25: Selecting the IEC61850 protocol edition



The version selection is available only if the configured RIO600 is the first one in the PCM600 project.

A progress bar is provided to show the status of the function generation. Wait until the function generation is complete.

The **Setup complete** dialog box opens when the function generation is complete.

9. In the Setup complete dialog box, click Finish.

10600 - Configuration	Wizard	T
etup complete		
Setup is complete. The cor	nfiguration that is made for the selected IED is	
IED type	RIO600	
Communication module	1.8	
IP address of IED	192.168.2.10	
Summary	Power supply : Double Communication module : LECM Digital input module(s) : 1 Configured digital input channel(s) : 8 Digital output module(s) : 1 Configured digital output channel(s) : 4 RTD module(s) : 1 Configured RTD/mA input channel(s) : 4 Sensor input module(s) : 1 Sensor input module(s) Current only :1	

Figure 26: Viewing the summary page in offline mode

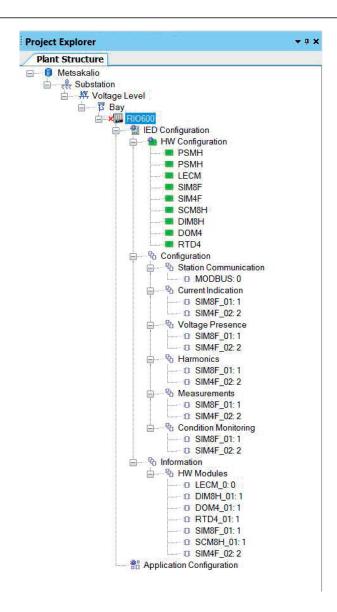
10. In the **Set technical key** dialog box, click **OK** to close the configuration setup wizard.

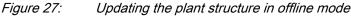
The **Plant Structure** is updated according to the hardware configuration. The module types and the related positions are visible under the **HW Configuration**.

The available power supply modules in the RIO600 stack are represented as **PSMH/L** in **Plant Structure** under the **HW Configuration** node. Only the modules available under the **HW Configuration** represent the physical stack.



The module instances are created based on the module type. For example, the instance created for the stack in summary page is PSMH-PSMH-LECM-DIM8H-DOM4-RTD4-AOM4-SIM8F-SCM8H-SIM4F.







In the **Plant Structure**, the **Application configuration** does not contain any data.



Click **Cancel** anytime during the configuration setup to remove the created RIO600 device from the plant structure. Use **Back** and **Next** to navigate between the pages in the setup wizard.



During the offline configuration, some modules, such as DOM4, AOM4 or SIM8F, are created with the latest module versions.

However, during commissioning, the versions can be updated using the online composition update tool. In online configuration, the configuration is generated based on the available versions of the modules in the physical stack.



When configuring the SIM8F and SIM4F modules in the stack, the instance number can be SIM8F1 and SIM4F2 or vice versa. This is because a few common logical nodes such as EFPTOC and PHPTOC are confusing if both are instantiated as 1. To avoid this, the instance numbers are consecutive. If the stack has a SIM4F module before the SIM8F module, they are considered as SIM4F1 and SIM8F2. All corresponding logical nodes take the same instance number, for example, EFPTOC1, PHPTOC1 and FPIPTOC1 for the SIM4F1 module, and EFPTOC2, PHPTOC2, MFAPSDE2 for the SIM8F2 module.

5.4.2 Inserting an IED in online mode



To set up a device in online mode, the device must be connected to PCM600.

- 1. In the **Plant Structure**, right-click the bay and point to **New**, point to **Remote I**/ **O IEDs** and then click **RIO600**.
 - The **Configuration mode selection page** dialog box opens.
- 2. Under Configuration mode, select Online Configuration and click Next.

RIO600 - Configuration mode selection page
RIO600 - Configuration Wizard Configuration mode selection page
This wizard helps you to create configuration for your IED. Configuration wizard sets the basic hardware and communication properties. The configuration can be made either online or offline.
Configuration mode
Online configuration
Offline configuration
Cancel Next >

Figure 28: Selecting online configuration mode

3. In the IED protocol list, select the protocol, for example, IEC 61850 and click Next.

RIO600 - Config Communication protoc		
IED protocol:	IEC 61850	•
	Cancel <bac< td=""><td>k Next ></td></bac<>	k Next >

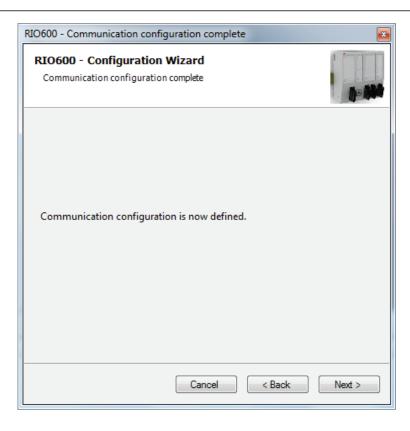
Figure 29: Selecting the IED protocol in online mode

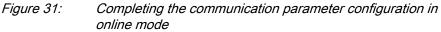
- 4. Under **PCM600 communication**, define the communication parameters and click **Next**.
 - 4.1. In the **Port** list, only **Port 1** can be selected as the communication port.
 - 4.2. In the IP Address box, enter the correct IP address.

RIO600 - IEC61850 com	munication protocol	E
RIO600 - Configu IEC 61850 communica		
PCM600 communica	ation	
Port:	Port 1 🔹	
IP address:	192,168,2,10	
	, ,	
	Cancel < Back	Next >

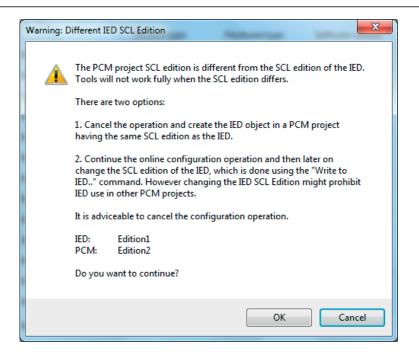
Figure 30: Defining the communication parameters in online mode

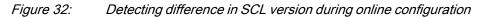
5. In the **Communication configuration complete** dialog box, click **Next**.





6. If the IEC 61850 editions between the IED and PCM600 differ, a dialog box opens.





- 6.1. Click **Cancel** to close the **Composition detection page** dialog box and to cancel the online configuration.
- 6.2. Click **Ok** to ignore the warning and to read the hardware configuration from the IED.
- In the Composition detection page dialog box, wait until the hardware configuration is read from the device.
 In online mode, the contents of the Composition detection page dialog box are read-only and cannot be edited.

RIO600 - Compositio Composition detection page	•		
Composition selection			
	Module type	Hardware type	Module version
Power supply 1		-	-
Power supply 2			-
Communication module			
Position 1			
Position Please wait			
Position :			
Position 5	-	T	-
Position 6			-
			-
Position 7			-
	-	-	· · · · ·
Position 7 Position 8 Position 9	•	•	· · · · · · · · · · · · · · · · · · ·
Position 8	· · ·		
Position 8 Position 9	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·

Figure 33: Reading the device composition in online mode

Composition detection page						W
Composition selection						
	Module type		Hardware type		Module version	
Power supply 1	PSM	•	High voltage	•	Not applicable	Ŧ
Power supply 2	PSM	•	High voltage	-	Not applicable	Ŧ
Communication module	LECM	•	Electrical	•	G	¥
Position 1	DIM8	•	High voltage	-	A	*
Position 2	DOM	•	Contact	•	A	*
Position 3	SIM8F	•	Sensor input	•	A	-
Position 4	SIM4F	•	Sensor input	•	A	-
Position 5	SCM	*	Low Voltage	•	A	*
Position 6	RTD	•	RTD/mA in	-	A	Ŧ
Position 7	Not configured	•	Not configured	•	Not configured	•
Position 8	Not configured	•	Not configured	-	Not configured	¥
Position 9	Not configured	•	Not configured	•	Not configured	•
Position 10	Not configured	•	Not configured	•	Not configured	*
Number of configured cha	nnel(s): 40					

Figure 34: Viewing the device composition in online mode

- 8. In the **Composition detection page** dialog box, click **Next**.
- 9. In **Application Type selection page** dialog box, configure the application types of all the SCM modules in the stack.

IO600 - Applicatio	on Type selection page		
RIO600 - Cor Application Type s	ifiguration Wizard		
Application Type	Selection		
Position	Module Type	Hardware Type	Application Type
5	SCM	Low Voltage	Not configured
			Not configured 414O 3 Position Switch Disconnector Earthing Switch Circuit Breaker
		Cancel < E	Back Next >

Figure 35:

Selecting the application types of SCM modules



The **Application Type selection page** dialog box opens only if at least one SCM module has been detected in the **Composition detection page** dialog box.

- 9.1. The application types of the SCM modules are already selected, if configured. In the **Application Type** list, change the selection, if required.
- 9.2. Click Next to go to the Version selection page.
- 10. In the Version selection page, select the IEC 61850 protocol edition of the IED and click Next for function generation.

RIO600 - Version Selection							
RIO600 - Configuration Wizard Version Selection Page							
Note SCL Edition and click the 'Next' button to generate the configuration.							
IEC 61850 protocol edition Edition Edition Edition	1						
	Cancel < Back Next >						

Figure 36: Selecting the IEC61850 protocol edition

A progress bar is provided to show the status of the function generation. Wait until the function generation is complete.

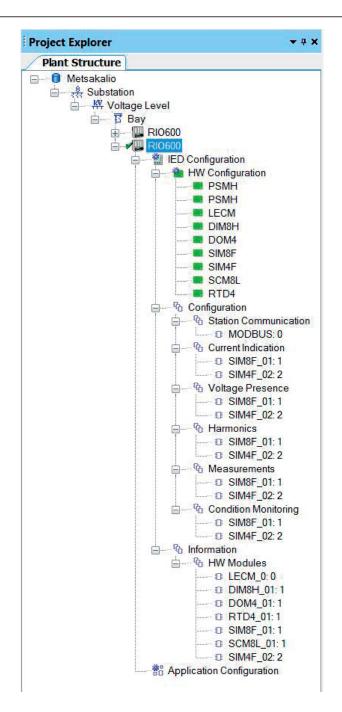
11. When the function generation is complete, the **Setup complete page** dialog box opens.

The available power supply modules in RIO600 stack are represented as **PSMH**/ L in the **Plant Structure** under the **HW Configuration** node. Only the modules available under the **HW Configuration** represent the physical stack.

LIO600 - Configuration Setup complete	Wizard	
Setup is complete. The cor	figuration that is made for the selected IED is	
IED type	RIO600	
Communication module	1.8	
IP address of IED	192.168.2.10	
Summary	Power supply : Double Communication module : LECM Digital input module(s) : 1 Configured digital input channel(s) : 8 Digital output module(s) : 1 Configured digital output channel(s) : 4 RTD module(s) : 1 Configured RTD/mA input channel(s) : 4 Sensor input module(s) : 1 Sensor input module(s) Current only :1	
	Cancel Finis	sh

Figure 37: Viewing the summary page in online mode

In the **Plant Structure**, the **Application configuration** does not contain any data.





Updating the plant structure in online mode



Click **Cancel** any time during the configuration setup to remove the created RIO600 device from the plant structure. Use **Back** and **Next** to navigate between the pages in the setup wizard.



The module instances are created based on the module type.



The version selection is available only if the configured RIO600 is the first one in the PCM600 project.

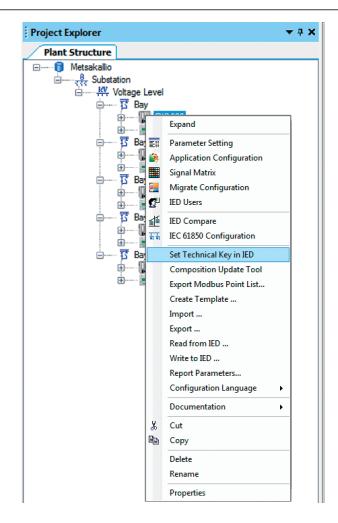


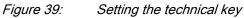
The default data sets created for a stack with more than two SIM8F/SIM4F modules contain only the data entries of first two SIM8F/SIM4F module instances.

Setting the technical key 5.5

The technical key is used for the unique identification of each device and must be modified for every new device.

1. In the Plant Structure, right-click RIO600 and select Set Technical Key in IED.





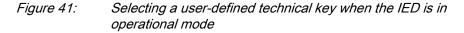
- 2. In the Technical Key Information dialog box, click OK.
 - Click **Cancel** or close the dialog box to cancel the setup.

Technical Key Information - Read carefully
This tool component is used for matching the "Technical Key" in PCM600 and the IED. Both keys have to match to establish connection to the device.
After clicking OK the "Technical Key" will be read from the device and the user has an option to change it. By confirming the change it will be written to the IED and stored in PCM600. The IED will be restarted automatically to take the changes into effect.
Please note: The "Technical Key" has to be unique in the system and affects to the horizontal IEC61850 configuration. Each change to it might require additional changes to the system's configuration!
OK Cancel

Figure 40: Viewing the technical key information

- 3. In the **Set Technical Key** dialog box, define the technical key when the IED is in online mode and click **OK**.
 - Select Technical Key in IED to set IED technical key to PCM600.
 - Select **Technical Key in PCM600** to set PCM600 technical key to IED.
 - Select User-defined Technical Key to provide technical key to IED as well as to PCM600.

Set Technical Key	
communication. Choo existing one from the I	ue "Technical Key" to be used for se "Technical Key in IED" to use the ED, "Technical Key in PCM600" to y PCM600 or create custom one by ed Technical Key":
RI01	Technical Key in IED
RI01	Technical Key in PCM600
ABB101	Oser-defined Technical Key
	OK Cancel



4. Wait until the configuration is complete and click **OK**. If there is a module mismatch between RIO600 stack information in PCM600 and the physical stack, select the appropriate option.

- Click **Yes** to update the technical key in PCM600.
- Click **No** to keep the existing technical key unchanged.

Set Technical Key	
Technical key in IED is 'RIO123' Please select option Yes = Update Technical Key in PCM600 No = Keep Techanical Key as it is in PCM600	
Yes <u>N</u> o	

Figure 42: Selecting a user-defined technical key

The technical key can be modified using the Object Properties pane.

[100] SCL Information	
Configuration Version	G
IED Type	RI0600
Manufacturer	ABB
SCL data model	Edition 2
Technical Key	ABB101

Figure 43:

Viewing the technical key properties



Do not set the same technical key for more than one device through the **Object Properties** pane or an error message is displayed in the **Output** pane.



A valid technical key can have a maximum of 32 characters for Edition 1 IED and a maximum of 60 characters for Edition 2 IED.

Output				
Date and Time	Category	User	Object	Message
12/8/2011 11:53:36.055 AM	Warning	[local]\abb - System	System	Overlapping SCL Technical Key 'RIO1'. Previous value 'AA1J1Q01A1' restored.
😵 12/8/2011 11:53:36.057 AM	Error	[local]\abb - System	System	Could not set Technical Key to PCM, hence communication will not work!
12/8/2011 11:53:59.068 AM	Message	[local]\abb - System	System	To establish communication, reboot the IED, connect it to the PC and run the wizard again.

Figure 44: Failing to set the technical key

5.6 Editing the object properties

The Object Properties pane is used to view the parameters set during the configuration setup. For example, the *IP Address* and *Technical Key* can be changed directly via the Object Properties of the selected device.

- 1. In the **Plant Structure** view, select a device.
- 2. On the View menu, click Object Properties. The Object Properties pane opens.
 - The **Object Properties** pane opens.
- 3. Type in the value like a new IP address to the **IP Address** row. Some object properties like **Configuration Version** and **IED Type** are not editable.

4 [000] Appearance Caption	BI0600
Description	Contract Con
4 [003] Composition	Remote I/O IED for medium voltage applications
	AA-AA-I AGEEAHGAGAACAAB-ADDA-
CompositionCode	AA-AA-LAGFFAHGAGAAGAAB-ADDA-
IP Address	192 168 2 10
IP-GATEWAY	192.168.2.1
IP-SUBNET	255.255.255.0
MacAddress	00:A0:C9:14:C8:29
[030] Communication Control	122 1 21
Connection Type	Fixed
4 [080] Authentication	
Is Authentication Disabled	True
Is Password used	False
Password	
4 [100] SCL Information	
Configuration Version	G
IED Type	RI0600
Manufacturer	ABB
SCL data model	Edition 2
Technical Key	ABB101
4 [300] Configuration Version	
Last modified	18-Nov-19 4:17 PM
System	IN-L-7243842
Version	2

Figure 45:

Viewing Object Properties



The changes in the *IP Address* and *Technical Key* in the Object Properties pane do not reflect in the device but are used to establish a connection between PCM600 and the device.

Section 6 Using the Parameter Setting tool

6.1 Viewing parameters

The device should contain a valid configuration. If the device is not configured or contains an invalid configuration, the Write to IED operation should be selected.

• In the **Plant Structure**, right-click a device and select **Parameter Setting** to view the configured parameters for the selected device.

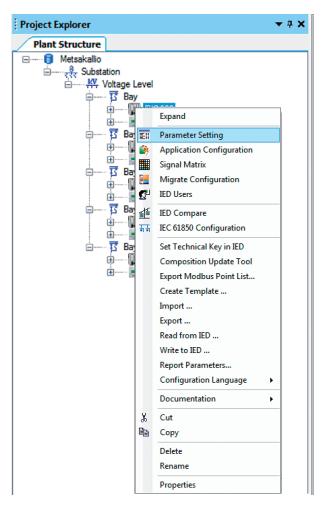


Figure 46: Selecting Parameter Setting

View the parameters of all modules in the **Parameter Setting** pane.

•

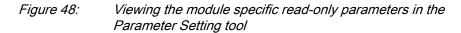
Section 6 Using the Parameter Setting tool

Plant Structure	G	roup / Parameter Name	IED Value	PC Value	Unit	Min	Max
Metsakalio	2	HW Modules					
🛓 👯 Substation	v	LECM_0: 0		-			
È₩. Voltage Level È₩ Bay B₩ Ri0600 È₩ Ri0600	v	LECM_0					
	v	Order Code	MOD600GLECMIR	MOD600GLECMIR			20 character
	v	Firmware Version	G	G			1 characters
ED Configuration	v	Firmware Revision	A	A			1 characters
HW Configuration Configuration	v	Hardware Version	D	D			1 characters
- the Information	v	Configuration Change	Cc 4	4		0	65535
HW Modules	V	Parameter Change Co	oun 3	3		0	65535
B LECM_0: 0 B DIM8H 01: 1		DIM8H_01: 1					
B DOM4_01	1 v	DIM8H_01					
G RTD4_01:1 SIMBF_01:1 SCM8L_01:1 SCM8L_01:1 SCM8L_02:2		Order Code	MOD600ADIM8H	MOD600ADIM8H			20 character
		Firmware Version	A	A			1 characters
	2 1	Firmware Revision	В	В			1 characters
👜 – 📸 Application Configuration	n v	Hardware Version	С	С			1 characters
	v	DOM4_01: 1					
	v	DOM4_01					
	v	Order Code	MOD600ADOM4R	MOD600ADOM4R			20 character
	v	Firmware Version	A	A			1 characters
	v	Firmware Revision	A	A			1 characters
	V	Hardware Version	В	В			1 characters



Viewing the parameters in the Parameter Setting tool

roject Explorer 🗸 🗸	RIO600 - Parameter S Group / Parameter Name	IED Value	PC Value	Unit	Min	Max
Plant Structure	Information	ILD value	P C Value	Unit	WIIIT	Wida
⊟	HW Modules					
B	LECM_0: 0			2		
Bay Bay	LECM 0	-	-			
ED Configuration	V Order Code		MOD600GLECMIR			20 characters
HW Configuration	Firmware Version		X			1 characters
E Configuration	Firmware Revision		x			1 characters
information ⊟ ^Q 0 HW Modules	Hardware Version		x			1 characters
E			0		0	65535
1 DIM8H_01: 1	Configuration Char Parameter Change	1	0		0	65535
B DOM4_01: 1	r diameter ondrige	Cd	U		U	65535
RTD4_01: 1 SIM8F 01: 1	Dimon_or. i					
SCM8H_01: 1	✓ DIM8H_01					
© SIM4F_01: 1	V Order Code		MOD600ADIM8H			20 characters
🗄 – 💏 Application Configuration	 Firmware Version 		X			1 characters
	 Firmware Revision 		X			1 characters
	V Hardware Version		х			1 characters
	MOM4_01: 1					
	v DOM4_01					
	V Order Code		MOD600ADOM4R			20 characters
	✓ Firmware Version		x			1 characters
	 Firmware Revision 		X			1 characters
	 Hardware Version 		X			1 characters
	RTD4_01: 1					
	RTD4_01					
	V Order Code		MOD600ARTD4			20 characters
	 Firmware Version 		×			1 characters
	 Firmware Revision 		х			1 characters
	✓ Hardware Version		×			1 characters
	SIM8F_01: 1					
	✓ SIM8F_01					
	V Order Code		MOD600ASIM8F			20 characters
	 Firmware Version 		×			1 characters
	 Firmware Revision 		х			1 characters
	V Hardware Version		X			1 characters
	SCM8H_01: 1					
	✓ SCM8H 01					



View the available supervision data under LECM in the **Parameter Setting** pane. ٠

Plant Structure	Gro	up / Parameter Name	IED Value	PC Value	Unit	Min	Max
Butcatic Bestation the station the station	- 1	ECM_0: 0					
	×	LECM_0					
	V	Order Code	MOD600GLECMIR	MOD600GLECMIR			20 character
	v	Firmware Version	G	G			1 characters
E	V	Firmware Revision	A	A			1 characters
ED Configuration	V	Hardware Version	D	D			1 characters
	V	Configuration Change Court	4	4		0	65535
i Information	V	Parameter Change Counte	3	3		0	65535

Figure 49: Viewing the supervision data in the Parameter Setting tool

The addition, removal or interchange of modules increments the *Configuration Change Counter* parameter value. Certain actions are not considered as application configuration changes and they do not increment *Configuration Change Counter*.

- Adding, removing or updating data sets in the IEC 61850 tool
- Subscribing to or unsubscribing from the data sets in the IEC 61850 tool
- Changing the application configuration layout
- Connecting a GOOSE input to a GOOSE receiver block and not to any output module in the Binary or Analog outputs tab

Any change in the parameter values increments the *Parameter Change Counter* value. The parameter read operation is required to get the updated counter values from the protection relay to the Parameter Setting tool. The common read operation does not provide the actual counter values to the Parameter Setting tool.



Parameter Setting and Logic Nodes for the Move function MVGAPC are available only after the function block has been added in Application Configuration. Parameter Setting for the Move function block can be found in the plant structure.

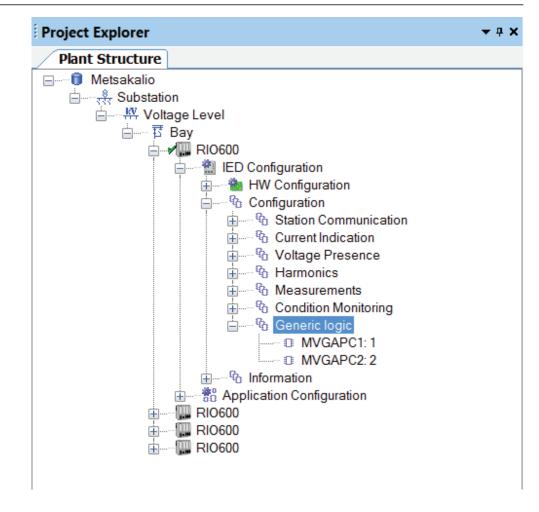


Figure 50: MVGAPC parameter setting

6.2 Reading parameters from the device

 Click the Read User Management Settings from IED button to read parameters from the device. The Read parameters from RIO600 dialog box opens.

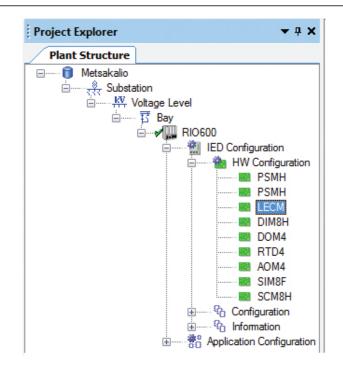
🚊 Read parameters from RIO600	
Parameter range RIO600	
 Selected group IRF channel number 	
Parameter options Copy IED values to PC value field	
	OK Cancel

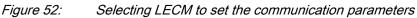
Figure 51: Reading parameters

- 2. Under **Parameter range**, select which parameters are read from the device.
 - 2.1. All parameters of a device like RIO600
 - 2.2. A selected group of parameters like General Parameters
 - 2.3. A selected parameter like IRF channel number
- 3. Under **Parameter option**, check the box **Copy IED values to PC value field** to update the IED value column after the configured values are read from the device.
- 4. Click **OK** to read the parameters from the device.

6.3 Setting communication and time synchronization parameters

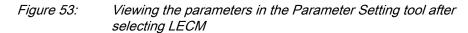
1. In the **Plant Structure**, select **RIO600/IED Configuration/HW Configuration/LECM** to set the communication parameters.





2. Right-click **LECM** and select **Parameter Setting** to display the general, communication and synchronization parameters in the Parameter Setting tool.

Project Explorer 🗸 🕂 🗙		RIO600 - Parameter Setting					
Plant Structure	Gro	oup / Parameter Name	IED Value	PC Value	Unit	Min	Max
🗊 Metsakalio 🔹	v 1	ECM					
Substation	V	General Parameters					
Bay	V	Test Mode		Disable			
	V	Standalone configuration		Disable			
IED Configuration HW Configuration	V	Communication					
PSMH PSMH PSMH PSMH DIM8H DOM4 RTD4 SIM8F SIM8F SIM8F SIM8F SIM8 PGraduation PGraduat	V	IP Address		192.168.2.10			
	~	Subnet Mask		255.255.255.0			
	V	Default Gateway		192.168.2.1			
	v	Synchronization					
	V	Synch Source		None			
	V	Publisher Information					
	V	Physical MAC Address Check		Disabled			
Station Communication =	- V	Physical MAC Address		00-00-00-00-00			17 character(
⊕%0; Hamonics ⊕-%0; Hamonics ⊕-%0; Homation ⊡-%0; Howasureents ⊡-%0; HW Modules □ LECM_0:0; □ DIMM_10;:1 □ RT04_01:1 □ SIMBE_01:1 □ SIMBE_01:1 □ SIMBE_01:1 □ B							



3. Change the values of the IP Address, Subnet mask, Default gateway, Synch Source, IP SNTP primary and IP SNTP secondary parameters based on the required configuration.

6.4

Setting Modbus configuration parameters

1. In the **Plant Structure**, select **RIO600/IED Configuration/Configuration/ Station Communication/MODBUS: 0** to set the Modbus configuration parameters.

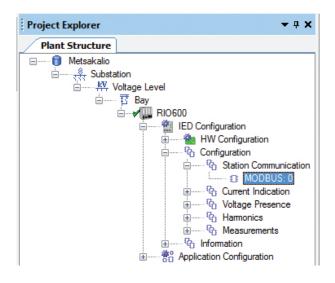
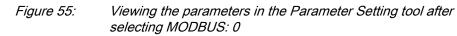


Figure 54: Selecting Modbus: 0 to set the Modbus parameters

2. Right-click **MODBUS: 0** and select **Parameter Setting** to display the Modbus configuration parameters in the Parameter Setting tool.

Project Explorer 🔹 🕈 🗙	RI0600 - Parameter Setting					
Plant Structure	Group / Parameter Name	IED Value	PC Value	Unit	Min	Max
Plant Structure	Croop + analised insteament V MODBUS0 V Operation V Connection Timeout V TCP Client 1 V Operation V Slave ID V Client IP V Binary Input Read Method V Binary Output Write		Off 10 Off 10 Off 11 000000.000.000 Latched Not Allowed	sec	1	100 255
	 Analog Output Write 		Not Allowed			



3. Change the values of **Operation**, **Connection Timeout**, **Slave ID**, **Client IP**, **Binary Input Read Method**, **Binary Output Write**, **Analog Output Write** parameters based on the required configuration.

6.5 Writing parameters to the device

- 1. Click the **Write User Management Settings to IED** button to write parameters to the device.
 - The Write parameters to RIO600 dialog box opens.
- 2. Under **Parameter range**, select which parameters are written to the device.
 - All parameters of a device like RIO600
 - A selected group of parameters like General Parameters
 - A selected parameter like IP Address

Write parameters to RIO600	×
Parameter range	
© RIO600	
General Parameters	
Selected parameter	
Parameter options	
Changed parameters	Read back
All parameters	
	OK Cancel

Figure 56: Writing parameter(s)

- 3. Under **Parameter options**, define if only the changed parameters are written to the device and if they are read back to the tool.
 - Select Changed parameters or All parameters.
 - Click the **Read back** check box to read back the parameters after writing them to the device.
- 4. Click **OK** to write the parameters to the device.

If there are no modified or changed parameters and the selected parameter range is **All parameters**, the **Parameter Setting** dialog box opens.

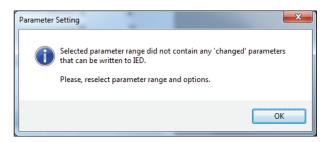


Figure 57: Detecting modified parameters

If the value of the new *Installation* parameter is changed to "Yes", the **Special Operation** dialog box opens.





Writing new Installation parameter



New installation is a one-time operation and the value is set back to "No" after writing the parameters.

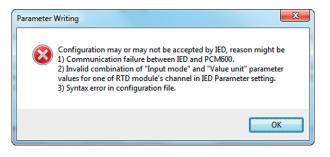


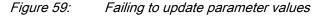
IED does not reboot if only the new *Installation* parameter is written through the Parameter Setting tool.



The *Description* parameter for channels should not contain the special character "&". Such configurations are rejected by RIO600 IED.

5. Wait until the parameters are written to the device and the device reboots. The Output pane message indicates if the parameters are successfully written to the device. If the parameters are written successfully but the configuration is rejected by the device, a dialog box opens indicating an error.





Section 7 Exporting and importing SCD files

7.1 Exporting SCD files

After the RIO600 parameters are set, export the System Configuration Description from PCM600 for the system configurations tool.

1. In the **Plant Structure** view, right-click the substation and select **Export**.

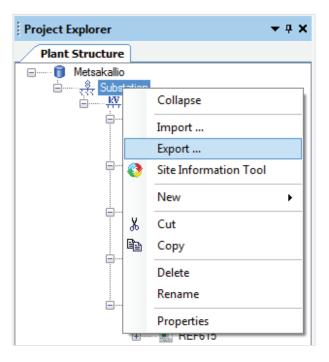


Figure 60: Selecting Export

- 2. In the **Information** dialog box, click **OK**.
- 3. In the **Export** dialog box, select the file destination and click **Save**.

Section 7 Exporting and importing SCD files

🔤 Export	1000				×
🕞 🕞 🗢 📕 🕨 Mi	etsakallio	▼ 49	Search Metso	akallio	٩
Organize 🔻 Ne	w folder			== -	0
Favorites Favorites Favorites Constraints Constraints	Name	Date	e modified earch.	Туре	
🖳 Computer	₹ .	III			•
File <u>n</u> ame:	SCD_PCM				-
Save as <u>t</u> ype:	Substation Configuration Descrip	otion (*.scd)			•
Alide Folders			<u>S</u> ave	Cance	e l

Figure 61: Selecting file destination

4. In the SCL Export Options dialog box, click Export to export the private sections to the SCD file.

SCL Export Options		— X
Data All SCL-data from the project will be exported.		
Advanced >>	Export (Cancel

Figure 62: Exporting SCD file

7.2 Importing SCD files

After GOOSE engineering in the system configuration tool, the SCD file can be imported at the substation level.

- 1. Open PCM600 and ensure that the original project is open.
- 2. Switch off the engineering mode.

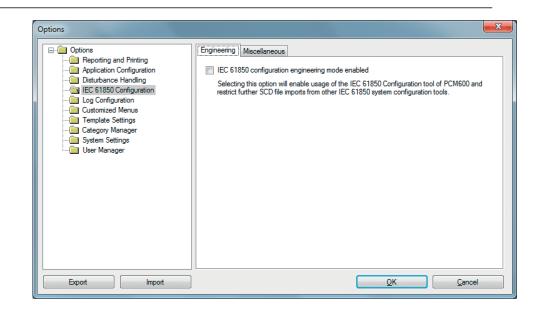


Figure 63: Switching off the engineering mode

3. In the **Plant Structure** view, right-click the substation and select **Import**.

Project Explorer		▼ ₽ ×
Plant Structure		
🖃 🔲 📔 Metsakallio		
ف رقر Substa ف	Collapse	
	Import	
	Export	
Ē 📀	Site Information Tool	
	New	•
<u></u> Ж	Cut	
	Сору	
	Delete	
	Rename	
	Properties	
		_

Figure 64: Selecting import

- 4. In the Import dialog box, locate an SCD file and click Open.
- 5. In the SCL Import Options dialog box, select how to handle the file during the import and click Import.

🙆 Import				×
🖉 🗸 🕌 🕨 Metsakallio 🕨		▼ [€] †	Search Metsakallic	۹ ر
Organize 🔻 New folder			:==	• 1 0
☆ Favorites	A Nam	ie 🔨		Date modified
🥅 Desktop	J 5	SpaZc40x		12/8/2011 4:45 PN
🚺 Downloads	S 2	SCD_IET.scd		12/8/2011 4:45 PN
💷 Recent Places	e 5	SCD_PCM.scd		12/8/2011 3:42 PN
 □ Libraries □ Documents → Music □ Pictures □ Videos 	E			
🖳 Computer				
🚢 Local Disk (C:)				
🔮 CD Drive (E:)	* 4			- F
File <u>n</u> ame:		-	Substation Configu	ration Descr 🔻
		,	<u>O</u> pen	Cancel

Figure 65: Selecting SCD file

- 5.1. Select **Don't import IEDs of unknown type** to protect the existing IEDs in case the SCD file does not match the original configuration in PCM600.
- 5.2. Select **Replace unknown IED types with generic IEC 61850 object type**, if it is known that the file includes additional IEDs that are needed. The Generic IEC 61850 IED type is used to integrate these IEDs into the plant structure.
- 5.3. Select **Ignore PCM Object Type** to update the IED object(s) in PCM600 from the IED type(s) in the SCD file, whether or not the IED type(s) in the SCD file matches the IED object(s) in PCM600.
- 5.4. Select **Ignore Substation Section** to not import the SSD file part of the SCD file
- 5.5. Click the **Preview Changes** button in the **SCL Import Options** dialog box which opens after selecting the file to preview the changes before importing SCL files (SCD, ICD, CID). The preview window shows the changes which will be made to the SCL configuration if the file is imported.



The **Import Short Addresses** selection does not affect the RIO600 configuration.

SCL Import Options
IED Types
Oon't import IEDs of unknown type
Replace unknown IED types with generic IEC 61850 object type
Ignore PCM Object Type
Import Type
Ignore Substation Section
☑ Import Short Addresses
Preview Changes
Import Cancel

Figure 66: Importing SCD file

Section 8 Using the Signal Matrix tool

8.1 Starting the Signal Matrix tool

The Signal Matrix tool is used to map signals from other IEDs to the binary and analog outputs of RIO600 and thus connect the two devices over the IEC 61850 communication link.

1. In the **Plant Structure**, right-click a device and select **Signal Matrix**.

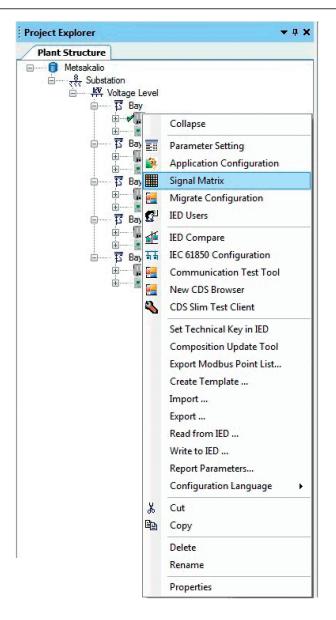


Figure 67: Selecting Signal Matrix

In a PCM600 project, the other IEDs see the RIO600 binary or analog inputs in the GOOSE tab in Signal Matrix after the system configuration.

Figure 68: Signal Matrix tool before GOOSE engineering

• The GOOSE tab is used to connect the GOOSE inputs from other relay's to the available GOOSE receive blocks during GOOSE engineering.



RIO600 supports a maximum of 40 GOOSERCV_BIN functions and a maximum of 20 GOOSERCV_MV functions.



GOOSE receive blocks are automatically created during configuration based on the number of outputs which are configurable through GOOSE. However, it is always possible to add GOOSE receive blocks in Application Configuration.



The automatic creation or removal of GOOSE receive blocks is not available during the composition update operation. The unused GOOSE receive blocks can be removed manually with Application Configuration.

Section 8 Using the Signal Matrix tool



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The GOOSERCV_BIN or GOOSERCV_MV blocks do not support output signal "Valid".

The Binary outputs tab is used to map the binary signals between the modules in the stack to support the intermodule communication.

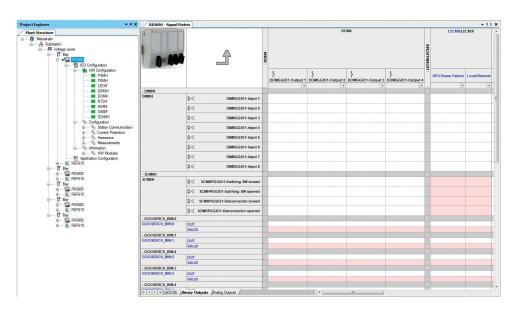


Figure 69: Signal Matrix tool before Binary Outputs Mapping

• The Analog outputs tab is used to map the signals between the analog GOOSE receive blocks and the available analog hardware channels.

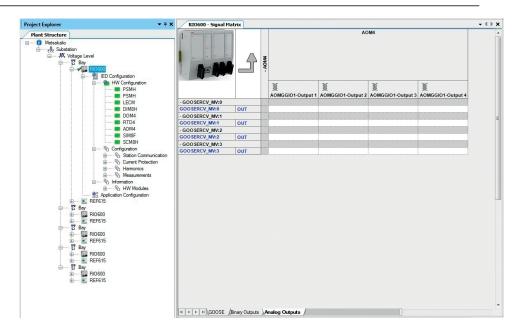


Figure 70: Signal Matrix tool before Analog Outputs Mapping

2. Make connections from the sending devices (publisher) to the receiving function blocks (subscriber).

	Logical Device :	AA1J1Q01A4, LD0			AA1J1Q01	A4, LD0			AA1J1Q01A6, LD0	AA1J1Q01A6, LD0		
		<u>-</u>		CMMXU1			VMMXU1		8	S	PCGAPC1	-
	Data Object: Data Attribute:		A.phsA cVal.mag.f	A.phsB cVal.mag.f	A.phsC cVal.mag.f	PhV.phsA cVal.mag.f	PhV.phsB	PhV.phsC cVal.mag.f		Ind1 stVal	Ind10 stVal	
- GOOSERCV_BIN:0												1
GOO SERCV_BIN:0	IN									X		
GOOSERCV_BIN:1												
GOOSERCV_BIN:1	IN										x	1
- GOO SERCY_BIN:2												
GOO SERCV_BIN:2	IN											
- GOOSERCV_BIN:3												
GOOSERCV_BIN:3	IN											
- GOO SERCY_BIN:4												
GOOSERCV_BIN:4	IN											-
- GOOSERCV_BIN:5												
GOO SERCV_BIN:5	IN											1
- GOOSERCV_MV:0												
GOOSERCV_MV:0	IN		X									
- GOOSERCV_MV:1												
GOOSERCV_MV:1	IN			X								
- GOOSERCV_MV:2												
GOOSERCV_MV:2	IN				X							
- GOO SERCV_MV:3												
GOO SERCV_MV:3	IN					x						



Making the connections with Signal Matrix



GOOSE input can be only connected to a GOOSE receive block. A direct connection between the GOOSE input and the output channel is not supported.



Multiple GOOSE received signals cannot be connected to a single GOOSE receive block. The PCM600 level validation is done for a duplicate connection.

Aodify Exi	isting Co	nnection?		- ×
<u>•</u>	he target:	IN already has an existing connection	n. Shall it be modified?	
E] Do not :	show this message again.		
			OK	Cancel
Target Cor	nnections	<u>.</u>	OK	Cancel
Target Cor Multiple Paths	nnections Visible	Source Container	OK Source Object	Cancel Inverted
Multiple		Source Container AA1J1Q01A6.LD0.SPCGAPC1.Ind1	Source Object	

Figure 72: Detecting duplicate connection

3. Make the internal connections by mapping the signals internally between the modules in the RIO600 stack.

The Binary output tab supports the following mappings.

- GOOSE receive blocks to output signals (a single GOOSE receive block can be connected to multiple outputs)
- Mappings between the hardware modules within the configured RIO600 stack (the input of one hardware module can be mapped to the output of another module)
- Multiple input mappings to a single output (enabled with the support of OR logic)



RIO600 does not support a configuration which contains the mapping of a single input from one hardware module to multiple outputs. However, this is allowed in Signal Matrix but such configuration is restricted during the common write operation.

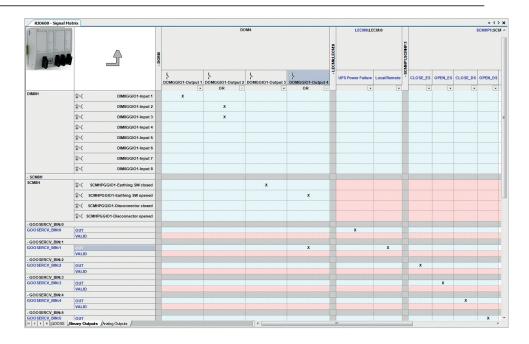


Figure 73: Making the internal connections using Signal Matrix

4. Make the connections between the analog GOOSE receive block and the configured analog output modules.

RI0600 - Signal Ma	trix						- 4	Þ	×
	2	- AOM4		DA)M4				*
			AOMGGI01-Output 1	AOMGGI01-Output 2	AOMGGI01-Output 3	AOMGGI01-Output 4			
- GOOSERCV_MV:0									
GOOSERCV_MV:0	OUT		X						
- GOOSERCV_MV:1							1		
GOOSERCV_MV:1	OUT			X					
- GOOSERCV MV:2							1		
GOOSERCV_MV:2	OUT				X				
- GOOSERCV_MV:3									
GOOSERCV_MV:3	OUT					X	1		
H 4 ▶ H)\GOOSE /E				14					Ŧ

Figure 74: Making the connections in Analog Outputs tab

5. In the **Plant Structure**, select the device, right-click and select **Write to IED**.



Data set entries appended into the existing data sets during the CUT operation are not reflected to the subscribed IEDs before the data set is resubscribed (unsubscribe and subscribe) in the IEC 61850 Engineering tool. The Signal Matrix signal mapping in the subscribed

IED is not retained for the modified data sets and re-engineering is required.

Section 9 Using the Application Configuration tool

9.1 Application Configuration tool

The Application Configuration tool is used to modify an application configuration for an IED and is based on IEC 61131-3 Function Block Diagrams.

The function blocks are dedicated to different functions.

- Control related functions
- IED configuration related functions
- Logical functions
- Communication

The basic features of Application Configuration include the ability to organize a configuration into several MainApplications as well as providing different application programming features.

- Organizing an application configuration
 - Organizing an application configuration into a number of logical parts (MainApplication)
 - Organizing a MainApplication over a number of pages
- Features for programming an application configuration
 - Inserting function blocks, making connections and creating variables
 - Including the hardware I/O channels directly to the application configuration
 - Documenting the application configuration: such as, making printouts
 - Saving application configurations as templates in an application library to reuse them in other IEDs (Function blocks and related logic can be fully or partially reused depending on the functionality available in other IEDs)
 - Validating the application configuration during the configuration process on demand and while writing the application configuration to the IED



For instructions on how to perform the different tasks in PCM600, see PCM600 online help.

Most function blocks are mapped as logical nodes according to the IEC 61850 standard. See the IEC 61850 parameter list for more information.

Other function blocks are not mapped as logical nodes; for example, logical gates.



Cycle time is represented as zero for all the function blocks.

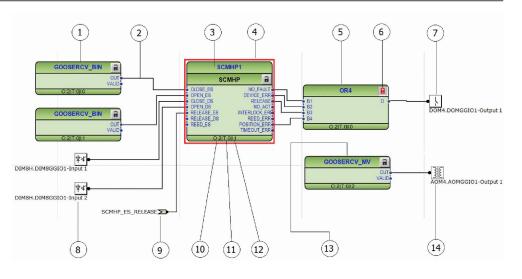


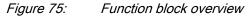
RIO600 does not support feedback loop configurations.

9.1.1 Function blocks

Function blocks are the main elements of an application configuration. They are designed for a various number of functions and organized into groups according to type. The different function block types are shown in the **Object Types** view. Function block data can be modified with the Application Configuration tool.

- User-defined names can be given for function blocks and signals.
- IEC 61850 symbol standard can be set.
- IEC or ANSI naming style can be set.
- Function blocks can be locked.
- Visibility for execution order, cycle time and instance number can be set.
- Signals can be managed.





- 1 GOOSE Receive Block for binary signals
- 2 Connections
- 3 User-defined function block name
- 4 Function block, selected (red)
- 5 OR logic function block name
- 6 Function block, locked
- 7 Hardware, binary output channel
- 8 Hardware, binary input channel
- 9 User-defined input variable
- 10 Execution order
- 11 Cycle time
- 12 Instance number
- 13 GOOSE Receive Block for analog signals
- 14 Hardware, analog input channel



RIO600 supports the OR/AND logic function block with a maximum of four inputs and a maximum of twenty instances. The NOT logic function block is also supported with a maximum of twenty instances.



RIO600 supports the Move function block MVGAPC with a maximum of 8 inputs and 8 outputs with a maximum of two instances and it has one-to-one mapping. Inputs can be given from the logic gates only.

9.1.2 Signals and signal management

Function block has a set of input and output signals. The placement of function block signals is from left to right. Input signals are placed on the left and output signals on the right. Function blocks can contain more signals than needed in that application part. Unused signals can be hidden to get a clear picture. Signals are located up and down on both sides of the middle position. When there is space left, some signals may be moved up or down for better visibility and connection routing.

9.1.3 Connections and variables

A connection is the link or "wire" between function block outputs and inputs.

There are rules and methods for making connections.

- Drag a line between two signals
- Link two signals by using variables



It is possible to search and replace variable names in Application Configuration tool.

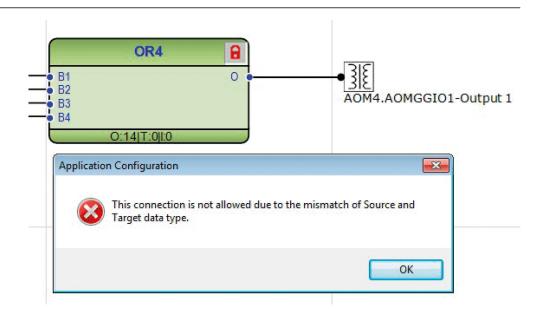


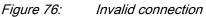
Connect the variables to a destination, for example to a function block or a hardware output channel. The connectivity package automatically removes the orphan variables which are not connected to any destination.

For more details on tool usage, see the PCM600 documentation.

Connection validation

A connection is only useful or even possible between two signals of the same base attribute type.







Except for GOOSE receive blocks, mapping single input to multiple outputs is not supported. Such configuration is restricted during Common write operation.

9.1.4 Hardware channels

Hardware channels can only be connected to a function block input or output. A hardware connection can be established with the Application Configuration tool or Signal Matrix tool.

When a hardware channel is connected, a graphical symbol appears in the Application Configuration tool. The connection is also displayed in the Signal Matrix tool with a cross mark. Hardware channels are always visible in the Signal Matrix tool.

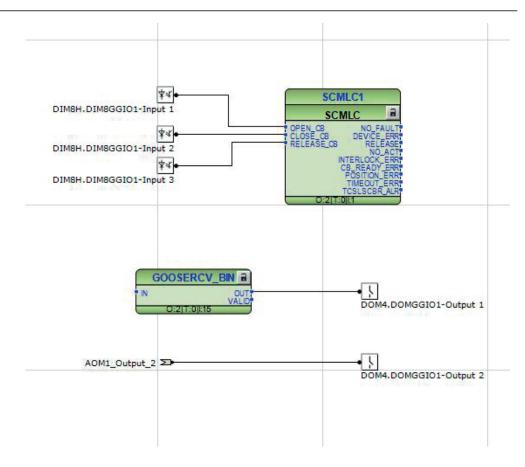


Figure 77: HW channels

There are three types of supported hardware channels.

- Binary input channels
- Binary output channels
- Analog input channels

Hardware input channel can be used as often as needed. A hardware binary output channel is taken from the list of available channels when a new channel is requested. This prevents using the same hardware binary output channel twice.

9.1.5 Validation

Validation checks the application configuration for errors based on the rules that govern the creation of the application at three different times.

- During the logic creation, while making a connection or placing a function block
- On demand by starting the validation
- When writing the application configuration to the IED

9.1.5.1 Validation when creating an application configuration

Validation is made when creating the application configuration.

- A connection between two input or two output signals is not possible.
- A connection between two different data types is not possible: for example, from a binary output to an analog input.

9.1.5.2 Validation on demand

The validity of an application configuration can be checked by clicking **Validate Configuration** on the toolbar. The Application Configuration tool checks the application configuration for formal correctness. The found problems are divided into warnings and errors.

- Warnings, marked with a yellow warning icon
 - Example: a variable connected to an output signal that is not connected
 - Example: if an output from a user connects an output from a higher execution order function is connected to inputs of lower execution order function
- Errors, marked with a red circle with a cross
 - Example: unconnected hardware output

Warnings do not prevent writing to the IED. However, errors must be corrected before writing the application configuration to the IED. The application configuration can be saved and the Application Configuration tool can be closed with open errors, but the application configuration cannot be written to the IED.

These problems are listed in the **Output** pane under the **Application Configuration** tab. Double-clicking the error or warning row navigates to the **MainApplication**/ **Page/Area**, where the problem was identified.

Section 9 Using the Application Configuration tool

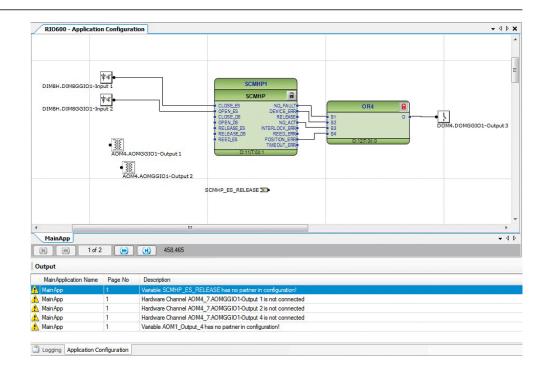


Figure 78: Validation on demand

9.1.5.3 Validation when writing to the IED

When writing the application configuration to the IED, an automatic validation is performed. The validation is the same as the one demanded manually.

9.2 Starting the Application Configuration tool

1. In the **Plant Structure**, right-click a device and select **Application Configuration**.

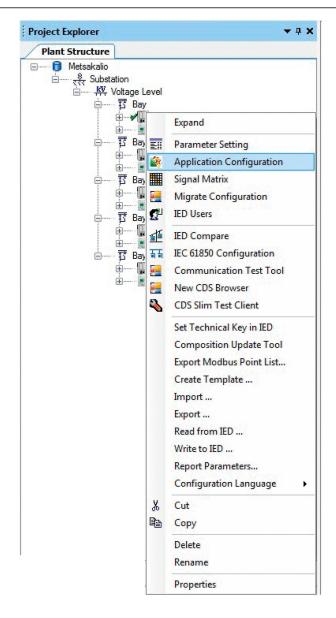


Figure 79: Selecting Application Configuration

 Instantiate function blocks in Application Configuration after the IED configuration has been completed in PCM600. Binary and analog GOOSE receive blocks are automatically instantiated in Application Configuration based on the configurable outputs through GOOSE.

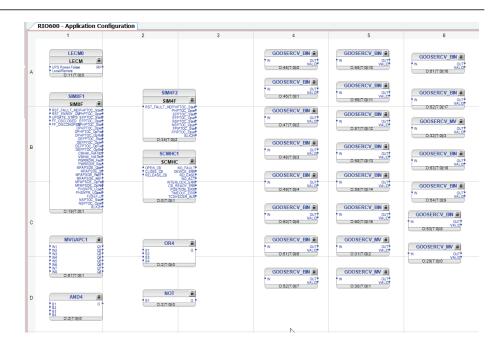


Figure 80: A basic

A basic configuration opened in Application Configuration



The creation or deleting of GOOSE receive blocks during the composition update, based on the available stack, is not supported.



The SIM8F blocks in Application Configuration have the input and output signals of the latest version even if the stack contains older SIM8F versions. When configuring, consider the signals which are not supported in an older version as nonfunctional.

Section 10 Using the IED Users Management tool

10.1 Managing IED users

The IED Users Management tool is used to configure new password in IED so that only authenticated users can perform read or write operation on the IED.

1. In the Plant Structure, right-click a device and select IED Users.

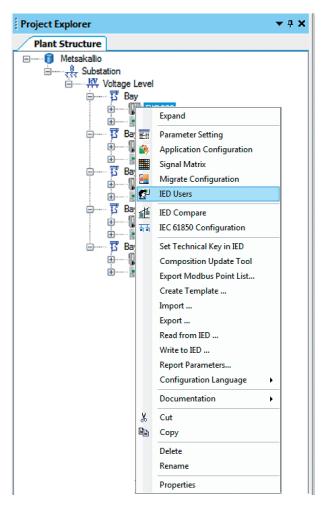


Figure 81: Selecting IED Users

2. Click Change Password to change the password.

Section 10 Using the IED Users Management tool

RI	0600 - IED Users
Gener	a
Ger	neral Settings
C	lick to restore factory settings. This function will overwrite all existing settings. Restore factory settings
c	lick to delete persisted IED login credentials. Delete credentials
(Change IED password policies Change Password Policies
	Change own IED password Change Own Password
I	ED supports password protection. <u>Change Password</u>

Figure 82: IED Users options

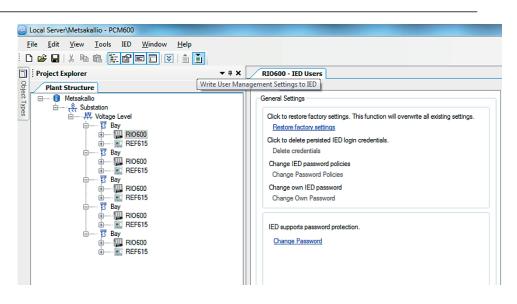
- 3. Enter the password.
- 4. Click **OK** to save or **Cancel** to discard the changes.

R Change Password
Change Password
New password

Retype new password
•••••
OK Cancel



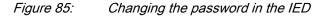
5. Click the **Write User Management Settings to IED** button to write the password to the IED.



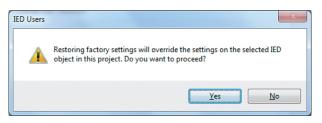


6. Click **Yes** to confirm the password change.

IED Users	×
<u>^</u>	Do you want to write the current settings to RIO600?
	<u>Y</u> es <u>N</u> o



- 7. Click **Restore Factory Settings** to restore the default password.
- 8. Click **Yes** to update the settings with the default settings.





Restoring the default password



It is advisable to change the default "ADMINISTRATOR" password immediately after the configuration.



RIO600 supports only one user credential for "ADMINISTRATOR".

Section 11 IED Configuration Migration (ICM)

11.1 Starting IED Configuration Migration

The IED Configuration Migration tool is used to update a lower RIO600 version IED configuration to a higher version.

1. In the **Plant Structure**, right-click the device and select **Migrate Configuration**.



The Migrate Configuration option is visible only if the IED is configured in an older version.

Section 11 IED Configuration Migration (ICM)

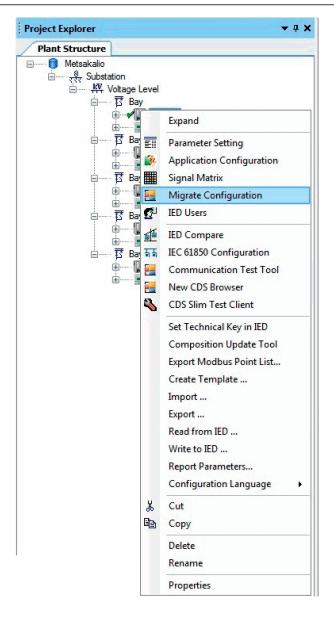


Figure 87: Selecting Migrate Configuration

The Migrate Configuration dialog box opens.

RIO600 - Migrate Configuration	and the second	X
	IED configuration can be migrated from 1.7 to any of the below given V Please select one of the version and click on continue to proceed. 1.8 Remark: Undo functionality is not supported for configuration migration. configuration backup will be created and stored under folder path CLPCMDataBasesIPCMBackup	
	Continue	Cancel

Figure 88: Migrating configuration

2. In the **Migrate Configuration** dialog box, select any of the available higher versions and click **Continue**.

RIO600 - Migrate Configuration	
	IED configuration can be migrated from 1.7 to any of the below given Versions. Please select one of the version and click on continue to proceed. Remark: Undo functionality is not supported for configuration migration. Old configuration backup will be created and stored under folder path CLPCMDataBasesIPCMBackup
	Continue

Figure 89: Selecting the IED version

3. In the **IED Configuration Migration Details** dialog box, click **Next** to proceed. Information about the functions and hardware module, which can be replaced in the migration process, is available in the **IED Configuration Migration Details** dialog box.



Version changes shown in the **IED Configuration Migration Details** dialog box do not represent the actual hardware module versions but the function block revisions.

4. In the **IED Configuration Migration** dialog box, wait until all the steps are completed and click **Finish**.

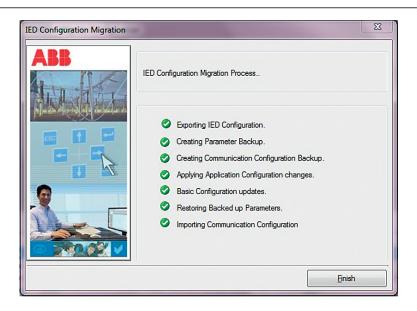


Figure 90: Viewing the IED Configuration Migration progress

5. Click **Finish** to complete the migration process.

IED Configuration Migration	
ABB	IED Configuration Migration Process
	IED Configuration Migration completed successfully.
	Show IED Configuration Migration Report.
	Enish

Figure 91: IED Configuration Migration complete

6. Report for migration of configuration is shown after the migration process.

RIO600 - Repo	orting and Printing - Viewer		• 4 Þ x
ED Configuration M	Aigration Report		
			-
			E
	Report for migration of config	uration from version 1.7 to 1.8 for RIO600.	
		Index	
		Worksheet Migration Summary	
		IED Basic Functionality Migration Details	
		Hardware Configuration Migration Details	
		Configuration Migration Details	
		SCL Information Migration Details	
		Graphical display editor association with Function block/Signal(s) Migration Details	
		Ethernet Configuration Migration Details	
			-



-

IED Configuration Migration report



Move the overlapping SIM8F function blocks (if any) in Application Configuration after IED migration from version 1.5 to 1.8 or newer.

Section 12 Common Read/Write (CRW)

12.1 Starting Read/Write

The Common Read/Write pane is used for both reading from the IED and writing to the IED.

1. In the **Plant Structure**, right-click the device and select **Read from IED** or **Write to IED**.

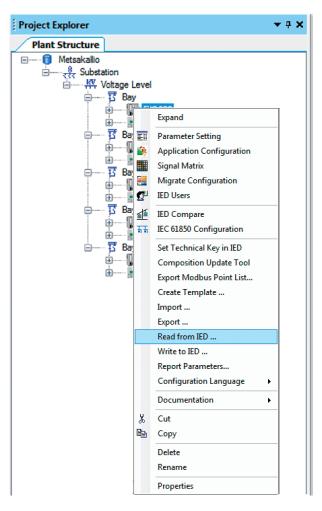


Figure 93: Reading configuration from the IED

The **Common Read/Write** pane is added to the tool. 2. In the **Read/Write** dialog box, click **Yes** to proceed.

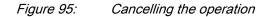
Section 12 Common Read/Write (CRW)

Common Read/Write	
Delete Read Write IED Status Comment Project Explorer Plant Structure Metsakalio Ky Votage Level Ky Votage Level	Read/Write Are you sure you want to read data from the following IED? Substation > Voltage Level > Bay > RIO600 IP: 192.168.210 Press YES, if you are. Otherwise, press NO and check your communication parameters.
● 話 Bay ● 話 Bay ● 話 Bay ● 話 Bay ● 話 Bay	Reading from the wrong IED might lead to loss of data!

Figure 94: Confirming the read operation

• Click **No** to cancel the read or write operation.

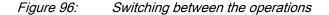
Common Read/Write					
Delete	Read	Write	IED	Status	Comment
\mathbf{X}	V		RIO600		Cancelled



•

To switch between the read and write operations, use the check boxes in the **Common Read/Write** pane.

Common Read/Write						
Delete	Read	Write	IED	Status	Comment	
×		V	RIO600		Cancelled	



 To restart the read or write operation, click in the Common Read/ Write pane. If the technical keys in both the IED and PCM600 match, the writing operation begins. The status progress bar and the comment fields show the progress.

If the communication settings of the IED do not match with the communication settings of the Parameter Setting tool, the IED Write dialog box opens.

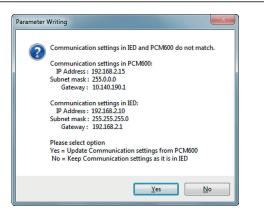


Figure 97: Mismatch between the communication settings of the IED and Parameter Setting

If there is no GOOSE engineering in the IED, for example, because of a missing configuration, the IED Write dialog box opens.

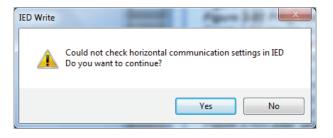


Figure 98: Failing to check IED's GOOSE settings

If the IEC 61850 SCL editions of the IED and PCM600 differ, the Error dialog box opens during the common read and write operations.

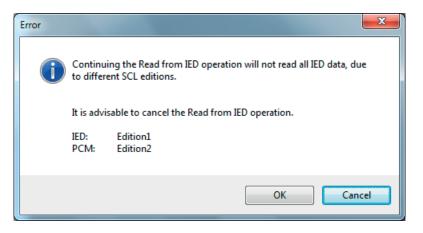


Figure 99: Difference in SCL versions during the common read operation

Warning: D	Different IED SCL Edition
	Continuing the Write to IED operation will change the SCL Edition of the IED. However, changing IED SCL Edition might prohibit IED use in other PCM projects.
	It is adviceable to cancel the Write to IED operation.
	IED: Edition1 PCM: Edition2
	Do you want to continue?
	OK Cancel

Figure 100: Difference in SCL versions during the common write operation

If the RIO600 stack contains two SIM8F/SIM4F modules at the maximum and is configured with GOOSE, the Question dialog box opens if the *GCB Mintime* and *Maxtime* settings are not within the suggested limits.

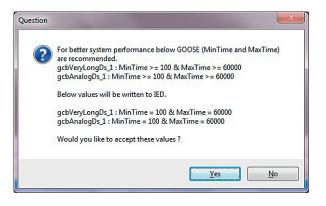


Figure 101: Failing to check the IED's GCB settings with two SIM8F/SIM4F modules at the maximum

If the RIO600 stack contains more than two SIM8F/SIM4F modules and is configured with GOOSE, the Question dialog box opens if the *GCB Mintime* and *Maxtime* settings are not within the suggested limits.

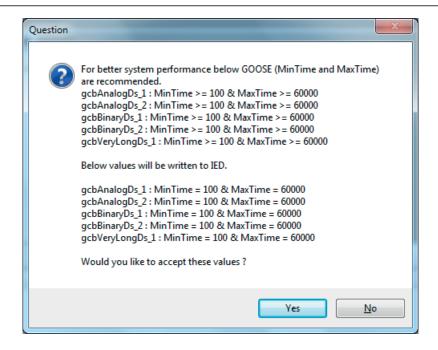


Figure 102:

Failing to check the IED's GCB settings with more than two SIM8F/ SIM4F modules



If the RIO600 stack consists of more than two SIM8F/SIM4F modules, the preferred *GCB Mintime* and *Maxtime* settings are set to all GOOSE control blocks in the IED object.



The accepted values of *GCB Mintime* and *Maxtime* are updated in PCM600 only after a common read operation.

If the GOOSE configuration in the IED does not match with the GOOSE configuration in PCM600, the IED Write dialog box opens. The GOOSE option should either be selected to write the GOOSE configuration in PCM600 to IED or cleared to keep the GOOSE configuration as it is in the IED.

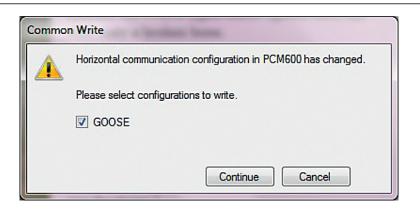


Figure 103: Mismatch between the GOOSE settings of the IED and PCM600

If any of the module firmware revisions in PCM600 do not match with the actual hardware modules in the stack, a mismatch dialog box opens. It provides position information of the firmware revision that does not match between PCM600 and RIO600 stack. A composition update is needed to proceed further.

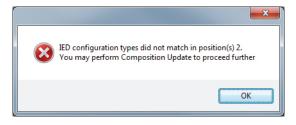


Figure 104: Revision mismatch dialog box

The IED reboots after all the required data is written to the IED. The procedure is the same when reading data from the IED, except that the IED should not be restarted in between operation.

The new installation parameter is not written during the common write operation.

The common write operation is cancelled under certain circumstances.

- If any structured data set entry is added
- If any single input is mapped to multiple outputs in Signal Matrix apart from the GOOSE receiver blocks
- If RIO600 subscribed to more than five GOOSE control blocks

Section 13 Using the Composition Update tool

The RIO600 composition is defined by the configuration wizard at the time the device is inserted to the project. Later the composition of an existing IED can be modified with CUT, for example, when removing or adding new modules to RIO600.

13.1 Configuring the device offline

1. In the **Plant Structure**, right-click RIO600 and select **Composition Update Tool**.

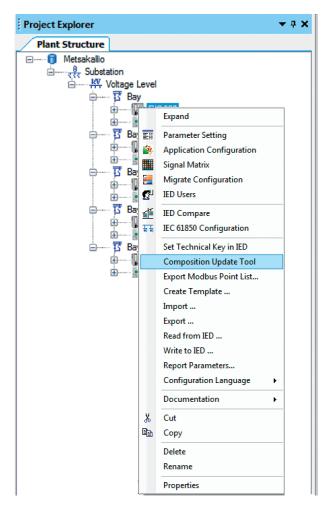


Figure 105:

Selecting the Composition Update Tool

- The **Composition update mode selection page** dialog box opens.
- 2. Under **Composition update mode selection**, select **Offline update** to configure the IED in offline mode and click **Next**.

RIO600 - Composition update mode selection page
RIO600 - Composition Update Wizard Composition update mode selection page
This wizard helps you to update configuration for your IED. The update can be made either online or offline.
Composition update mode selection
Online update
Offline update
Cancel Next >

Figure 106: Selecting offline update in Composite Update tool

The **Composition selection page** dialog box opens and shows the existing configuration of the selected IED.

3. In the **Composition selection page** dialog box, add or remove modules or update the existing ones and click **Next** to navigate to the **Application Type selection page**.

Composition selection page						
Composition selection						
	Module type		Hardware type		Module version	
Power supply 1	PSM	•	High voltage	•	Not applicable	*
Power supply 2	PSM	•	High voltage	•	Not applicable	*
Communication module	LECM	•	Electrical	•	G	*
Position 1	SIM8F	•	Sensor input	*	A	Ŧ
Position 2	SIM4F	•	Sensor input	•	A	-
Position 3	SCM	•	High voltage	•	A	
Position 4	DIM8	•	High voltage	•	A	*
Position 5	DOM	•	Contact	*	A	*
Position 6	AOM	•	mA out	*	A	*
Position 7	Not configured	•	Not configured	*	Not configured	*
Position 8	Not configured	•	Not configured	•	Not configured	*
Position 9	Not configured	•	Not configured	•	Not configured	*
Position 10	Not configured	•	Not configured	•	Not configured	-
Number of configured cha	nnel(s): 40					

Figure 107: Modifying the current configuration



GOOSE re-engineering is required if a module is removed from the stack.

4. In the **Application Type selection page** dialog box, update the application types of the SCM modules, if required, and click **Next** to go to the IEC 61850 **Version Selection Page**.

RIO600 - Application	Type selection page		
Application Type s		zard	
Application Type Se	lection		
Position	Module Type	Hardware Type	Application Type
6	SCM	High voltage	3 Position Switch 👻
		Cancel	Back Next >

Figure 108: Se

Selecting application types of the SCM modules



The **Application Type selection page** dialog box opens only, if at least one SCM module has been selected in the **Composition selection page**.

5. In the Version Selection Page dialog box, click Next.

10600 - Version Selection	
RIO600 - Composition Up Version Selection Page	date Wizard
Note SCL Edition and click the 'N	lext' button to generate the configuration.
IEC 61850 protocol edition	Edition 1 👻
	Cancel < Back Next >

Figure 109: Selecting the IEC 61850 protocol edition

The **Composition Update Tool** dialog box opens with a message about the changes in the composition configuration.

- 6. In the **Composition Update Tool** dialog box, select one of the alternatives.
 - Click **No** to abort the operation.
 - Click **Yes** to generate the functions.

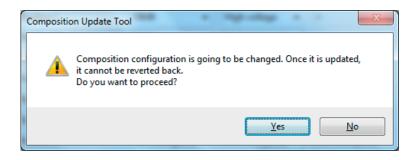
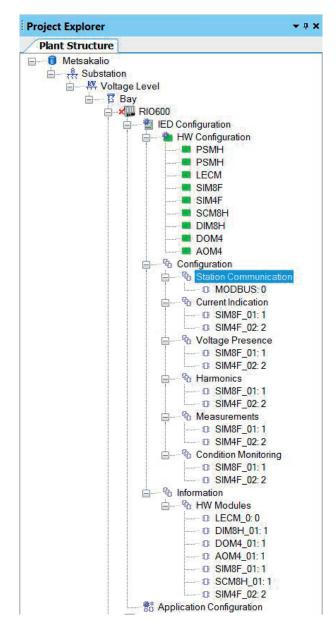


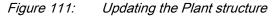
Figure 110: Detecting change in composition configuration

A progress bar is provided to show the status of the function generation. The **Setup complete page** is shown when the composition update is completed.

- 7. In the Setup complete dialog box, click Finish.
- 8. In the **Set Technical Key** dialog box, click **OK** to close the configuration update wizard.

The **Plant Structure** is updated according to the hardware configuration. The available power supply modules in the RIO600 stack are represented as **PSMH/L** in **Plant Structure** under the **HW Configuration** node. Only the modules available under the **HW Configuration** represent the physical stack.





The module instances are created based on the module type.

Default data sets for the new modules are not created if the maximum supported number of data sets has been reached. The changes made to the default data sets are not retained on addition of modules to the stack. Data set entries appended into the existing data sets during the Composition Update Tool operation are not reflected to the subscribed IEDs before the data set is resubscribed (unsubscribed and subscribed) in the IEC 61850 Engineering tool. The Signal Matrix signal mapping in the subscribed IED is not retained for the modified data sets and re-engineering is required. The default data sets created for a stack with more than two SIM8F/SIM4F modules contain only the data entries of first two SIM8F/SIM4F module instances.



During the offline configuration, some modules, such as DOM4, AOM4 or SIM8F, are created with the latest module versions. However, during commissioning, the versions can be updated using the online composition update tool. In online configuration, the configuration is generated based on the available versions of the modules in the physical stack.

13.2 Configuring the device online

- 1. In the **Plant Structure**, right-click RIO600 and select **Composition Update Tool**.
 - The Composition update mode selection page dialog box opens.
- 2. Under **Composition update mode selection**, select **Online update** to configure the IED in online mode and click **Next**.

Section 13 Using the Composition Update tool

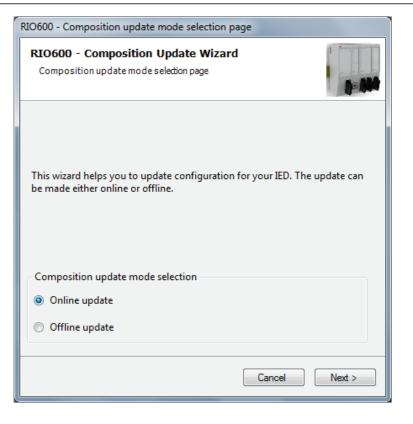


Figure 112: Selecting online update in Composite Update tool

The **Composition detection page** dialog box opens and the hardware configuration is read from the device.



GOOSE re-engineering is required if a module is removed from the stack.

3. In the **Composition detection page** dialog box, wait until the hardware configuration is read from the device and click **Next** to navigate to the **Application Type selection page**.

RIO600 - Composition detec	tion page		
RIO600 - Composition Composition detection page			
- Composition selection			
	Module type	Hardware type	Module version
Power supply 1	-	-	-
Power supply 2	-	-	-
Communication module	-	-	
Position 1	-	-	-
Position Please wait	C A	222222	-
Position :			
Position (
Position 5		Ŧ	-
Position 6	-	-	-
Position 7	-	-	-
Position 8	-	-	-
Position 9	-	-	
Position 10	-	-	
Number of configured cha	nnel(s): 0		
		Cancel < Bac	k Next >

Figure 113: Viewing the composition scan

Section 13 Using the Composition Update tool

RIO600 - Composition detec	tion page					
RIO600 - Composition Update Wizard Composition detection page						
Composition selection						
	Module type		Hardware type		Software version	n
Power supply 1	PSM	-	High voltage	-	Not applicable	-
Power supply 2	PSM	-	High voltage	-	Not applicable	-
Communication module	LECM	-	Electrical	-	F	-
Position 1	DIM8	-	High voltage	-	A	-
Position 2	DOM	-	Contact	-	A	-
Position 3	RTD	-	RTD/mA in	-	Α	-
Position 4	AOM	-	mA out	-	A	-
Position 5	SIM8F	-	Sensor input	-	A	-
Position 6	SCM	-	Low Voltage	-	Α	-
Position 7	Not configured	-	Not configured	-	Not configured	-
Position 8	Not configured	-	Not configured	-	Not configured	-
Position 9	Not configured	-	Not configured	-	Not configured	-
Position 10	Not configured	-	Not configured	-	Not configured	-
Number of configured cha	nnel(s): 36					
			Cancel	< Bac	k Next >	

Figure 114: Viewing the current configuration in online mode

4. In **Application Type selection page** dialog box, configure the application types of all the SCM modules in the stack.

RIO600 - Application T	ype selection page			
Application Type se	RIO600 - Composition Update Wizard Application Type selection page			
- Application Type Sele	ection			
Position	Module Type	Hardware Type	Application Type	
6	SCM	Low Voltage	3 Position Switch 🔹	
		Cancel	Back Next >	

Figure 115: Selecting application types of the SCM modules

RIO600 - Version Selection	
RIO600 - Composition Update Wizard Version Selection Page	
Note SCL Edition and click the 'Next' button to generate the configuration.	
IEC 61850 protocol edition Edition 1	
Cancel < Back N	ext >

Figure 116: Viewing the IEC 61850 protocol edition

- 4.1. Click Next to navigate to the IEC61850 Version Selection Page.
- 4.2. Click Yes to confirm the function generation and wait until the composition has been updated. The Setup complete page dialog box is shown when the generation has been successfully completed.



Application Type selection page is shown to the user only, if the **Composition detection page** contains at least one SCM module.

5. In the Setup complete dialog box, click Finish.

IO600 - Composition L tetup complete	Jpdate Wizard	
Setup is complete. The cor	nfiguration that is made for the selected IED is	
IED type	RIO600	
Communication module	1.8	
IP address of IED	192.168.2.10	
Summary	Power supply : Double Communication module : LECM Digital input module(s) : 1 Configured digital input channel(s) : 8 Digital output module(s) : 1 Configured digital output channel(s) : 4 RTD module(s) : 1 Configured RTD/mA input channel(s) : 4 Analog output module(s) : 1 Configured mA output channel(s) : 4	
	Fini	sh

Figure 117: Viewing the updated summary page in online mode

The **Plant Structure** is updated according to the hardware configuration and the summary of the configuration wizard selections is displayed. Click **Finish** to close the configuration wizard setup and the **Plant Structure** is updated for the selected IED.

The available power supply modules in the RIO600 stack are represented as **PSMH/L** in **Plant Structure** under the **HW Configuration** node. Only the modules available under **HW Configuration** represent the physical stack.

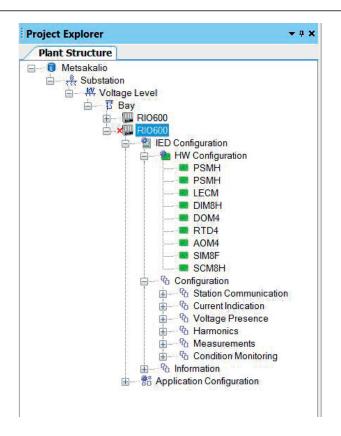


Figure 118: Viewing the updated Plant Structure

The module instances are created based on the module type.

Default data sets for the new modules are not created if the maximum supported number of data sets is reached. The changes made to the default data sets are not retained on addition of modules to the stack. Data set entries appended into the existing data sets during the Composition Update Tool operation are not reflected to the subscribed IEDs before the data set is resubscribed (unsubscribed and subscribed) in the IEC 61850 Engineering tool. The Signal Matrix signal mapping in the subscribed IED is not retained for the modified data sets and re-engineering is required. The default data sets created for a stack with more than two SIM8F/SIM4F modules contain only the data entries of first two SIM8F/SIM4F module instances.

Section 14 Using Export Modbus Point List

14.1 Exporting Modbus Point List

The Modbus data points of the configured RIO600 stack can be exported and saved either as a PDF or a CSV report.

For more information on the Modbus functionality and point list, see the installation and commissioning manual.

1. In the **Plant Structure**, right-click a device and select **Export Modbus Point** List.

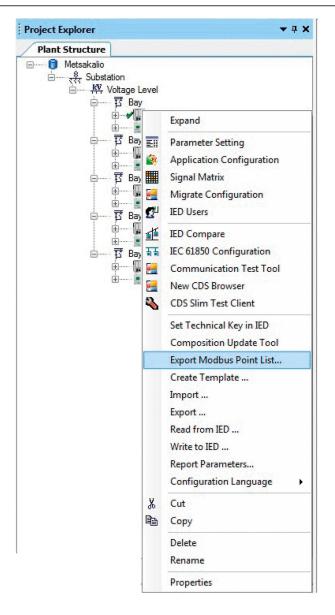


Figure 119: Selecting Export Modbus Point List

- 2. Generate the Modbus Point List in one of the alternative formats.
 - PDF Report
 - CSV Report

The report is generated based on the RIO600 stack and displayed in PCM600. Regardless of the Modbus format, the point list report contains the details of the configured stack with the corresponding position and Modbus data points for signals/ channels.

	nd Printing - Viewer		- √
600 Modbus Point List			
	Available	Modules List	
	Position	Module Name	
		LD0.PSMHGGIO1	
	0	LD0.LLN0	
	1	LD0.DIM8GGIO1	
	2	LD0.DOMGGI01	
	3	LD0.RTDGGIO1	
	4	LD0.SIM8FGGIO1	

Figure 120: Modbus Point List in the PDF format



The position information for power supply modules is not in the report. The position index always starts from 0 and is fixed for LLN0, that is, LECM communication module.

Modbus data points for the available modules are categorized into different tables.

- 0X Mappings
- 1X Mappings
- 3X Mappings
- 4X Mappings

For more information on the Modbus standard data types, see the installation and commissioning manual.

	0)	(Mappings		
Position	Module Name	Modbus Address	Signal Name	Description
2	LD0.DOMGGIO1	256	LD0.DOMGGIO1.SPCSO1.stVa	Output channel 1
2	LD0.DOMGGIO1	257	LD0.DOMGGIO1.SPCSO2.stVa	Output channel 2
2	LD0.DOMGGIO1	258	LD0.DOMGGIO1.SPCSO3.stVa	Output channel 3
2	LD0.DOMGGI01	259	LD0.DOMGGIO1.SPCSO4.stVa I	Output channel 4
4	LD0.SIM8FGGIO1	576	RST_FAULT_IND	Reset Fault Indicator
4	LD0.SIM8FGGIO1	577	RST_ENRGY_CNT	Reset Energy Counter
4	LD0.SIM8FGGIO1	578	UPDATE_STATS	Update Statistics

Figure 121: OX Mapping in the PDF format

All the 0X Modbus addresses are provided under the 0X Mappings table with the position of the module, module name, Modbus address, signal name and signal description. The other standard data type addresses are also provided in the respective tables.

14.1.1 Generating PDF reports

- 1. In the Select Report Type dialog box, select PDF Report from the File Type list.
- 2. Click **OK** to generate the report in PDF format.
 - Click **Cancel** or **Close** button to cancel the operation.

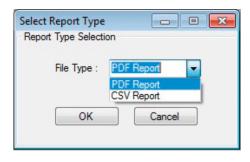


Figure 122: Selecting report type

3. To save the generated PDF Modbus Point List report, select **Save** on the toolbar.

🔤 Loca	l Serve	er\rere - P	CM600			
File	Edit	View	Report	Tools	Window	Help
i 🖨 C) 🖻	🖬 %	t i	R 🗗		3

Figure 123: Saving the PDF report

4. To print and generate the PDF Modbus Point List, select **Print** on the toolbar.

🔤 Local Serve	er\rere - P	CM600			
File Edit	View	Report	Tools	Window	Help
Elocal Serve File Edit	B %	e e	<u></u>		3

Figure 124: Printing the PDF report

5. To navigate between the available pages in the Modbus Point List report, use the options available on the **Report** menu.

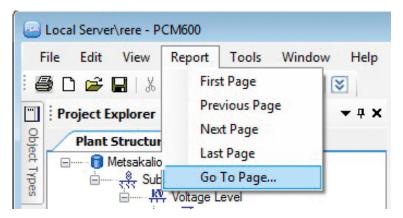


Figure 125: Navigating between the pages

14.1.2 Generating CSV reports

- 1. In the Select Report Type dialog box, select CSV Report from the File Type list.
- 2. Click **OK** to save the report in CSV format.

Select Report Type	
Report Type Select	ion
File Type :	CSV Report 👻
ОК	Cancel

Figure 126: Selecting the report type

- 3. In the Save as dialog box, select the file destination and click Save.
 - Click **Cancel** to cancel the operation.

After the save operation, the file destination is provided in the Output pane in PCM600. The message includes the technical key information of the IED.

Save As		
Coover De Libra	aries > Documents >	← 4 Search Documents P
Organize 🔻 New	folder	}
🥽 Libraries	Documents library	Arrange by: Folder 🔻
Documents	Name SAP	Date modified Type Si ▲ 23-00-2014 PM 0 Het folder
Pictures Videos	SavedChats	10-10-2012 PM 0 File folder 02-05-2014 PM 0 File folder
🖳 Computer	SharePoint Drafts Visual Studio 2008	10-02-2014 PM 1 File folder 29-04-2015 PM 0 File folder
Local Disk (C:)	Visual Studio 2010 VIC	05-05-2015 PM 0 File folder
👊 Network	WinCHM for Word	17-07-2012 AM 0 File folder +
	Modbus Report	•
Save as type:	CSV Files (*.csv)	
Hide Folders		Save Cancel

Figure 127: Saving the CSV report

Output				▼ #>
Date and Time	Category	User	Object	Message
06-05-2015 .453 PM 6:25:51	Message	[local]\abb - System	System	Project opened: IN-L-KBXI012732\/PCMSERVER\vere
106-05-2015 .340 PM 7:35:28	Message	locall\abb - System	System	CSV Report Generated Successfully (AA1J1Q01A4); C:\Users\INPHK\Documents\Modbus Report.csv

Figure 128: Information in the Output pane

Section 15 Using Export Configuration Files

15.1 Exporting Configuration Files

The configuration files for the RIO600 stack configured in PCM600 can be exported and saved in the local workstation. All the information related to configuration, parameters and application configuration layout can be exported to a ZIP file.

The final configuration ZIP file contains a number of XML files.

- RioConf.xml contains IEC 61850 information and signal mappings in Application Configuration and Signal Matrix
- IOParams.xml contains the parameter settings
- RIO_ACTLayout.xml contains the application configuration layout changes

The common write operation is used to export the configuration files. The Export Configuration Files option in the RIO600 tools menu is used to enable or disable the export operation. By default, the Export Configuration Files selection is cleared.

1. In the **Plant Structure**, right-click a device and select **Export Configuration Files**.

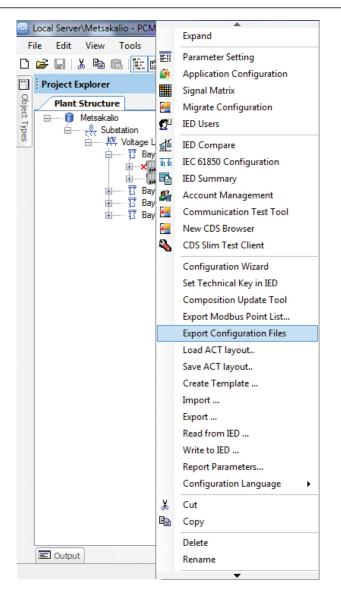


Figure 129: Selecting Export Configuration Files

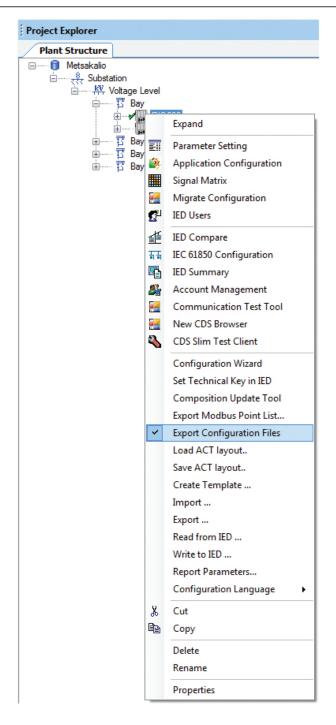


Figure 130: Enabling Export Configuration Files

Selecting **Export Configuration Files** enables the check box. The common write operation can export the configuration files to a local work station only if the **Export configuration Files** option is checked.

2. Click Write to IED to start the write operation.

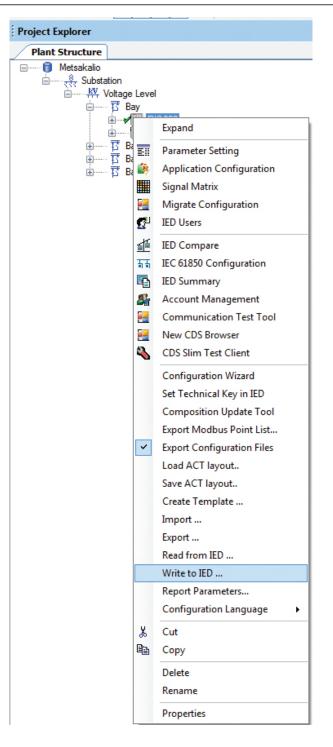


Figure 131: Selecting Write to IED

3. Click **Yes** to continue.

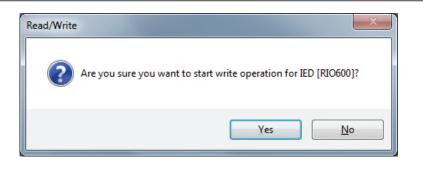


Figure 132: Starting the write operation

4. In the **Browse for Folder** dialog box, select a destination directory to save the configuration ZIP file and click **OK**.

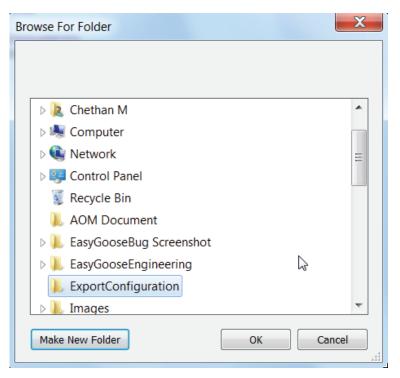


Figure 133: Selecting destination directory

After a successful write operation, all the configuration files are available in a ZIP file in the selected destination directory. The exported configuration file path is provided in the PCM600 Output message pane.

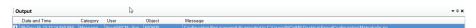


Figure 134: Exporting configuration successfully

The final folder structure is Destination directory\PCM600 Project name.zip.



Keep a local copy as a backup of the configuration written to the IED.

Section 16 GOOSE engineering

RIO600 exchanges data between IEDs by using GOOSE service over the IEC 61850 station bus. The IEC 61850 GOOSE is configured with the IEC 61850 Configuration tool in PCM600. When the published data is defined in the IEC 61850 Configuration tool, RIO600 sends it to the other IEDs and subscribes the data that the other IED sends.

16.1 Creating GOOSE data sets

The RIO600 connectivity package provides automatically the default GOOSE data sets. The connectivity package collects all the available inputs and module health data to these data sets. They can be directly taken into use in PCM600's IEC 61850 tool by creating a GOOSE control block and linking the available data set to it. If the user wants to create their own data sets, it is recommended to delete the existing ones and create a new one.



RIO600 supports a maximum of seven data sets in the application.

There are default data sets based on modules.

- One data set per each DIM8 H/L module
- One data set per two RTD modules
- One data set per all DOM/AOM modules
- One data set per each SIM8F/SIM4F module's analog data
- One data set per two SIM8F/SIM4F module's binary data
- One data set per two SIM8F/SIM4F module's very long data (Metering statistics)
- One data set per each SCM H/L module
- 1. In the **Plant Structure**, right-click **Substation** and select **IEC 61850 Configuration**.

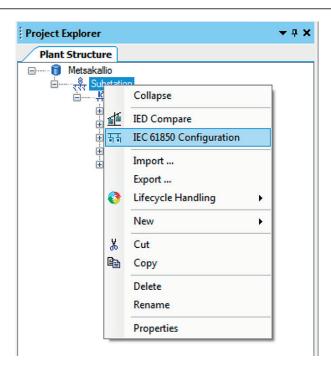
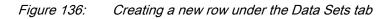


Figure 135: Selecting the IEC 61850 Configuration

- 2. Click the IED node to select a publisher IED.
- 3. To add a new data set, right-click on the area containing the data set names and select **New**.

G005	G00SE Communication - IEC 61850 Configuration											×	
	1	AA1J1Q01A2 (LD0)	AA1J1Q02A2 (LD0)	AA1J1Q03A2 (LD0)	AA1J1Q04A2 (LD0)	AA1J1Q05A2 (LD0)	RIO_1 (LD0)	RIO_2 (LD0)	RIO_3 (LD0)	RIO_4 (LD0)	RIO_5 (LD0)		
RIO_1.LD													
RIO_1.LD	0.LD0.LLN0.BinaryDS												
RIO_1.LD	0.LD0.LLN0.BinaryDS_1												
RIO_1.LD	0.LD0.LLN0.HealthDS												
	Details	Ct	rl + .	Alt +	т								
	New	Ct	rl + .	Alt +	N								
	Copy Cr Cut	_	new										
	Paste	Ctrl + V											
	Delete	De	el										
	Send to All												
L	Send to None	_	_	_	_								
Data Sets	GOOSE Controls Inp	uts											
Substation	n.Voltage Level.Bay.RIO_1	L											



4. In the **Create New Data Set** dialog box, define a data set name and click **OK**. A row representing the new data set is created under the **Data Sets** tab.

Create New Data Set	
 AA1J1Q01A2 AA1J1Q02A2 AA1J1Q03A2 AA1J1Q05A2 AA1J1Q05A2 AA1D1Q05A2 AA1D1Q05A2 AA1D1Q05A2 AA1D1Q05A2 RIO_1 AP LD0 LD LD0 LN LLN0 RIO_2 RIO_3 AIO_4 	Name dsRIO1
Substation.Voltage Level.Bay.RIO_1.LD0.	LD0.LLN0
	OK Cancel

Figure 137: Creating a new data set

GOOSE Communication - IEC 61850 Configuration											
4	GLD)	GLD (LD	GLD :	GLD S	GLD (LD						
	01A2	02A3	03A2	04A2	05A2	(OQ)	(DO)	(OQ)	(OQ)	(OQ)	
	AA1J1Q01A2 (LD0)	AA1J1Q02A2 (LD0)	AA1J1Q03A2 (LD0)	AA1J1Q04A2 (LD0)	AA1J1Q05A2 (LD0)	RIO_1 (LD0)	RIO_2 (LD0)	0_3(0_4(RIO_5 (LD0)	
	A	A	A	A	A	ž	ž	ž	ž	ž	
RIO_1.LD0.LD0.LLN0.AnalogDS											
RIO_1.LD0.LD0.LLN0.BinaryDS											
RIO_1.LD0.LD0.LLN0.BinaryDS_1											
RIO_1.LD0.LD0.LLN0.dsRIO1											
RIO_1.LD0.LD0.LLN0.HealthDS											

Figure 138: Creating a new row under Data Sets tab

16.1.1 Defining data attributes

- 1. Select the **Data Sets** tab on the editor pane.
- 2. Right-click a GOOSE data set and select **Details**.

GOOSE Communication - IEC	gura	tion					•	4 ⊳ ×			
	AA1J1Q01A2 (LD0)	AA1J1Q02A2 (LD0)	AA1J1Q03A2 (LD0)	AA1J1Q04A2 (LD0)	AA1J1Q05A2 (LD0)	RIO_1 (LD0)	RIO_2 (LD0)	RIO_3 (LD0)	RIO_4 (LD0)	RIO_5 (LD0)	
RIO_1.LD0.LD0.LLN0.AnalogDS											
RIO_1.LD0.LD0.LLN0.BinaryDS											
RIO_1.LD0.LD0.LLN0.BinaryDS_1											
RIO_1.LD0.LD0.LLN0.dsRIO1											
RIO_1.LD0.LD0.LLN0.HealthDS											
	+ Al										
New Edit or view detail	s of t	the s	elect	ed d	ata.	1					
Copy Ctrl	+ C										
Cut Ctrl	+ X										
Paste Ctrl	+ V										
Delete Del											
Send to All											
Send to None											
Data Sets GOOSE Controls Inp	outs										
Substation.Voltage Level.Bay.RIO	1										

Figure 139: Details of a data set

3. Select LD/LN/DObject/DAttr/FC and click Insert to add the data in the data set.



RIO600 supports only unstructured data sets in GOOSE.



A single data set in RIO600 contains a maximum of 100 data attributes.

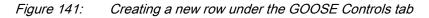
RIO_1.LD0.LD0.LL	.N0.dsRIO1				×
LD	LN AOMGGIO5 DIM8GGIO1	DO Beh (INS)	FC ST	Data set entries LD0.RTDGGI04.AnIn4.q (MX) LD0.RTDGGI04.AnIn4.range (MX)	† +
	DIMERGEO3 DOMEGIO2 LLNO LPHDI RTDGGIO4	-00 Health (INS) -00 Ind1 (SPS) -00 Ind2 (SPS) -00 Ind3 (SPS) -00 Ind3 (SPS) -00 Ind5 (SPS) -00 Ind5 (SPS) -00 Ind5 (SPS) -00 Ind8 (SPS) -00 Ind8 (SPS) -00 NamPlt (LPL)	DA c (ST) e Val (ST) t (ST)	LDD RTDGGIO 2 An Har to ge (MO) LDD LINO 2 per Hith q (ST) LDD LINO 2 per Hith q (ST) LDD LINO 2 per Hith q (ST) LDD LINO 2 LOG D Ind 2 q (ST)	
				ОКСС	ance

Figure 140: Adding data in the data set

16.2 Configuring GOOSE control blocks

- 1. In the **Plant Structure**, select the IED node.
- 2. In the editor pane, select the **GOOSE Controls** tab.
- 3. To add a new GOOSE control block, right-click the editor pane and select New.

OSE COmmunication	- IEC 61850 Configur	ation	
		_	
Details	Ctrl + Alt + T		
Data Set Details			
Data Set Details New	Ctrl + Alt + N		
New			
New Copy	ate new. _C		
New Copy Crea Cut	ctrl + X		
New Copy Crea Cut Paste	Ctrl + X Ctrl + V		
New Copy Crea Cut	ctrl + X		
New Copy Crea Cut Paste	Ctrl + X Ctrl + V		
New Copy Cut Paste Delete	Ctrl + X Ctrl + V		



4. In the **Create New GOOSE Control** dialog box, define a GOOSE control block name, select the previously created data set from the **Data set** drop-down list and click **OK**.

A new row is created under the GOOSE Controls tab.

Create New GOOSE Control	X
AA1J1Q01A2 AA1J1Q02A2 AA1J1Q03A2 AA1J1Q03A2 AA1J1Q05A2 AA1J1Q05A2	Name gcbRIO Data set dsRIO1 Gse type GOOSE
Substation.Voltage Level.Bay.RIO_1.LD0.	LD0.LLN0
	OK Cancel

Figure 142: Creating a new GCB

5. In the GOOSE Controls tab, update GoCB attributes in object properties.

Object Properties		▼ ₽ ×
₽ ↓		
▲ Communication		
App ID	0001	
MAC Address	01-0C-CD-01-00-01	
Max Time	10000	
Min Time	4	
VLAN ID	000	
VLAN Priority	4	

Figure 143: Updating the GoCB attributes



Use a unique Multicast MAC address and APP ID.

GoCB property	Description
GOOSE Control	GOOSE control block name
Application Id	A unique GoID for each GoCB in the system. Recommendation is to define a device-specific value and not to use the default empty value.
Min Time	Indicates the maximum response time in milliseconds to data change. This time can be used by the receiver to discard messages that are too old. In principle, t(min) can vary depending on the data type.
Max Time	Indicates the background "heartbeat" cycle time in milliseconds; the default value is "10 000 ms". If there are no data changes, the IED still resends the message with the heartbeat cycle to enable the receiver to detect communication losses, that is, the communication is supervised.
Config Revision	Contains an integer value that is sent in every GOOSE message The integer indicates the amount of changes in the data set. The receiver checks the message for configuration mismatches. "Configuration Revision" cannot be manually edited in IET600.
MAC Address	Multicast MAC address to which the specific GOOSE data is sent The receiving IED filters the frames and starts to process them if a specific multicast address is defined in the configuration. It is recommended to have one unique multicast address per GoCB. The address range for GOOSE Multicast addresses is 01-0C- CD-01-00-0001-0C-CD-01-01-FF.
App ID	Unique HEX value application identifier for sending the GoCB within the system. It identifies the purpose of this particular data set. The value range is 00003FFF.
VLAN ID	Used if the Ethernet switches in a station bus support VLAN. If static VLAN identifiers are defined, it also affects the switch port configuration. Value "000" indicates a non-configured VLAN and switches do not filter these messages on a port basis. This is the recommended, if there is no need to split the logical network. The VLAN identifier is a 3-character HEX value with range 000FFF
VLAN Priority	Used in networks supporting VLANs. The priority is used with network switches. The default value for GOOSE is "4" and the value range is 07.

Table 4:

Selected GOOSE control block properties



The multicast *MAC address* is usually unique, and *APP-ID* must be unique for each GoCB in the same IEC 61850 system.

16.3 Configuring a GOOSE Subscriber

The GOOSE data sets that RIO600 is subscribing from the peer IED must be configured on the data attribute level. Functional constrained data objects are not allowed. Also, the subscribed data sets must contain status value and quality attributes in this order.

- 1. In the **Plant Structure**, select **Substation node**.
- 2. Connect the publishers and subscribers.

GOOSE Communication - IEC	61850		_		_						 - 1	×
	AA1J1Q01A2 (LD0)	AA1J1Q02A2 (LD0)	AA1J1Q03A2 (LD0)	AA1J1Q04A2 (LD0)	AA1J1Q05A2 (LD0)	RIO_1 (LD0)	RIO_2 (LD0)	RIO_3 (LD0)	RIO_4 (LD0)	RIO_5 (LD0)		
RIO_1.LD0.LD0.LLN0.gcbRIO	V	V	R/									
	-											
Data Sets GOOSE Controls Inpu	its											

Figure 144: Making the connection between the publisher and subscriber

3. Save the configuration and close the IEC 61850 Configuration.

IEC 61850 Configuration	i di la companya di la		x
Do you want to save th	e changes?		
	Yes	No	Cancel

Figure 145: Saving the IEC 61850 Configuration

16.4 Easy GOOSE engineering in Application Configuration

Easy GOOSE engineering enables configuration of GOOSE communication between two or more IEDs in a single tool, Application Configuration. GOOSE data sets and GOOSE control blocks are created automatically when the configuration is done in Application Configuration. Easy GOOSE engineering does not replace GOOSE engineering in Signal Matrix or the IEC 61850 Engineering tool.

Easy GOOSE engineering is supported for both IEC 61850 Edition 1 and IEC 61850 Edition 2 configured IEDs.

Easy GOOSE engineering is supported from PCM600 Hotfix 2 or later. To configure easy GOOSE and make the GOOSE connection through Application Configuration, see the PCM600 help manual, which can be opened by pressing the F1 function key in PCM600.

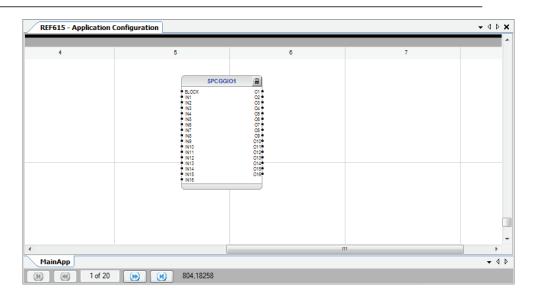
PCM600 Online Help	
Hide Back Print Options	
Contents Index Search	[
	PCM600 Online Help PCM600
Copyright Disclaimer	Protection and Control IED Manager
	ABB
Weing the PCM600 tool	
Using the tool components B ABB Lifecycle Services	
Account Management	
Q Application Configuration	
3 Starting application configuration	GOOSE Engineering
Configuration handling Validation handling	GOOSE Engineering enables to configure GOOSE communication between the sender and receiver IEDs. GOOSE receiver block of receiver IED can
A MainApplication handling	receive any available IEC 61850 attribute from any other IED in a project belonging to the same subnetwork.
🗄 👁 Page handling	
Function block handling	Enabling/disabling GOOSE in Application Configuration
Connections Variables	Making connections
E Catables	
Composite function block editor	Deleting connections
Creating composite function block types from function block instances	GOOSESenderApp MainApp
Omposite function block handling	GOOSE symbols
MainApplication template Mardware Channel	SCL blocks
Comparing application configuration	
Online Monitoring	Cut-Paste and Copy-Paste of ACT GOOSE variables
🗄 🗣 Glue Logics	GOOSE Online Monitoring
© Constant signals © Constant signals	
Enabling/disabling GOOSE in Application Configuration	Parent topic: Application Configuration
2 Making connections	Copyright 2018 ABB. All rights reserved.
2 Deleting connections	Copyright doub water and the second double of the s
GOOSESenderApp MainApp GOOSE symbols	
2 SCL blocks	
Cut-Paste and Copy-Paste of ACT GOOSE variables	
GOOSE Online Monitoring	
Signal user-defined name (Signal UDN) Interaction with Signal Matrix Tool	
Interaction with Signal Matrix Lool	
3 Setting Application Configuration preferences	
Closing Application configuration	
21 Licensing	

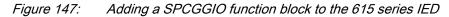
Figure 146: GOOSE engineering in PCM600 online help

16.5 GOOSE engineering examples using RIO600 and a 615 series IED

16.5.1 Connecting a generic SPCGGIO output from a 615 series IED to a RIO600 binary output

1. In the **Application Configuration** tool in PCM600, add the SPCGGIO function block to the configuration of the 615 series IED.





- 2. In the **Plant Structure**, select the 615 series publisher IED.
- 3. In the **Data Sets** tab in the editor pane, right-click and insert a new row.

60	OSE Communica	tion - IEC 61850 Conf	guration	- 4 ▷ x
		AA1J1Q01A2 (LD0) RIO_1 (LD0)		
	Details	Ctrl + Alt + T	1	
	New	Ctrl + Alt + N		
	Сору	Create new.		
	Cut	Ctrl + X		
	Paste	Ctrl + V		
	Delete	Del		
	Send to All Send to None			
Data S				
Substat	tion.voltage Level	.Bay.AA1J1Q01A2		

Figure 148: Creating a new row under the Data Sets tab

4. In the Create New Data Set dialog box, define a data set name and click OK.

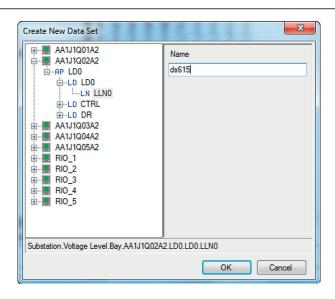


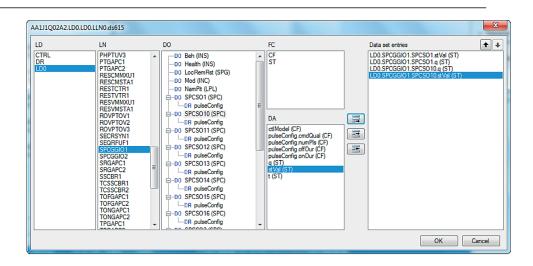
Figure 149: Creating a new data set

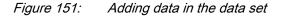
A row representing the new data set is created under the **Data Sets** tab.5. Right-click the newly created data set row and select **Details**.

GOOSE Communicat	ion - IEC 61850 Configuration	→ 4 Þ ×
AA111001A21 D01 D0111	A111001A2 (LD0) RIO_1 (LD0)	
Details	Ctrl + Alt + T	
New Edit or vie	ew details of the selected data.	
Сору	Ctrl + C	
Cut	Ctrl + X	
Paste	Ctrl + V	
Delete	Del	
Send to All Send to None		
Data Sets GOOSE Cont	rols Inputs	
Substation.Voltage Level.	Bay.AA1J1Q01A2	

Figure 150: Adding details in the data set

6. Select the data set entries, click the **Insert** button to add the data in the selected data set and click **OK**.





7. In the **GOOSE Controls** tab, insert a new row to add a new GOOSE control block.

	GOOSE Communication -	IEC 61850 Configuration	× ◊ ▷ ×
Γ	Details	Ctrl + Alt + T	
	Data Set Details		
	New	Ctrl + Alt + N	
	Create new.		
	Copy	Ctrl + C	
	Cut	Ctrl + X	
	Paste	Ctrl + V	
	Delete	Del	
	Send to All		
	Send to None		
Dat	ta Sets GOOSE Controls	Inputs	
Sub	station.Voltage Level.Bay.A	A1J1Q02A2	

Figure 152: Creating a new row under the GOOSE Controls tab

8. In the **Create New GOOSE Control** dialog box, define a GOOSE control block name under **LLN0**, select the previously created data set from the **Data set** drop-down list and click **OK**.

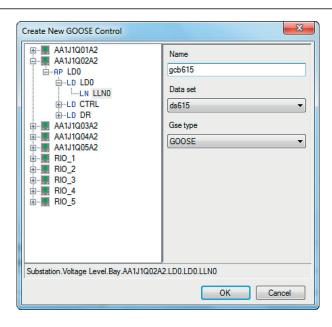


Figure 153: Creating a new GCB

A new row is created under the GOOSE Controls tab.

9. In the GOOSE Controls tab, connect the publisher and subscribers.

GOOSE Communication - IEC 6	1850) Configuration	•	4 ۵	×
AA1J1Q01A2.LD0.LD0.LLN0.gcb615	AA1J1Q01A2 (LD0)	RIO_1 (LD0)			
Data Sets GOOSE Controls Input Substation.Voltage Level.Bay.AA1J10		2			

Making the connection between publisher and subscriber under the GOOSE Controls tab



RIO600 can subscribe from a maximum of five different GOOSE control blocks either from one or multiple relays. A unique combination of MAC id and App id is required for the GOOSE control blocks.

10. Save the configuration and close the IEC 61850 Configuration dialog box.

Figure 154:

ancel

Figure 155: Saving the IEC 61850 Configuration

- 11. In the **Plant Structure**, right-click the RIO600 IED and select **Application Configuration**.
 - 11.1. Connect GOOSERCV_BIN outputs to SCMHP1 function block and make the connections. GOOSE data is received by *GOOSERCV* function block and data is passed to SCM function *SCMHP1*.

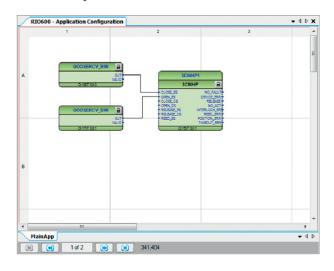


Figure 156: Making connections between the function blocks

- 11.2. Save the configuration and close Application Configuration
- 12. In the Plant Structure, right-click the RIO600 IED and select Signal Matrix.
 - 12.1. In the GOOSE tab, make the connections.
 - 12.2. Save and close Signal Matrix.

	Logical Device :		AA1J1Q01A4, LD0							1Q01A6, LD0	
		2	CMMXU1 VMMXU1				- A41J1Q01A6, LD0	SP	CGAPC1	-	
	Data Object: Data Attribute:	A.phsA cVal.mag.f	A.phsB cVal.mag.f	A.phsC cVal.mag.f	PhV.phsA cVal.mag.f	PhV.phsB cVal.mag.f	PhV.phsC cVal.mag.f		Ind1 stVal	Ind10 stVal	1
- GOOSERCV_BIN:0											
GOO SERCV_BIN:0	IN								X		
- GOOSERCV_BIN:1											
GOO SERCV_BIN:1	IN									X	
- GOOSERCV_BIN:2											
GOO SERCV_BIN:2	IN										
- GOOSERCV_BIN:3											
GOOSERCV_BIN:3	IN										-
- GOOSERCV_BIN:4											
GOO SERCV_BIN:4	IN										
- GOOSERCV_BIN:5											
GOOSERCV_BIN:5	IN										
- GOO SERCY_MV:0											
GOOSERCV_MV:0	IN	X									
- GOO SERCY_MV:1											
GOO SERCY_MV:1	IN		X								
GOOSERCV_MV:2											
GOOSERCV_MV:2	IN			X							
- GOOSERCV_MV:3											
GOOSERCV MV:3	IN				X						-

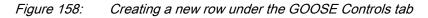
Figure 157: Making the connections with Signal Matrix

13. Download the configuration to both the 615 series IED and RIO600 using the "Write to IED" operation.

16.5.2 Connecting two RIO600 binary inputs to the 615 series IED disconnector status

- 1. In the **Plant Structure**, right-click the RIO600 publisher IED and select **IEC** 61850 Configuration.
- 2. In the GOOSE Controls tab, right-click and insert a new row.

GO	05E Communication	- IEC 61850 Configuration	- 4 ▷
	Details	Ctrl + Alt + T	
	Data Set Details.	-	
	New	Ctrl + Alt + N	
	Сору	reate new. I + C	
	Cut	Ctrl + X	
	Paste	Ctrl + V	
	Delete	Del	
	Send to All		
	Send to None		
L			
a Se	ets GOOSE Control	s Inputs	
stati	ion.Voltage Level.Ba	/.RIO_1	



3. In the **Create New GOOSE Control** dialog box, define a GOOSE control block name, select the correct data set in the **Data set** drop-down list and click **OK**. A new row is created under the **GOOSE Controls** tab. Default data sets are pre-configured by RIO600 Connpack, but the modifications can be done as required.

Create New GOOSE Control	x
AA1J1Q01A2 B. RIO_1 BRP LD0 BLD LD0 LD LD0 LN LLN0	Name gcbRIO Data set BinaryDS • Gse type GOOSE •
Substation.Voltage Level.Bay.RIO_1.LD0.	LD0.LLN0
	OK Cancel

Figure 159: Creating a new GCB

4. In the **GOOSE Controls** tab, connect the publisher and subscribers.

G005E Communication - IEC 61850 Configuration	- 4 ▷ ×
RIO_1.LD0.LD0.LLN0.gcbRIO	
Data Sets GOOSE Controls Inputs	
Substation.Voltage Level.Bay.RIO_1	

Figure 160: Connecting the publisher and subscriber

5. Save the configuration and close the IEC 61850 Configuration dialog box.

IEC 61850 Configuratio	in		×
Do you want to save t	he changes?		
	Yes	No	Cancel
			,

Figure 161: Saving the IEC 61850 Configuration

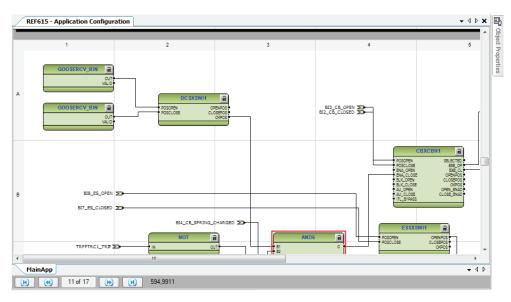
6. In the **Plant Structure**, right-click the 615 series IED and select **Application Configuration**.

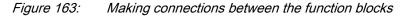
File Edit View Tools Window Help Eiii Parameter Setting D </th <th></th>	
Object Types Project Explorer Event Viewer General Plant Structure Disturbance Handling 	
Generic IEC61850 IED	
Feeder IEDs ★ Substation Voltage Protection IEDs ★ Bay Signal Matrix	
Remote I/O IEDs	
Communication Management IED Users IED Compare	

Figure 162: Selecting Application Configuration

7. Add two GOOSERCV_BIN and DCSXSWI function blocks and make the connection.

GOOSE data is received by GOOSERCV function block and data is passed to disconnector DCSXSWI.





- 8. Save the configuration and close **Application Configuration**.
- 9. In the **Plant Structure**, right-click the 615 series IED and select **Signal Matrix**.

Local Server\Test - PCM600	Table Street		
File Edit View Tools	Window Help		Collapse Parameter Setting Signal Monitoring Event Viewer Disturbance Handling
Generic IEC61850 IED \$	☐ Test ☐ Test ☐	:	Migrate Configuration Application Configuration
Voltage Protection IEDs		역 역	Signal Matrix Graphical Display Editor Communication Management
	**************************************	‴ ₽ ₫	IED Users IED Compare

Figure 164: Selecting Signal Matrix

10. In the GOOSE tab, make the connections.

REF615 - Signal M	atrix																	- 4 Þ	x
	Logical Device :	4A1J1Q01A1, LD0		AA1J1Q01A1, LD0															
		¥				DI	18GGI	01						DIM	8LGGI	03			
	Data Object: Data Attribute:		Health stVal	Ind1 stVal	Ind2 stVal		Ind4 stVal	Ind5 stVal		Ind7 stVal		Health stVal	Ind1 stVal		Ind4 stVal		Ind6 stVal		
- GOO SERCV_BIN:0																			
GOOSERCV_BIN:0 IN	I			X															
- GOO SERCV_BIN:1																			
GOOSERCV_BIN:1 IN	I				X														1
									Ŧ										



- 11. Save and close Signal Matrix.
- 12. Download the configuration to both the 615 series IED and RIO600 using the "Write to IED" operation.

Section 17 Troubleshooting

17.1 Troubleshooting the technical key in online mode

1. Ensure that each IED in the plant structure has a unique technical key. If the device is created in online mode and the technical key is already set to another device instance in the plant structure, a dialog box opens and an error is displayed in the Output pane. In online mode, the technical key is retrieved from the device and set to the device instance's technical key in PCM600.

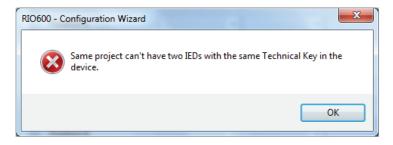


Figure 166: Detecting failure in setting the technical key

Output				
Date and Time	Category	User	Object	Message
12/8/2011 11:53:36.055 AM	Warning	[local]\abb - System	System	Overlapping SCL Technical Key 'RIO1'. Previous value 'AA1J1Q01A1' restored.
😢 12/8/2011 11:53:36.057 AM	Error	[local]\abb - System	System	Could not set Technical Key to PCM, hence communication will not work!
12/8/2011 11:53:59.068 AM	Message	[local]\abb - System	System	To establish communication, reboot the IED, connect it to the PC and run the wizard again.

Figure 167:	Error message in the Output pane
-------------	----------------------------------

Define the device type and communication parameters correctly in the configuration wizard in the online mode.
 If the device is not responding or is connected to other IED type, a dialog box opens when the Scan button is clicked.

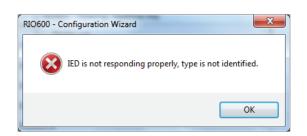


Figure 168: Detecting an unresponsive IED or incorrect IED type



Check the communication settings and the physical connection to the device.

- 3. Accept the technical keys suggested by PCM600. If the device's technical key is, for example, "RIO600" or "BAY1" and a new device instance is created in online mode, a dialog box opens.
 - Click **Yes** to change the technical key.
 - Click **No** to abort the scan.



Figure 169: Changing the default technical key and rebooting

17.2 Troubleshooting the reading and writing of parameters

Common validations while reading and writing parameters

- Ensure that the device is online.
- Ensure that the device contains a valid configuration. Composition of IED and IED object in PCM should match.
- Ensure that the composition selection matches with the device. Technical key in IED and PCM should match.
- Ensure that the technical key is correct.

Validations while writing parameters

• Check that the physical MAC Address is given in XX-XX-XX-XX format where X can be [0-9], [a-f] or [A-F].

٠



Figure 170: Checking physical MAC Address format

Check that the *Oscillation Suppression Hysteresis* of the Digital input module is lower than the *Oscillation Upper limit*.

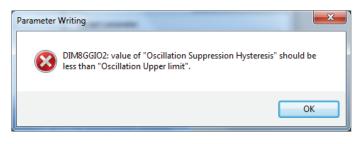


Figure 171: Checking Oscillation Suppression Hysteresis

Check that the module versions in the device and PCM600 match.

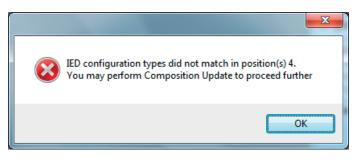


Figure 172: Validation for modules with different versions

17.3 Troubleshooting the glue logic connection

- 1. Instantiate the maximum number of OR, AND or NOT logic gates in Application Configuration.
- 2. Open Signal Matrix and try to make the glue logic connection. An error message appears in Signal Matrix if all instances of logic blocks are instantiated in Application Configuration and no new blocks can be created from the background.

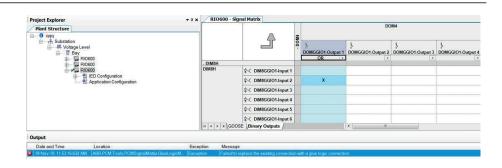


Figure 173: Error message in Signal Matrix

Section 18 Technical reference

18.1 Model conformance statement

The Model Implementation Conformance Statement (MICS) of the standard data object model elements supported by RIO600 are common data attribute classes, common data classes and controllable single point classes. Some data may not be retrieved from the IED but they are included in RIO600 as a default.

18.1.1 Quality

Attribute name	Attribute type	Value	RIO600 comments						
Validity	CODED ENUM	good invalid reserved questionable	Supported						
detailQual	PACKED LIST								
Overflow	BOOLEAN		Not supported						
outOfRange	BOOLEAN		Supported						
badRefererence	BOOLEAN		Not supported						
Oscillatory	BOOLEAN		Supported						
Failure	BOOLEAN		Supported						
oldData	BOOLEAN		Not supported						
Inconsistent	BOOLEAN		Not supported						
Inaccurate	BOOLEAN		Not supported						
Source	CODED ENUM	process substituted DEFAULT process	Not supported						
Test	BOOLEAN	DEFAULT FALSE	Supported						
Operator Blocked	BOOLEAN	DEFAULT FALSE	Supported						

Table 5:Quality type definition

The DEFAULT value must be applied, if the functionality of the related attribute is not supported. The mapping may specify to exclude the attribute from the message, if it is not supported or if the DEFAULT value applies.

18.2 Common data classes

Table 6:

18.2.1 Single point status

Common data class of single point status (SPS)

Attribute name	Attribute type	FC	TrgOp	Value	
Data name	Inherited from data	Inherited from data class (see IEC 61850-7-2)			
Data attribute		1			
Status					
stVal	BOOLEAN	ST	dchg	TRUE or FALSE	
q	quality	ST	qchg		
t	TimeStamp	ST			

18.2.2Single point control (SPC)

Table 7:

Common data class of single point control (SPC)

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	Inherited from data class (see IEC 61850-7-2)		
Data attribute	<u>.</u>			
Status				
stVal	BOOLEAN	ST		TRUE or FALSE
q	Quality	ST		
t	Time stamp	ST		
ctlModel	CtlModels	CF		Status-only

18.2.3 Integer status (Health)

 Table 8:
 Common data class of integer status (INS)

Attribute Name	Attribute Type	FC	TrgOp	Value
Data Name	Inherited from Data Class (refer to IEC 61850-7-2)			
Health				
stVal	ENUM	ST	dchg	1 = OK 2 = Warning 3 = Alarm
q	Quality	ST	qchg	
t	TimeStamp	ST		

18.2.4

Measured value (MV)

Common data class of MV

Table 9: ABBRIO_MV

Attribute name	Attribute type	FC	TrgOp	Value		
Data name	Inherited from data	Inherited from data class (see IEC 61850-7-2)				
mag	Analogue value	MX	dchg			
range	ENUM	МХ	dchg	0 = normal 1 = high 2 = low 3 = high-high 4 = low-low		
q	Quality	MX	qchg			
t	Time stamp	MX				

Table 10: ABBRIO_MVx

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	class (see IEC 6185	50-7-2)	
mag	Analogue value	MX	dchg	
q	Quality	MX	qchg	
t	Time stamp	MX		

18.2.5 Complex measured value (CMV)

Table 11:

Common data class of Measured Value (CMV)

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	a class (see IEC 6185	50-7-2)	
cVal	Vector	MX		
q	Quality	MX	qchg	
t	Time stamp	MX		

18.2.6 Controllable analog process value (APC)

Table 12:Common data class of APC

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	Inherited from data class (see IEC 61850-7-2)		
MxVal	Analog value	MX		
q	Quality	MX		
t	Time stamp	MX		
ctlModel	CtlModels	CF		status-only

18.2.7 Binary counter reading (BCR)

Table 13:	Common data class o	of BCR		
Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	a class (see IEC 6185	50-7-2)	
actVal	INT128	ST		
q	Quality	MX		
t	Time stamp	MX		
pulsQty	FLOAT32	CF		status-only

18.2.8 Phase to ground related measured values of a three phase system (WYE)

Table 14: Common data class of WYE

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	class (see IEC 6185	60-7-2)	
phsA	CMV			
phsB	CMV			
phsC	CMV			

18.2.9 Phase to phase related measured values of a three phase system (DEL)

Table 15: Common data class of DEL

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	class (see IEC 6185	0-7-2)	
phsAB	CMV			
phsBC	CMV			
phsCA	CMV			

18.2.10 Activation information (ACT)

Common data class of ACT

Table 16: ABBRIO_ACTef

Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	a class (see IEC 6185	60-7-2)	
general	BOOLEAN	ST	dchg	
q	Quality	ST		
t	TimeStamp	ST	qchg	

Table 17:	ABBRIO_ACToc			
Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	a class (see IEC 6185	50-7-2)	
general	BOOLEAN	ST	dchg	
PhsA	BOOLEAN	ST	dchg	
PhsB	BOOLEAN	ST	dchg	
PhsC	BOOLEAN	ST	dchg	
q	Quality	ST		
t	TimeStamp	ST	qchg	

18.2.11 Directional activation information (ACD)

Common data class of ACD

Table 18:	ABBRIO_ACDef			
Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from data	a class (see IEC 618	50-7-2)	
general	BOOLEAN	ST	dchg	
dirGeneral	ENUM	ST	dchg	0 = unknown 1 = forward 2 = backward 3 = both
q	Quality	ST		
t	Time stamp	ST	qchg	

Table 19:	ABBRIO_ACDoc			
Attribute name	Attribute type	FC	TrgOp	Value
Data name	Inherited from da	ata class (see IE	C 61850-7-2)	
general	BOOLEAN	ST	dchg	
dirGeneral	ENUM	ST	dchg	0 = unknown 1 = forward 2 = backward 3 = both
phsA	BOOLEAN	ST	dchg	
dirPhsA	ENUM	ST	dchg	0 = unknown 1 = forward 2 = backward 3 = both
phsB	BOOLEAN	ST	dchg	
dirPhsB	ENUM	ST	dchg	0 = unknown 1 = forward 2 = backward 3 = both
phsC	BOOLEAN	ST	dchg	

Table continues on next page

Section 18 Technical reference

Attribute name	Attribute type	FC	TrgOp	Value
dirPhsC	ENUM	ST	dchg	0 = unknown 1 = forward 2 = backward 3 = both
Q	Quality	ST		
t	Time stamp	ST	qchg	

Section 19 Glossary

ACSI	Abstract communication service interface
AOM	Analog output module
Attribute	Named element of data and of a specific type
Connectivity package	A collection of software and information related to a specific protection and control IED, providing system products and tools to connect and interact with the IED
CUT	Composition Update tool in PCM600
Data attribute	Defines the name, format, range of possible values and representation of values while being communicated
DIN rail	A standardized 35 mm wide metal rail with a hat-shaped cross section
EMC	Electromagnetic compatibility
Ethernet	A standard for connecting a family of frame-based computer networking technologies into a LAN
FPI	Measured value, short floating point information
FPI	Fault passage indicator
GCB	1. GOOSE control block
	2. Generator circuit breaker
GoCB	GOOSE control block
GolD	GOOSE control block-specific identifier
GOOSE	Generic Object-Oriented Substation Event
HW	Hardware
I/O	Input/output
IEC	International Electrotechnical Commission
IEC 61850	International standard for substation communication and modeling
IED	Intelligent electronic device
LECM	Communication module
MAC	Media access control
MFA	Multifrequency admittance
MICS	Model implementation conformance statement

Modbus	A serial communication protocol developed by the Modicon company in 1979. Originally used for communication in PLCs and RTU devices.
Multicast address	An identifier for a group of hosts that have joined a multicast group
MV	Medium voltage
PCM600	Protection and Control IED Manager
RIO600	Remote I/O unit
RJ-45	Galvanic connector type
RTU	Remote terminal unit
SCADA	Supervision, control and data acquisition
SCL	XML-based substation description configuration language defined by IEC 61850
SCM	Smart control module
SIM4F	Sensor input module (4 currents)
SIM8F	Sensor input module (4 currents and 4 voltages)
SNTP	Simple Network Time Protocol
SPS	Single-point status
stVal	Status value
TCP/IP	Transmission Control Protocol/Internet Protocol
WHMI	Web human-machine interface
XML	Extensible markup language



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