SIEMENS

SICAM
SICAM PAS

V8.21

Overview

E50417-X8976-C431-C8

NOTE

For your own safety, observe the warnings and safety instructions contained in this document, if available.

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Preface

Purpose of the Manual

This manual provides an overview of the fields of application and configuration options for the SICAM PAS system. In addition to this, the manual includes brief descriptions of the individual components and their interaction. The "First Steps" chapter presents an example which makes you familiar with the SICAM PAS user interface for configuration and operation.

Configuration using SICAM SCC is not described in this manual.

Target Audience

The main target group of this manual are persons who configure, parameterize, and operate the SICAM PAS power automation system.

Scope

This manual is valid for SICAM PAS.

Standards

SICAM PAS has been developed in compliance with ISO 9001:2008 standard.

Additional Support

For questions about the system, contact your Siemens sales partner.

Customer Support Center

Our Customer Support Center provides a 24-hour service.

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Training Courses

Inquiries regarding individual training courses should be addressed to our Training Center:

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Notes on Safety

This document is not a complete index of all safety measures required for operation of the equipment (module or device). However, it comprises important information that must be followed for personal safety, as well as to avoid material damage. Information is highlighted and illustrated as follows according to the degree of danger:

DANGER

DANGER means that death or severe injury **will** result if the measures specified are not taken.

✧ Comply with all instructions, in order to avoid death or severe injuries.

WARNING

WARNING means that death or severe injury **may** result if the measures specified are not taken.

✧ Comply with all instructions, in order to avoid death or severe injuries.

CAUTION

CAUTION means that medium-severe or slight injuries **can** occur if the specified measures are not taken.

✧ Comply with all instructions, in order to avoid moderate or minor injuries.

NOTICE

NOTICE means that property damage **can** result if the measures specified are not taken.

✧ Comply with all instructions, in order to avoid property damage.

NOTE

Important information about the product, product handling or a certain section of the documentation which must be given attention.

Qualified Electrical Engineering Personnel

Only qualified electrical engineering personnel may commission and operate the equipment (module, device) described in this document. Qualified electrical engineering personnel in the sense of this document are people who can demonstrate technical qualifications as electrical technicians. These persons may commission, isolate, ground and label devices, systems and circuits according to the standards of safety engineering.

Proper Use

The equipment (device, module) may be used only for such applications as set out in the catalogs and the technical description, and only in combination with third-party equipment recommended and approved by Siemens.

Problem-free and safe operation of the product depends on the following:

- Proper transport
- Proper storage, setup and installation
- Proper operation and maintenance

When electrical equipment is operated, hazardous voltages are inevitably present in certain parts. If proper action is not taken, death, severe injury or property damage can result:

- The equipment must be grounded at the grounding terminal before any connections are made.
- All circuit components connected to the power supply may be subject to dangerous voltage.

- Hazardous voltages may be present in equipment even after the supply voltage has been disconnected (capacitors can still be charged).
- Operation of equipment with exposed current-transformer circuits is prohibited. Before disconnecting the equipment, ensure that the current-transformer circuits are short-circuited.
- The limiting values stated in the document must not be exceeded. This must also be considered during testing and commissioning.

OpenSSL

This product includes software developed by the OpenSSL Project for use in OpenSSL Toolkit (*http://www.openssl.org/*).

This product includes software written by Tim Hudson (*tjh@cryptsoft.com*).

This product includes cryptographic software written by Eric Young (*eay@cryptsoft.com*).

Overview of the SICAM PAS Documentation

Analogous to the software, the descriptions of the SICAM PAS system also have a modular structure.
The overviews describe the system's overall functionality.
Function-specific descriptions illustrate the parameterization and the use of the system component.
Independent descriptions are available for optionally usable components.
The following paragraphs briefly describe the contents of all manuals and provide references to detailed descriptions. Dependencies between the manuals are marked with arrows.

SICAM PAS Overview

- Function of the System Components
  - SICAM PAS UI – Configuration
  - SICAM PAS UI – Operation
  - SICAM PAS UI – Operation Client
  - SICAM PAS Value Viewer
  - SoftPLC (Automation)
  - User Administration
  - Feature Enabler
  - SICAM SCC HMI
  - SICAM PQ Analyzer, Incident Explorer, Fault Event Viewer, and Event Viewer
  - Substation Control Functions
- Fields of Application
- Communication Interfaces
- Quantity Structure
- Supply Variants
- Technical Consulting
- Training
- Example Illustrating the Configuration and Parameterization Approach

SICAM PAS/PQS Installation

- System Types
- Installation Variants
- Prerequisites for Installation
- Installation/Uninstallation
- Licensing Using a Dongle/Soft License/Online Software Delivery (OSD)
- Enabling the Features using the Feature Enabler
- Enabling the Features using the Automation License Manager
- Setting up OPC Components
- Time Synchronization

SICAM PAS/PQS Security

- Defining the Network Topology (Central Firewall)
- Encryption/Authentication
- Installation and Configuration
- Generating Certificates via OpenSSL

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SICAM PAS/PQS Configuration and Operation

- SICAM PAS UI – Configuration
  - Views/Operator Control Actions
  - Importing/Exporting Configuration Data
  - Defining and Parameterizing the Configuration
  - Mapping Information
  - Defining the Topology
  - Device Templates
  - Normalizations
  - Reports
  - Grid Codes
  - Certificates
  - Import/Export of Archive Data
  - Notification
  - Documenting a Project
- SICAM PAS UI – Operation, SICAM PAS UI – Operation Client
  - Displaying the Operational Status
  - Controlling Connections
- SICAM PAS Value Viewer
  - Displaying, Substituting and Controlling Information
- User Administration
  - Creating a User, User Login/Logout
  - Configuring the syslog Server
  - Enabling Asset Monitoring
  - Enabling Security Notifications
- Human-Machine Interface (HMI)
  - Connection to SICAM SCC
- SINAUT LSA Converter
- Diagnostic Tools Version Scan and SICAM CHaSI

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SICAM PQS Fault Locator

- Defining Fault Location Parameters
- Executing Fault Location Procedure
  - Automatically
  - Manually

  Examples

SICAM PAS Redundancy

- Redundancy Types
- Changeover/Dependency
- Setting up/Operating Redundancy
- Isolating Systems
- Examples

SICAM PAS Automation Blocks

- Configuration/Basic Principles
- Commands, Indications, Measured and Metered Values
- Organizational Blocks
- Examples

SICAM PQ Analyzer – Incident Explorer

- General Information on the SICAM PQ Analyzer
  - Installation, Licenses, Menus, Configuring the SICAM PQ Analyzer
- Incident Explorer
  - Operator Control Actions
  - Fault Event, Fault Records, Fault Location Reports, PQ Violation Reports, PDR Records, Slow-Scan Records, SIPROTEC Fault Records, SIPROTEC Slow-Scan Records, Transient Records
- Fault Event Viewer
  - Prerequisites, Analyzing the Fault Events
- Event Viewer
  - Prerequisites, Analyzing the Events
- SICAM PQ Collector
  - Use
  - Parameterization and Operation
- Configuring PDR Records

SICAM SCC, Human Machine Interface (HMI)

- Installation/Uninstallation
- Working with SICAM SCC
- Graphic Objects, for example, Circuit Breakers, Measured Values, Bay Overviews, Topological Coloring
- Task-Oriented Parameterization, for example, Combined Parameterization of the Switching Devices and Measured Values of a Bay
- Client-Server Systems
- Redundancy
- WinCC Web Navigator
- Time Synchronization

SICAM Valpro, Measured and Metered Value Archive Evaluation

- Measured and Metered Value Archive Evaluation

For the protection devices and fault recorders, device-specific manuals are additionally available.

Complementary to the descriptions, the context-sensitive online help provides detailed information on the parameters.

Table of Contents

1 SICAM PAS System

Overview

This chapter provides a brief overview of the fields of application, the quantified project scope, and the functions of the SICAM PAS system.

1.1 SICAM PAS System Overview

The SICAM PAS power automation system provides innovative solutions for the most diverse tasks in spatially distributed information systems.

The system is equally suitable for use in the substations of electric utility companies as in industrial plants.

SICAM PAS has been designed as a modular, open system, which complies with all widely used communication standards. Furthermore, it supports the operator in the implementation of project-specific tasks in the fields of substation automation and power automation.

Multiple functions for the detection and evaluation of Power Quality measuring data (PQ measuring data) for checking the network quality complement the possible fields of application of the SICAM PAS system.

The User Administration tool ensures that system configuration, operation and system management tasks can only be performed by authorized persons.

The assignment of individual switching authorities down to the information level further enhances the security of system management.

The notification functions notify you by an e-mail and/or SMS on pending network faults, fault records, and reports, for example, fault location reports.

The individual system components are described in Chapter 3. In particular, this chapter provides information with regard to the following topics:

The system can be structured redundantly on the system, interface, and device level. This approach significantly improves fail-safe operation. In the case of an interruption of a communication link, the redundant component takes over the process connection. Depending on the transmission protocol, the process image of the redundant system is updated either continually or by means of a general request upon process takeover.

The DNP3i, IEC 60870-5-104, and IEC 61850 protocols allow TLS-based, secured data transmission via certificates.

In Ethernet TCP/IP networks, switches are used for communication with the terminal equipment. SICAM PAS supports the SNMP protocol (Simple Network Management Protocol) for monitoring the operational status of the Ethernet components and for speedy error detection in order to ensure operational reliability.

The Human-Machine Interface (HMI) of SICAM SCC provides numerous options for the implementation of your individual system management concept through customized user interfaces and specific operator actions.

The consistent use of Windows technologies, convenient user interfaces, and the sophisticated operating logic of the system components ensure that newcomers can familiarize themselves with SICAM PAS within a short period of time.

Since individual system components can be combined in many different ways, SICAM PAS meets almost all requirements in respect of a state-of-the-art, safe, and user-friendly substation automation system.

For more information concerning communication interfaces and monitoring via Ethernet, refer to *2 Communication Interfaces*.

The individual system components are described in *3 Overview of Functions*. In particular, this chapter provides information with regard to the following topics:

- SICAM PAS functions
- Configuration with SICAM PAS UI – Configuration
- Efficient user administration for secure system access
- Enabling function packages using the ALM
- SICAM PAS Value Viewer for viewing and testing
- SICAM SCC Human-Machine Interface (HMI)
- SICAM Valpro for the convenient archiving of measured and metered values
- Fault record and PDR report evaluation using the Incident Explorer (SICAM PQ Analyzer)
- Archiving events to be displayed in the Event Viewer (SICAM PQ Analyzer)
- Displaying the versions of the system components installed via Version Scan
- Collecting hardware and software information of the SICAM system via SICAM CHaSI

For information on SICAM PAS Power Quality functionality, refer to */2/ SICAM PQS, Overview*.

For more information on available product variants and contact partners for technical questions regarding SICAM PAS, refer to *4 Available Variants of System Components*.

The brief example in *5 First Steps* illustrates the configuration of a SICAM PAS project for power automation.

1.1.1 Fields of Application

SICAM PAS can be used for all applications where the following is required:

- Different communication standards and interfaces for the connection of bay devices and substations or for the connection to telecontrol centers (Ethernet TCP/IP, serial interfaces, or OPC DA Client/Server, OPC XML DA Server)
- Data acquisition and transmission under real time conditions
- Secured data transmission
- Ethernet network monitoring, for example, based on SNMPv2/v3
- Double-channel connection for enhanced availability of communication to the control centers
- Data exchange via OPC DA for connection with office computers
- Realization of automation tasks
- Process visualization - Human-Machine Interface (HMI)
  - Flexible solutions for local visualization, control, archiving, and logging
  - Remote visualization, control, archiving, and logging, using SICAM SCC and the SIMATIC Web Navigator
  - Visualization of process data via individually designed user interfaces such as overview diagrams, station diagrams, and event lists
  - Archiving of measured and metered values
- Archiving fault records and PDR records and evaluation with the SICAM PQ Analyzer
- Archiving events and evaluation with the SICAM PQ Analyzer
- Notification on the arrival of fault records, state changes of selected items of information or the completion of fault location reports
- Automatic or manual export of fault records
- Transmission of fault records from IEC 61850 devices to a control center via IEC 61850 Server
- Transmission of asset Information from IEC 61850 devices and SNMP devices to a control center via IEC 61850 Server
- Assignment of individual switching authorities down to the information level
- Secured data access via the User Administration tool
- Switchgear interlocks for telecontrolling/controlling
- Redundant structure of the substation level
- Test and diagnostic functions
- (Remote) visualization and control of SICAM PAS applications, interfaces, and connection to devices and control centers with SICAM PAS UI – Operation Client

1.1.2 Communication Interfaces

Via the system's communication interfaces, you can connect SICAM PAS to:

- Higher-level control centers
- Bay devices and substations
- Components for data exchange with industrial automation systems, such as SIMATIC

Communication with Higher-Level Control Centers

Communication takes place via the following protocols:

- IEC 61850 Server [1]
- IEC 60870-5-104 Slave
- IEC 60870-5-101 Slave
- DNP3 Slave (serial, TCP/IP)
- Modbus Slave (serial, TCP/IP)
- Telegyr 8979 Slave
- CDT Slave

Connection of Bay Devices and Substations

Communication takes place via the following protocols:

- IEC 61850 Client, GOOSE status monitoring
- IEC 61850 Server, GOOSE Publisher
- IEC 60870-5-103 Master
- IEC 60870-5-104 Master
- IEC 60870-5-101 Master
- SICAM MIC Master
- DNP3 Master (serial, TCP/IP)
- Modbus Master (serial, TCP/IP)
- PROFIBUS DP Master
- PROFINET IO Master
- SINAUT LSA ILSA Master
- SIMEAS R Master
- SICAM Q80 Master
- SIPROTEC 4 Service IF Master (fault records)

OPC Connection

- OPC XML DA Server
  Exchange of structured information via Internet in XML format
- OPC Server (DA V3.0)
  Data exchange with OPC clients of other applications, for example, process visualization systems

1 Fault records from IEC 61850 protection devices as well as asset information from devices connected with IEC 61850 or SNMP can be transmitted to higher-level control centers with IEC 61850 Server.

- OPC Client (DA V3.0)
  Data exchange with any OPC server of other applications, for example, automation systems or other manufacturers' protocol drivers

1.1.3 Quantified Project Scope

The number of items of information processed by SICAM PAS and originating from devices, which can be connected to SICAM PAS is mainly determined by the structure and the transfer rate of the system components used.

SICAM PAS is a scalable system, which depending on the number of devices and items of information, can be operated on one single computer or can be set up as a distributed system for a large number of devices and items of information.

The use of one single computer is sufficient for many application scenarios. In these cases, the **Full Server** performs all tasks - from the connection of devices, automation and archiving through to the establishment of communication links to the Human-Machine Interface (HMI) and the control centers.

For medium to large stations, the Full Server is complemented by up to 6 DIPs. Even under this configuration, the runtime system, the database system, and the OPC server (if required) still run on the Full Server. Depending on the degree of expansion, all further applications, including the SoftPLC, archives or the communication links to subdevices and higher-level control centers, can be processed on additional computers. These computers are referred to as **DIPs** (Device Interface Processors) in the SICAM PAS system.

The figures indicated below serve as reference values. However, it must be considered that they are influenced by various factors including:

- The number of subdevices (bay devices and substations) to be connected
- The number of information objects to be supported
- The type and number of communication protocols
- The type and extent of automation tasks

Contact your Siemens sales partner for an optimized layout of your system regarding the number of required computers and the number of recommended interfaces per computer.

1.1.3.1 Number of Devices and Items of Information

The following configuration examples show the calculated numbers of devices and items of information for computers with Intel Core i7 processor, 3.4 GHz (4+4 cores), 8 GB DDR3 RAM, and 64-bit operating system.

The following applies for a SICAM PAS system:

- Connection of the IEC 61850 devices via TCP/IP, no serial communication
- System redundancy
- Automation (SoftPLC) on the Full Server
- Configured SCC application on the Full Server for external operation (HMI) on SICAM SCC clients

1 Full Server

1 Full Server is sufficient if the following numbers are not exceeded:

- 400 devices
- 35 000 items of information from bay devices and substations (Master applications)
- 2 interfaces to control centers (Slave applications)

1 Full Server, 1 DIP

A system comprising of 1 Full Server and 1 DIP can be used for up to 600 devices and 55 000 items of information from bay devices and substations (Master applications).

The devices and items of information are shared by:

- Full Server
  - 200 devices, 20 000 information points via 3 TCP/IP interfaces
  - 2 interfaces to control centers
- DIP
  - 400 devices, 35 000 information points via 6 TCP/IP interfaces

1 Full Server, 2 DIPs

A system comprising of 1 Full Server and 2 DIPs can be used for up to 800 devices and 70 000 items of information from bay devices and substations (Master applications).
The devices and items of information are shared by:

- Full Server
  - 3 interfaces to control centers
- Each of both DIPs with
  - 400 devices, 35 000 information points via 6 TCP/IP interfaces

NOTE

The maximum number of 800 devices cannot be extended even by using further DIPs.

1.1.3.2 Transmission Protocols

The rules mentioned earlier apply for the connection of subdevices based on the IEC 61850 protocol. When using other transmission protocols for communication with bay devices and substations, the following other rules must be considered:

- IEC 60870-5-103, IEC 60870-5-101, DNP3, Modbus (serial), SINAUT LSA ILSA
  - Up to 100 devices connected to a Full Server or DIP
  - More than 50 interfaces

  The use of COM expanders or serial hubs is recommended for performance reasons.
- IEC 60870-5-104, DNP3i, Modbus over IP
  - Up to 100 devices connected to a Full Server or DIP
- PROFIBUS DP
  - Up to 2 CP5613 communications processors with up to 31 devices each connected to a Full Server or DIP
- PROFINET I/O
  - Up to 16 devices connected to each interface
  - Network card for communication
- SIPROTEC 4 Service Interface Master
  - Up to 12 interfaces
  - Up to 31 devices connected to an interface
  - Up to 100 devices connected to all interfaces

NOTE

SICAM PAS supports the monitoring of Ethernet components using SNMP Managers via the Simple Network Management Protocol (SNMP). For more information, refer to *2.5 Network Monitoring through SNMP*.

1.2 System Requirements

SICAM PAS is suitable for use on a SICAM Station Unit (6MD91) or an industrial computer on which a Windows operating system has been installed.

For information regarding the system equipment and the operating system versions of the individual system components, refer to:

- */3/ SICAM PAS/PQS, Installation*
- */5/ SICAM SCC, Human Machine Interface SICAM SCC*
- */13/ SICAM PQ Analyzer*
- */4/ SICAM PAS/PQS, Configuration and Operation*

Operational Knowledge Required

In addition to special professional training in the field of electrical engineering, your **system management** staff must have all operational knowledge required. Furthermore, these persons must be familiar with the Windows technology, which is nowadays used in numerous fields of application. Advanced system or programming knowledge is not required.

To **configure** and **parameterize** a SICAM PAS system, your staff requires special know-how in the fields of technology and communications engineering. Know-how on the graphical configuration of automation tasks is also recommended. As a prerequisite, users must be fully familiar with the operation of a computer.

Due to the sophisticated **design** of SICAM PAS, profound experience in station configuration and special know-how in the following fields are required:

- System management
- Communications engineering
- Automation engineering
- Telecontrol engineering

A comprehensive **online help system** provides answers to detailed questions.

Our **training center** provides the knowledge required for the efficient use of a SICAM PAS system.

1.3 SICAM PAS System Components

SICAM PAS UI – Configuration

The SICAM PAS UI – Configuration system component supports you in the following tasks:

- Configuration and parameterization of your station
- Exchange of configuration data

In the different views, you can specify the type and the transmission modes of your communication links. Additionally, you can define which devices, substations, control centers, or HMIs are connected.

In addition, for each connected component you select which information is evaluated in SICAM PAS. You define which information must be available for communication with higher-level control centers and for system management through SICAM SCC.

Furthermore, you configure SNMP Ethernet network monitoring and certificate-secured data transmission for the DNP3i and IEC 60870-5-104 protocols.

You can individually structure your station data in a topological view in order to emulate your operating conditions.

A predefined device-specific and project-specific device description template enables you to configure your station conveniently within a short period of time.

Import and export functions support you in the setting of parameter values and provide for reduced error rates (compared to multiple inputs).

Through the assignment of specific user rights for the operating personnel, the User Administration tool provides for secure data access during configuration, operation, and system management.

Redundant system components prevent data loss. In the case of interruption of a communication link, the redundant component takes over the process connection.

To determine the network quality, additional functions have been integrated. These functions enable the archiving and evaluation of PQ measuring data and support the data exchange via import and export functions.

You can define to be notified by an e-mail and/or an SMS on selected operational events such as the arrival of a fault record.

SICAM PAS UI – Operation

SICAM PAS UI – Operation provides you with a brief overview of the operational status of your station components. Update functions ensure that the display is always up to date.

Furthermore, you can enable, disable, or switch over individual components such as interfaces or devices, or set bay and telecontrol blocks.

The diagnostic function supports you in the analysis of pending faults.

SICAM PAS UI – Operation Client

SICAM PAS/PQS UI – Operation Client provides the functions of SICAM PAS/PQS UI – Operation from a local computer or a remote computer with improved performance by an Internet browser.

SICAM PAS Value Viewer

If the communication links have been established properly, the SICAM PAS **Value Viewer** displays information on the selected device or substation.

Within the framework of commissioning, for example, you can use this information view in order to test data links and to check whether an interface or a device actually transmits correct values. Detailed time stamps provide information on the reliability of values.

For test purposes, you can also initiate password-protected command outputs or manually update information.

SICAM PAS – Automation (SoftPLC)

In order to perform project-specific automation tasks in SICAM PAS, you can graphically link automation blocks (CFC blocks) or even define the automation function as Structured Text (ST), via the Statement List (STL), or using the Sequential Function Chart (SFC).

A comprehensive library of different automation blocks supports you in performing your tasks. These blocks have been specifically designed to provide sophisticated solutions in the field of power automation.

SICAM PAS User Administration

Via the User Administration tool, you can assign passwords in order to define which persons can access individual programs. To this end, you assign different user roles, such as administrator, parameterization engineer or operating personnel. If the control center connection is implemented via DNP3i, you can assign each command to a specialist who has the switching authority required.

For access authorization, you can either use Windows access rights or define your own SICAM PAS access rights.

SICAM PAS – ALM

SICAM PAS is designed as an open, modular system whose components can be individually selected.

Using ALM, you can enable all the functions which you require on your computer. For more information, refer to *3.9 SICAM PAS – Automation License Manager (ALM)*.

The following items are referred to as functions:

- Communication protocols
- SICAM PAS UI – Configuration system
- Automation function
- Security functionality
- Power Quality functions

SICAM SCC – Human-Machine Interface (HMI)

The SICAM SCC Human-Machine Interface (HMI) assists you in monitoring and controlling your station.

SICAM SCC comprises of the following components:

- SIMATIC WinCC process visualization system
- SICAM SCC components

SIMATIC WinCC provides standard function modules for graphical representations, for the topological coloring of connected network sections, for controlling, manual updating, archiving, and logging.

Based on its powerful process interface, fast display refresh rates, and safe data archiving functions, the system ensures a high degree of availability.

SICAM SCC components complement the standard functions by system management-specific features and convenient functions for user interface configuration and parameterization.

SICAM SCC components include the following:

- SICAM PAS Wizard

  This sophisticated wizard supports you in creating a new SCC project or in updating an existing project.
- SICAM PAS graphic object library

  This library includes for example, objects for the representation of switching devices, measured and metered values, and control elements.
- Switching device objects

  Based on IndustrialX Controls, these objects provide for the dynamic representation of your system. Status and state displays and sequences of switching actions are realized by means of these objects.
- Alarm Logging – Alarm Lists

  This list is for the display of alarms in correct chronological order. Incoming indications are logged in alarm lists with the absolute time stamps created in bay devices or substations. The time stamp and the state are complemented by additional information, such as the cause, event source, status information, and protection times.
- Message list

  Indications can be assigned to **Event and alarm list**, **Event and protection message list**, **Event list**, and **SCC default**.
- Message type

  Indications can be classified as **Alarm** type, **Error** type, **SCC default** type, and **Warning** type.
- Value text group

  Indications can be assigned to different type of value text groups: **0...16**, **SCC default**, **Show process value**.

SIMATIC WinCC, and thus SICAM SCC, can be configured as a client/server system. This enables you to operate and monitor large stations efficiently. On the clients, you can display and operate station or overview diagrams of one or several WinCC servers.

The SICAM SCC operating system can be structured redundantly for enhanced availability.

SICAM Valpro

SICAM Valpro is an optional component for the graphical or tabular evaluation of measured and metered values from the SICAM SCC archiving system.

SICAM PQ Analyzer – Incident Explorer, Fault Event Viewer, and Event Viewer

The **Incident Explorer** is an independently used subcomponent of the SICAM PQ Analyzer. It serves for fault record and PDR report evaluation in SICAM PAS.

The Incident Explorer opens a fault record through the viewer assigned. By default, the record is opened in SIGRA (if installed) and additional evaluation functions are also thus available. Otherwise, the record is opened using the Comtrade Viewer, which is included in the scope of delivery.

The export function enables the export of fault records. To this end, you can adapt the recording frequency and the COMTRADE export format (Common Format for Transient Data Exchange) to the requirements of your evaluation program.

PDR reports can be analyzed using the PDR Viewer evaluation routine.

The **Fault Event Viewer** displays the fault event and the associated fault records for a specific time range.

The **Event Viewer** displays the list of events related to any incident for a specific time range.

Version Scan

The Version Scan provides you with an overview of the version and storage location of the products installed and their lower-level system components, for example, SICAM PAS UI – Configuration. The information supports you in checking the system consistency and determining the causes of problems.

The following products are evaluated:

- SICAM PAS
- SICAM SCC
- SICAM PQ Analyzer
- DIGSI

SICAM CHaSI

SICAM CHaSI (Collect Hardware and Software Information) is a diagnostic tool used to collect information on the hardware and software components of the SICAM systems.

You can forward this information to the Customer Support Center for further analysis, which includes the following data:

- Hardware and software inventory data including data concerning the BIOS, the processor, and the software installed
- Information on the file system, the network, important entries from the registration database, and system settings (including the hosts file and the ntp file)
- Information on the version of the SICAM products and files installed for:
  - SICAM PAS
  - SICAM PQ Analyzer
  - SICAM SCC
  - SIMATIC WinCC
- Error log files with information on any program crashes (dump files)
- Windows Event Log
- Windows Error Reporting files (Only Appcrash & Apphang files)
- Report logs

1.4 Configuration Examples

Due to its modular system structure, SICAM PAS can be used for multiple purposes on the substation control level of interconnected control centers.
SICAM PAS can be set up in the following different variants:

- With a Full Server and SICAM SCC
- As a distributed system consisting of
  - 1 or several Full Servers
  - 1 or several DIPs
  - SICAM SCC

SICAM PAS systems communicate with higher-level control centers through:

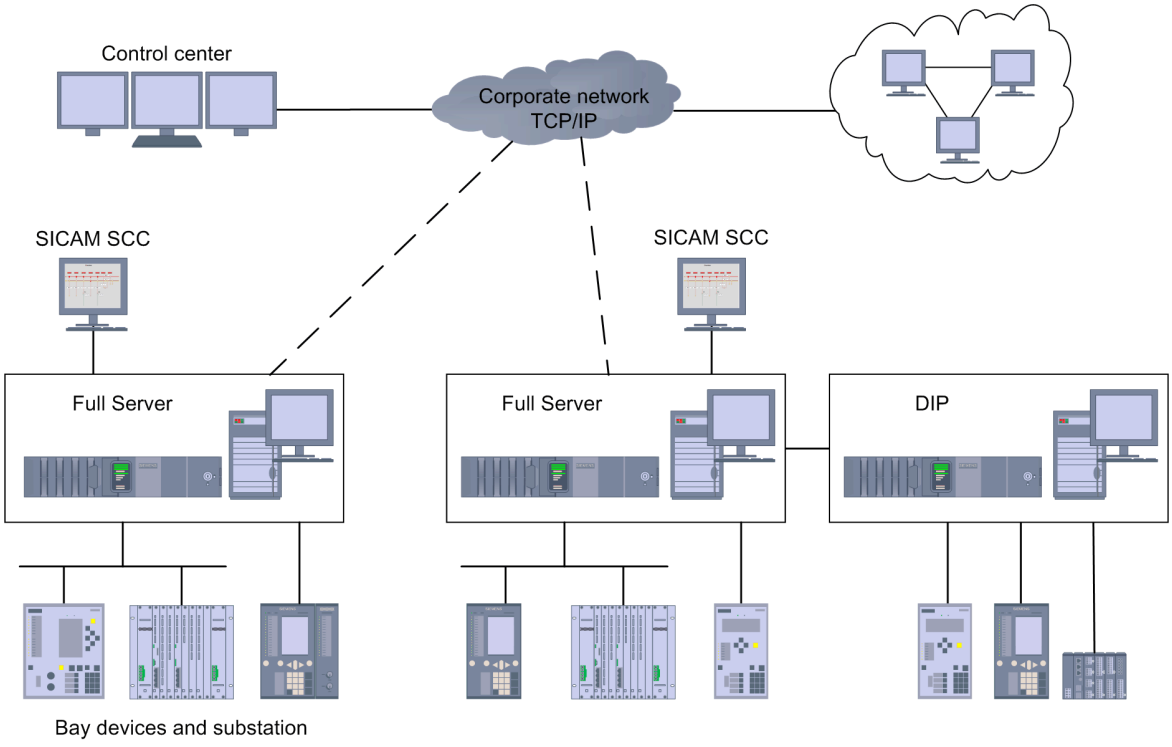
- Ethernet TCP/IP (LAN/WAN)
- Serial interfaces

SICAM PAS communicates with bay devices, protection devices, and substations through:

- Ethernet TCP/IP (LAN/WAN)
- Serial interfaces
- PROFIBUS interfaces

For a list of protocols, refer to *1.1.2 Communication Interfaces*.

The example below illustrates the connection of 2 SICAM PAS systems to a higher-level control center



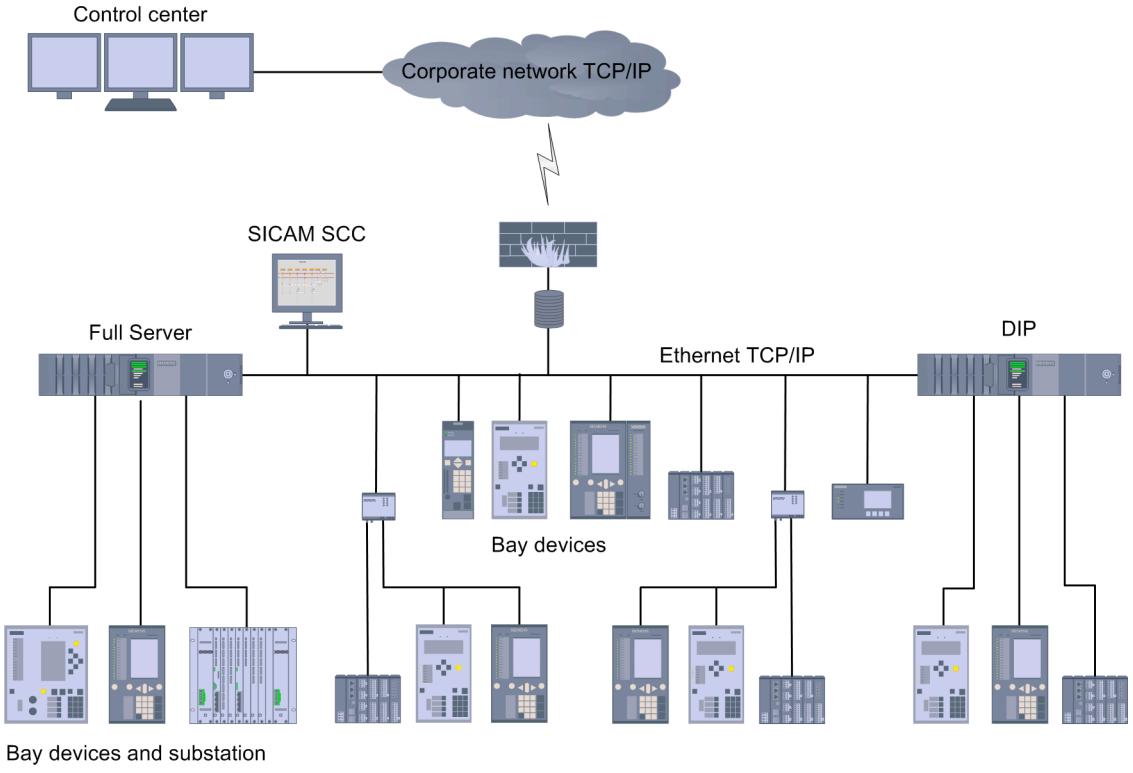
[dw_PAS_2_systems, 2, en_US]

Figure 1-1 Sample Configuration with 2 SICAM PAS Systems

Distributed System with Full Server and DIP

The example shows a distributed SICAM PAS system. It consists of a Full Server and DIP and communicates with a control center through TCP/IP. Bay devices and substations are connected to a distributed system through Ethernet and serial interfaces.

For more information on the protocols, refer to *1.1.2 Communication Interfaces*.



[dw_PAS_distributed_FS_DIP, 2, en_US]

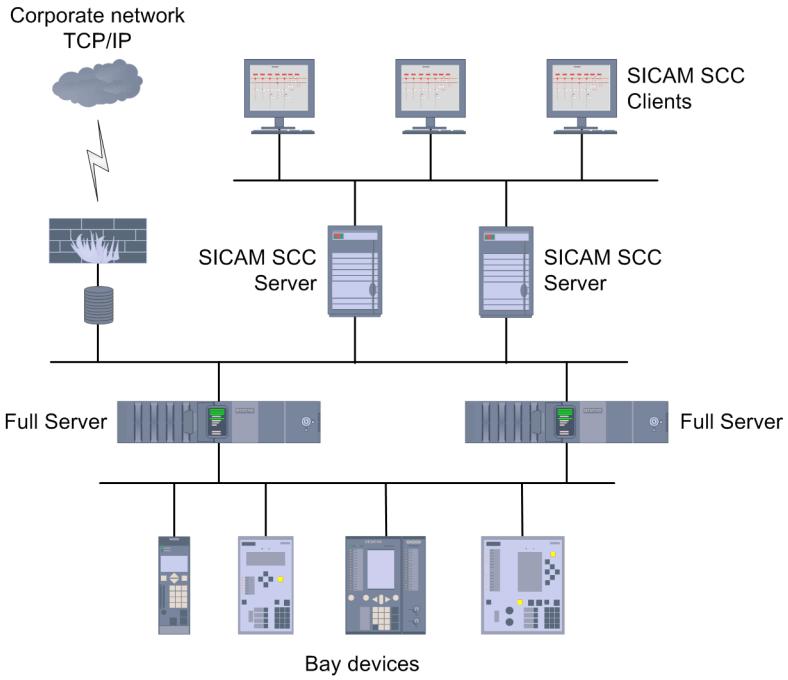
Figure 1-2 Example of a Distributed SICAM PAS System with Full Server and DIP

Redundant Connection of Bay Devices and Substations

SICAM PAS supports the redundant connection of bay devices and substations.

The following example illustrates the configuration:

- Redundant Full Servers
- Redundant SICAM SCC implemented in server/client architecture
- Connection of bay devices to 2 SICAM PAS stations



[dw_PAS_station_bus_config, 2, en_US]

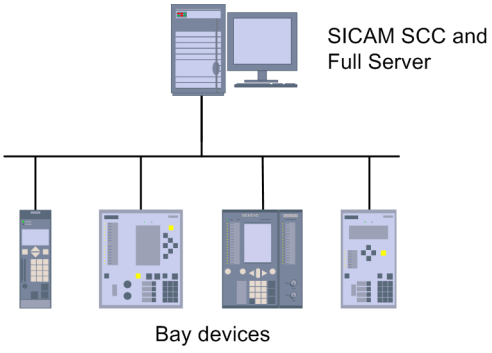
Figure 1-3 SICAM PAS Station Bus Configuration with Redundant Connection of the Bay Devices through a Switch and Redundant SICAM SCC in Server/Client Architecture

Bay devices with 2 interfaces are required for the redundant connection of bay devices with serial communication. Alternatively, bay devices equipped with 1 interface can be connected redundantly through a modem splitter.

For more information and examples for redundant connection options on the system, interface, and device levels, refer to */9/ SICAM PAS, Redundancy*.

Configuration for Small Applications

With systems comprising up to 80 bay devices and depending on the amount of data and the complexity of the automation and HMI functionality, you can operate SICAM PAS and SICAM SCC on the same computer.

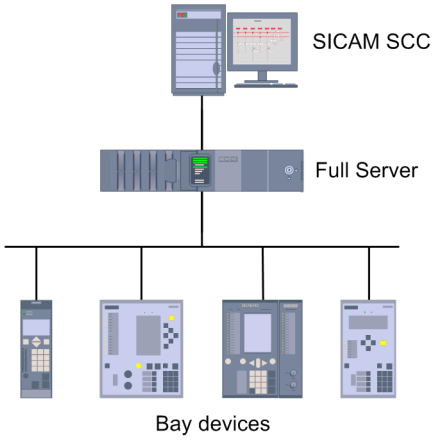


[dw_PAS_station, 1, en_US]

Figure 1-4 Connection of Bay Devices to SICAM PAS

Configuration for Medium Applications

If your station comprises more than approximately 80 bay devices, SICAM PAS and SICAM SCC must run on separate computers. The example below illustrates the connection of the bay devices to 1 SICAM PAS computer.



[dw_PAS_station_SCC, 2, en_US]

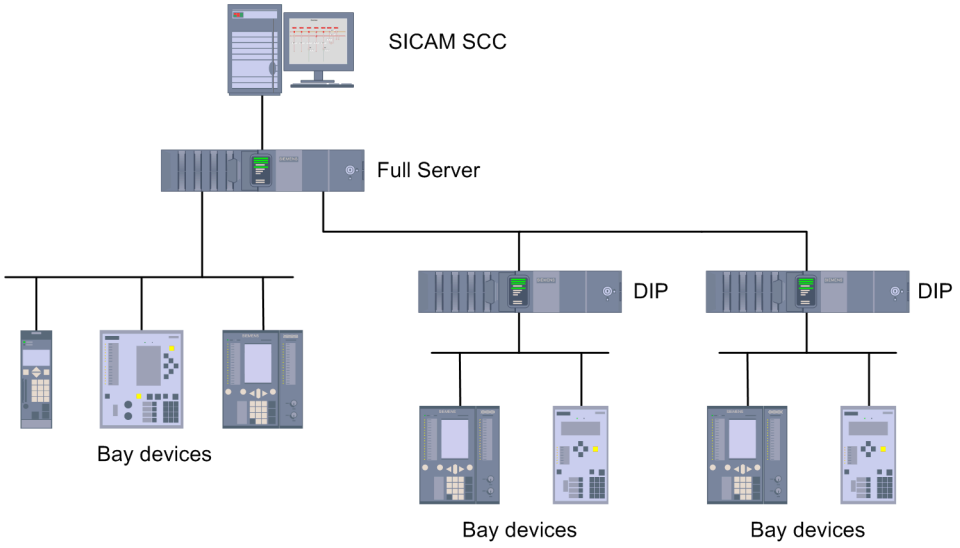
Figure 1-5 Connection of Bay Devices to a SICAM PAS Computer

Configuration for Large Applications

Up to 400 bay devices can be connected to 1 SICAM PAS Full Server.

In large appllications with up to 800 bay devices, SICAM PAS is implemented as a distributed system equipped with a Full Server and up to 2 DIPs.

SICAM SCC is installed on a separate computer.



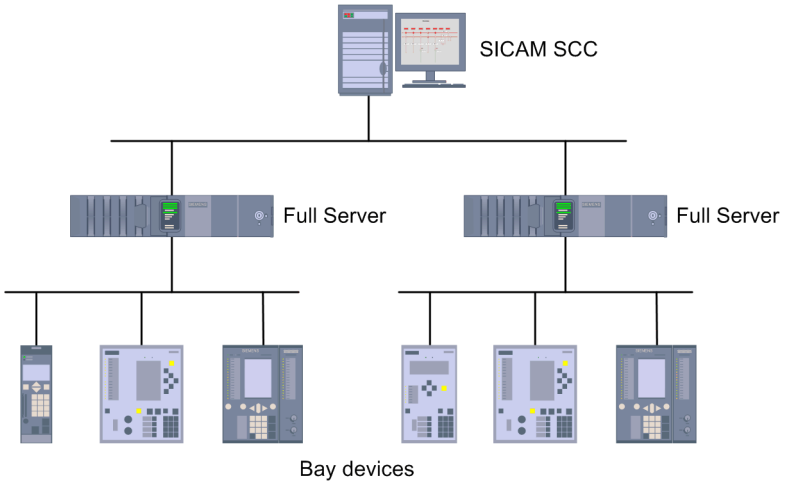
[dw_PAS_station_DIP_SCC, 2, en_US]

Figure 1-6 Connection of Bay Devices in a Distributed System

Several SICAM PAS Full Servers Connected to a Human-Machine Interface (HMI)

The following example illustrates a SICAM SCC Human-Machine Interface (HMI) with 2 SICAM PAS computers to which bay devices are connected.

This configuration makes sense in cases where no spatially distributed Human-Machine Interface and no fail-safe SICAM SCC are required.

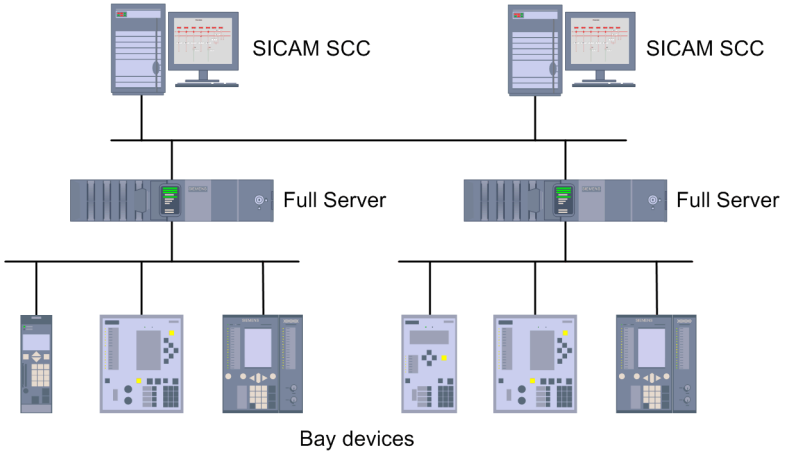


[dw_several_FS_same_SCC, 2, en_US]

Figure 1-7 Several Full Server Connected to the same SICAM SCC

Redundant Human-Machine Interface (HMI)

The connection of several Full Servers to a redundant SICAM SCC Human-Machine Interface represents another configuration option. This configuration enhances the system's operational reliability.

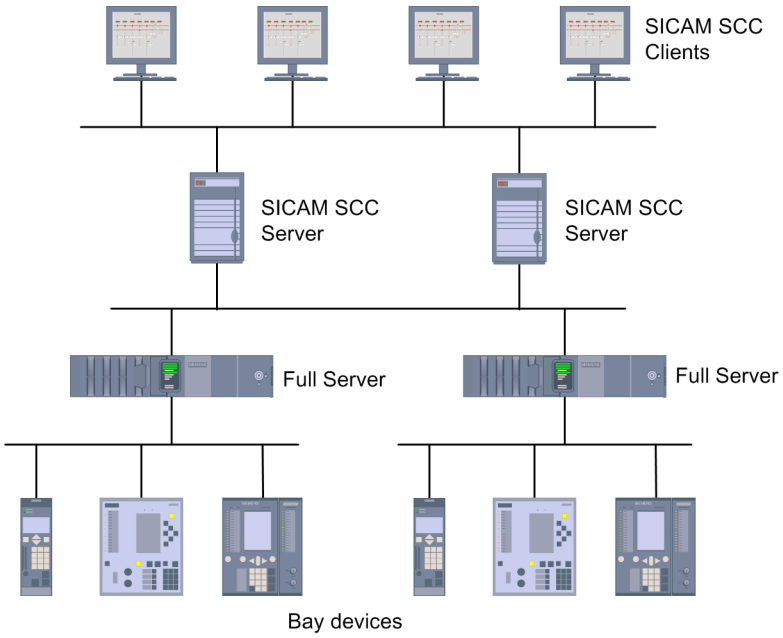


[dw_several_FS_redundant_SCC, 2, en_US]

Figure 1-8 Several Full Servers with Redundant SICAM SCC

Redundant Human-Machine Interface (HMI) in Server/Client Architecture

In large stations, it may be necessary to distribute station management tasks between several components. In such cases, you set up a SICAM SCC Human-Machine Interface in server/client configuration. The following example illustrates a redundant SICAM SCC comprising 2 Full Servers.



[dw_Redundant_FS_redundant_SCC, 2, en_US]

Figure 1-9 Redundant SICAM SCC with Redundant Full Server

2 Communication Interfaces

Overview

SICAM PAS supports you in the implementation of many versatile configuration options for connection to other systems and subsystems. The following subchapters provide an overview of the communication interfaces of the system.

2.1 General Information

SICAM PAS is a modularly structured system. It is open for the connection of the most versatile components, which exchange their process data based on state-of-the-art communication standards.

The following data exchange options are available:

- SICAM PAS with the SICAM SCC Human-Machine Interface (HMI) via Ethernet (TCP/IP)
- SICAM PAS with bay devices and substations
- SICAM PAS with higher-level control centers
- SICAM PAS with OPC DA servers such as the SIMATIC automation system
- SICAM PAS with OPC DA clients, for example, process visualization systems of other manufacturers
- SICAM PAS with systems with OPC XML DA clients

SICAM PAS allows the user to save events, fault records, PDR records, PQ measuring data and fault location information to an archive. The archive contents can be visualized and evaluated in the various views provided by the **SICAM PQ Analyzer** installed on the same or a different computer. With the SICAM PQ Analyzer **Collector** function, the archive can be transferred to a dedicated archive computer, and the (source) archives of several SICAM PAS systems can be combined to a (Collector) archive. In addition to the **Incident Explorer** view, where the fault records are displayed in chronological order, the **Event Viewer** shows the events and the **Fault Event Viewer** shows the fault events detected by SICAM PAS (that is several fault records from different protection devices captured in a predefined, tight time slot). In the **Incident Explorer**, the fault records are sorted into the (device) configuration tree or the (process) topology tree depending on the respective selection.

SICAM PAS can also integrate additional PQS functions for the evaluation of PQ measuring data. These include a connection option for third-party devices, which provide fault records or PQ measuring data and the automatic export of fault records (with file naming vonvention IEEE Std. C37.232-2011), messages during a fault (<=> fault log), reports, or PQ data.

The SNMP protocol allows you to monitor the communication links of the switches connected through Ethernet network. For more information, refer to *2.5 Network Monitoring through SNMP*.

In order to perform **asset monitoring** tasks, SICAM PAS provides an SNMPv3 agent which makes available asset information, for example, the product name, product version, as well as project-specific product applications, to an SNMP client.

In order to perform **security notification** tasks, SICAM PAS provides an SNMP agent to store security related logs, for example, start/stop of system componenets, modification in the archive (import records, import PQDIF, delete records, delete reports, add or edit traffic lights) available as information and traps for the SNMPv3 client. In addition, the spontaneous transmission of safety-relevant events is supported.

The licenses for the protocols and applications required for the connection of the different system components are also available individually and optionally complement the SICAM PAS basic license. The SNMPv2/v3 protocol, the OPC DA server, the communication with SICAM MIC RTUs (CP8000, CP8021/22) based on IEC 60870-5-104, as well as the fault record transmission from SIPROTEC 4 devices are included in the basic license. For more information on supply variants, refer to *4 Available Variants of System Components*.

Redundancy

The entire system, the interfaces, and the substation and device connections can be implemented in redundant configuration.

In case of failure of a component, the redundant component automatically takes over operation.

The process image of the redundant system is updated either continually or by means of a general request upon switchover. The type of updating depends on the type of communication links and the transmission protocol.

The type of communication link and the parameterization of the interfaces determine whether only the failed device is switched over in case of a failure (mode-independent) or whether all devices are jointly switched over to the redundant interface (mode-dependent).

Devices connected through TCP/IP allow the simultaneous establishment of several links. In case of a redundant connection, they can communicate independently through both interfaces.

Devices with 2 serial interfaces can also be connected to both interfaces and communicate independently.

Devices equipped with one single interface are connected to the redundant interfaces through a modem splitter. The device operates in dependent mode, that is, the driver of an interface communicates with the device in the command direction. The information in the monitoring direction is transmitted to both interfaces.

Isolating systems in in SICAM PAS UI – Operation Client provides you with two isolated redundant systems at runtime. It is used to change the configuration settings on the isolated redundant systems, without interfering in the communication between the control center and its redundant partners.

For more information on the redundant configuration of system components, refer to */9/ SICAM PAS, Redundancy*.

Security

SICAM PAS Secure Communication enables tap-proof data traffic via a TCP/IP connection between SICAM PAS and a control center or device. The asymmetrical TLS-based encryption method is used for this purpose.

In addition, an authentication procedure can be set up for DNP3i protocol in order to clearly determine the user's identity before executing critical tasks.

Secure communication is possible with the following communication protocols:

- DNP3i Master/Slave
  Both TLS conform to the IEC 62351-5 standard and authentication can be set up.
  DNP3 Slave Secure Authentication conforms to Secure Authentication SAv5 based on IEEE Std 1815-2012.
- IEC 60870-5-104 Master/Slave
  TLS conform to the IEC 62351-5 standard can be set up.
- IEC 61850 Client/Server
  TLS conform to the IEC 62351-4 standard can be set up.

For more information, refer to */8/ SICAM PAS/PQS, Security* and */24/ SICAM GridPass V1.30, Manual*.

Via the **SICAM PAS User Administration**, you can assign passwords in order to define which persons can access individual programs conform to the IEC 62351-8 standard. To this end, you assign different user roles, such as administrator, data engineer or operating personnel. For access authorization, you can either use Windows access rights or define your own SICAM PAS access rights.

Security related logs, for example, user login/logout, start/stop of system components, modifications in the archive (import records, import PQDIF, delete records, delete reports, add or edit traffic lights), are displayed in the **Windows Event Viewer** in the **PASSecurity** and **PQ Analyzer Security** folders.

Use **Syslog** conform to the IEC 62351-14 standard to collect the security related logs of the applications within a system on a syslog server.

Use **Enable security notification** to generate these security related logs of the applications within a system as traps to SNMP manager.

Safety-relevant events can also be transmitted to an SNMP client using the SNMP agent.

When installing SICAM PAS for the first time, Windows user groups are added to provide a role-based access control for the archive (**RBAC** conform to the IEC 62351-8 standard) to perform various operations for the archive data.

2.2 Communication with Bay Devices and Substations

SICAM PAS supports different protocols for the connection of bay devices and substations. The protocol licenses can be purchased and installed individually in order to complement the basic license.

Bay devices are connected through the following protocols:

- IEC 61850 Client, GOOSE status monitoring
- IEC 61850 Server, GOOSE Publisher
- IEC 60870-5-103 Master
- IEC 60870-5-104 Master
- IEC 60870-5-101 Master
- SICAM MIC Master
- DNP3 Master (serial, TCP/IP)
- Modbus Master (serial, TCP/IP)
- PROFIBUS DP Master
- PROFINET IO Master
- SINAUT LSA ILSA Master
- SIMEAS R Master (fault records and PQ data)
- SICAM Q80 Master (fault records and PQ data)
- SIPROTEC 4 Service IF Master (fault records only)

2.2.1 Connection Types

SICAM PAS supports the connection of bay devices and substations through:

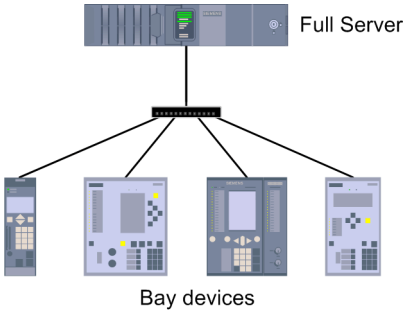
- Ethernet TCP/IP
- Serial interfaces
- PROFIBUS DP

The connection can be realized electrically and through fiber-optic cables.

The type of bay device or substation connection depends on the interface type of the devices or substations. The industrial PC is equipped with an RS232 interface.

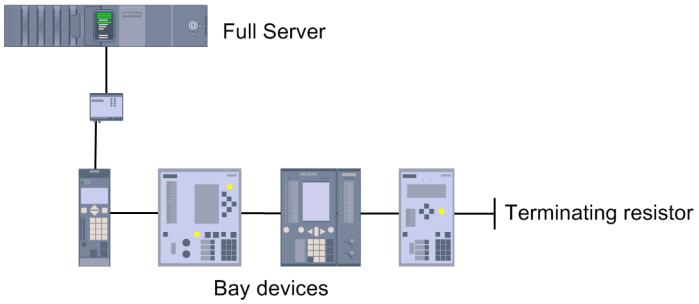
Numerous options are possible for the connection of devices with serial interfaces:

- Interface extension through
  - the optional interface card of the industrial PC is equipped with 8 interfaces
  - the COM Expander equipped with 4, 8, 16, or 32 serial interfaces
- Serial connection, distributed, to an Ethernet LAN with serial hubs, equipped with 4 or 8 serial interfaces
- Connection through RS232 - RS485 converter
- Connection through star coupler (7XV53, 7XV545)



[dw_Bay_device_serial232_hub, 2, en_US]

Figure 2-1 Connection of Bay Devices with Serial RS232 Interface through Serial Hub



[dw_Bay_device_serialRS485_hub, 2, en_US]

Figure 2-2 Connection of Bay Devices with Serial RS484 Interface through Serial Hub

The redundant connection of the bay devices and substations to SICAM PAS enhances transmission reliability. For more information, refer to *2.1 General Information* and */9/ SICAM PAS, Redundancy*.

The following subchapter describes examples for the different connection options.

For more information on modem operation, refer to the IEC 60870-5-101 protocol.

2.2.2 Protocols

IEC 61850

The communication standard for the IEC 61850 station bus is based on Ethernet TCP/IP.

The optional use of TLS (Transport Layer Security) provides additional security during data transmission.

IEC 61850 defines the communication and the exchange of configuration data between bay devices and substations from different manufacturers. Based on the IEC 61850 GOOSE mechanism, bay devices can directly exchange data - independently of the operating state of the substation controller. This cross communication enables for example, the implementation of bay-independent interlocks on the device level.

The state of the IED GOOSE server can be monitored via SICAM PAS and visualized via the SICAM PAS UI – Operation Client Web user interface without the need for additional engineering.

The IEC 61850 Server – GOOSE Publisher enables the transmission of data from other station components (for example, devices connected via IEC 60870-5-103, -101, ...) or from the SoftPLC (Automation) to the IED GOOSE server.

Depending on the project requirements, the IEC 61850 station bus based on Ethernet TCP/IP can be realized in different configurations:

- Star configuration, electrical variant
- Ring structures, optical variant
- Combination of star and ring structures
- Redundant LAN with seamless operation (Parallel Redundancy Protocol – PRP)

Through their integrated communication modules, SIPROTEC 4 and SIPROTEC 5 devices can be incorporated directly into an Ethernet ring. External switches are not required.

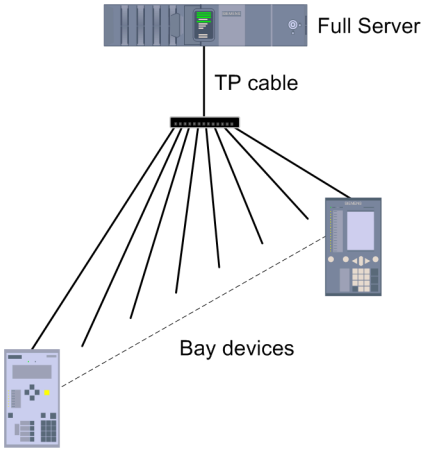
In a ring structure, a redundancy mechanism (Rapid Spanning Tree Protocol – RSTP, High-availability Seamless Redundancy – HSR) ensures that the communication to the devices is maintained even in case of a communication interruption in a ring segment or in case of failure of a device in the ring.

For the connection of other devices to this ring, for example, an industrial PC or third-party devices, Siemens recommends the use of switches manufactured by Siemens, Scalance/Ruggedcom or Hirschmann. The switches used in ring structures must originate from the same manufacturer.

The following paragraphs explain the principal communication configurations for the IEC 61850 connection.

The following connection type is used for stations in which SICAM PAS and the devices connected through a switch are located close to each other.

The connection of the bay devices to a switch can be realized either electrically or through FO. For an electrical connection, shielded copper Twisted Pair (TP) cables are required. The cable between the switch and the device must not exceed 20 m in length.

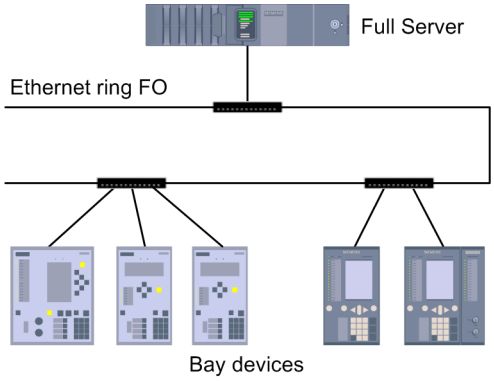


[dw_IEC_61850, 2, en_US]

Figure 2-3 IEC 61850 Connection Example

If larger distances have to be overcome or if a larger number of devices have to be connected, the configuration shown below should be considered.

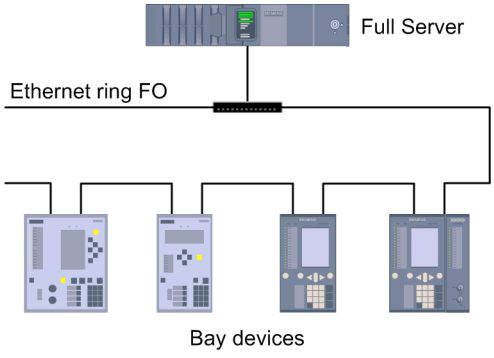
The example below illustrates the connection of bay devices to an Ethernet ring through switches.



[dw_IEC_61850_Ethernet_ring, 2, en_US]

Figure 2-4 IEC 61850 Connection Example to an Ethernet Ring through Switches

The example below illustrates the direct connection (without additional switches) of SIPROTEC 4 and SIPROTEC 5 devices which are equipped with Ethernet communication modules.



[dw_SIPROTEC_devices, 2, en_US]

Figure 2-5 Connection Example – SIPROTEC 4 and SIPROTEC 5 Devices

IEC 60870-5-103

The IEC 60870-5-103 protocol is supported by the protection and bay devices of numerous manufacturers. For example, SIPROTEC devices, SICAM T, SICAM P850/855, or transformer controllers manufactured by Eberle or Reinhausen can be connected to SICAM PAS.

The connection to SICAM PAS is performed through serial interfaces with baud rates up to to 38 400 baud.

IEC 60870-5-104

The IEC 60870-5-104 protocol is used for the connection of bay devices and SICAM PAS at the station level using Ethernet TCP/IP.

The optional use of TLS (Transport Layer Security) provides additional security during data transmission.

Connection options are illustrated in *Figure 2-3* and *Figure 2-4*.

IEC 60870-5-101

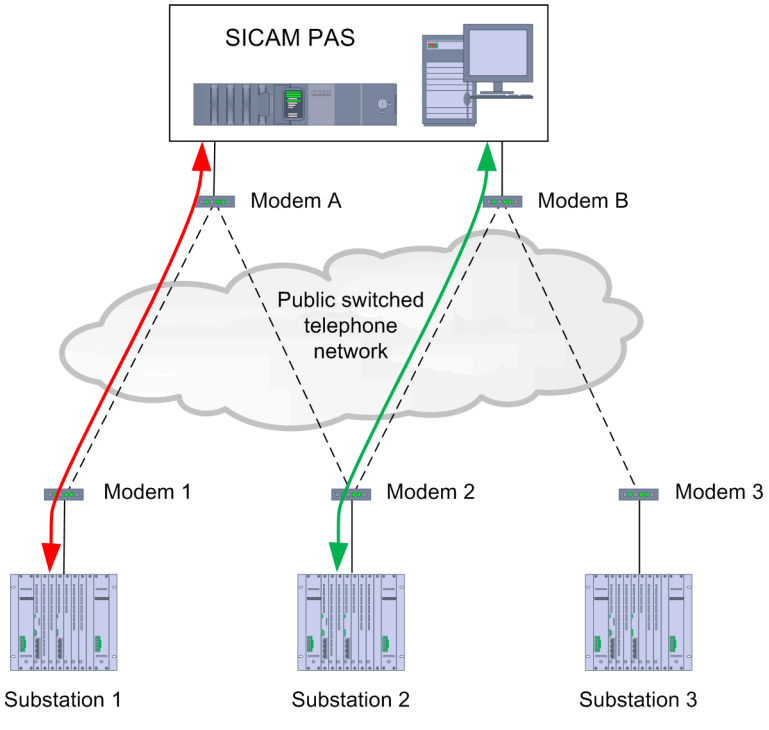
The IEC 60870-5-101 protocol is used for the connection of substations to SICAM PAS through a serial COM port or a modem connection.

The connection through a **COM port** with baud rates of up to 56 700 baud allows the operating modes **balanced** for point-to-point configuration and **unbalanced** for line operation with up to 16 substations.

Modems (IAWD, analog, ISDN, GSM dial-up mode) with the capability of being staggered enable line operation with baud rates up to 9600 baud.

If a modem is busy communicating with another substation or if a modem has failed, a configured spare modem automatically takes over the communication.

In the following example, modem B is configured as a spare modem for substation 2. For the 2 other substations, no spare modem is defined. While modem A is communicating with substation 1 and is blocked for the communication with substation 2, the connection to substation 2 is established via the spare modem B.



[dw_Substation_modem, 2, en_US]

Figure 2-6 Substation Connection through Modems, Example

Siemens recommends the use of INSYS modems.

DNP3

The DNP3 protocol is used for the connection of bay devices and substations to SICAM PAS through Ethernet TCP/IP or serial interfaces with baud rates up to 19 200 baud.

The optional use of TLS (Transport Layer Security) and authentication provides additional security during data transmission. TLS can only be used if DNP3 protocol is communicating through Ethernet TCP/IP.

Modbus

The Modbus standard is used in the field of automation engineering and supported by distributed I/Os.

The communication can be performed through Ethernet TCP/IP or serial interfaces with baud rates up to 38 400 baud.

PROFIBUS DP

The PROFIBUS DP bay bus standard is frequently used in the field of automation engineering and supported by distributed I/Os.

The devices equipped with a PROFIBUS DP interface (DPV0), such as SIMEAS P, ET200, or SIPROTEC 4 devices, can be connected to SICAM PAS.

For the connection of PROFIBUS DP devices, Siemens recommends the use of PROFIBUS components manufactured by Siemens (for example, OLM for fiber-optic connections).

PROFINET IO

The PROFINET IO bay bus standard is used in the field of automation engineering and supported by distributed I/Os.

The devices equipped with a PROFINET IO interface, such as ET200, can be connected to SICAM PAS.

The following applies for the connection to SICAM PAS:

- A separate Ethernet module must be used for PROFINET IO.
- The PROFINET configuration is configured using the TIA Portal (≥ SIMATIC Step7 V13 SP1).
- The XML file exported via the TIA Portal is imported using SICAM PAS UI – Configuration.

SINAUT LSA ILSA

If the bay devices (I/O devices, protection devices) communicate through SINAUT LSA ILSA Master, the following technical features are relevant:

- Communication through serial interfaces
- DIN 19244 or IEC 60870-5-1/2 link layer type
- Baud rates of up to 115 200 Baud

SIPROTEC 4 Service IF

Communication with SIRPOTEC 4 devices through their service interface for fault record transmission.

SIMEAS R / SICAM Q80

The communication data for devices for the acquisition and processing of PQ data are included in */2/ SICAM PQS, Overview*.

2.3 Communication with the Control Center

SICAM PAS supports different protocols for the communication to up to 5 higher-level control centers. The protocols can be purchased and installed as individual options complementing the basic package.

The following protocols can be used for communication with higher-level control centers:

IEC 61850 Server

- Communication through Ethernet TCP/IP:
  - Certificates (TLS) for additional security during data transmission
- Transmission of fault records from IEC 61850 devices
- Transmission of asset information from IEC 61850 and SNMP devices

IEC 60870-5-101 Slave

- Communication through serial interfaces:
  - Double-channel connection (main/backup)
  - Balanced modes for point-to-point configuration
  - Unbalanced mode for line configuration
  - Baud rates of up to 128 000 baud
  - Communication through X21/V35 balanced, at 64 000 baud

IEC 60870-5-104 Slave

- Communication through Ethernet TCP/IP:
  - Multi-channel connection on the link layer level
  - Certificates (TLS) for additional security during data transmission

DNP3 Slave (Serial, TCP/IP)

- Communication through Ethernet TCP/IP (DNP3i):
  - Certificates (TLS) for additional security during data transmission
  - Authentication
- Communication through serial interfaces:
  - Multi-channel connection on the link layer level
    Double-channel connection
  - Baud rates of up to 19 200 baud

Modbus (Serial, TCP/IP)

- Communication through Ethernet TCP/IP
- Communication through serial interfaces:
  - Baud rates of up to 38 400 baud

Telegyr 8979 Slave

- Communication through serial interfaces:
  - Double-channel connection
  - Baud rates of up to 19 200 baud

CDT Slave

- Communication through serial interfaces:
  - Baud rates of up to 38 400 baud

The redundant connection of your station to the control center enhances transmission security. If a link fails, the other link takes over the exchange of information without any loss of information. For more information, refer to *2.1 General Information* and */9/ SICAM PAS, Redundancy*.

The combination of a redundant and a double-channel connection is not supported.

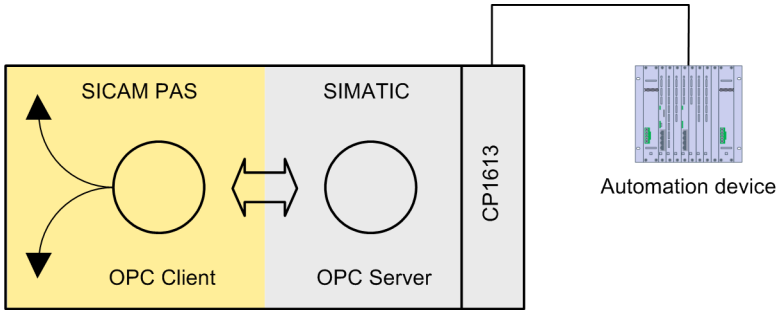
2.4 OPC Communication

OPC Client

Through the OPC Client component, your SICAM PAS system can exchange data with any OPC Server. Either of the following configurations is possible:

- The OPC Server and OPC Client communication partners are installed on the same computer
- The OPC Server is installed on another computer connected to SICAM PAS via Ethernet.

This open communication can be used especially for the data exchange with automation devices.



[dw_Data_exchange_OPC_server_OPC_client, 1, en_US]

Figure 2-7 Example for the Data Exchange Between the OPC Client and the OPC Server

In the example above, a SIMATIC S7-400 is connected to SICAM PAS via Ethernet by means of the CP1613 communication processor.

The communication between the SIMATIC S7-400 and the CP1613 is based on the S7 protocol. Through a SIMATIC OPC Server, the CP1613 communication processor exchanges process data with the SICAM PAS OPC Client.

OPC Server

Through the OPC Server component included in the standard scope of delivery, your SICAM PAS system can communicate with any OPC Client. This allows you, for example, to connect any process visualization system equipped with an OPC Client.

OPC XML DA Server

The OPC XML DA Server enables the secure exchange of structured information through Internet (HTTPS). The data exchange between SICAM PAS and a control center is performed through the Microsoft Web-Server MS IIS (Microsoft Internet Information Service). The OPC XML DA Client of the control center can be installed on any operating system.

2.5 Network Monitoring through SNMP

Nowadays, most networks implemented for the interconnection of control systems are based on the Ethernet communication standard. Intelligent network structures implemented in switching technology provide the basis for real-time data transmission. Redundant structures of the network and the components used can significantly improve the availability of the overall system, because failures of individual components can be compensated. Features for speedy and uncomplicated fault detection and for immediate fault signalling are nevertheless required.

In the Ethernet network, the SNMP monitors the following:

- Communication links to the system components connected
- Switches for the connection of system components

The SNMP protocol is based on UDP/IP.

The monitoring parameters are defined in SICAM PAS. The information of the SNMP application is processed like any other process information. It can be forwarded to higher-level control centers or SICAM SCC. Group indications can be formed from individual failure indications, for example, port failure or redundancy failure.

If the Ethernet components are monitored through SNMP, up to 100 devices can be connected to a Full Server or DIP with an interrogation cycle of 60 secs.

3 Overview of Functions

Overview

This chapter provides you with an overview of the individual components and functions of SICAM PAS.

3.1 Overview

SICAM PAS has been designed as a modular system with open communication interfaces. It meets the requirements of state-of-the-art substation control and protection systems and of the power management systems required for industrial manufacturing plants.

This chapter provides an overview of the individual components of a SICAM PAS system and their specific tasks.

- **SICAM PAS UI – Configuration**
  Configuration and parameterization of SICAM PAS
- **SICAM PAS UI – Operation**
  Operation of the SICAM PAS
- **SICAM PAS UI – Operation Client**
  Operation of the SICAM PAS on a web-based browser
- **SICAM PAS Value Viewer**
  Test and diagnostic functions
- **Automation** functions
- **SICAM PAS User Administration**
  Definition of user rights
- **ALM**
  Activation of the individual components
- **SICAM SCC**
  Human-Machine Interface (HMI)
- **SICAM Valpro**
  Evaluation of archived measured values
- **SICAM PQ Analyzer – Incident Explorer**
  Evaluation of fault records and PDR records
- **SICAM PQ Analyzer – Fault Event Viewer**
  Display of the selected fault event and the associated fault records
- **SICAM PQ Analyzer – Event Viewer**
  Display of a list of events
- **Version Scan**
  Display of the versions of the system components
- **SICAM CHaSI**
  Collection of information about the used hardware and software

Complementary to the above-mentioned components, *3.14 Station Control Functions* provides useful information regarding substation control functions such as:

- Switching authority
- Bay blocking
- Telecontrol blocking
- Substitute (manual updating)
- Time synchronization
- Fault recording
- PDR records

3.2 SICAM PAS UI – Configuration

The SICAM PAS UI – Configuration system component is used for performing the following functions:

- Configuration of your station
- Exchange of configuration data

3.2.1 Configuration and Parameterization

The clearly structured configuration interface provides you with a comprehensive overview of the station parameters.

Individual elements of the user interface can be displayed in a customized manner or hidden. For example, table columns, which are permanently required can be fixedly attached to the individual view; columns which are not needed can be hidden. The settings are also maintained after a restart of the program.

Import and export functions enable the exchange of configuration data. This reduces the expenditure and error sensitivity during the configuration and parameterization of a station.

By means of conversion routines, project data from a SINAUT LSA station or data generated with previous versions of SICAM PAS UI – Configuration can be further used.

Predefined device templates, sorting and filter options, copy functions, and the editing of parameters using MS EXCEL provide for increased transparency and flexibility and thus for more convenient parameterization.

Station-specific automation functions are configured through a graphical interface. You can use both standard logic functions and automation blocks specifically developed for the implementation of your power automation tasks.

Your parameter entries are immediately checked for plausibility.

Tooltips provide information on permissible values and the value range of a parameter. Explanations on the selected parameter are provided in an information field.

The cause of an adjustment error is displayed in the error field.

In addition, you are supported by a context-sensitive online help.

It is not necessary to explicitly generate the configured and parameterized data for the runtime environment.

The Station Documentation function enables you to create a documentation for your project. To do this, you can select between different selection criteria, for example, selection according to individual views (Configuration, Mapping, and Topology) or mapped values only. Specific areas of a selected view can be printed out, for example, the mappings of individual devices or of a control center connection.

The project statistic provides an overview of the volume and use of the information defined through parameters.

SICAM PAS UI – Configuration structures the parameters in the following views:

- Configuration
- Mapping
- Topology
- Templates

You can configure specific Power Quality functions in the **Reports** and **Grid Codes** views. For more information, refer to */2/ SICAM PQS, Overview* and */13/ SICAM PQ Analyzer*.

3.2.1.1 Configuration

In this view, you specify the components, which your SICAM PAS system consists of. These include:

- **Systems**
  - Full Server
  - DIP

- **Applications**
  - IED protocol
  - Control center interface
  - Connection of a SINAUT LSA
  - SICAM SCC Human-Machine Interface (HMI)
  - Automation with SoftPLC
  - OPC
  - Network Monitoring via SNMP
  - Archive
  - Power Quality processing functions
- **Interfaces**
  - Serial interfaces
  - Ethernet TCP/IP
  - PROFIBUS
- **Devices/Control Center**

  Bay and protection devices, transformer tag changers, distributed I/Os, PQ devices, and control centers
- **List**

  Transmission list, for example, general request list, request list, user-defined list, or periodic list.

  For control centers and substations, you configure one or several transmission lists. In the **Mapping** view, you assign these lists the items of information to be transmitted.

  Depending on the transmission protocol, you can also create one or several device lists. These lists describe protocol-specific parameters, including the Freeze mode for measured and metered values or trigger options.

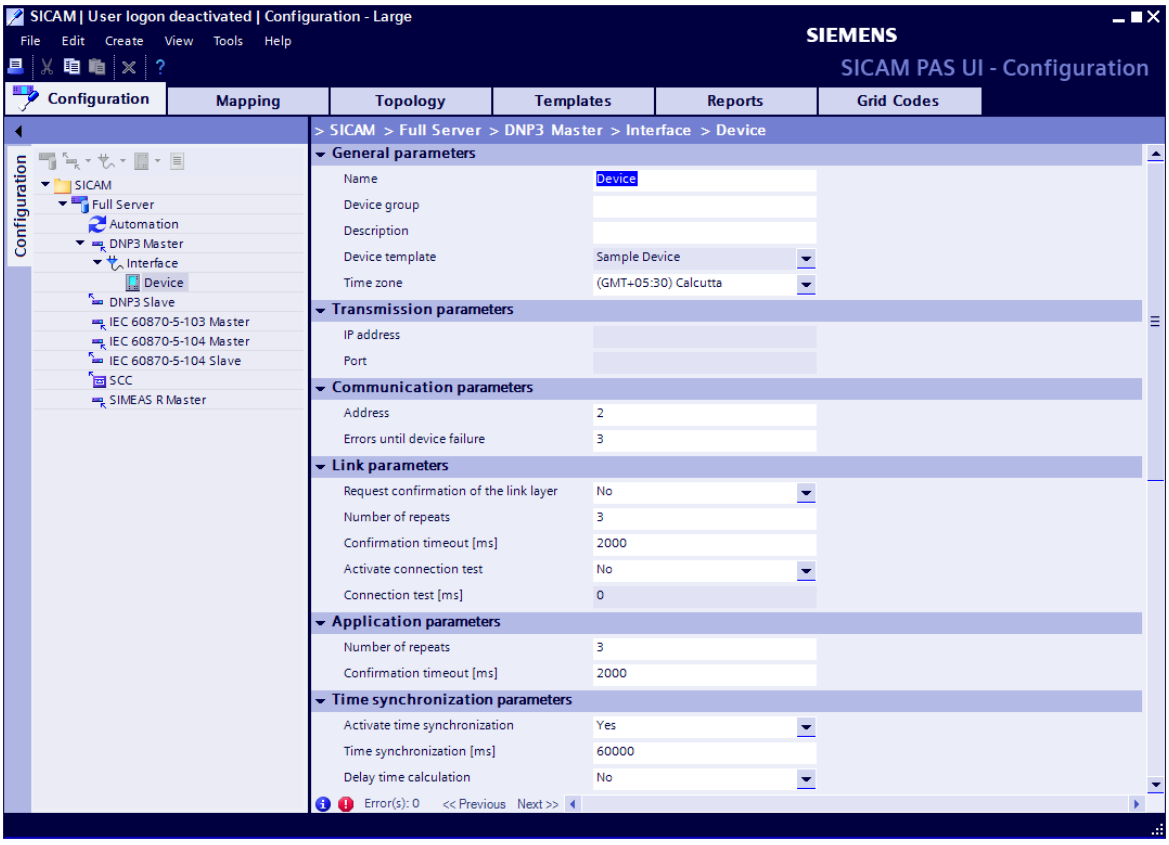
  Use the **SNMP** component for monitoring your Ethernet connections. For the corresponding devices (switches), insert the **Port Failure** and/or **Redundancy Failure** lists.

  If an interruption of the connection has been detected, you now select the items of information for which a message must be forwarded through these lists in the **Mapping** view.

The configured components are represented in a tree structure, the parameters of the selected component are displayed in the input area.

Additionally, a description of permissible setting options is displayed for the parameter currently selected.

Erroneous inputs are marked and explained in an error field.



[sc_SICAMPAS_Configuration, 2, en_US]

Figure 3-1 SICAM PAS Configuration

Creating a Project

You have the following options to create a new project:

- With **New**, you create an empty project.
- With **New from template**, an existing project is dearchived and used as a template. SICAM PAS assigns new internal identifications, the original project remains unchanged and can be used for further processings.

Archiving/Dearchiving

The archiving and dearchiving of project data is initiated in the **Configuration** view. When creating a new project, you can decide whether the current project shall be archived before it is overwritten by the new project.

You also use these functions in order to exchange configuration data between redundant systems.

Import

When inserting individual components, it is often possible to accept data already specified. For example, these import functions can be used for bay devices, substations, and for the integration of SINAUT LSA stations.

Export

In the **Configuration** view, you export parameterized information in order to make it available to other system components.

Afterwards, higher-level control centers or the SICAM SCC HMI can import this data. The information is then available for system management. It can be indicated, controlled, manually updated (substituted), or archived.

Importing/Exporting Mappings

For devices based on the IEC 61850 protocol, the import comprises the entire volume of available information. If you do not need all this information, you select the required items of information in the **Mapping** view. You can export this selection and import it into other devices for which you use the same information. This function helps you to minimize the parameterization expenditure for your station.

Station Documentation

The Station Documentation function enables you to create documentation for your project. To do this, you can select between different selection criteria, for example, selection according to individual views (Configuration, Mapping, and Topology) or mapped values only.

Print

The Print function allows you to specifically print out the configuration and parameterization of the currently selected component, such as interface parameters, device connection data, or the structure of configured components.

Project Statistic

The project statistic analyzes the configuration of your project and displays a summary of the following project data:

- Total number of devices and control centers
- Total number of data points for Master applications
- Total number of data points for Slave applications
- Total number of data points used, but not mapped
- Total number of license-relevant data points.

For each level of the configuration tree, the project statistic shows you how many items of information are available and mapped and how many items of information are not used.

3.2.1.2 Mapping

In this view, you can select which information relating to inserted devices and substations shall be used in your station, which information shall be transmitted to the control center, and which information shall be used by SICAM SCC for station management.

Here you can select whether an individual item of information shall be transmitted despite a telecontrol or bay block, whether the switching authorization shall be checked upon a command output or whether a command is subject to “M of N” checking. On the project level, you can select how many commands can be sent simultaneously.

For the interface to higher-level control centers, you must define all related telecontrol addresses, the list assignment, and protocol type-specific parameters such as command monitoring times in this view.

For the interface to the SICAM SCC HMI, you must select all information, which must be available for alarming, display, and controlling. All the information selected for Alarm Logging is logged in the alarm list. Measured and metered values, which you select for the archive system are archived and can be evaluated for example, using SICAM Valpro. All information available in the Tag Management can be used in graphical representations, including overview diagrams, station diagrams, or control diagrams.

If you have mapped the items of information to SICAM SCC before creating the topology, you must have the tag names updated in order to ensure that the current topological designations are available for the design of your station's Human-Machine Interfaces.

For individual items of information, you define whether you want an automatic notification to be sent by an e-mail or SMS as soon as their state has changed.

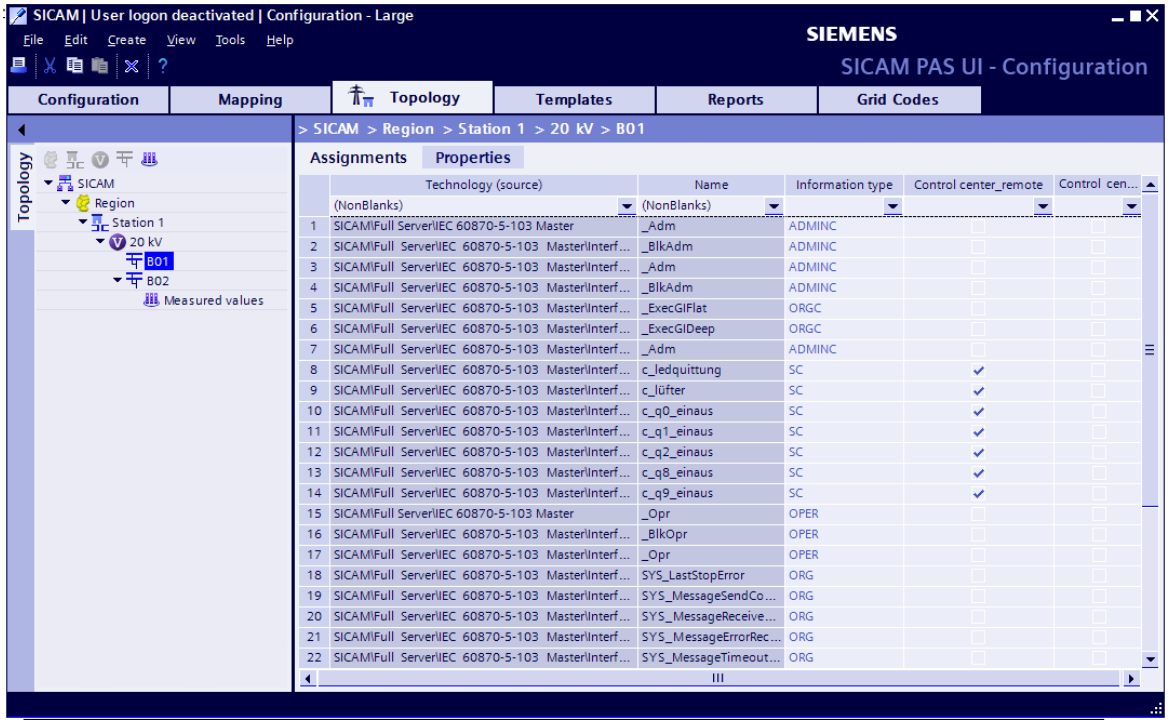
For the DNP3i protocol, you assign the individual commands to users with the required switching authorization.

For the SNMP Ethernet monitoring application, you must specify for each network address whether a message must be created as soon as the switch has detected a connection problem.

For documentation purposes, you can print out the mappings of device information or the mappings to the control center. To do this, select the mapping in the monitoring or command direction and then start the print job.

3.2.1.3 Topology

While the **Configuration** view focuses on your station's communication requirements, you can create a system view focusing on the primary technological topology in the **Topology** view.



[sc_StationTopology_SelectingInfo, 2, en_US]

Figure 3-2 SICAM PAS Topology, Example of Information from the SICAM PAS Station

To define the switching authority on the device level, you can implement your station's configuration structure into a topological structure through menu commands. The topological structure created already includes all related information on each level.

To create another topological view, you create structural levels such as Region, Station, Voltage Level, Bay, and also user-defined groups. Afterwards, you assign these structural levels the corresponding items of information.

Numerous filter options assist you in the assignment of information. For example, you can filter information types, names, or the assignment to a control center and then drag and drop this selection to the corresponding structural level.

In addition, it is also possible to copy a device in the **Configuration** view and insert it into the topological structure on any level.

Information can be freely moved between the structural levels. Structure elements can also be moved, the permissibility of the assignment to the destination structural levels is verified during this step.

Furthermore, you can define a specific switching authority for each structural level. By linking this information to the tags in the graphical representations in SICAM SCC, this station component is assigned the Local x or Remote x switching authorization.

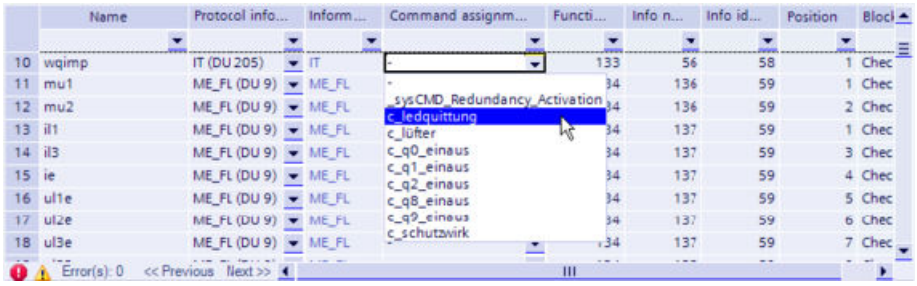
In order to be able to determine the network quality, the structural levels must be assigned one or several Grid Codes.

On the project and bay level, you define the line data for the Automatic Fault Location Power Quality function.

The topological structure of your station can be printed out for documentation purposes. To do this, select the corresponding area, such as the structure or information, and start the print job.

3.2.1.4 Templates

Using the templates in the **Templates** view, you can define device-specific and project-specific device templates and also templates for the normalization of information.



[sc_MappingInfo_DeviceTemplate_Ex, 4, en_US]

Figure 3-3 SICAM PAS Templates, Example

A sample device for each protocol is included in the scope of delivery of SICAM PAS UI – Configuration. Furthermore, you can create your own device descriptions or normalization templates. You can assign project-specific information names and addresses or specify command execution times, the assignment of commands and command feedbacks or the type of information.

The **Copy/Paste** function is an efficient way to modify the existing device templates or the normalization templates.

Furthermore, the configuration system allows you to copy information or areas of information into MS Excel in order to modify them and transfer them back.

Various devices are available by default for the connection of the SNMP Ethernet monitoring component. You can use them as templates. By means of the _SnmpSystemDevice, connection problems can be grouped to group indications.

With the DNP3i, IEC 60870-5-104, and IEC 61805 protocols, data can be transmitted in secured mode. To use this option, insert the required certificates in the **Templates** view under **Certificates**. Afterwards, you can perform the protocol-specific security parameterizations for the interfaces and devices in the **Configuration** view.

All device templates can be printed out. To do this, select the required information in the monitoring or command direction and then start the print job.

3.2.2 Formula-based Device Configuration

By the means of a formula, you copy the configured device and its redundant (interface and system) devices including its properties, mappings, topology assignments, and the list and create definable quantities of the device with unique names (case-insensitive). During copying control center mappings, the control center mappings and the topology assignments of the selected device are copied to all devices of the same device group. During updating, the properties of the devices are updated collectively with respect to the selected device.

To configure the devices using a formula, perform the following functions:

- **Paste Multiple Objects**
  The purpose of this function is to create a definable quantity of copies of a configured device.
- **Copy Control Center Mappings**
  The purpose of this function is to implement the mappings from the desired device to the selected devices in the same device group.
- **Update Multiple Objects**
  The purpose of this function is to select the base device and update all the devices, which belong to the same device group.

For more information, refer to */4/ SICAM PAS/PQS, Configuration and Operation*.

3.2.3 Exchanging Configuration Data

You can import configuration data for devices and substations parameterized through DIGSI or Toolbox II, SICAM Webmic into SICAM PAS UI – Configuration. Subsequent changes to the volume of information or the parameterization of imported project data can be updated simply.

Station data parameterized in SICAM PAS UI – Configuration can be exported for further use in higher-level control stations or SICAM SCC.

Afterwards, the data for SICAM SCC is imported by the SICAM PAS Wizard and used for the generation of the Human-Machine Interface of your SICAM PAS system.

If your SICAM PAS system works as an OPC Client, you can transfer data from the corresponding OPC Server. In the OPC Browser, you select the items of information to be used from the available volume of information.

Depending on the level on which an import or export is executed, configuration data is exchanged in different formats.

3.3 SICAM PAS UI – Operation

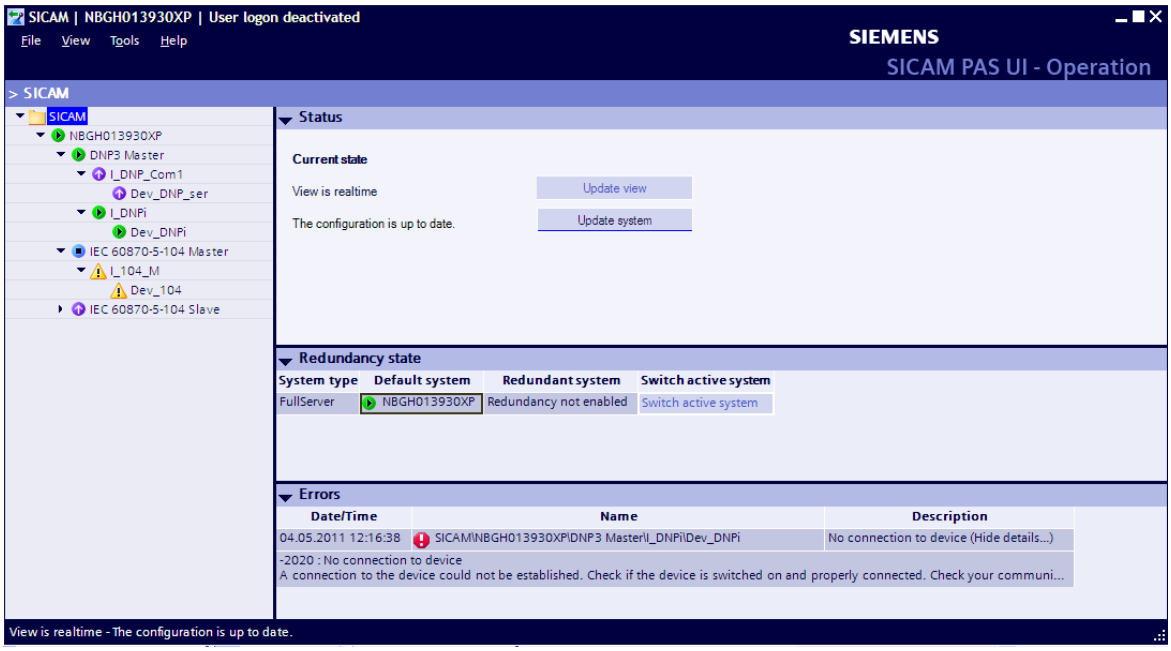
SICAM PAS UI – Operation provides you with an overview of the runtime status of your station. The configuration is displayed in the tree structure. The different colors show the status of interfaces, devices, or other applications.

In the **Status** data area, you can:

- Activate the component selected in the tree structure
- Deactivate the component selected in the tree structure
- Set a bay block
- Set a telecontrol block
- Update device information

In redundant systems, you can see which component is active in the **Redundancy state** data area. In this area, you can also switch over components, for example, interfaces.

In the **Errors** data area, the diagnostic function provides useful notes on sources of error, which might have caused a pending fault. Potential causes include communication faults or missing licenses. For the interpretation of these notes, it is essential to consider the current operating state of your system.

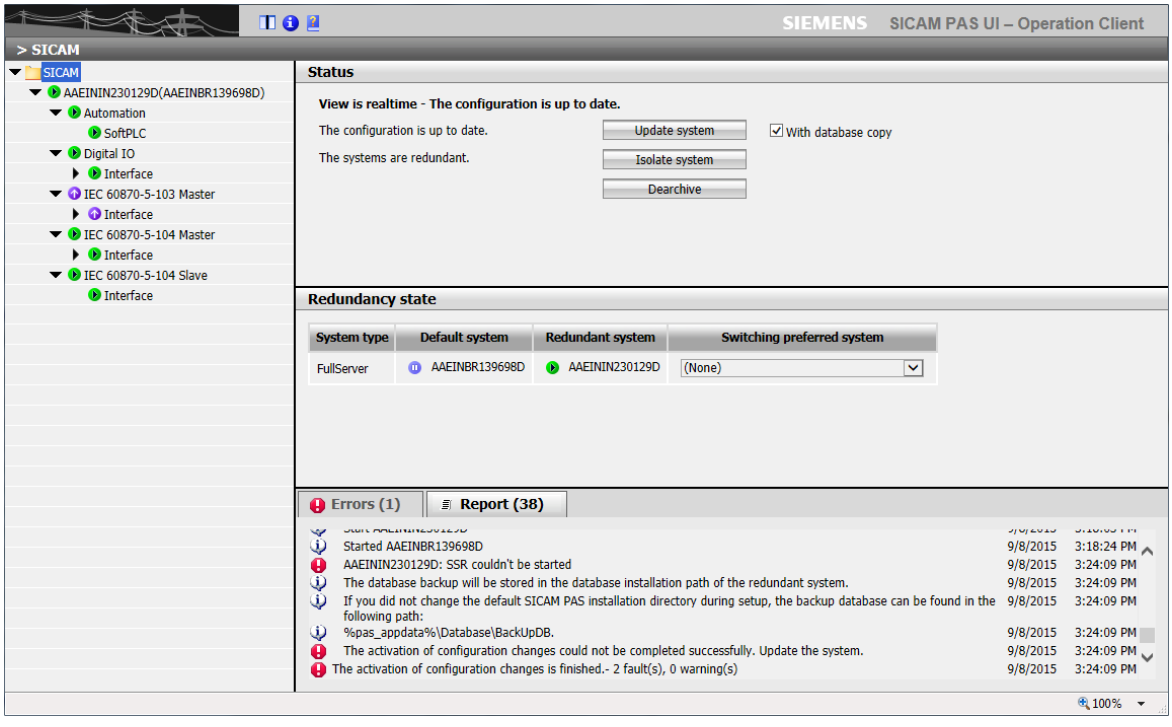


[sc_UI-Operation, 1, en_US]

Figure 3-4 SICAM PAS UI – Operation

3.4 SICAM PAS UI – Operation Client

SICAM PAS UI – Operation Client provides the functions of SICAM PAS UI – Operation from a local computer or a remote computer with improved performance by an Internet browser.

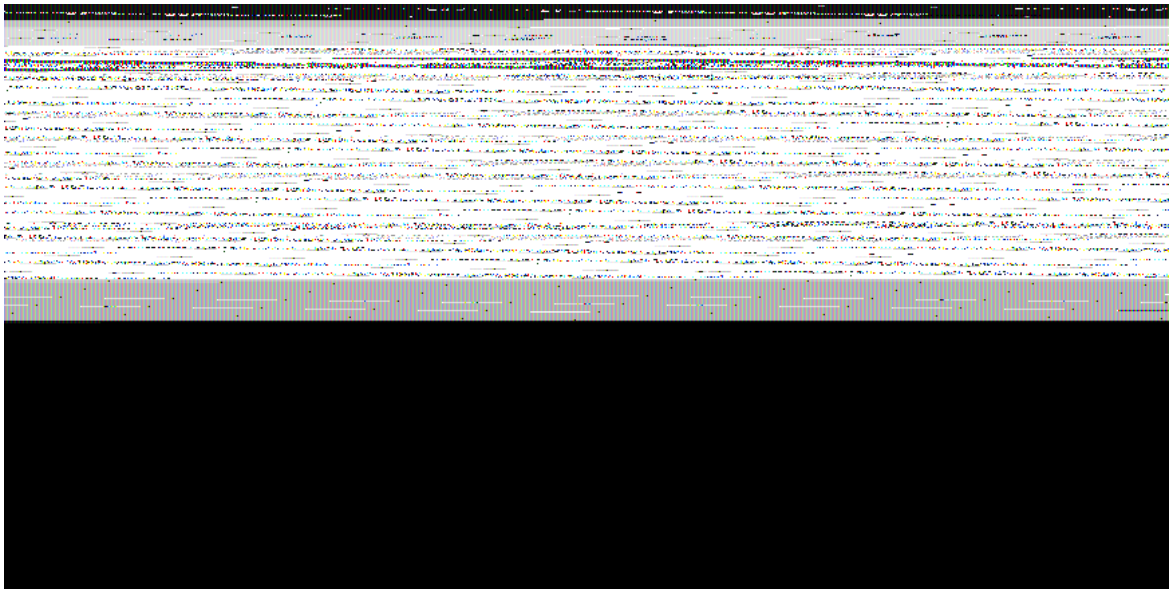


[sc_UI-Operation_Client, 1, en_US]

Figure 3-5 SICAM PAS UI – Operation Client

3.5 Archive Activity Monitor

The **Archive Activity Monitor** shows the current activities of an archive, that is, all the information sent to the archive from a **Power Quality** or a **Fault Recording** device. All the devices are listed in the **Device** column. The data stored by the archive is displayed in the **Activity** column. The date and time of the corresponding activity is displayed in the **Date/Time** column. The elapsed activity information along with the date and time is displayed in gray. The elapsed activity information is available as long as the **Archive Activity Monitor** is running. The grayed out information is replaced if the next activity is started for that device.



[sc_Archive_activity_monitor, 3, en_US]

Figure 3-6 Archive Activity Monitor

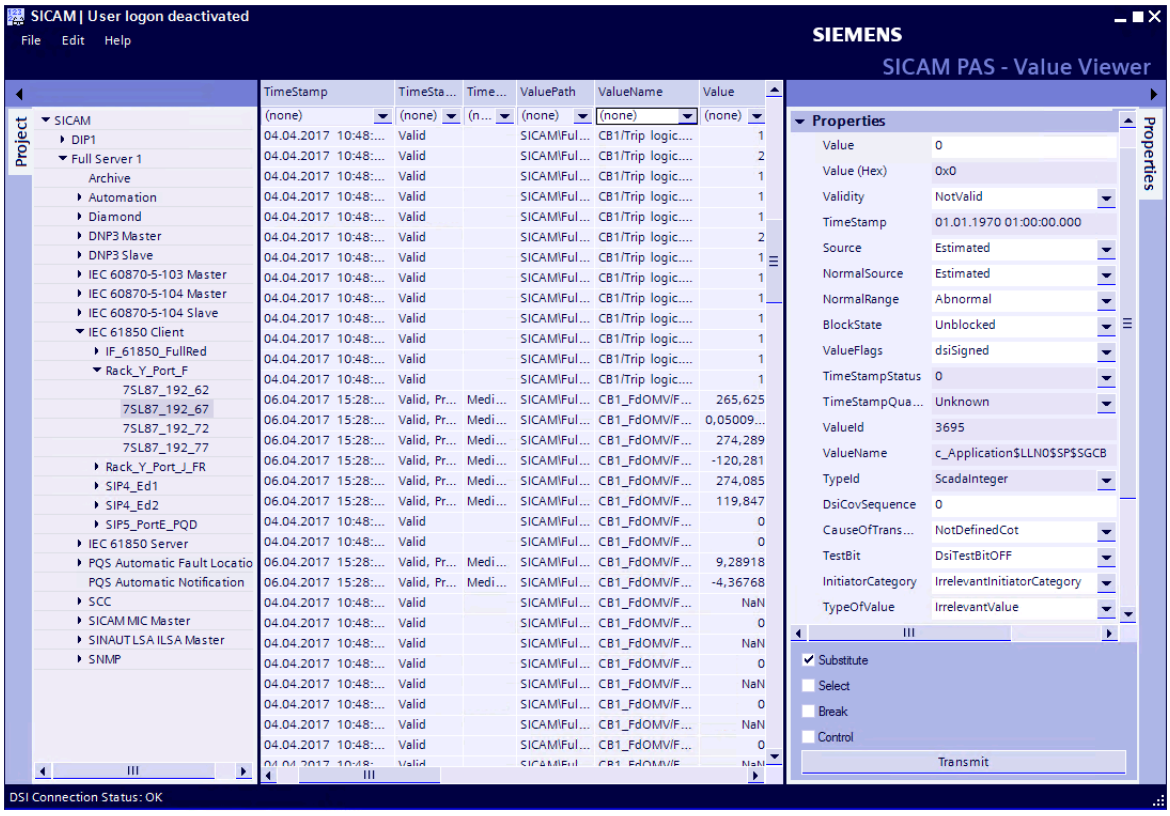
3.6 SICAM PAS – Value Viewer

The **Value Viewer** is an important tool for the project phases of configuration, testing, commissioning, and operation.

Without any additional configuration expenditure, it allows the visualization of process and system information and informs you about the current status of your station.

In addition to checks in the monitoring direction, information can be manually updated and the command direction can be tested. Command outputs are secured by passwords.

The value display is updated continuously.



[sc_Value_viewer_PAS, 2, --_--]

Figure 3-7 SICAM PAS – Value Viewer, Example

3.7 Automatic Functions

The SICAM PAS automation (SoftPLC) provides a comprehensive tool allowing individual solutions of operational automation tasks.

In SICAM PAS, you can resolve project-specific automation tasks through the following:

- Graphical linkage of CFC automation blocks
- Formulation of the automation function as Structured Text (ST)
- Statement List (STL)
- Sequential Function Chart (SFC)

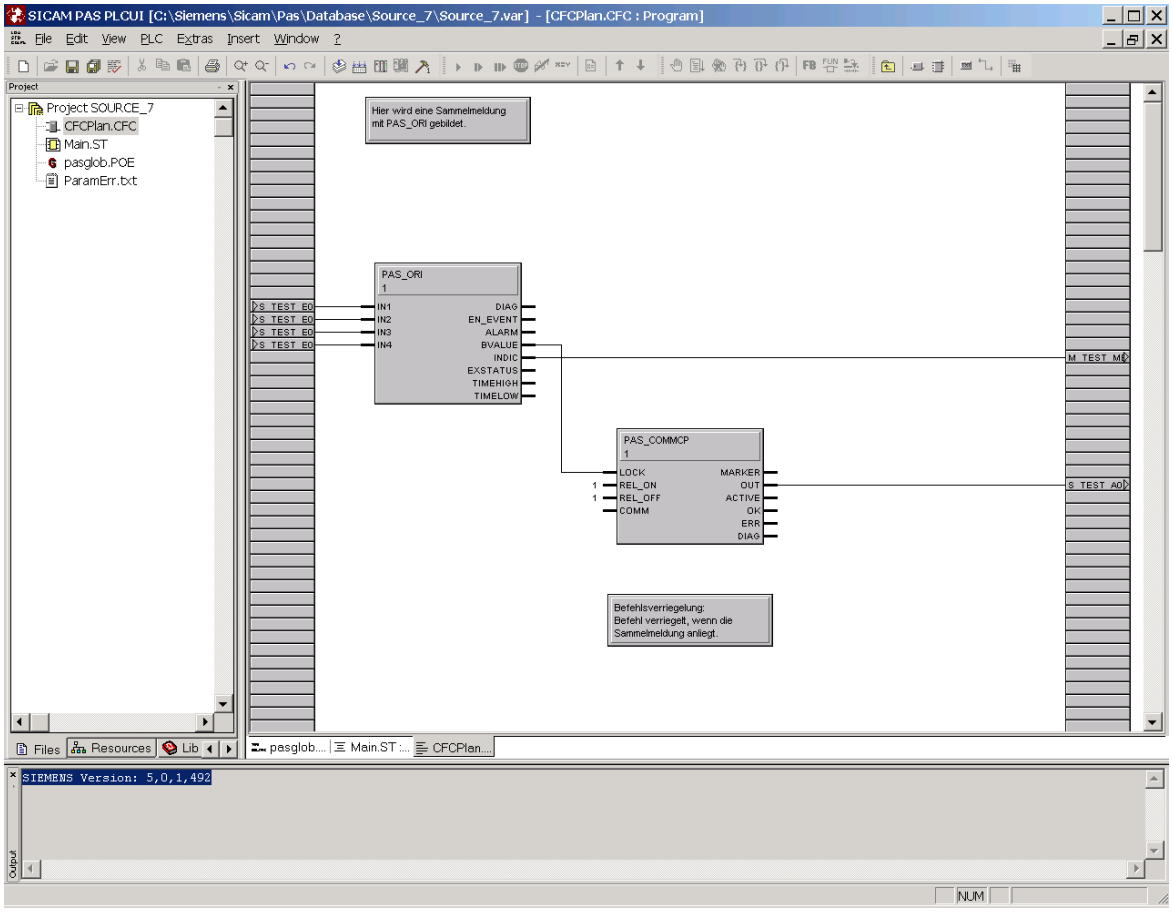
A comprehensive library of different automation blocks supports you in performing your tasks. These blocks have been specifically designed to provide sophisticated solutions in the field of power automation. All customary logic operations blocks such as AND, OR, and NOR are available for this purpose.

In this way, you can realize typical task definitions such as:

- Command processing
  - Command derivation
  - Interlock tasks

- Indication processing
  - Indication derivation
  - Indication filtering
  - Inversion and conversion of indications
  - Group indications
  - Transformer tap and bit pattern comparisons
- Measured- and metered-value calculation
  - Non-linear characteristic
  - Limit value monitoring
  - Slave pointer
  - Mean-value generation
  - Arithmetic and comparision blocks
- Switching sequences

Simple configuration rules facilitate the definition and interpretation of function charts; the chart-to-chart technology provides for a comprehensive overview of the configured automation functions.



[sc_Ex_Command_Interlock_Graphical_Config_CFC, 1, en_US]

Figure 3-8 SICAM PAS, Example for a Command Interlock, Graphical Configuration through CFC

For more information, refer to */7/ SICAM PAS, Automation Blocks*.

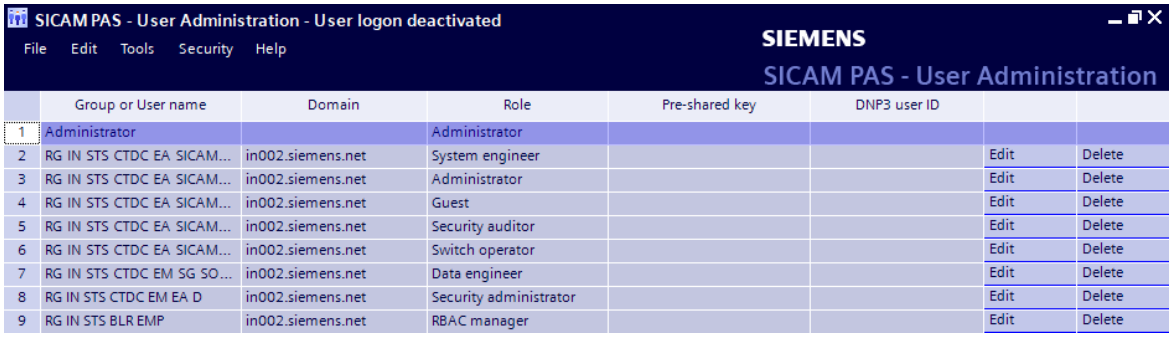
3.8 SICAM PAS – User Administration

Through the **User Administration** tool, you can assign passwords in order to define which persons can access individual programs.

User Administration

A user can log on with one of the following user roles:

- **Administrator** with full rights
- **System engineer** with full rights, no access to the User Administration
- **Data engineer** with full rights for SICAM PAS UI – Configuration and Feature Enabler, read-only rights for SICAM PAS UI – Operation and Value Viewer
- **Switch operator** with full rights for SICAM PAS UI – Operation and Value Viewer, read-only rights for SICAM PAS UI – Configuration and Feature Enabler
- **Guest** with read-only rights for all SICAM PAS system components with exception of the User Administration
- **Security administrator** with full rights for the User Administration, read-only rights for all SICAM PAS system components
- **RBAC manager** creates users and assigns roles in the User Administration, with read-only rights for all SICAM PAS system components
- **Security auditor** audits the security logs, with read-only rights for all SICAM PAS system components



	Group or User name	Domain	Role	Pre-shared key	DNP3 user ID		
1	Administrator		Administrator				
2	RG IN STS CTDC EA SICAM...	in002.siemens.net	System engineer			Edit	Delete
3	RG IN STS CTDC EA SICAM...	in002.siemens.net	Administrator			Edit	Delete
4	RG IN STS CTDC EA SICAM...	in002.siemens.net	Guest			Edit	Delete
5	RG IN STS CTDC EA SICAM...	in002.siemens.net	Security auditor			Edit	Delete
6	RG IN STS CTDC EA SICAM...	in002.siemens.net	Switch operator			Edit	Delete
7	RG IN STS CTDC EM SG SO...	in002.siemens.net	Data engineer			Edit	Delete
8	RG IN STS CTDC EM EA D	in002.siemens.net	Security administrator			Edit	Delete
9	RG IN STS BLR EMP	in002.siemens.net	RBAC manager			Edit	Delete

[sc_User_Administration, 4, en_US]

Figure 3-9 User Administration, Example

For access authorization, you can either use Windows access rights or define your own SICAM PAS access rights. The type of User Administration can be modified, but you can only work with one type of access rights at the same time.

If you are working in secured data transmission mode based on the DNP3i protocol, you enter the **Private Shared Key** of the certificate used and also the **DNP3-User ID** for each user.

When defining the parameters for the DNP3i interface to the control center, you assign a user as default user in the **Configuration** view.

Afterwards, in the **Mapping** view, you can assign each item of information in the command direction a user with the required switching authorization.

The User Administration can be shown or hidden.

Users must log on while the User Administration view is shown. Their login applies to all system components, such as SICAM PAS UI – Configuration, SICAM PAS UI – Operation, or SICAM PAS Value Viewer.

All activities, such as the user logins and logouts or the creation of users, are stored in a security log file. In addition, the login processes for protocols with TLS encryption (DNP3i Master/Slave, IEC 60870-5-104 Master/Slave, and IEC 61850 Client/Server) and the authentication processes for DNP3i Slave are stored in this file.

For more information on the parameterization of user roles and the assignment of switching authorizations, refer to */4/ SICAM PAS/PQS, Configuration and Operation*.

3.9 SICAM PAS – Automation License Manager (ALM)

Use the **ALM** tool to enable/check the SICAM PAS system components, which you require in your project or on the corresponding computer.

System components are referred to as **applications** and comprise:

- Different protocols
- SICAM PAS UI – Configuration
- Automation function
- OPC connections
- SNMP Ethernet network monitoring
- Power Quality functions
- Functional extensions
- Upgrade packages

To use the SICAM PAS system components, you require:

- Online Software Delivery (OSD)

No additional license is required for the following:

- SNMP
- OPC DA Server
- SICAM MIC Master
- SIPROTEC 4 Service IF Master
- SIMEAS R Master
- SICAM Q80 Master
- Event list / Fault events
- IEC 61850 Client (Monitoring direction)

For more information, refer to *4 Available Variants of System Components*.

License keys - D (D:)

Status	Family	Product	Version	Number of license ...	License key	License number	Standard license type	License type	Validity	Article No.
✓	SICAM	PQS Runtime Application	1.0	1	SISPZSPAPP01003	9999999999A000658164	Single	Countable objects	3 (3)	-
✓	SICAM	PQS Runtime Application	1.0	1	SISPZSPAPP01002	9999999999A000658180	Single	Countable objects	2 (2)	-
✓	SICAM	PQS Runtime Application	1.0	1	SISPZSPAPP01001	9999999999A000658167	Single	Countable objects	1 (1)	-
✓	SICAM	PAS UI Configuration	1.0	1	SIFLSPUIC_0100	9999999999A000657457	Floating	Unlimited	Unlimited	-
✓	SICAM	PAS Runtime Compact	1.0	1	SISLSPRTC_0100	9999999999A000657591	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS Runtime Small	1.0	1	SISLSPRT_S0100	9999999999A000657496	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS Runtime Secure Comm.	1.0	1	SISLSPOSC_0100	9999999999A000657466	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS Runtime Protocol	1.0	1	SISPZSPROT01003	9999999999A000658158	Single	Countable objects	3 (3)	-
✓	SICAM	PAS PQS Runtime Protocol	1.0	1	SISPZSPROT01002	9999999999A000658154	Single	Countable objects	2 (2)	-
✓	SICAM	PAS PQS Runtime Protocol	1.0	1	SISPZSPROT01001	9999999999A000658155	Single	Countable objects	1 (1)	-
✓	SICAM	PAS PQS Runtime Automation	1.0	1	SISLSPOAT_0100	9999999999A000657479	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS RT - Functional Upgrade to XL	1.0	1	SISLSPRTEX0100	9999999999A000657452	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS RT - Functional Upgrade to Medium	1.0	1	SISLSPRTEM0100	9999999999A000657473	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS RT - Functional Upgrade to Large	1.0	1	SISLSPRTEL0100	9999999999A000657496	Single	Unlimited	Unlimited	-
✓	SICAM	PAS PQS RT - Functional Upgrade to Control	1.0	1	SISLSPOCT_0100	9999999999A000657459	Single	Unlimited	Unlimited	-

[sc_ALMLicences, 1, en_US]

Figure 3-10 ALM

3.10 Human-Machine Interface (HMI)

In the SICAM PAS system, SICAM SCC performs the control and display functions of the process information of your station.

Functional and spatial interactions of your station components are represented conveniently in the overview and station diagrams of SICAM SCC.

State changes of process information and control actions are logged chronologically in message lists, such as alarm and event lists.

You can intervene in the process and control it from the station diagrams. If the data transmission is interrupted, you can substitute the current switch position.

The topological coloring of connected station sections provide for a comprehensive overview of the station and thus facilitates system management.

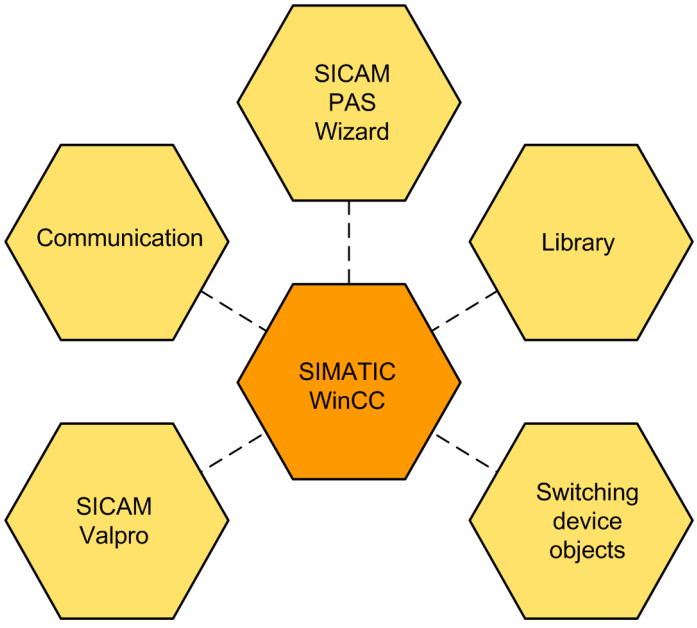
Station data such as messages and measured values can be logged and saved in freely definable archives.

The assignment of specific authorizations, the possibility to use bay and telecontrol blockings, different switching modes, and switching authorities complement the control functions. For more information on these functions, refer to *3.14 Station Control Functions*.

The communication with the SICAM PAS Station is performed via Ethernet (TCP/IP).

In large stations, it may be necessary to distribute station management tasks between several components. For this purpose, you use SICAM SCC in server/client architecture. The SICAM SCC Server takes over the information from the SICAM PAS Station and forwards it to the SICAM SCC Clients. Afterwards, the SICAM SCC Clients take over all operating and display tasks. The SICAM SCC operating system can be structured redundantly for enhanced system management security.

SICAM SCC consists of the SIMATIC WinCC process visualization system and the SICAM SCC components.



[dw_SICAM_SCC, 1, en_US]

Figure 3-11 SICAM SCC

3.10.1 SIMATIC WinCC

SIMATIC WinCC provides standard function modules for the graphical display, indication, archiving, and logging of information. With its powerful process interface, fast display refresh rates and safe data archiving functions, it ensures high availability of your station data.

3.10.2 SICAM SCC Components

The SICAM SCC components extend the SIMATIC WinCC standard functionality by special functions required for the use of the HMI for power automation.

3.10.2.1 SICAM PAS Wizard

The SICAM PAS Wizard supports you in the configuration of your project.

Import

After the creation of a station, you can use the SICAM PAS Wizard to import information configured and parameterized using the SICAM PAS UI – Configuration tool.

The import includes:

- Import of the SICAM PAS tags into the SICAM SCC Tag Management
- Import of the SICAM PAS messages to the SICAM SCC Alarm Logging
- Import of the SICAM PAS measured and metered values into the SICAM SCC Tag Management
- Creation of the SICAM-specific structure tags and of the required internal tags

Initialization

The SICAM PAS Wizard initializes the project. Within the framework of the initialization, the following tasks are executed:

- SICAM symbol library is imported
- SICAM-specific Alarm Logging is created
- SICAM text library is created

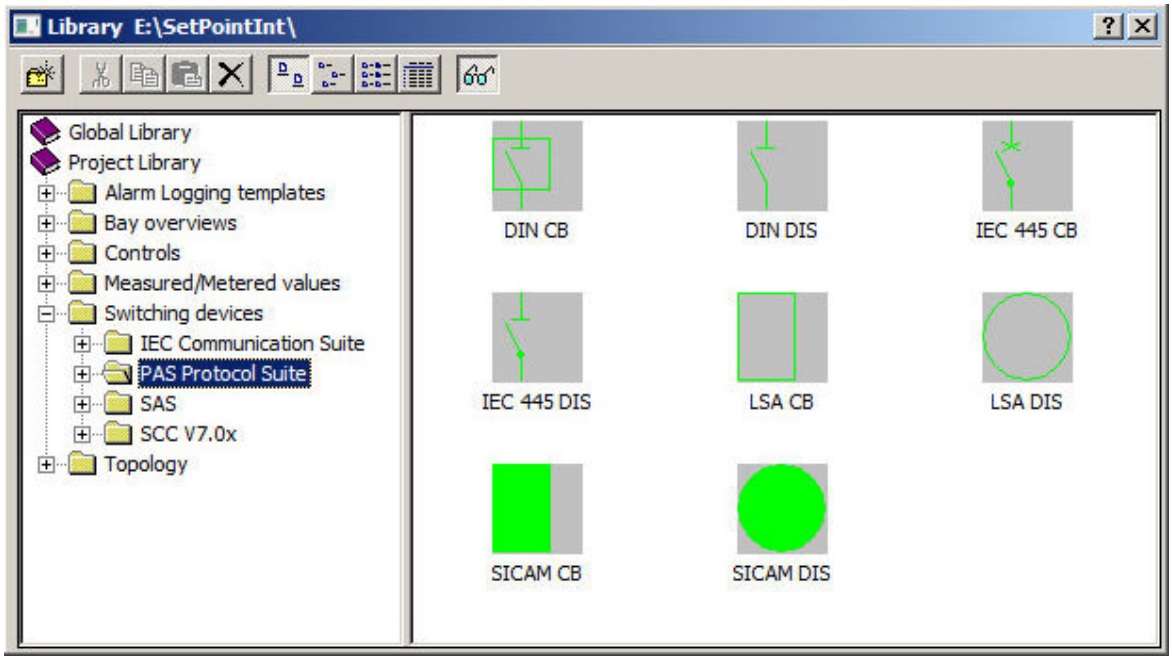
The initialization can be performed independently of the import of the SICAM PAS data. In this way, you can start the configuration of the SICAM SCC project before the completion of the project through SICAM PAS UI – Configuration.

The activities of the SICAM PAS Wizard are logged in the **Report**, which provides detailed information on the success of the activities or shows error messages and warnings.

3.10.2.2 SICAM PAS Graphic Object Library

The SICAM PAS symbol library includes

- Objects for the representation of the switching devices
- Objects for the visualization of measured and metered values
- Message window templates for Alarm Logging (templates for the event list, alarm list, and the protection message list)
- Control elements for the control of the switching authority and for synchronized switching
- Control elements for the control of the message list entries for defining which updates of process information initiate entries in the message lists

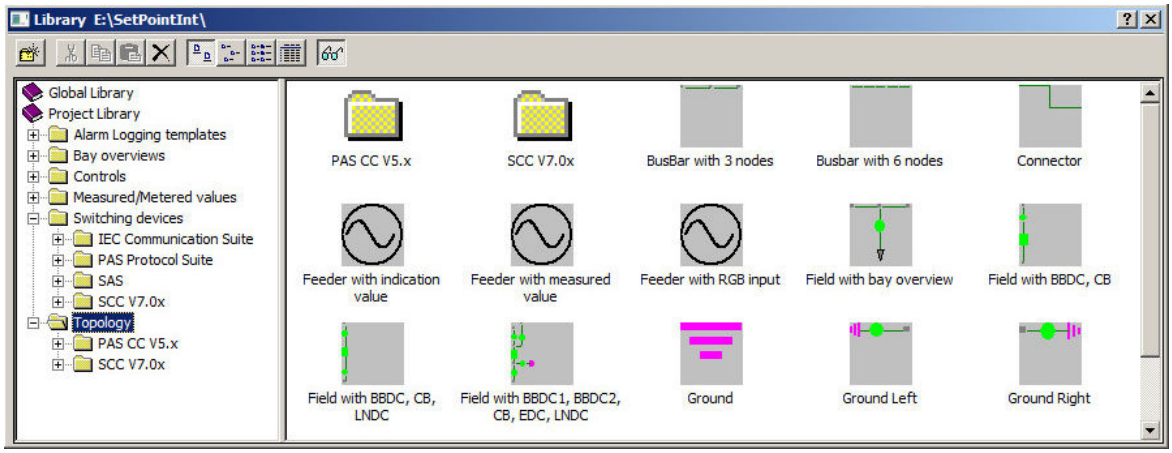


[sc_Symbol_Library_SwitchingObjs, 1, en_US]

Figure 3-12 SICAM Symbol Library, Switching Objects

When creating your station diagrams, you simply move these graphical objects through Drag&Drop from the library to your diagram. Afterwards, you connect them to the information that is parameterized in SICAM PAS UI – Configuration.

In addition, a library with topological objects is available for the creation of your system's graphical user interfaces.



[sc_Symbol_library_TopologicalObjs, 1, en_US]

Figure 3-13 SICAM Symbol Library, Topological Objects

3.10.2.3 Switching Device Objects

IndustrialX Controls are used in SICAM PAS for the visualization and control of the switching devices. IndustrialX Controls can be used in the multi-client and Web navigator environment.

The SICAM switching device objects for circuit breakers and disconnectors support 4 representation modes each:

- SICAM
- DIN 42200

- IEC 445
- LSA

If other representation options are required, you can assign the different states special **Bitmaps**, which have been defined for this purpose. The GIF format ensures optimum display speed.

The following functions can be used in order to define the switching device objects:

- **Status display**

  The status display visualizes the information state in a graphical manner.

  Not topical, WIN CC status not OK, Bay blocking, Telecontrol blocking, and **Substituted**.

  Through a context menu, you can show the current status of a selected information object as text.

  The user can specifically select the colors for each status in the graphical representation.

- **Dynamic display**

  If a distinction must be made between synchronized and unsynchronized controlling of a switching device, you can activate the corresponding functionality in the switching device object. The control dialogs are extended and the control method can be defined during runtime. Some SIPROTEC 4 bay devices support synchronized switching.

  If the switching device objects are only used in the monitoring direction (missing entry of the control tags), no control dialog is shown.

- **Two-step controlling**

  The switching devices are controlled in 2 steps using IndustrialX Controls. The switching direction is selected in the first step, whereas the command output is initiated in the second step (also refer to *3.10.4 Controlling*).

  If a subdevice supports the **Select before Operate** function, it can be combined with the two-step method.

- **EnableSwitching**

  Depending on other tags, the display of control dialogs can be prevented during runtime. For example, this feature is used if the switching authority changes between several operator terminals in a SICAM WinCC Client/Server configuration.

- **PermissionLevel**

  In the WinCC properties dialog, you can specify the **user authorizations** to determine which operator actions or parameter settings can be performed by which operator.

- **LabelButton...**

  With this parameter in the WinCC properties dialog, you can specify object-specific texts for runtime dialogs for example, Step up/Step down for the transformer control.

- **Language switching**

  The default version of SICAM SCC provides configuration and runtime dialogs in German and English. However, all texts used in these configuration and runtime dialogs are stored in text files. They can be conveniently translated into other languages.

- **Status of devices**

  SICAM SCC visualizes the status of the device connections to the SICAM PAS Station. If the connection is lost, the color of the switching device objects and measured-value objects in the diagram changes.

  Additionally, the device status can be logged in the alarm lists.

3.10.2.4 Bay Overview Objects

Bay overview objects are available in the SICAM PAS symbol library. These IndustrialX Controls visualize the switching status of the entire bay. To set parameters, you select the individual switching devices whose color is to change when the switching state changes. Bay overview objects improve the display of the various elements in your overview diagrams.

The following functions are available for defining the switching objects:

- **Status display**
  The status display visualizes the information state in a graphical manner.
  Not topical, WIN CC status not OK, Bay blocking, Telecontrol blocking, and **Substituted**.
  The user can specifically select the colors for each status in the graphical representation.
- **PermissionLevel** (see also *3.10.2.3 Switching Device Objects*)
- **Language switching** (see also *3.10.2.3 Switching Device Objects*)
- **Status of devices** (see also *3.10.2.3 Switching Device Objects*)

3.10.2.5 SICAM SCC Alarm Logging – Alarm Lists

In the SICAM SCC alarm lists, incoming messages are logged with the real time stamps from bay devices or substations. The time stamp and the alarm state are complemented by additional information. Examples of additional information: Cause, event source, status information, and protection times.

Besides the values ON/OFF and RAISED/CLEAR, the value display also comprises fault positions (double-point indications) and bit pattern indications.

Value texts can be specifically defined, for example, for Step up/down. You can create up to 8 different value text groups.

Command output indications are logged in addition to process indications.

In the alarm list, you can select which indication status is to be acknowledged:

- RAISED state
- CLEAR state
- RAISED and CLEAR state

RAISED indications remain in the alarm list until the corresponding CLEAR indication and the acknowledgement have arrived.

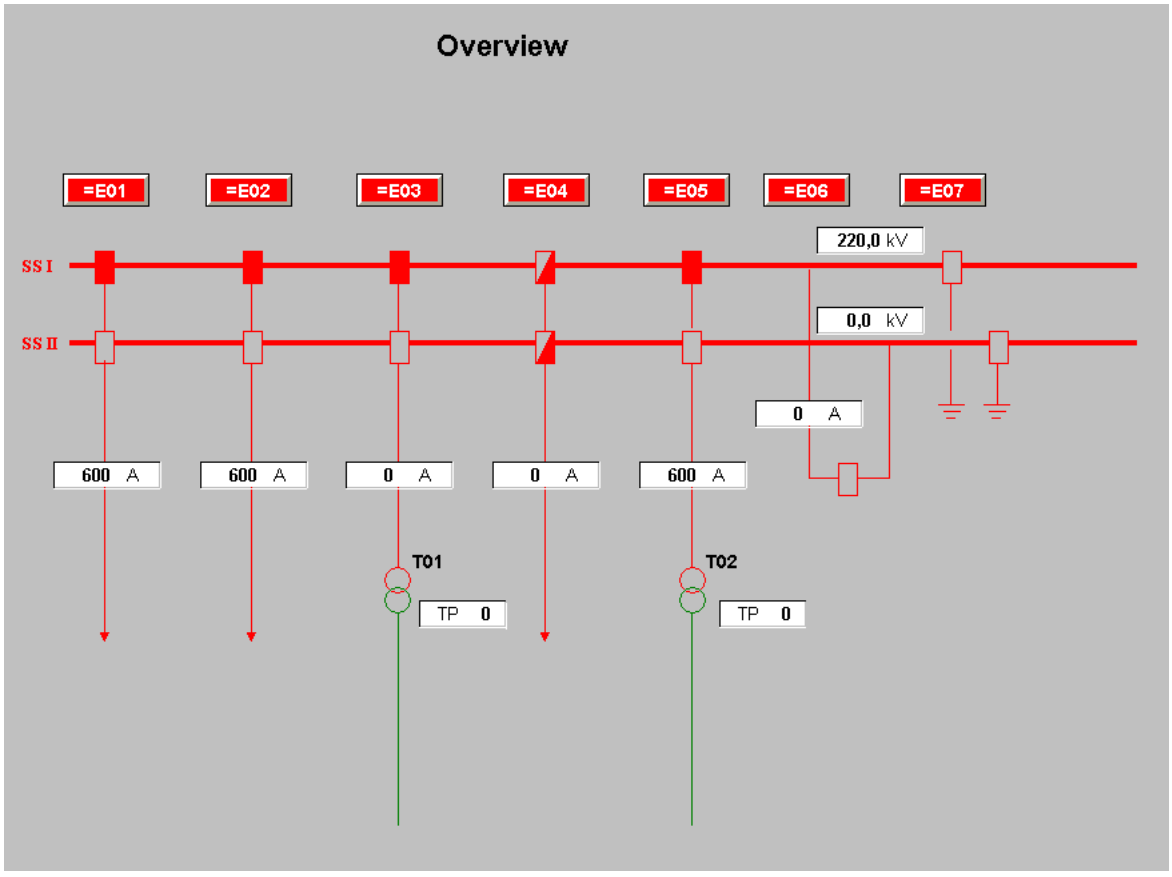
3.10.3 Displays

The spatial and functional correlations of your station components can be represented in more or less detailed diagrams.

Graphical representations of individual station components or devices can be created in addition to overview and station diagrams.

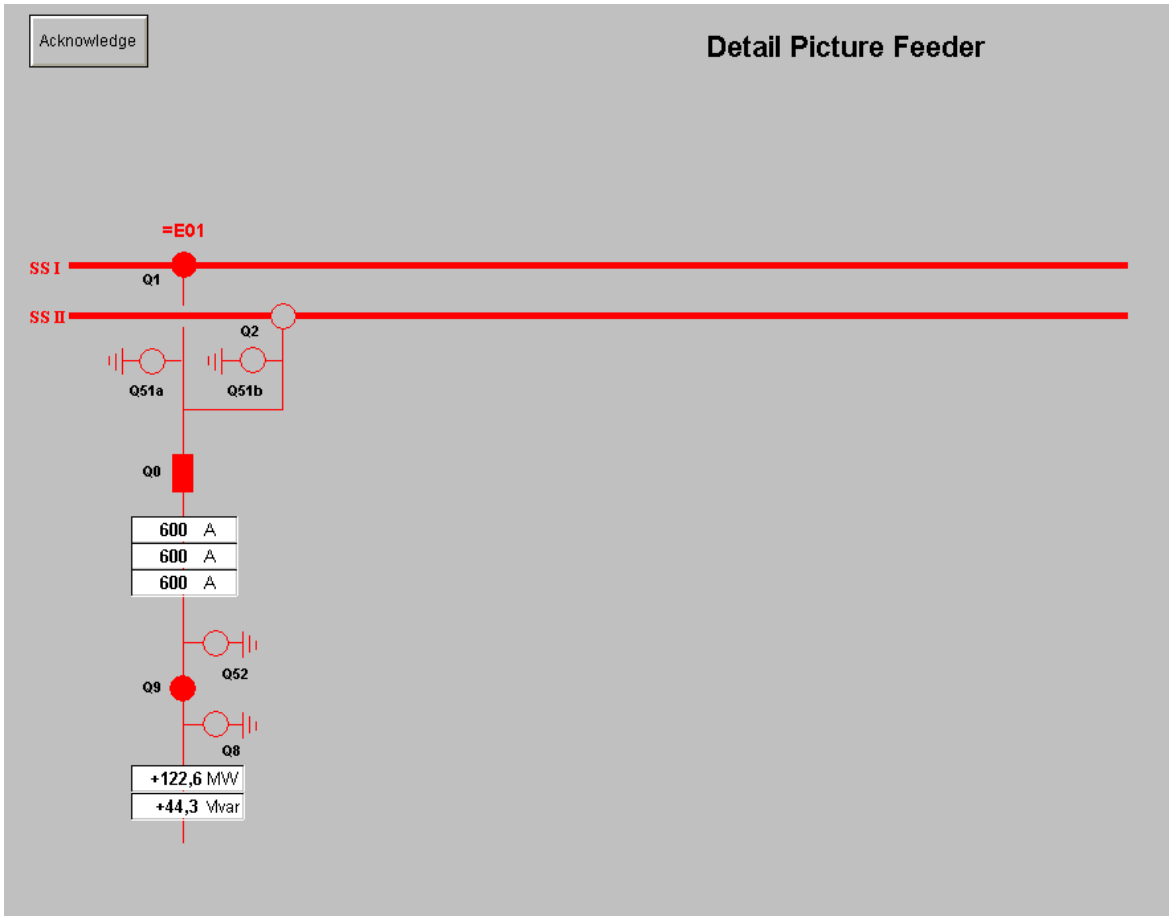
The process information is logged in an event list.

SICAM Valpro can evaluate archived measured and metered values through graphical and tabular representations.



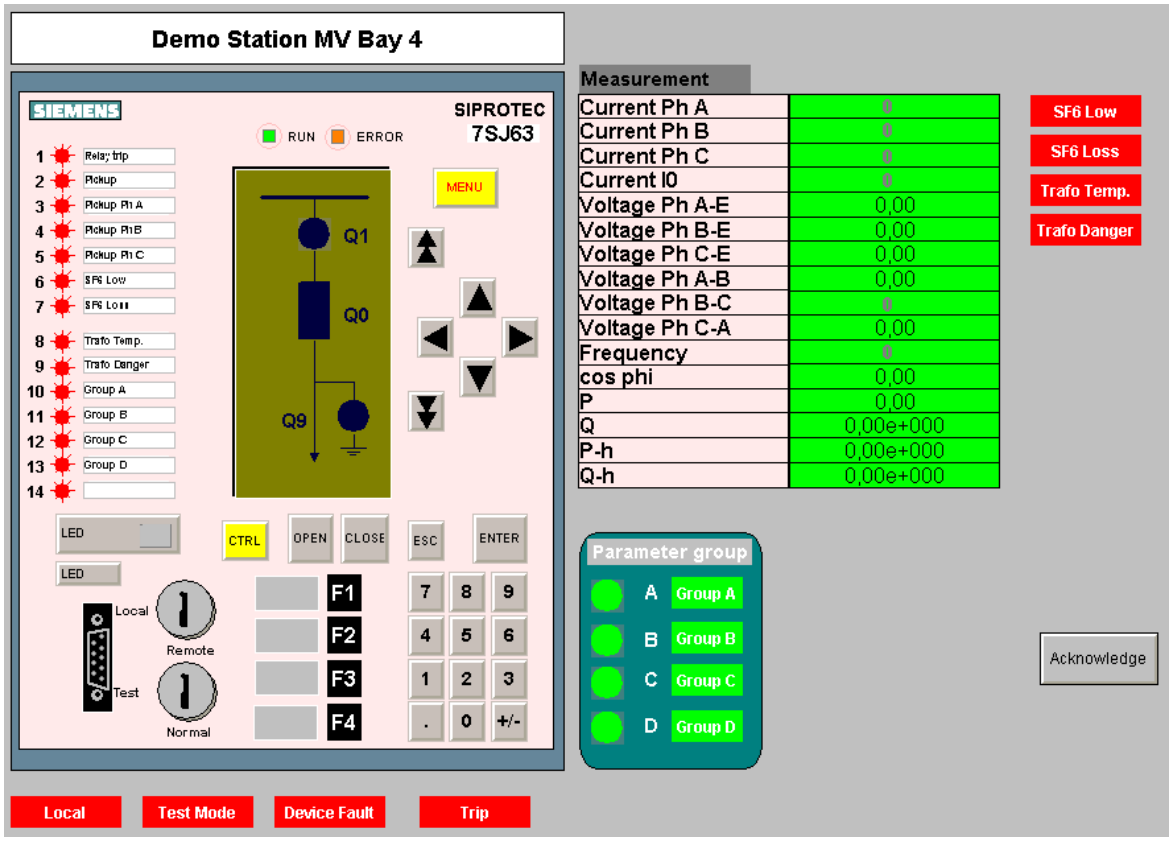
[sc_OverviewDiagram_Ex, 1, en_US]

Figure 3-14 Overview Diagram, Example



[sc_ControlDiagram_DisplayDetail, 1, en_US]

Figure 3-15 Control Diagram - Display Detail, Example



[sc_Representation_SIPROTECBayDevice, 1, en_US]

Figure 3-16 Representation of a SIPROTEC Bay Device, Example

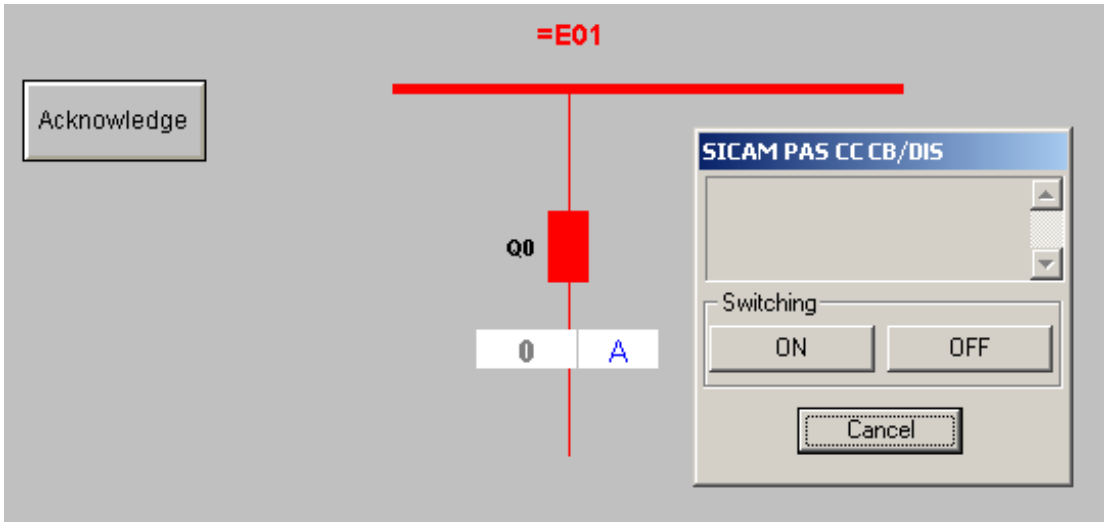
3.10.4 Controlling

Depending on the parameterization of your station, you can perform control interventions of the process through the control diagrams.

SICAM SCC provides the following different control modes:

- Switching with enable
- Select before Operate with enable
- Synchronized Switching

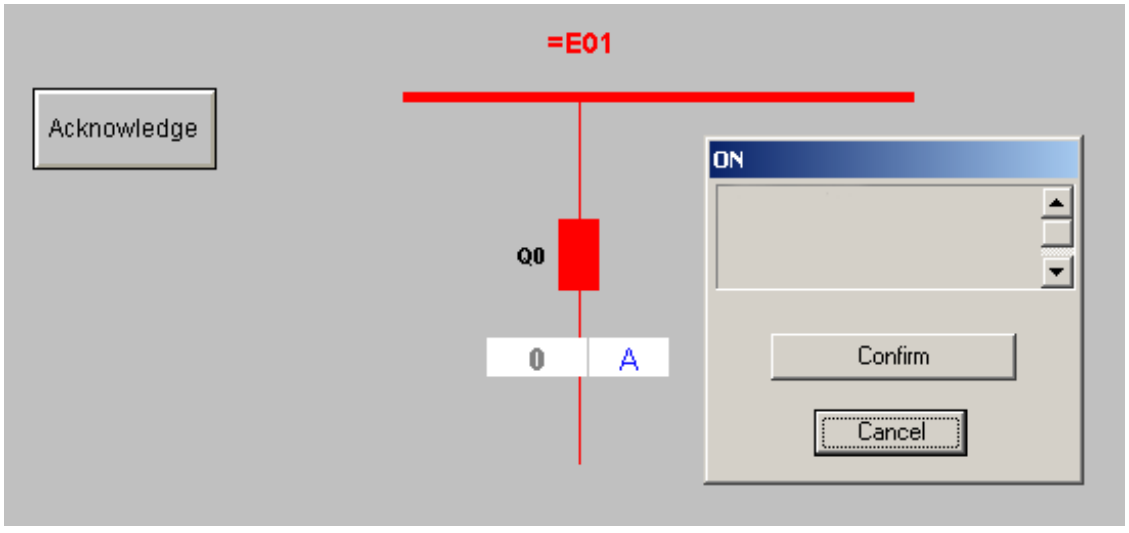
The example below illustrates the switching of a circuit breaker from OFF to ON with enable. As soon as you have selected a circuit breaker (information object), the related switching dialog opens.



[sc_Initiating_SwitchingOperation, 1, en_US]

Figure 3-17 Initiating the Switching Operation

After you have clicked the ON button, the switching device starts to blink in the set status and the next dialog opens for enabling.

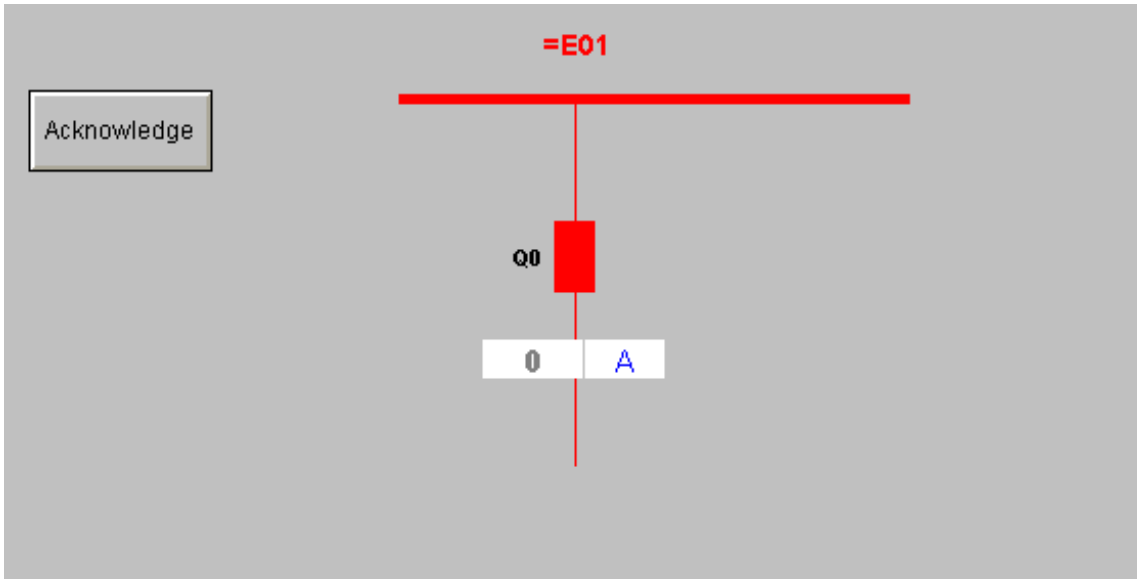


[sc_SwitchingOperation_Enable, 1, en_US]

Figure 3-18 Switching Operation - Enable

Click the **Acknowledge** button to enable the switching operation. The setpoint blinking stops and the circuit breaker icon now shows the ON state.

If the switching operation could not be executed successfully, a message explaining the cause for cancelling the switching operation is displayed in the text field in the dialog which opens next. The circuit breaker symbol now switches to the actual status and blinks.



[sc_SwitchingOperation_Completed, 1, en_US]

Figure 3-19 Switching Operation Completed

The switching operation and the command feedback are logged in the event list.

SICAM SCC V6 Event list

	T.st	Date	Time	Message Group	Message Text	Value	Status (Validity)	Cause	Additional cause
979	S | IN	02/07/2010	10:42:52.926	SICAM_GS bgh000649xp\PROFIBUS DP Master\Interface_DP\ET200B_A	_Opr	UP	valid	spontaneous	no error
980	S | IN	02/07/2010	10:42:52.926	SICAM_PQS bgh000648xp\PROFIBUS DP Master\Interface_DP\ET200_A	_ComFault	RAISED	valid	spontaneous	no error
981	S | IN	02/07/2010	10:42:52.926	SICAM_PQS bgh000648xp\PROFIBUS DP Master\Interface_DP\ET200_A	_ComFault	CLEARED	valid	spontaneous	no error
982	S | IN	02/07/2010	10:42:52.926	SICAM_PQS bgh000649xp\PROFIBUS DP Master\Interface_DP\ET200_A	_Opr	DOWN	valid	spontaneous	no error
983	S | IN	02/07/2010	10:42:52.926	SICAM_PQS bgh000649xp\PROFIBUS DP Master\Interface_DP\ET200_A	_Opr	UP	valid	spontaneous	no error
984	S | IN	02/07/2010	10:42:52.945	SICAM PAS PQS bgh000648xp\PROFIBUS DP Master\Interface_DP	_Opr	Standby	valid	spontaneous	no error
985	S | IN, r	02/07/2010	10:42:53.461	SICAM PAS PQS bgh000649xp\Archive	_Opr	UP	valid	cause irrelevant	no error
986	S | IN, r	02/07/2010	10:42:53.461	SICAM PAS PQS bgh000649xp\PQS Scheduled Reports	_Opr	UP	valid	cause irrelevant	no error
987	S | IN	02/07/2010	10:43:00.410	SICAM_h000648xp\IEC 60870-5-103 Master\Interface_103M\Device_99	_ComFault	CLEARED	valid	spontaneous	no error
988	S | VS	02/07/2010	10:43:02.718	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	c_Steuerung/Q0_1.Position	ON	valid	command	no error
989	S | IN	02/07/2010	10:43:03.692	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	c_Steuerung/Q0_1.Position	ON	valid	command -	sync. precondition missing
990	S | IN	02/07/2010	10:43:05.473	SICAM_bgh000648xp\IEC 60870-5-104 Master\Interface_104M\MIC_163	_ComFault	CLEARED	valid	spontaneous	no error
991	S | VS	02/07/2010	10:44:52.039	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	Steuerung/Q0_1.Position	interm. state	valid	feed back	no error
992	S | VS	02/07/2010	10:44:52.240	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	Steuerung/Q0_1.Position	ON	valid	feed back	no error
993	S | VS	02/07/2010	10:45:06.782	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	Steuerung/Q0_1.Position	interm. state	valid	feed back	no error
994	S | VS	02/07/2010	10:45:06.985	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	Steuerung/Q0_1.Position	OFF	valid	feed back	no error
995	S | IN	02/07/2010	10:45:07.956	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	c_Steuerung/Q0_1.Position	OFF	valid	command execution end +	no error
996	S | IN	02/07/2010	10:45:10.910	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	c_Steuerung/Q0_1.Position	ON	valid	command	no error
997	S | IN	02/07/2010	10:45:11.003	SICAM_nbgh000648xp\IEC 61850 Client\Interface_61850\7SJ642_solo	c_Steuerung/Q0_1.Position	ON	valid	command -	sync. precondition missing
998	S | IN	02/07/2010	10:46:02.081	SICAM_h000648xp\IEC 60870-5-103 Master\Interface_103M\Device_99	c_Leistungsschalter Q0	ON	valid	command	no error
999	S | VN	02/07/2010	10:46:02.286	SICAM_h000648xp\IEC 60870-5-103 Master\Interface_103M\Device_99	c_Leistungsschalter Q0	ON	valid	command +	no error
1000	S | IN	02/07/2010	10:47:02.455	SICAM_h000648xp\IEC 60870-5-103 Master\Interface_103M\Device_99	c_Leistungsschalter Q0	ON	valid	command execution end -	monitoring time expired

7/2/2010 | 10:50 (LOC) | List: 2 | Window: 1000 | Ack: 0

[sc_SICAMSCC_EventList, 1, en_US]

Figure 3-20 SICAM SCC Event List

For more information on SICAM SCC, refer to */5/ SICAM SCC, Human Machine Interface SICAM SCC*.

3.10.5 SICAM Vaplro

SICAM Valpro is an optional system component, which uses the measured and metered values of the SICAM SCC archiving system (SIMATIC WinCC Tag Management).

SICAM Valpro displays archived values in a graphical or tabular form. The following values are evaluated:

- Original values
- Maximum, minimum, and mean values in different time intervals, for example, 15 mins or hourly values
- Power factors
- Sum/difference values of metered values in different time intervals

The diagram representation can be freely defined with regard to many properties, such as curve type or background.

The curve properties can be defined specifically for an individual curve.

The tabular representation of the archived values can be added to the curve window or positioned independently. The cursor position in the curve window correlates with the first table row displayed.

Graphical representations and tables can be printed out.

Tables with archive data can be exported in the CSV format, whereas reports can be exported in the text format in order to make them available for further processing in other programs (such as Excel).

In order to evaluate archive data by SICAM Valpro on another computer without process connection, combine the measured and metered values on your process system to separate groups and transfer the group data to the other computer.

SICAM Valpro can be used on the SIMATIC WinCC Server or on clients. Alternatively, it can also be operated independently of SIMATIC WinCC. For offline evaluation, you have to use the group files, which you have created with SICAM Valpro in the SIMATIC WinCC environment.

SICAM Valpro requires an individual authorization for each computer.

For more information regarding SICAM Valpro, refer to */6/ SICAM Valpro, Measured/Metered Value Processing Utility SICAM Valpro*.

3.11 SICAM PQ Analyzer – Incident Explorer

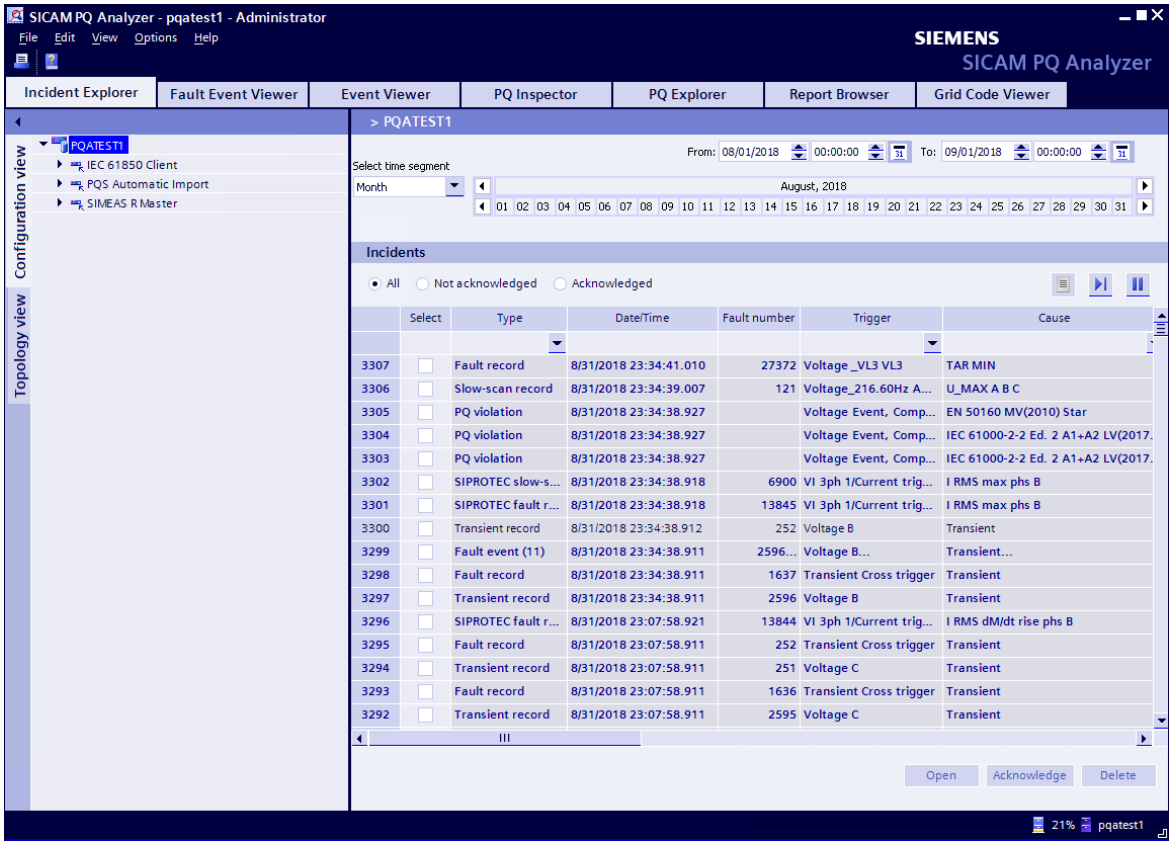
The Incident Explorer is an independently used subcomponent of the SICAM PQ Analyzer.

It serves for fault record and PDR report evaluation in SICAM PAS.

The transmitted fault records are evaluated through the **Incident Explorer**. Fault records are analyzed using the COMTRADE Viewer evaluation routine provided as standard. If your system is equipped with the SIGRA fault record evaluation routine, this routine is used by default.

If you require a fault record for evaluation by other programs, you can export it. During this process, the recording frequency can be reduced and the COMTRADE format can be selected accordingly.

PDR reports can be analyzed using the PDR Viewer evaluation routine.



[sc_IEwithfaultrecords, 2, en_US]

Figure 3-21 SICAM PQ Analyzer – Incident Explorer

For more information, refer to */14/ SICAM PQ Analyzer, Incident Explorer*.

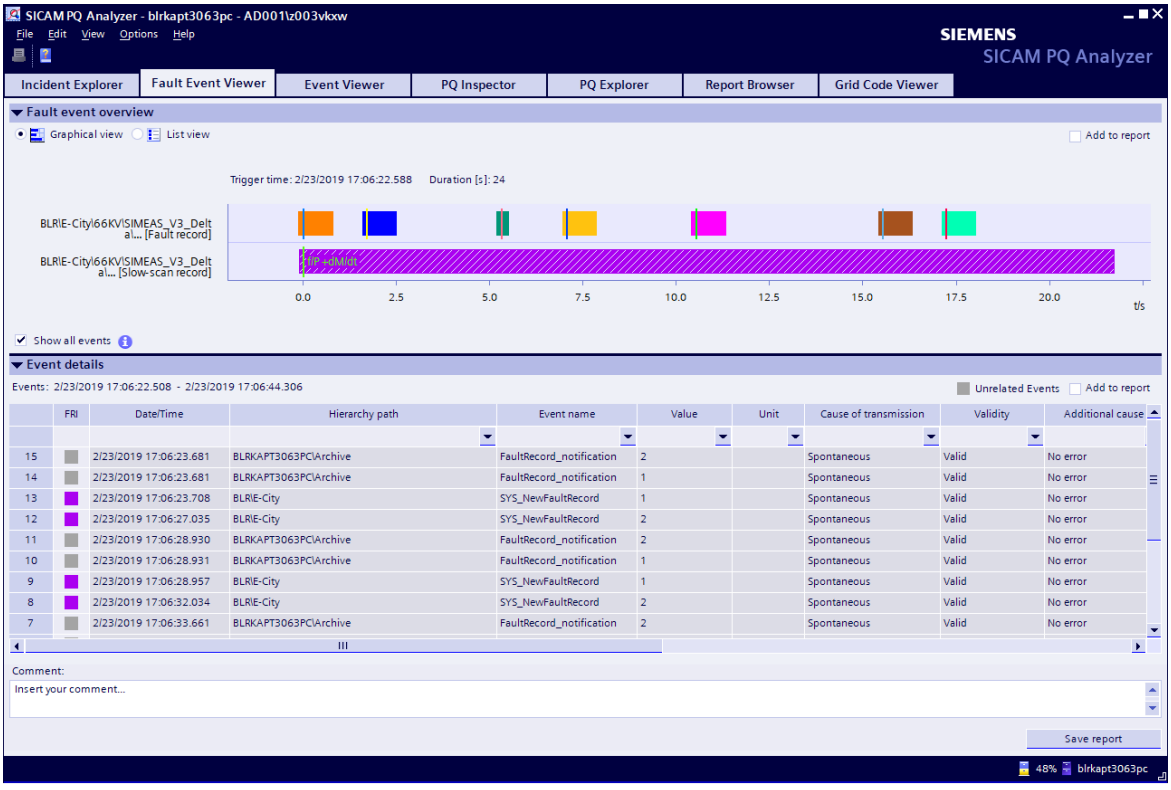
SICAM PQ Collector

In systems with several SICAM PAS stations and/or archive servers, SICAM PQ Collector collects archive data from the individual (source) archives and enters them in a (Collector) archive. The evaluation functions of the SICAM PQ Analyzer access this archive.

For more information, refer to */14/ SICAM PQ Analyzer, Incident Explorer*.

3.12 SICAM PQ Analyzer – Fault Event Viewer

The fault events that occured in the power network are visualized in the **Fault Event Viewer** view of the SICAM PQ Analyzer. The graphical representation of all the fault records that are associated with the respective fault event are also displayed in this view.



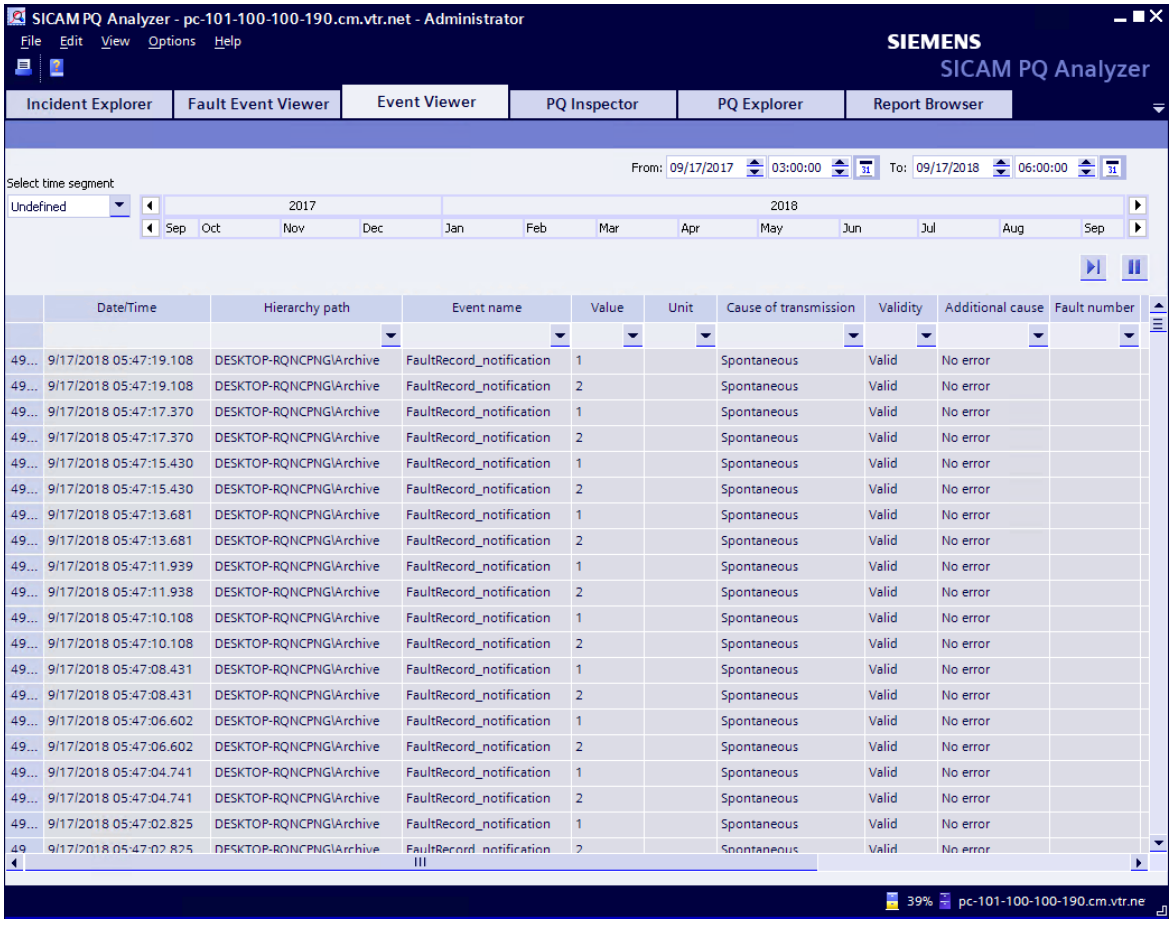
[sc_faulteventviewer, 2, en_US]

Figure 3-22 Fault Event Viewer

For more information, refer to */14/ SICAM PQ Analyzer, Incident Explorer*.

3.13 SICAM PQ Analyzer – Event Viewer

All the events that are mapped in **SICAM PAS UI – Configuration** are visualized in the **Event Viewer** view of the SICAM PQ Analyzer. The events are automatically updated and are available for better analysis of faults in the power system.



[sc_EventViewer, 2, en_US]

Figure 3-23 SICAM PQ Analyzer – Event Viewer

For more information, refer to */14/ SICAM PQ Analyzer, Incident Explorer*.

3.14 Station Control Functions

SICAM PAS provides a series of functions, which are specifically customized to meet the requirements of substation control tasks. These include:

- Switching authority
- Bay blocking
- Telecontrol blocking
- "M of N" check
- Substitute
- Fault recording
- PDR record
- Time synchronization

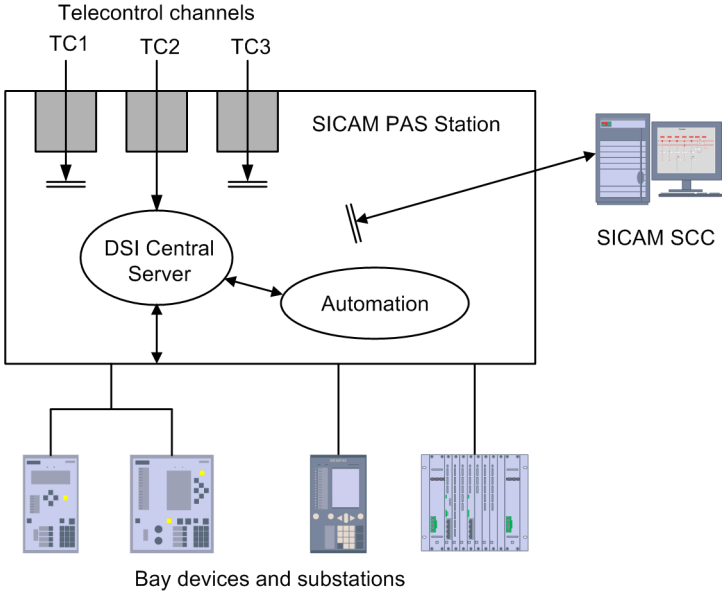
In the case of redundantly executed systems, operational conditions are manually updated in the standby system, for example, the setting of a bay block or the manual update of a switch position.

3.14.1 Switching Authority

In distributed systems, the switching authority defines which layer has the switching authority.
The switching authority can be on the following levels:

- Bay control level (local, key switch of the bay device)
- Station control level (local or remote)
- Network control level (remote)

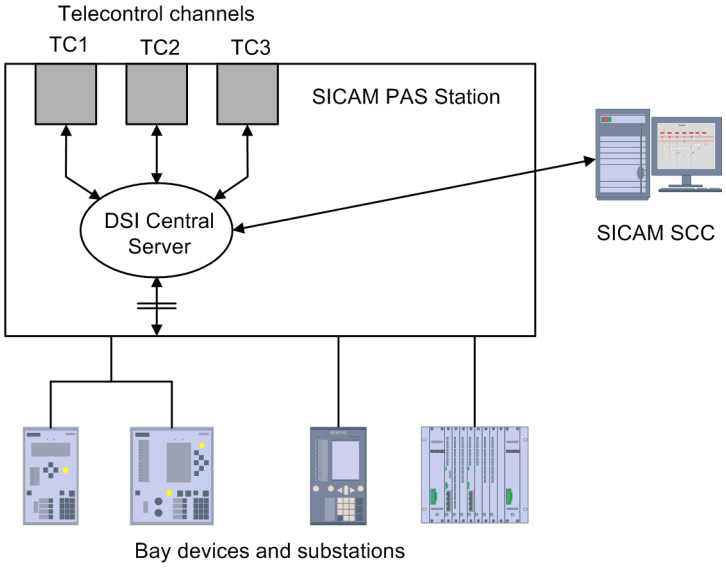
The switching authority can be defined for the specific channel, that is, one telecontrol channel has the switching authority, whereas the other channels and the local control have no authority. In the example below, only the TC2 telecontrol channel has the switching authority.
Additionally, you can define individual switching authorities for each topological level, such as voltage level- or device-specific switching authorizations.
The switching authority is assigned by SICAM SCC during operation.



[dw_PAS_switching_authority, 1, en_US]
Figure 3-24 SICAM PAS Switching Authority, Example

3.14.2 Bay Blocking

In the case of maintenance work on a feeder, it is advisable not to transmit any information between bay devices and SICAM PAS for a certain period of time. This is performed through the device-specific activation of a bay block in SICAM PAS UI – Operation, refer to *3.3 SICAM PAS UI – Operation*.
With **Value Viewer** or **SICAM SCC**, the **Bay blocking** can be applied for individual items of information.
If the bay blocking is activated, value changes of process or status information are not transmitted. When mapping information, you can also determine whether individual items of information shall be transmitted even though a bay blocking has been activated.



[dw_PAS_bay_blocking, 1, en_US]

Figure 3-25 SICAM PAS Bay Blocking

The bay blocking is visualized by the graphical representation variants of the switching objects, refer to *3.10 Human-Machine Interface (HMI)*.

The activating and deactivating of the bay blocking is logged in the event list of the SICAM SCC HMI:

Additionally, you can specify whether the information affected by the bay blocking shall also be individually marked as **Not topical** in the event list.

3.14.3 Telecontrol Blocking

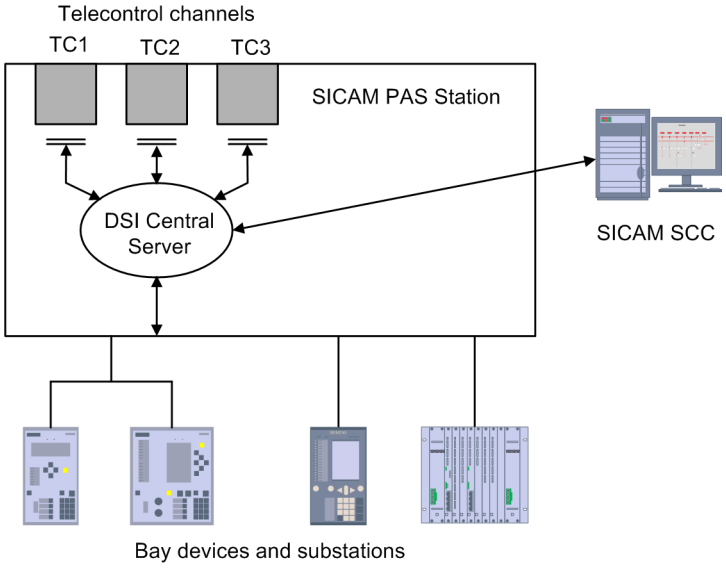
To perform maintenance tasks in a station, the exchange of current status changes of the affected devices with higher-level control centers is stopped in both the control and monitoring direction. For this purpose, device related telecontrol blocking can be activated/deactivated with SICAM PAS UI – Operation and SICAM SCC.

With **Value Viewer** or **SICAM SCC**, the **Telecontrol blocking** can be applied for individual items of information.

The telecontrol blocking can be activated or deactivated for a specific channel, refer to *3.3 SICAM PAS UI – Operation*.

If a telecontrol blocking is activated, the related information objects are still up-to-date in substation HMI.

When mapping information, you can also determine for each individual item of information whether it shall be transmitted even though a telecontrol blocking has been activated.



[dw_PAS_telecontrol_blocking, 1, en_US]

Figure 3-26 SICAM PAS Telecontrol Blocking

The activating and deactivating of the telecontrol blocking is logged in the event list of the SICAM SCC HMI:

3.14.4 "M of N" Check

When defining the system parameters, you define how many commands can be sent simultaneously. Up to 32 commands are permissible; the value 0 disables the check.

3.14.5 Substitute

If the communication to a device is interrupted, the states of information and measured values can be manually updated (substituted) through SICAM SCC. Substituted values are transmitted to the control center.

For test purposes, the Substitute function is also available in the SICAM PAS Value Viewer.

3.14.6 Fault Recording

During a network failure, numerous protection devices write fault records with measured values and binary information.

These fault records are archived in the (source) archive of SICAM PAS and then transferred to (collector) archive through the SICAM PQ Collector.

The retrieved fault records are evaluated through the **Incident Explorer**. The viewer assigned in the **Assign viewer** dialog is called up. If your system is equipped with the **SIGRA** fault record evaluation routine, this routine is used for fault record evaluation by default. Otherwise, **Comtrade viewer** is used.

If you require a fault record for evaluation by other programs, you can export. During this process, the recording frequency can be reduced and the COMTRADE format can be selected accordingly. The export can be performed automatically through the **PQS Automatic Export** application for all fault records. Alternatively, you can use the **Incident Explorer** to export individual fault records manually.

The Incident Explorer is an independently used component of the SICAM PQ Analyzer. It accesses the archive and displays archive data in their topological storage structure or classified according to devices. The topological structure corresponds to the structure which you have defined when configuring the SICAM PAS Station.

Recording is possible for the following protocols:

- IEC 61850
- IEC 60870-5-103
- SINAUT LSA ILSA
- SIMEAS R
- SIPROTEC 4 IF

If you require fault records from devices whose protocol is currently not supported, you can connect them as virtual devices through the **PQS Automatic Import** application.

3.14.7 PDR Records

In order to analyze network failures even more precisely, SICAM PAS provides the option of recording selectable information as PDR reports during a predefinable period.

PDR Reports are stored in the archive and evaluated through the **Incident Explorer** and the **PDR Viewer**.

You can create several PDR reports (groups) to which you assign the trigger signal and the information to be recorded. In addition, you define the time range before and after the trigger during which the selected measured values and binary signals shall be recorded.

For more information on the evaluation of fault records and PDR reports, refer to the following manuals:

- */14/ SICAM PQ Analyzer, Incident Explorer*
- */6/ SICAM Valpro, Measured/Metered Value Processing Utility SICAM Valpro*
- */4/ SICAM PAS/PQS, Configuration and Operation*

3.14.8 Automatic Notification

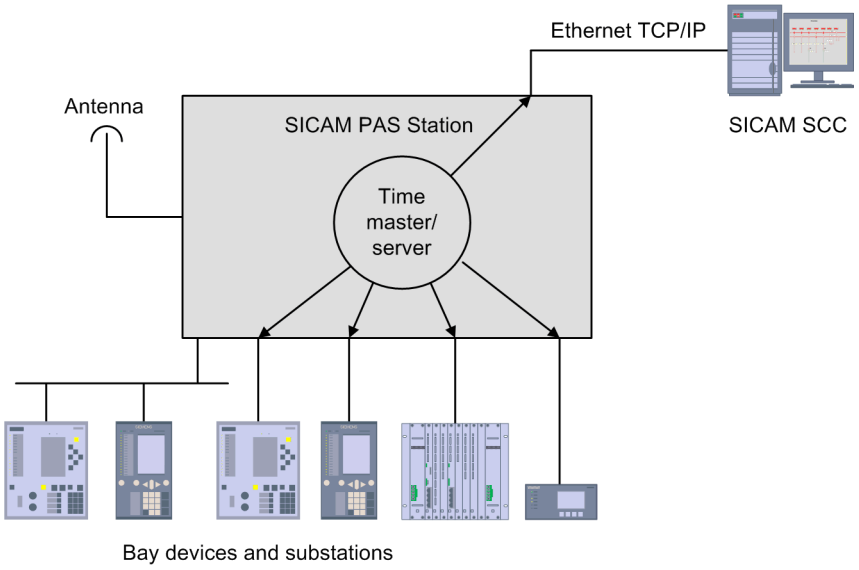
The **PQS Automatic Notification** application notifies you by an e-mail and/or SMS on various system events. To this end, the application distinguishes between the following 2 types of events: alarms and reports.

You can define to be notified on the following events:

- Process and status information
  You will be notified by an e-mail and/or SMS on a status change of selectable process or status information.
- Fault records
  As soon as a new fault record has arrived, you will receive an SMS with brief information on the topological origin and the time of occurrence of the fault. In addition, the fault record in COMTRADE format will be sent by an e-mail.
- Fault location reports
  On completion of a fault location report, you will receive an SMS with brief information on the topological origin, the type of error and the elimination of the error. In addition, the fault location report in PDF format will be sent by an e-mail.

3.14.9 Time Synchronization

In order to ensure that your SICAM PAS Station takes over the time synchronization of bay devices, substations, and SICAM SCC, this can be performed through a DCF 77 or GPS receiver with Network Time Protocol (NTP) incorporated in the computer.



[dw_PAS_time_sync_PCI_card, 1, en_US]

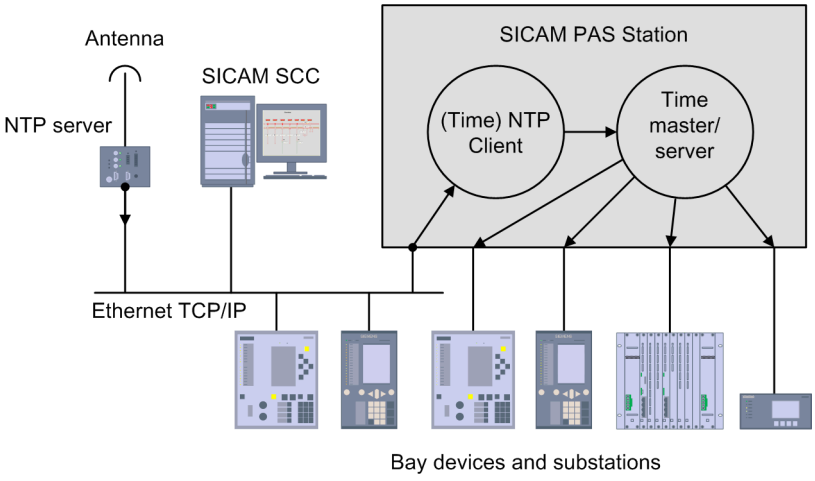
Figure 3-27 Time Synchronization Using the SICAM PAS Station, Example

The time synchronization of the components of the SICAM PAS system can also be performed from a control center.

Ethernet Station Bus

For system configurations with an Ethernet station bus, a separate time master can be used on the Ethernet. This SNTP-Server synchronizes all connected devices, the SNTP Clients.

In this case, the SICAM PAS Station also acts as an SNTP Client with regard to time synchronization. Nevertheless, it takes over the synchronization of the devices connected to the station through other protocols.



[dw_PAS_time_sync_Ethernet_station_bus, 1, en_US]

Figure 3-28 Time Synchronization in the Ethernet Station Bus

3.14.10 Supporting IEDs in Test Mode

Some communication protocols (for example IEC 61850) support the exchange of information marked as test information. IEDs supporting and running in test mode use such protocols to:

- Exchange monitoring information marked as test information
- Accept only those commands marked as test information

The main focus in sending monitoring and control information marked as test information is to test and verify whether the information sent/received serves its intended purpose.

SICAM PAS supports the routing of information items marked as test information both in monitoring and command direction. Based on the protocol properties, the following SICAM PAS applications support forwarding of test information through the system:

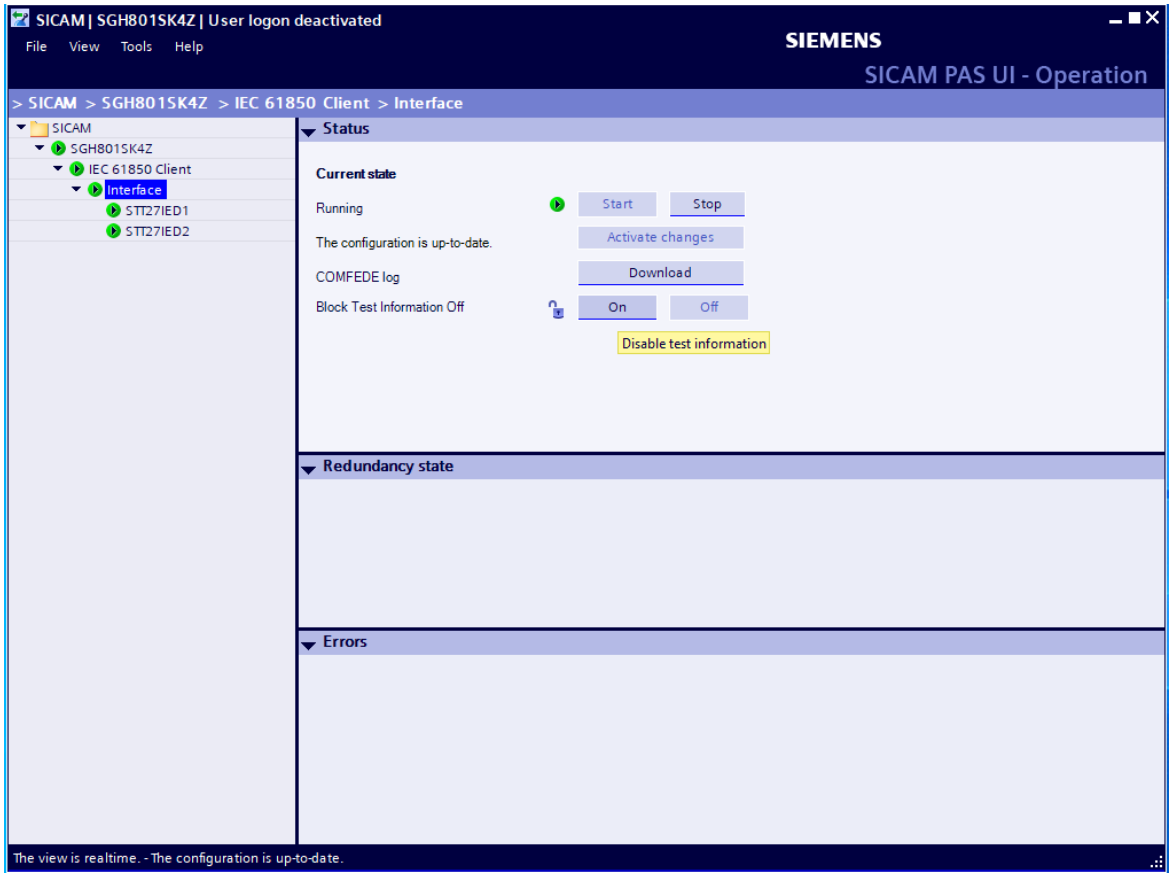
- IEC 60870-5-101 Master/Slave
- IEC 60870-5-103 Master (monitoring direction only)
- IEC 60870-5-104 Master/Slave
- IEC 61850 Client/Server

Additionally, the following applications support test mode:

- DNP3 Master/Slave
- Modbus Master/Slave
- PROFINET IO Master

Through the configuration in SICAM PAS, the information marked as test information can either be forwarded or discarded. For example, it can be configured whether a command marked as test information (sent from the control center using IEC 60870-5-104 protocol) can be forwarded as a normal command to an IED connected with DNP3 Master or discarded.

From V8.18 onwards, test tagged information is handled from runtime using PAS UI Operation and UI Operation Client.

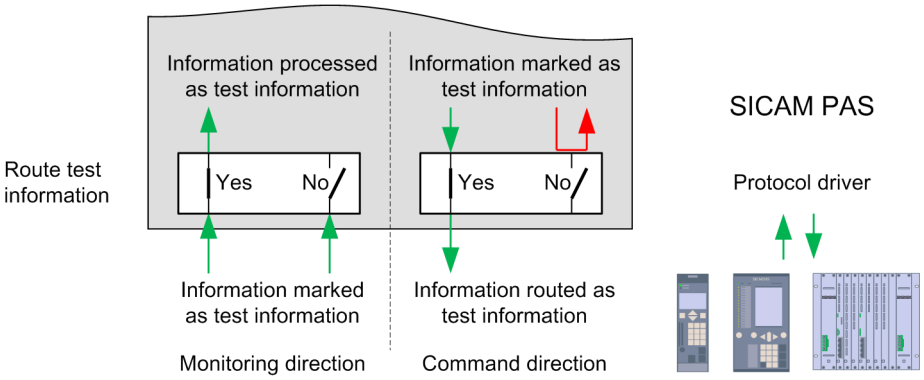


[sc_PAS UI Operate, 1, en_US]

Master Applications Supporting Test Mode

The figure shows the behavior of the protocols:

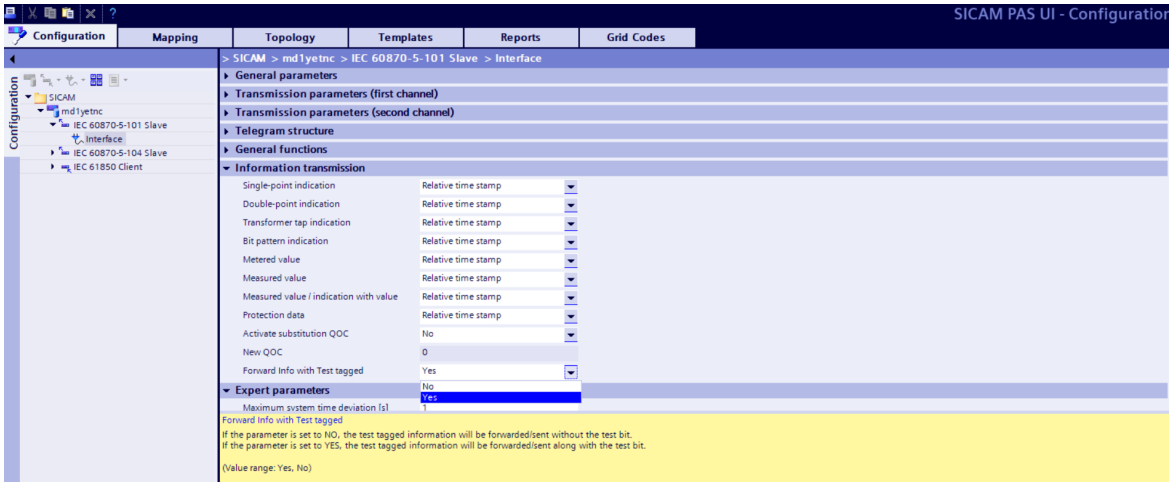
- IEC 60870-5-101 Master
- IEC 60870-5-103 Master (only monitoring direction)
- IEC 60870-5-104 Master
- IEC 61850 Client



[dw_Test mode Master supporting test mode, 1, en_US]

Figure 3-29 Master Applications Supporting Test Mode

Users with IEC 60870-5-101 Slave and IEC 60870-5-104 Slave have the flexibility to forward/send test tagged information with or without a set test bit. If the parameter is set to **No**, the test tagged information will be forwarded/sent without the test bit set. If the parameter is set to **Yes**, the test tagged information will be forwarded/sent with the test bit set.

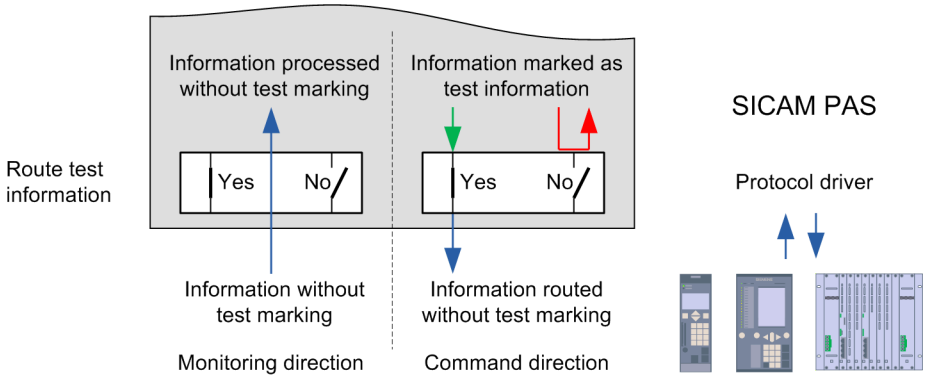


[sc_Forward Info with test tagged, 1, en_US]

Master Applications Not Supporting Test Mode

The figure shows the behavior of the protocols:

- DNP3 Master
- Modbus Master
- PROFINET IO Master



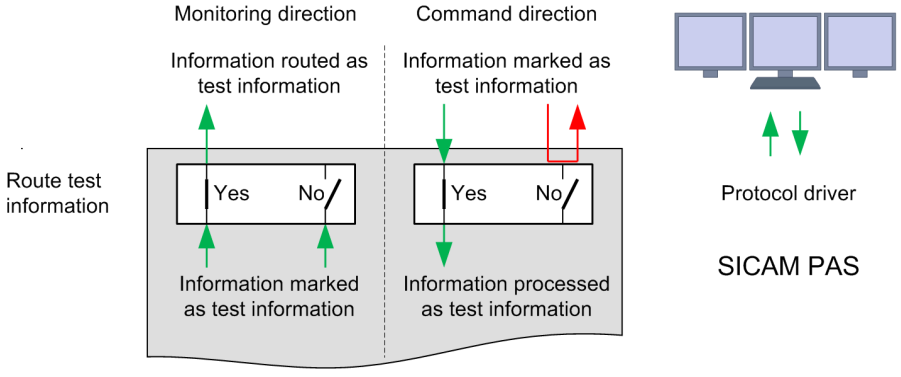
[dw_Test mode Master not supporting test mode, 1, en_US]

Figure 3-30 Master Applications Not Supporting Test Mode

Slave Applications Supporting Test Mode

The figure shows the behavior of the protocols:

- IEC 60870-5-101 Slave
- IEC 60870-5-104 Slave
- IEC 61850 Server



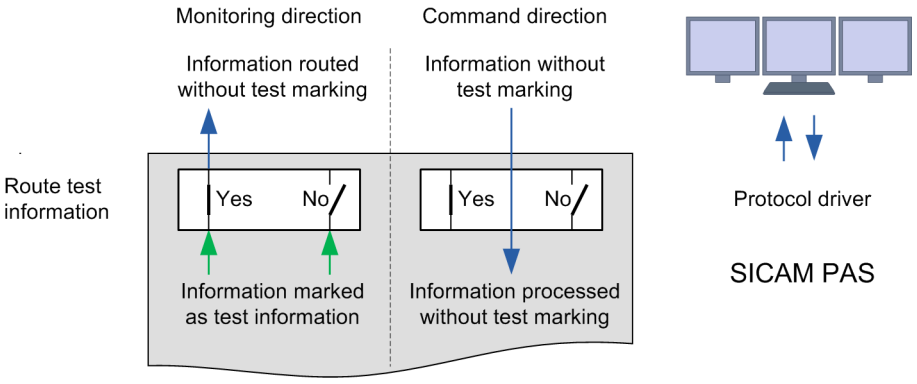
[dw_Test mode Slave supporting test mode, 1, en_US]

Figure 3-31 Slave Applications Supporting Test Mode

Slave Applications Not Supporting Test Mode

The figure shows the behavior of the protocols:

- DNP3 Slave
- Modbus Slave



[dw_Test mode Slave not supporting test mode, 1, en_US]

Figure 3-32 Slave Applications Not Supporting Test Mode

Fault Records

Fault records from a device running in test mode connected via **IEC 61850 Client** can be visualized via the **Test mode data archive** in SICAM PQ Analyzer.

If **Block test information** is disabled, the fault records are not saved.

Fault records from a device running in test mode connected via **IEC 60870-5-103 Master** are saved in the configured archive.

Automation

SICAM PAS SoftPLC processes information marked as test information. If an automation block used receives information marked as test information, the test information mark is also added to the output.

Human Machine Interface

Information marked as test information is forwarded to SICAM SCC as an operational information and is visualized as usual.

Other Applications

The routing of information marked as test information can not be configured for the following **Master** applications:

- OPC Client
- PROFIBUS DP Master
- SINAUT LSA ILSA Master

Information marked as test information is not routed in command direction.

The routing of information marked as test information can not be configured for the following **Slave** applications:

- OPC Server and OPC DA XML Server
- Telegyr 8979 Slave
- CDT Slave

Information marked as test information is not routed in monitoring direction.

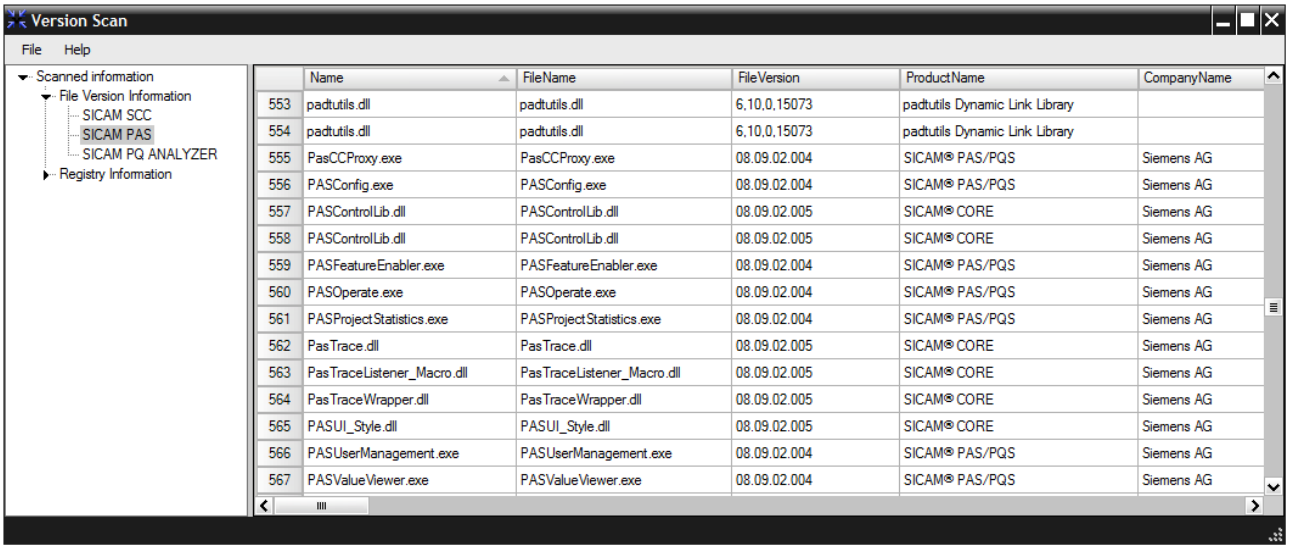
3.15 Version Scan

The **Version Scan** system component determines the version and storage location of the products installed and their lower-level system components. Sources of error through inconsistent versions of the individual components can thus be determined quickly and efficiently.

For the Customer Support Center, the Version Scan provides valuable information that serves as a basis for evaluating the system behavior or for determining the causes of problems.

The following products are evaluated:

- SICAM PAS
- SICAM SCC
- SICAM PQ Analyzer
- DIGSI



	Name	FileName	FileVersion	ProductName	CompanyName
553	padtutils.dll	padtutils.dll	6,10,0,15073	padtutils Dynamic Link Library	
554	padtutils.dll	padtutils.dll	6,10,0,15073	padtutils Dynamic Link Library	
555	PasCCProxy.exe	PasCCProxy.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
556	PASConfig.exe	PASConfig.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
557	PASControlLib.dll	PASControlLib.dll	08.09.02.005	SICAM® CORE	Siemens AG
558	PASControlLib.dll	PASControlLib.dll	08.09.02.005	SICAM® CORE	Siemens AG
559	PASFeatureEnabler.exe	PASFeatureEnabler.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
560	PASOperate.exe	PASOperate.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
561	PASProjectStatistics.exe	PASProjectStatistics.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
562	PasTrace.dll	PasTrace.dll	08.09.02.005	SICAM® CORE	Siemens AG
563	PasTraceListener_Macro.dll	PasTraceListener_Macro.dll	08.09.02.005	SICAM® CORE	Siemens AG
564	PasTraceWrapper.dll	PasTraceWrapper.dll	08.09.02.005	SICAM® CORE	Siemens AG
565	PASUI_Style.dll	PASUI_Style.dll	08.09.02.005	SICAM® CORE	Siemens AG
566	PASUserManagement.exe	PASUserManagement.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG
567	PASValueViewer.exe	PASValueViewer.exe	08.09.02.004	SICAM® PAS/PQS	Siemens AG

[sc_VersionScan, 3, en_US]

Figure 3-33 Version Scan

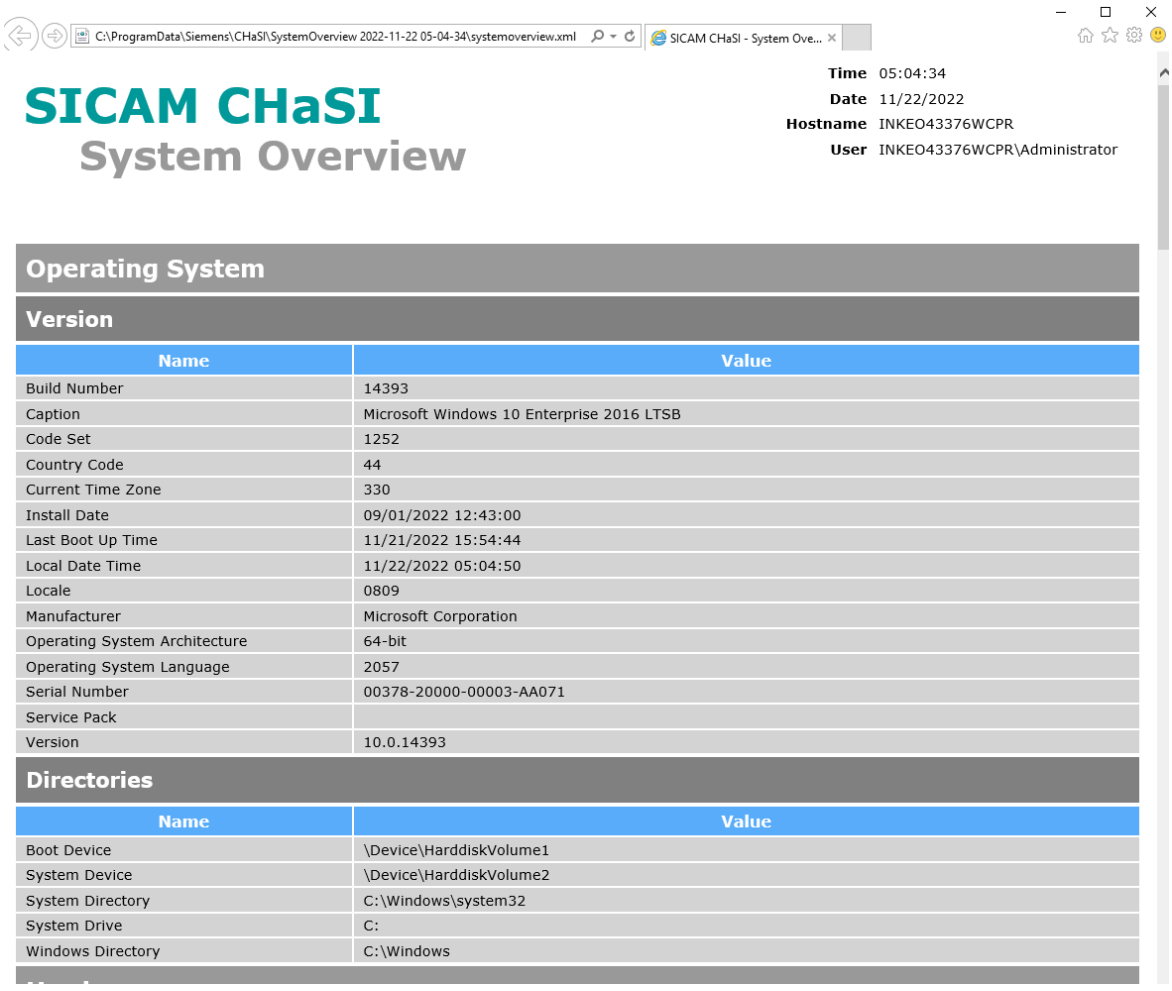
3.16 SICAM CHaSI

SICAM CHaSI (Collect Hardware and Software Information) is a diagnostic tool used to collect information on the hardware and software components of the SICAM systems.

You can forward this information to the Customer Support Center for further analysis, which includes the following data:

- Hardware and software inventory data including data concerning the BIOS, the processor, and the software installed
- Information on the file system, the network, important entries from the registration database, and system settings (including the hosts file and the ntp file)
- Information on the version of the SICAM products and files installed for:
  - SICAM PAS
  - SICAM PQ Analyzer
  - SICAM SCC
  - SIMATIC WinCC
- Error log files with information on any program crashes (dump files)

- Windows Event Log
- Windows Error Reporting files (Only Appcrash & Apphang files)
- Report logs



[sc_SICAMchasi_Sysoverview_IE, 2, en_US]

Figure 3-34 Displaying the System Overview Data in Internet Explorer

3.17 Test and Diagnosis

SICAM PAS UI – Operation, **SICAM PAS UI – Operation Client**, or **SICAM PAS Value Viewer** are available for test and diagnostic purposes.

These components are used for example, for monitoring the communication connections or the operational status of individual devices. In addition, you can perform control and manual update operations or read out information states or values.

If an error has occurred, you will receive useful notes on potential causes of the pending fault.

For more information, refer to *3.3 SICAM PAS UI – Operation* and *3.6 SICAM PAS – Value Viewer*.

The **Version Scan** provides you with an overview of the version of the products installed and the corresponding applications.

CHaSI collects information on the hardware and software components of the SICAM systems.

Our hotline can use additional diagnostic tools for fault localization, for example, TRACE sequences or monitoring of the data traffic between the system components.

Customer Support Center

Our Customer Support Center provides a 24-hour service.

Siemens AG
Smart Infrastructure – Protection Automation
Customer Support Center

Tel.: +49 911 2155 4466
E-Mail: *energy.automation@siemens.com*

4 Available Variants of System Components

Overview

The components of the modular SICAM PAS system are available in different variants tailored to meet the specific requirements of your individual station.

4.1 SICAM PAS – ALM

SICAM PAS comprises various different basic, function, and upgrade packages.

4.1.1 Basic Package

The basic package is available in different variants. It depends on your individual system architecture, which packages are necessary. The basic package is delivered as an Online Software Delivery (OSD). The licenses depend on the required functionality and the number of devices in your station.

You require the runtime packages for the operation of your SICAM PAS system.

The configuration packages serve for the configuration and parameterization of the SICAM PAS system with its connections to the other system components.

The number of usable devices is determined by the degree of extension of your station. An existing license can be extended by the upgrade packages.

NOTE

A PQ device with a used measuring channel is valuated with 133 information points.

The following packages can be ordered:

Runtime

Basic Package		Number of Devices or Data Points			
Order Number (MLFB)	License	≤ 4 Devices	≤ 15 Devices or ≤ 2000 Data Points	≤ 180 Devices	≥ 180 Devices
6MD9000-3RA10...	Runtime Small	x			
6MD9000-3MA10...	Runtime Medium		x		
6MD9000-3AA10...	Runtime Large			x	
6MD9000-3BA10...	Runtime XLarge				x
6MD9000-3AA20...	UI Configuration				x
6MD9020-3MA10...	Runtime Compact		x		

Device Interface Processor (DIP)

In a distributed system you must connect a DIP to the Full Server. As a prerequisite, a network connection must have been set up to the Full Server and the Full Server must run.

- DIP Runtime
- "n" Protocol license

Runtime Basic Package for Full Server

The Runtime basic package for the Full Server includes:

- User interface
  SICAM PAS UI – Configuration for changing parameters.
  SICAM PAS UI – Operation for checking the connections during runtime
- Commissioning aids through **onboard** functions
- SICAM PAS Value Viewer for tag monitoring and command output
- Normalization functions for binary and analog values

- Database system
- Central data server DSI (Distributed System Infrastructure)
- OPC DA Server for data exchange with other process visualization systems and with protocol drivers from third-party manufacturers
- SNMP Client
- Communication with SICAM MIC (incl. CP-8000, CP-8021/22)
- Communication with SICAM SCC
- IEC 61850 Client
- SIPROTEC 4 Interface Master
- SIMEAS R Master
- SICAM Q80 Master
- Event list / Fault Event support
- Manuals and online helps

NOTE

With the license for the **Runtime** basic package, you can create, change, delete, or move the parameterization using SICAM PAS UI Configuration for the following applications:

- Archive
- Event List / Fault Events
- IEC 60870-5-103 Master, only monitoring direction
- IEC 61850 Client, monitoring and control direction
- OPC DA Server
- SICAM Q80 Master
- SIMEAS R Master
- SIP 4 Service IF Master
- PQS Automatic Import
- PQS Automatic Export
- PQS Automatic Fault Location
- PQS Automatic Notification
- PQS Scheduled Reports
- SNMP Client

To parameterize all the other applications, you need a **Configuration** license. To change single parameters of these applications, you only need the license for the **Runtime** basic package.

4.1.2 SICAM PAS Compact

The SICAM PAS Compact package comprises the functionality of the **Runtime & Configuration** basic package. SICAM PAS Compact can be extended by function packages any time.

SICAM PAS Compact is subject to the following restrictions:

- SICAM PAS Compact cannot be used on a DIP.
- An increase in items of information (functional upgrade) is not possible.

SICAM PAS Compact includes the following licenses:

Runtime & Configuration

Full Server for up to 2000 items of information from connections of Master Applications, for example, bay devices

Automation

Automation based on CFC, ST, IL, and SFC

Protocols

Any 4 protocols including IEC61850 Client

Additional protocols/applications are subjected to license.

Free features with Compact License: SIPROTEC 4 Service IF Master, SICAM MIC (incl. CP-8000, CP-8021/22), SNMP Client, SNMP Agent, Syslog, OPC DA Server, SIMEAS R Master, SICAM Q80 Master, Event List/Fault Events.

4.1.3 Upgrades

Functional Upgrade – Number of Supported Devices

Basic Package		
Order Number (MLFB)	**License**	**Upgrade to**
6MD9004-3MA10...	Functional upgrade to Medium	Upgrade from SICAM PAS **Runtime - Small** (for up to 4 devices) to **Runtime - Medium** (for up to 2000 master information objects)
6MD9004-3AA10...	Functional upgrade to Large	Upgrade from SICAM PAS **Runtime - Medium** (for up to 2000 master information objects) to **Runtime - Large** (for up to 180 devices)
6MD9004-3BA10...	Functional upgrade to XL	Upgrade from SICAM PAS **Runtime - Large** (for up to 180 devices) to **Runtime - Extra Large** (for more than 180 devices)

Version Upgrade

Upgrade to the latest version of SICAM PAS.

4.1.4 Function Packages

Complementary to the Full Server basic packages, optional packages are available for the following functions:

- Protocols for the connection of protection devices, RTUs, and control centers, licensed by ordering optional MLFBs for "n" protocols (e.g. 6MD9000-3SA04-8AA0, where n=4).
- Power Quality functions, licensed by ordering optional MLFBs for "n" (PQ) applications (e.g. 7KE9000-3PA04-8AA0, where n=4).
- Functional upgrade for communication protocols (secure communication).

Protocols for the Connection of Bay Devices and Substations

- IEC 60870-5-103 Master
- IEC 60870-5-104 Master
- IEC 60870-5-101 Master

- DNP3 Master (serial, TCP/IP)
- Modbus Master (serial, TCP/IP)
- PROFIBUS DP Master
- PROFINET IO Master
- SINAUT LSA ILSA Master

Protocols for the Connection to Higher-Level Control Centers

- IEC 61850 Server
- IEC 60780-5-104 Slave
- IEC 60870-5-101 Slave
- DNP3 Slave (serial, TCP/IP)
- Modbus Slave (serial, TCP/IP)
- Telegyr TG8979 Slave
- CDT Slave

Open Communication for the Data Exchange with OPC Servers

- OPC Client
- OPC XML DA Server

Automation

Automation based on CFC, ST, STL, and SFC

Secure Communication

Function package for TCP/IP-based communication protocols:

- IEC 60780-5-104 Slave (TLS encryption)
- IEC 60780-5-104 Master (TLS encryption)
- IEC 61850 Client (TLS encryption)
- IEC 61850 Server (TLS encryption)
- DNP3i Slave (TLS encryption, authentication)
- DNP3i Master (TLS encryption, authentication)

Post Disturbance Review Recorder (PDR)

Recording of selected information during a selectable period of time and with a selectable trigger criterion

Automatic Import

Import of fault records in COMTRADE format

Automatic Export

- Export of fault records in COMTRADE format
- Export of reports in PDF format (fault location reports)

Automatic Notification

Notification by an e-mail and/or SMS on state changes of items of information, fault records arrived, or fault location reports.

Power Quality

For more information on the type and volume of the Power Quality packages, refer to the description in */2/ SICAM PQS, Overview*.

NOTE

The installation requirements for SICAM PAS UI – Configuration are described in */3/ SICAM PAS/PQS, Installation*.

4.2 SICAM SCC Human-Machine Interface (HMI)

SICAM SCC is based on SIMATIC WinCC. It is extended by components realizing special power automation requirements.

For more information on the individual components, refer to *3 Overview of Functions*.

For instructions regarding the setting of parameters for the Human-Machine Interface, refer to */5/ SICAM SCC, Human Machine Interface SICAM SCC*.

SICAM SCC is provided on DVD with all required licenses.

4.2.1 Basic Packages

SICAM SCC is available in different order variant:

- SICAM SCC Runtime with WinCC
- SICAM SCC Runtime & Configuration with WinCC

Furthermore, you can select whether you want to operate SICAM SCC by either of the methods:

- Without measured-value and metered-value evaluation
- With measured-value and metered-value evaluation through SICAM Valpro

The basic packages are available with a different volume of tags:

- 128 tags
- 512 tags
- 2048 tags
- 8196 tags
- 65 536 tags

Be aware of the following information when selecting the package size:

- In the SIMATIC WinCC Tag Management, each SICAM PAS information object (indication, command, measured value, metered value) consists of several tags.

  For the selection of the package size, only the number of SICAM PAS information objects is relevant. However, the number of SIMATIC WinCC tags resulting from this is irrelevant.
- For the determination of the information objects, indications which are only recorded in event lists and not required for display in the Tag Management do not need to be considered.

4.2.2 Upgrades

Functional Upgrades

If you do not want to use the default WinCC version included in the scope of delivery of SICAM SCC, you can also order SICAM SCC as an upgrade package without WinCC.

Take care that your existing SIMATIC WinCC is compatible with SICAM SCC. For more information, refer to */5/ SICAM SCC, Human Machine Interface SICAM SCC*.

- Upgrade packages from WinCC to SICAM SCC (Runtime), with or without SICAM Valpro
- Upgrade packages from WinCC to SICAM SCC (Runtime & Configuration), with or without SICAM Valpro

Version Upgrade

The following version upgrade packages are also available:

- Upgrade from SICAM SCC V6.00 to SICAM SCC V7 or V8
- Upgrade from SICAM SCC V5.xx to SICAM SCC V7 of V8

NOTE

For more information on the installation requirements for SICAM SCC and the optional SICAM Valpro component, refer to:

- */5/ SICAM SCC, Human Machine Interface SICAM SCC*
- */6/ SICAM Valpro, Measured/Metered Value Processing Utility SICAM Valpro*

4.2.3 SICAM Valpro

SICAM Valpro can be ordered separately and used independently of SICAM SCC.

4.2.4 SICAM PQ Analyzer – Incident Explorer, Fault Event Viewer, and Event Viewer

The Incident Explorer, the Fault Event Viewer, and the Event Viewer are integral parts of the SICAM PQ Analyzer delivered on a separate DVD.

Depending on the functionality in your environment, you require the corresponding licenses for the Incident Explorer of the SICAM PQ Analyzer. The Incident Explorer license includes the Fault Event Viewer and Event Viewer functionality.

In distributed systems with several SICAM PAS Stations, the SICAM PQ Collector collects the archive data of the individual runtime archives and enters them in the PQ Analyzer archive.

For more information on the different variants of the SICAM PQ Analyzer, refer to */2/ SICAM PQS, Overview*, */14/ SICAM PQ Analyzer, Incident Explorer*, and */13/ SICAM PQ Analyzer*.

5 First Steps

This chapter presents a sample configuration to illustrate how to work with SICAM PAS UI – Configuration.
This example focuses on the functions for the substation control application of SICAM PAS.
A brief example for the configuration of Power Quality functions is provided in */2/ SICAM PQS, Overview*.
An example for the configuration of SICAM SCC is provided in */5/ SICAM SCC, Human Machine Interface SICAM SCC*.

5.1 Sample Configuration

The sample configuration illustrates the handling of the SICAM PAS UI – Configuration tool.

You configure a Full Server with the following characteristics:

- The one, which communicates with a higher-level control center through IEC 60870-5-104
- The one, which comprises a SICAM SCC HMI for system management
- The one to which a bay device with a sample configuration, based on the IEC 60870-5-103 protocol and a DNP3 sample device is connected.

The User Administration component is not enabled.

For DNP3, the sample does not comprise secured data transmission through certificates.

Proceed as follows:

✧ Start SICAM PAS UI – Configuration.

✧ Select the **Configuration** view and configure the components of your station.

✧ Open the **Mapping** view and select all required items of information in the command and monitoring direction.

✧ Open the **Topology** view and specify a system-oriented structure of the configured data.

✧ Export the station data for further processing by SICAM SCC.

✧ Print the components of your station configuration.

The suggested procedure illustrates the individual stages of the configuration and parameterization of a station. It does not provide a complete station configuration and does not describe specific functions and parameters.

For more information on the work with SICAM PAS UI – Configuration, refer to */4/ SICAM PAS/PQS, Configuration and Operation*.

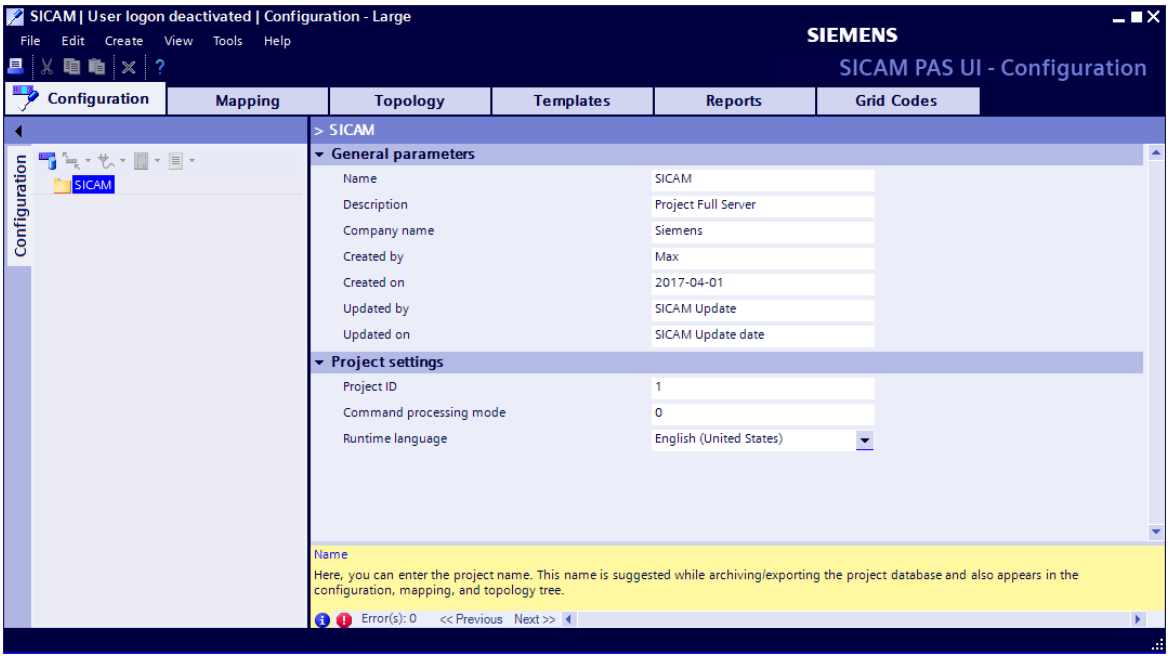
For more information on the basic principles for the configuration of a redundant system, refer to */9/ SICAM PAS, Redundancy*.

For more information on the use of the different security functions, refer to */8/ SICAM PAS/PQS, Security*.

5.2 Configuring a System

During configuration, you insert all components required for your station. In addition to the bay devices, these also include the connections to the control center and the SICAM SCC HMI.

After starting SICAM PAS UI – Configuration, an empty **project** with its **properties** is displayed in the **Configuration** view.



[sc_Config_start_window, 2, en_US]

Figure 5-1 Configuration Start Window

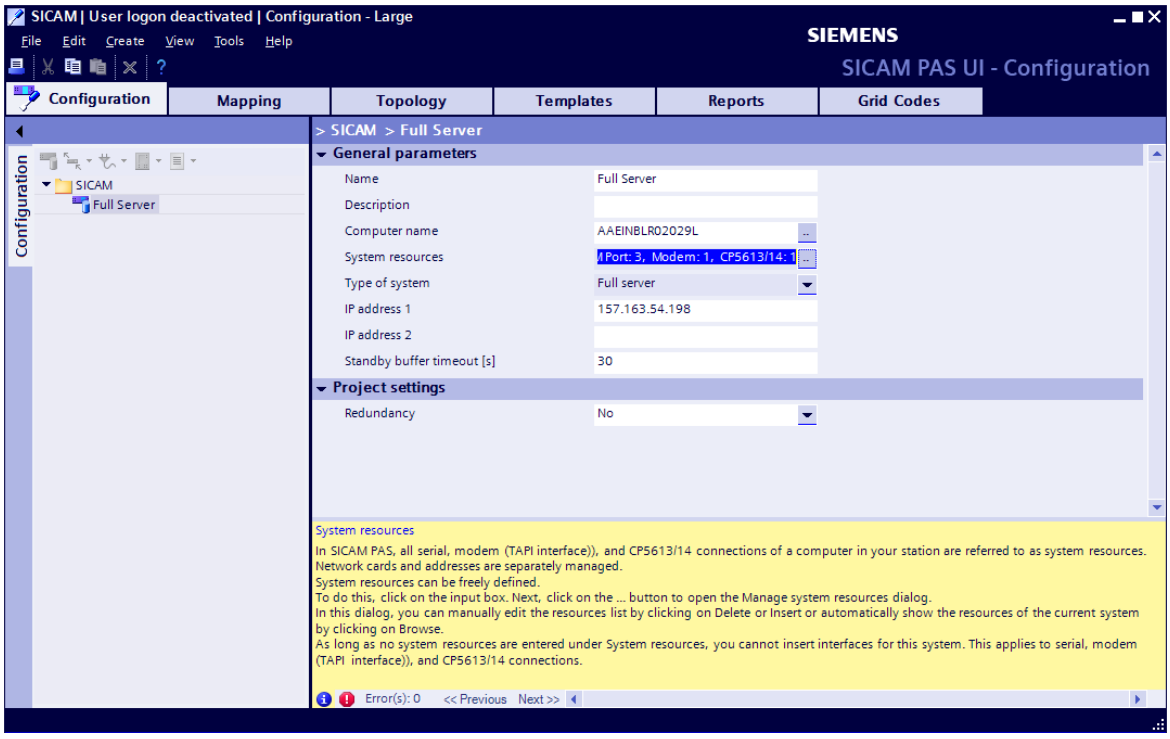
You can now start to configure your system.
Names can be modified in the configuration tree or in the input area.
Information with a dark background cannot be modified in the current view.

NOTE

Wherever possible, use context menus.

5.2.1 Inserting the SICAM PAS System

- ✧ In the **Configuration** view, select the SICAM PAS Station and insert a **system**. The system is assigned the name of your computer.
- ✧ Click the **Name** box and enter **Full Server**.

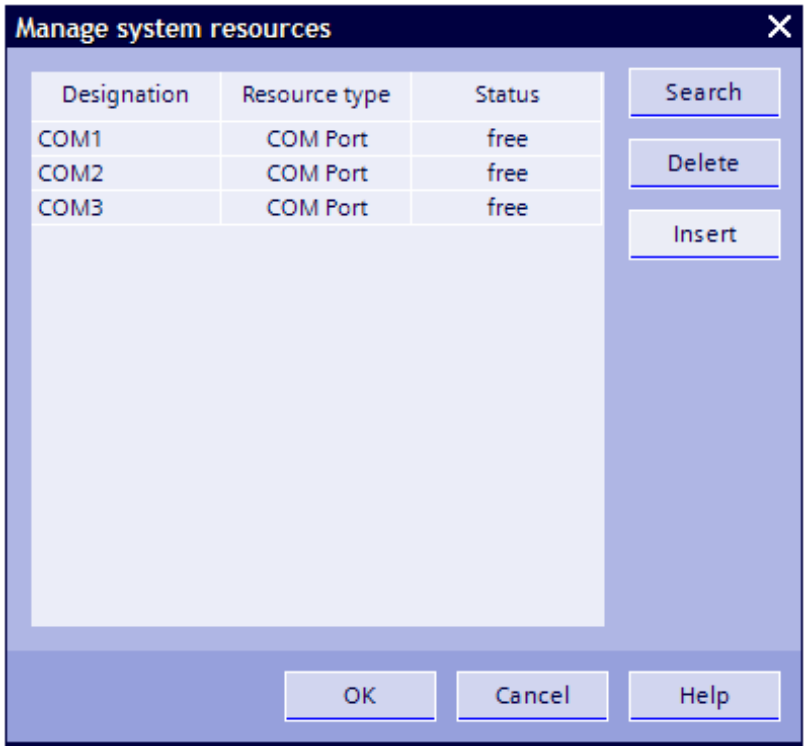


[sc_Inserting_Full_server, 2, en_US]

Figure 5-2 Inserting the Full Server

✧ Click the **System Resources** box.

✧ Click **Insert** and create 3 COM interfaces.



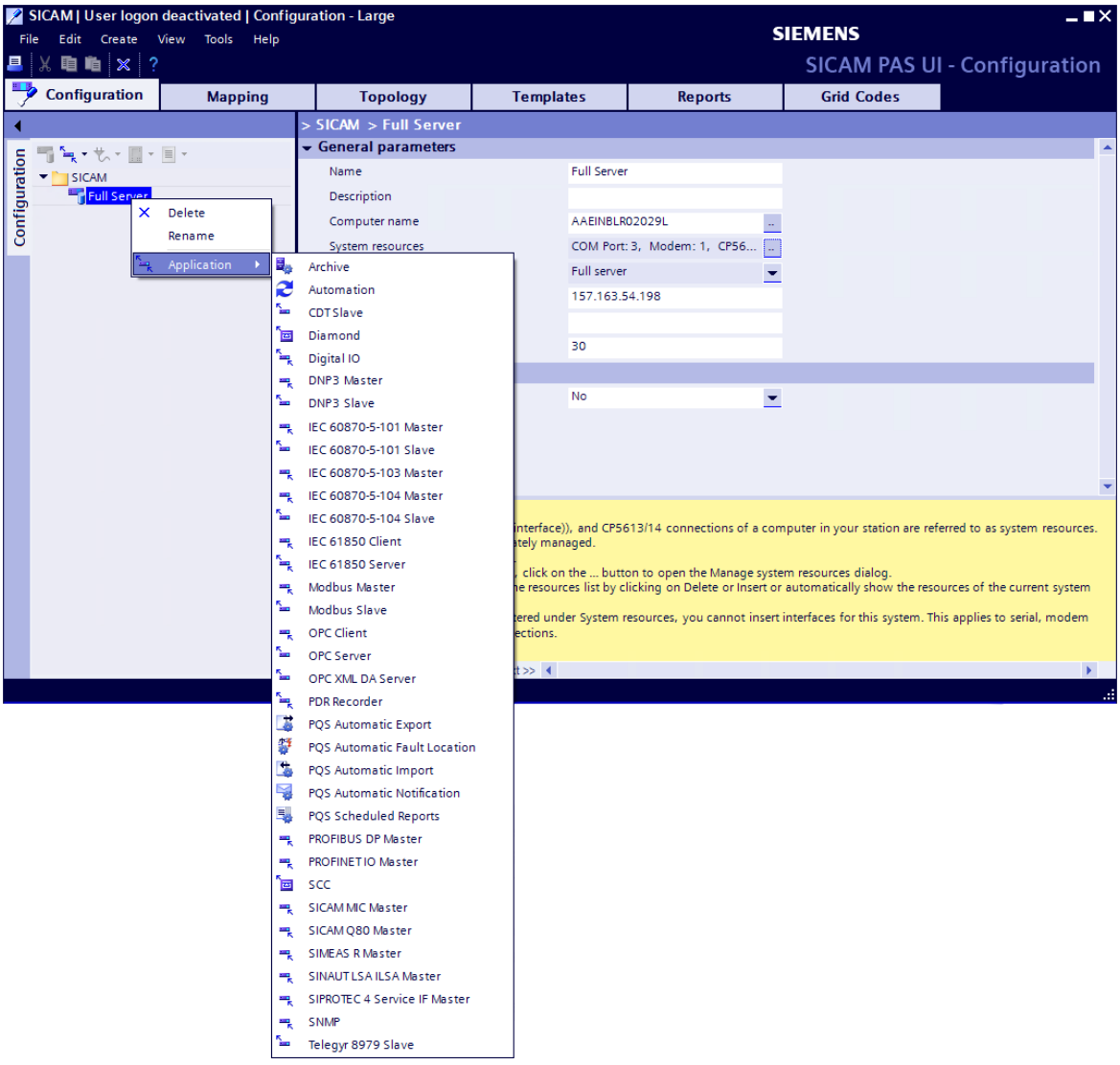
[sc_Inserting_System_Interfaces, 2, en_US]

Figure 5-3 Inserting System Interfaces

5.2.2 Inserting Applications and Interfaces

Define the connections to the control center, to SICAM SCC and to the bay devices.

✧ Select the **Full Server** and insert the following **applications**:
- **IEC 60870-5-104 Slave** for the connection to a control center
- **IEC 60870-5-103 Master** and **DNP3 Master** for the connection of the bay devices
- **SCC** for the connection of SICAM SCC



[sc_Inserting_Apps, 2, en_US]

Figure 5-4 Inserting Applications

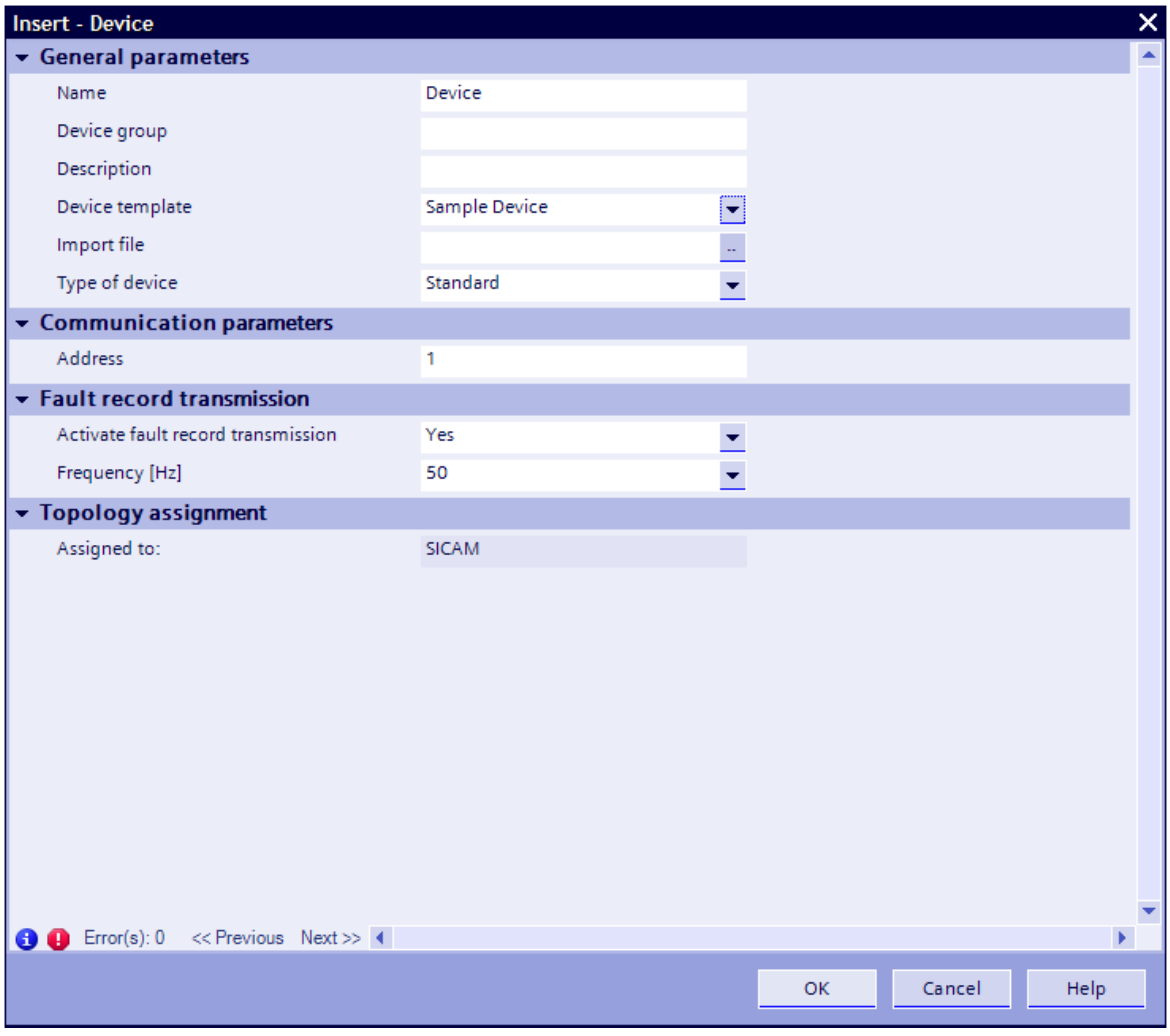
✧ Select the **SCC, IEC 60870-5-104 Slave, DNP3 Master,** and **IEC 60870-5-103 Master** applications one after the other. Add an **interface**.

5.2.3 Adding Bay Devices

✧ Select the **interface** for **IEC 60870-5-103 Master** and insert a **device**.

✧ In the **Insert - Device** dialog, in the **Device template** field select **Sample Device** from the list box.

The device is imported including all parameters.



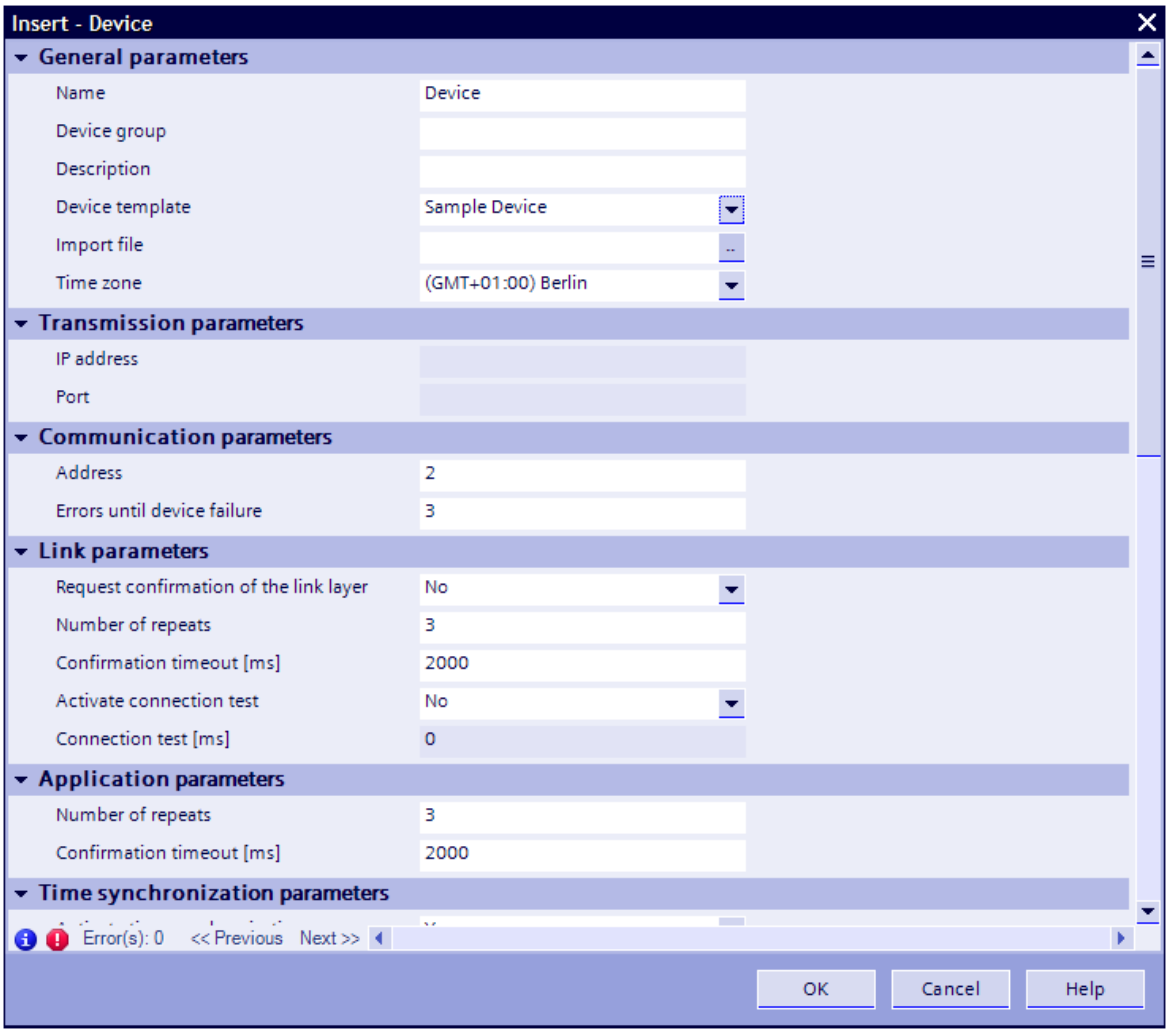
[sc_Import_IEC608705103_device, 2, en_US]

Figure 5-5 Import of an IEC 60870-5-103 Device

✧ Select the **interface** for **DNP3 Master** and insert a **device**.

✧ Click the **Device Template** box and select the delivered device template **Sample Device**.

The information is entered in the device template.

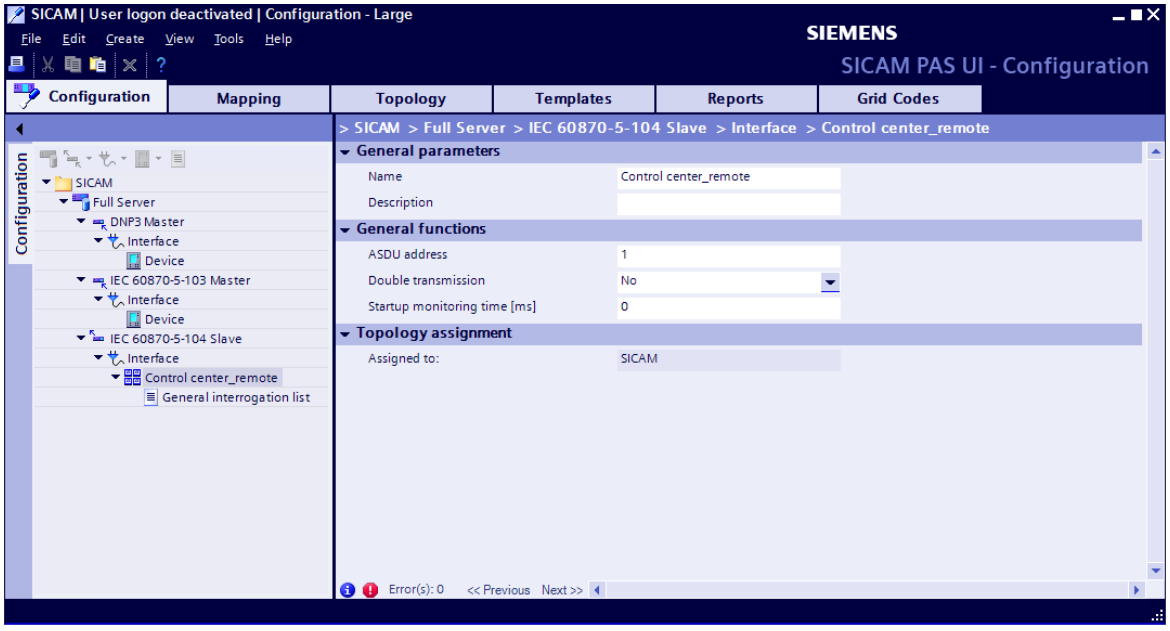


[sc_Inserting_Bay_device, 2, en_US]

Figure 5-6 Inserting a Bay Device

5.2.4 Adding a Connection to the Control Center and Defining Related Parameters

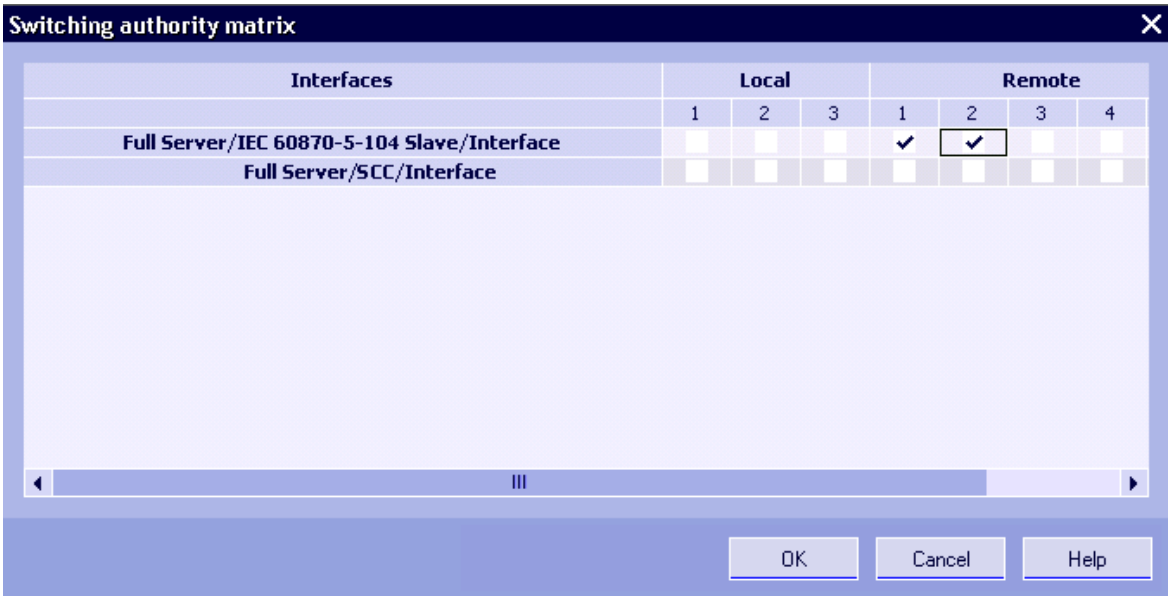
- ✧ In the configuration tree, select the **interface** for **IEC 60870-5-104 Slave** and insert a **control center**.
- ✧ Rename it **Control center_remote**.
- ✧ Select **Control center_remote** and insert a **list**.



[sc_ControlCenter_List, 2, en_US]

Figure 5-7 Control Center and List

✧ Select the **interface** for **IEC 60870-5-104 Slave**, click on **Switching Authority Group Assignment** in the input area and then select **Remote 1** and **Remote 2**.



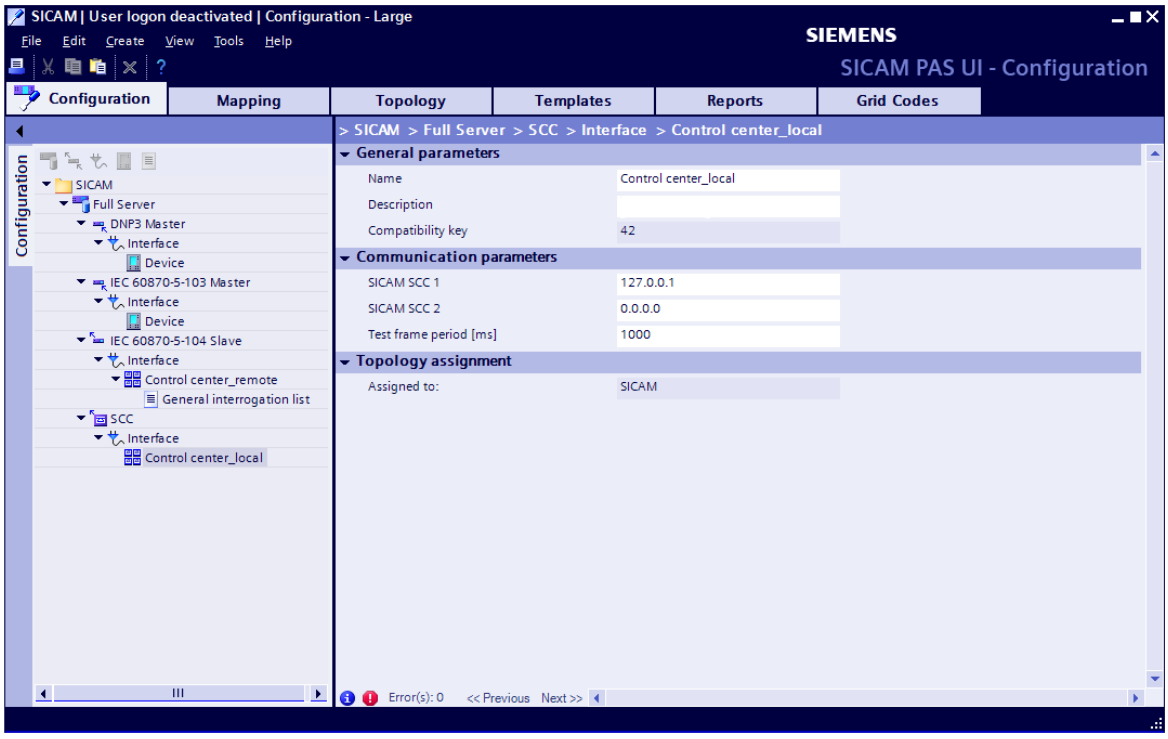
[sc_Assigning_SwitchingAuthority_CC, 1, en_US]

Figure 5-8 Assigning the Switching Authority for the Control Center

5.2.5 Inserting a Connection to SICAM SCC and Defining Related Parameters

✧ In the configuration tree, right-click the **interface** for **SCC** and select a **control center** from the context menu.

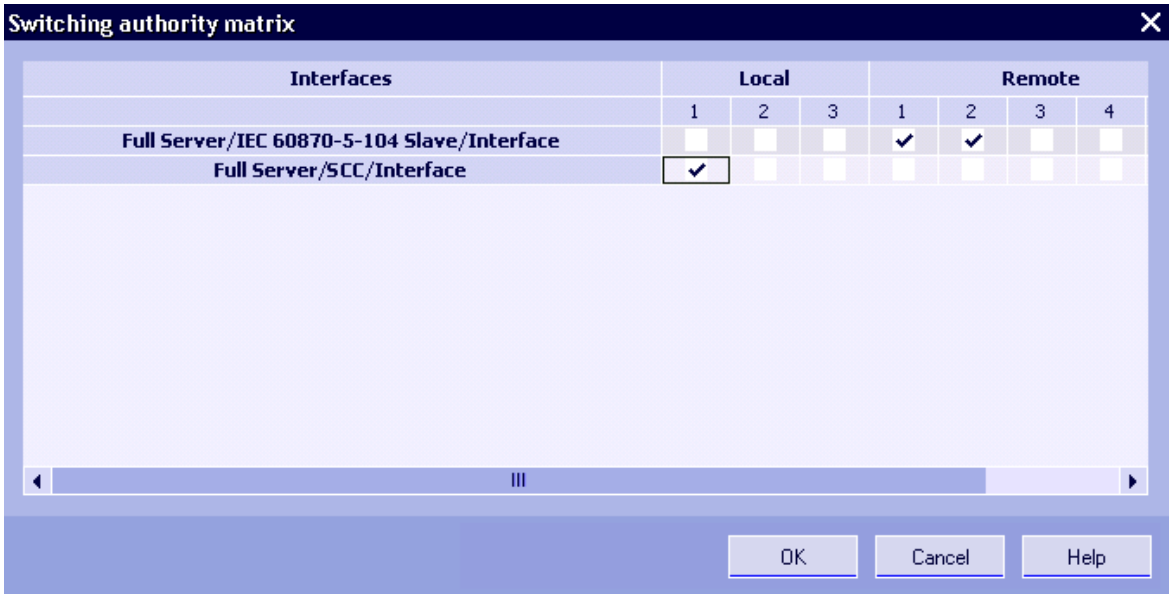
✧ Rename it **Control center_local**.



[sc_interface_SICAMSCC, 2, en_US]

Figure 5-9 Interface to SICAM SCC

✧ Select the **interface**, click on **Switching authority group assignment** in the input area and then select **Local 1**.



[sc_Assignment_SwitchingAuthority_SCC, 1, en_US]

Figure 5-10 Assignment of the Switching Authority for SCC

5.3 Mapping of Information of the Bay Devices

As soon as you have inserted all components required for our sample project, you can start to map information. You define which information from the bay devices shall be used and whether it must be transmitted to

the control center or used by the SCC HMI. These definitions must be performed separately for the monitoring direction and the command direction.

✧ Open the **Mapping** view.

IEC 60870-5-103 Master

✧ Select the **device** connected to the **IEC 60870-5-103 Master** interface.

✧ In the **Monitoring direction** window, select all items of information to be transferred to the higher-level **Control center_remote** and/or to be displayed and/or logged on your SICAM SCC workstation **Control center_local**.

✧ In the **Blocking** column, modify the **Check all** setting for individual items of information.
Select **Telecontrol blocking** if the information shall be transmitted despite a telecontrol blocking. Select **Bay blocking** if the information shall be transmitted despite a bay blocking.
If you select **Ignore all**, the information is transmitted despite a bay blocking or telecontrol blocking.

✧ Select all items of information to be controlled for the **command direction**.

✧ In the **Blocking** column, modify the **Check all** default setting for individual items of information in the same way as for the monitoring direction.

✧ In the **Authority** column, deselect the setting for certain items of information.
This ensures that the corresponding items of information can be controlled without previous assignment of the switching authority.

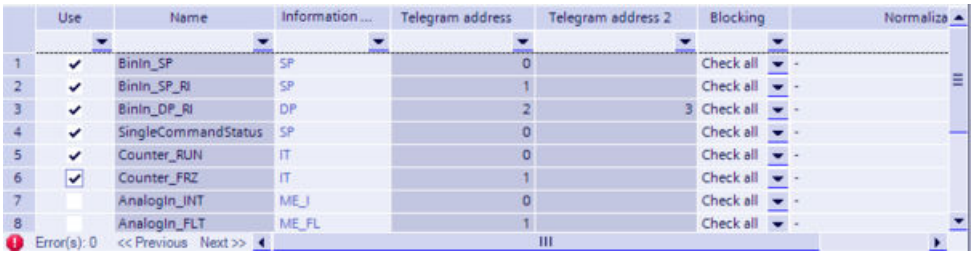
✧ Deselect the setting for certain items of information in the **´M of N´ check** column.
The command is no longer included in the monitoring of commands, which can be sent simultaneously.
On the project level, you can select how many commands can be sent simultaneously.

DNP3 Master

✧ Select the **device** connected to the **DNP3 Master** interface.

✧ Select all the information to be used in the **Monitoring direction** and **Command direction**.

✧ Modify the default settings analogous to the settings of the DNP3 device.

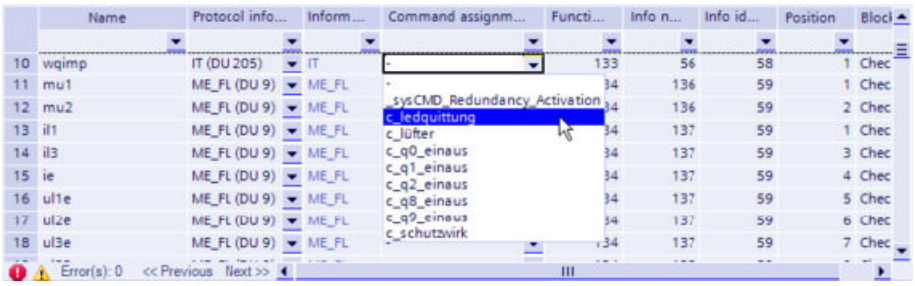


[sc_MappingInfo_BayDevice_DNP3, 3, en_US]

Figure 5-11 Mapping of Information of the Bay Device

Various parameter settings, for example, the assignments of commands to command feedbacks, must already be performed when defining the device **templates** or when setting the parameters for devices and substations.

These parameters can also only be modified in the **Templates** view.



[sc_MappingInfo_DeviceTemplate_Ex, 4, en_US]

Figure 5-12 Mapping of Information in the Device Template, Example

5.4 Mapping of Information to the Higher-Level Control Center

Monitoring Direction

✧ In the **Mapping** view, select **Control center_remote**. In the monitoring direction in the **Use** column, select the messages to be transmitted to the higher-level control center.

The numbers of the information rows selected and the fields of the **Telegram address** are highlighted in red.

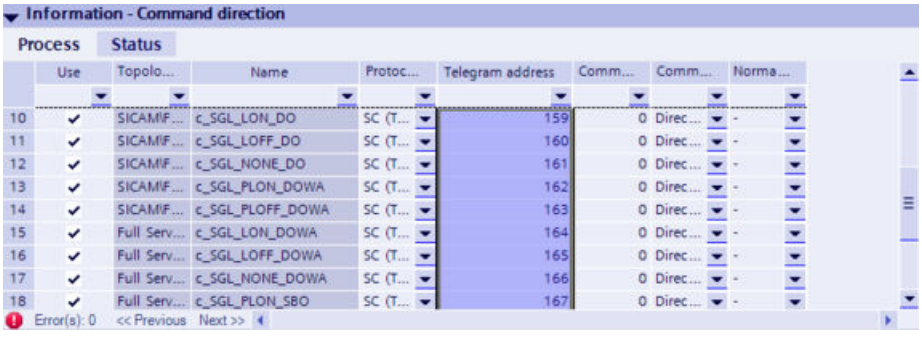
✧ Select the **Telegram address** column. Enter the addresses through the **Automatic value input** context menu.

The information rows are no longer highlighted in a color.

Command Direction

✧ Switch to the **command direction** and select the information, which can be controlled by the control center in the **Use** column.

✧ To enter the **telegram addresses** into this window, proceed in the same way as described for the **Monitoring direction** window.



[sc_MappingInfo_HigherLevel_CC, 3, en_US]

Figure 5-13 Mapping of Information to the Higher-Level Control Center

5.5 Defining the Station Topology

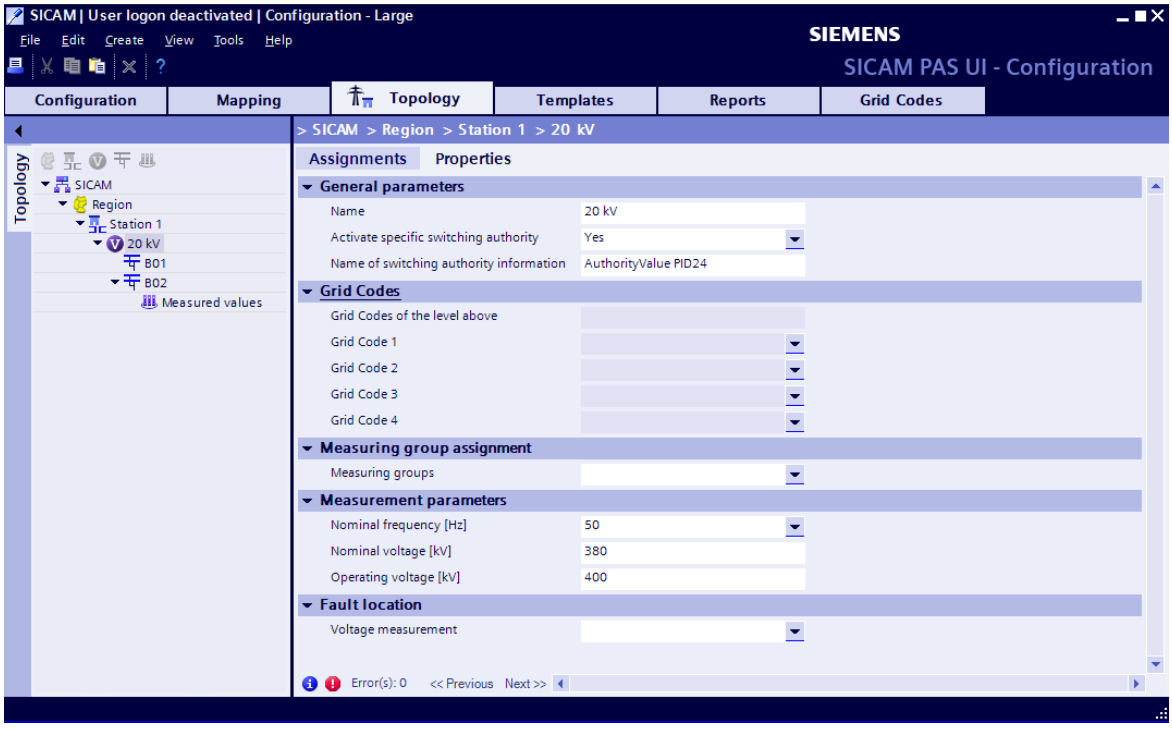
So far, your project data is structured exclusively in views designed for configuration and connection. In SICAM PAS, you can also structure your data in a topological view of the system and the process.

The example describes options for the assignment of individual items of information to the different topological levels. As you can see from the example, the assignment can be performed for specific items of information, that is, the measured values of a device can for example, be assigned to a different topological level than the messages and commands.

The assignment to the topological levels is also used as the topological address structure in the archive of the SICAM PQ Analyzer.

- ✧ Open the **Topology** view.
- ✧ Select **SICAM** and insert a region.
- ✧ Select the **Region**, insert a station and rename it **Station 1**.
- ✧ Select **Station 1**, insert a voltage level and rename it **20 kV**.
- ✧ Select the **20 kV** voltage level, insert 2 bays and rename them **B01** and **B02**.
- ✧ Select **B02**, insert a user-defined group and rename it **Measured values**.
- ✧ Select the **20 kV** voltage level. In the **Properties** tab, select **Yes** in the **Activate specific switching authority** field.

A tag is now created in the **Name of switching authority** field. In SICAM SCC, you can use this tag for the assignment of the switching authority for this voltage level.



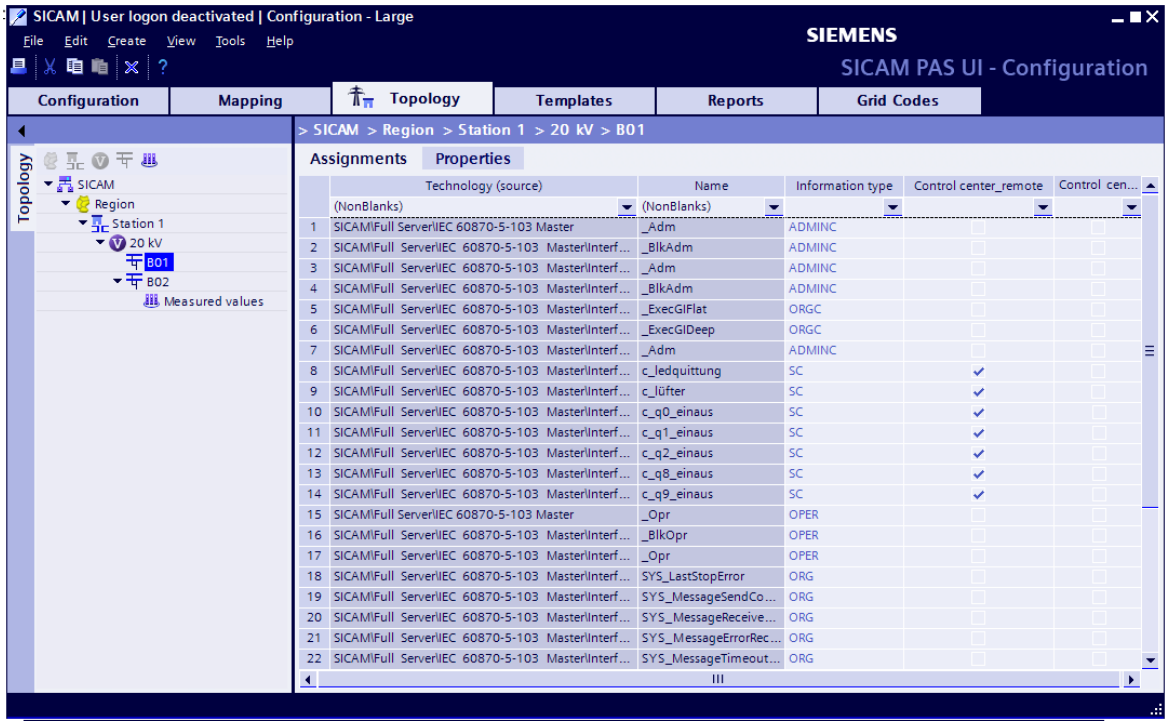
[sc_StationTopology_DefiningSwitchingAuthority, 2, en_US]

Figure 5-14 Station Topology, Defining the Switching Authority

Assign the topological structure levels all configured and parameterized items of information. They are still located on the project level under **SICAM**.

- ✧ Select the **SICAM** project and set the filter in the **Technology (source)** column to **(User)**. In the dialog which opens, enter **IEC 60870-5-103**.
- ✧ Select the line numbers of the entire selection and then drag and drop the information to the **B01** field.
- ✧ Open the **Configuration** view.
- ✧ Select the **DNP3 Master** device and then select **Copy for topology** from the context menu.
- ✧ Return to the **Topology** view.
- ✧ Select the **B02** field and then select **Paste** from the context menu.
  All information relating to the device is assigned to the **B02** field.

In the **Assignments** tab in the input area, you now see all information of the selected **B01** or **B02** or **Measured values** topology structure along with the control center assignments selected during mapping.



[sc_StationTopology_SelectingInfo, 2, en_US]

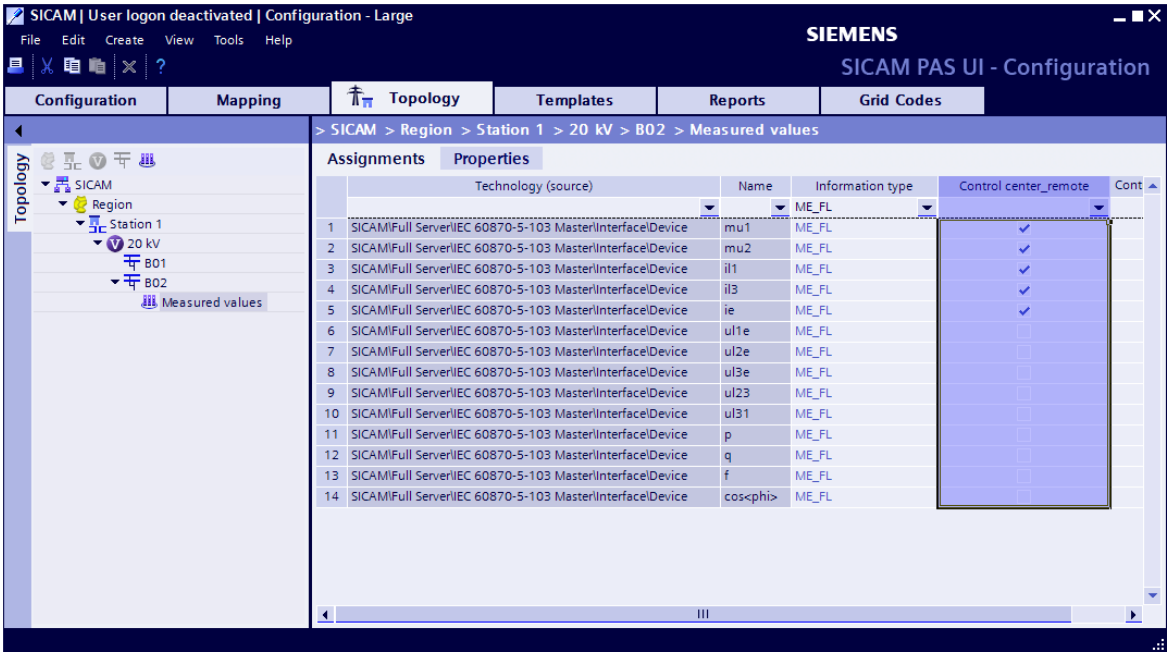
Figure 5-15 Station Topology, Selecting Information

Assign the measured values of the **IEC 60870-5-103 Master** to the user-defined **Measured values** group.

✧ Click **B01** and then select the **ME_FL** measured-value type in the **Information type** column.

Information of this type is now displayed.

✧ Select the line numbers of all measured values of the bay device and then drag the information to the **Measured values** group.



[sc_Sorting_AssigningInfo, 2, en_US]

Figure 5-16 Sorting and Assigning Information

5.6 Mapping of Information to SICAM SCC

Monitoring Direction

- ✧ Select **Control center_local** in the **Mapping** view.
- ✧ In the **monitoring direction** in the
  - **Alarm logging** column, select the messages to be recorded in event lists
  - **Tag management** column, select the messages to be displayed in overview and station diagrams
  - **Tag logging** column, select the messages to be stored in the SICAM SCC archive.

The selection ensures that the information in the **Use** column is activated automatically. For each item of information, this selection creates the SICAM SCC tags, which you require for the configuration and parameterization of your user interface.

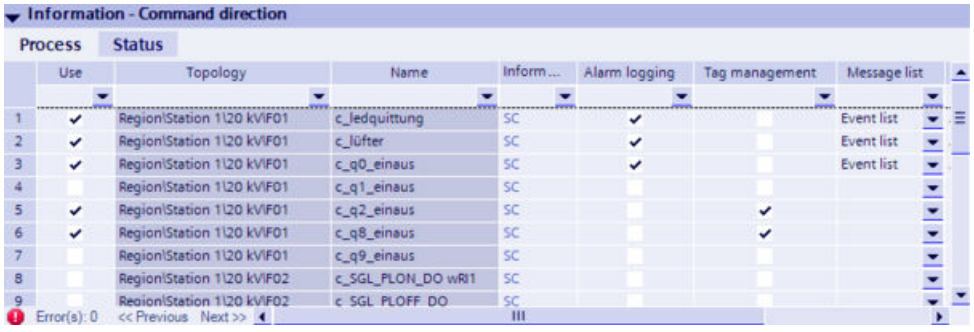
If you perform your selection in the **Use** column, the line number and the **Alarm logging** and **Tag management** fields are highlighted in red.

- ✧ Position the mouse pointer on one of the parameters highlighted in red. The tooltip informs you about the cause of the error. In the example, the assignment of the selected information to the Alarm logging or to the Tag management is required.
- ✧ For each item of information, select whether it is recorded in an alarm list (**Alarm logging**), displayed in a diagram (**Tag management**) or used in the archive system (**Tag logging**). If you activate the **Tag logging** column, the **Tag management** column is activated automatically.

Once you have performed a logical selection, the colors in the fields is removed.

Command Direction

- ✧ Switch to the **Command direction**. In the **Alarm logging** and/or in the **Tag management** column, select the information to be controlled from a diagram on your workstation and/or to be logged in the event list.



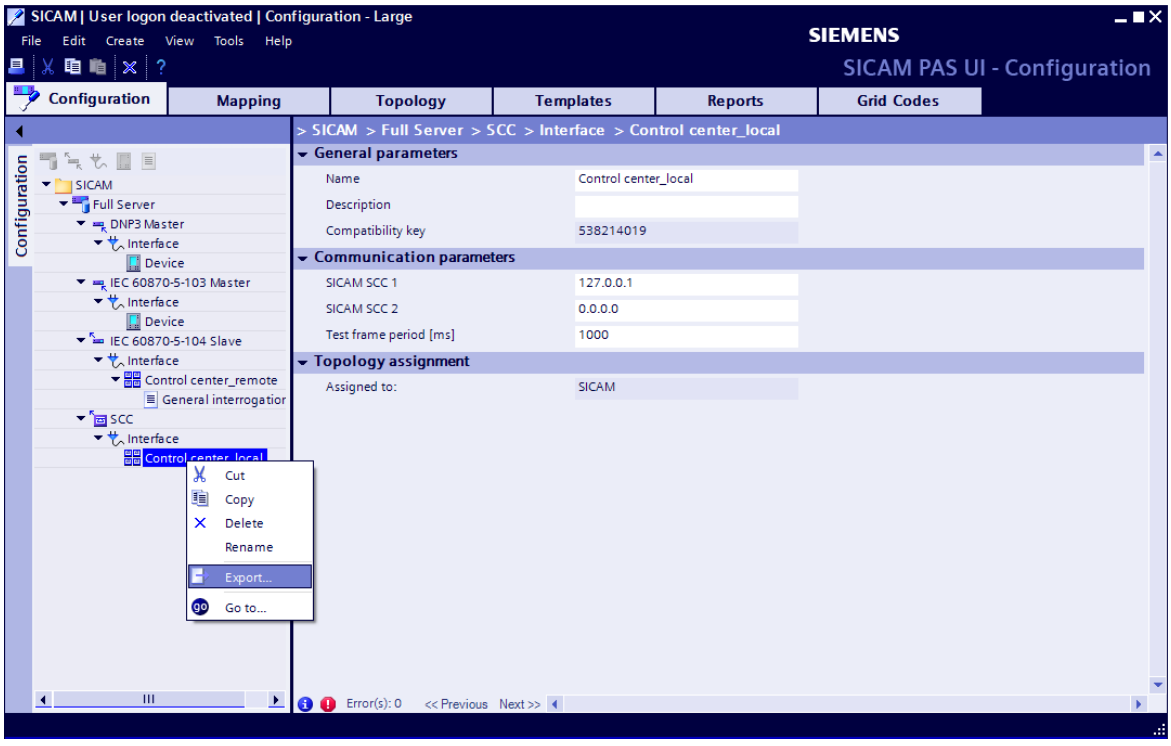
[sc_MappingInfo_SICAMSCC, 3, en_US]

Figure 5-17 Mapping of Information to SICAM SCC

5.7 Exporting Configuration Data

To ensure that the configured information is available for the creation of Human-Machine Interfaces, they must be exported.

- ✧ In the **Configuration** view, select the **Control center_local** and select **Export...** from the context menu.



[sc_ExportingConfigdata_SICAMSCC, 2, en_US]

Figure 5-18 Exporting Configuration Data for SICAM SCC

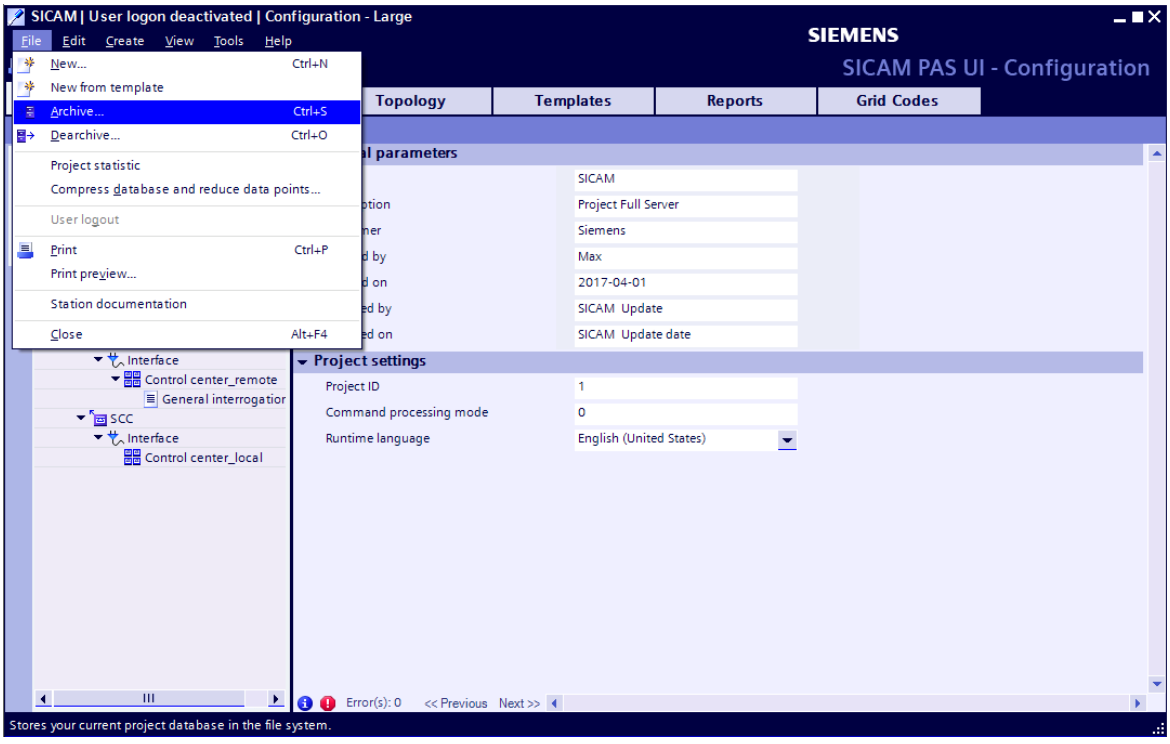
The export function creates a PXD file in the selected directory. You can import this file into the SICAM SCC Human-Machine Interface using the SICAM PAS Wizard.

You can use the same procedure to export the information mapped to **Control center_remote**. The export function creates an XML file in the selected directory. Afterwards, this file can be imported by a control system such as Power CC.

5.8 Archiving Configuration Data

To save your configuration data, archive the entire project database.

✧ In the navigation tree in the **Configuration** view, select the **SICAM** project. In the **File** menu, select **Archive...**.



[sc_saving_config_data, 2, en_US]

Figure 5-19 Saving Configuration Data

The data is compressed and stored as a .zip file in the selected directory.

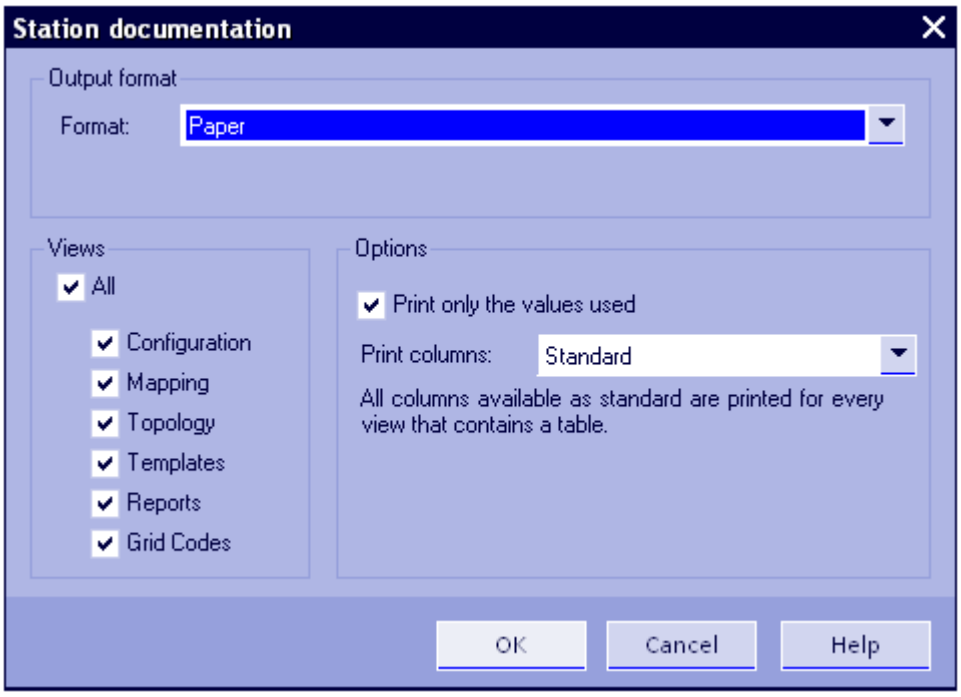
5.9 Documenting Configuration Data

You have the following options in order to document your sample configuration:

- Station documentation
- Print

Station Documentation

✧ Click **File > Station Documentation > Print**.



[sc_StationDocu_selection_window, 1, en_US]

Figure 5-20 Station Documentation Selection Window

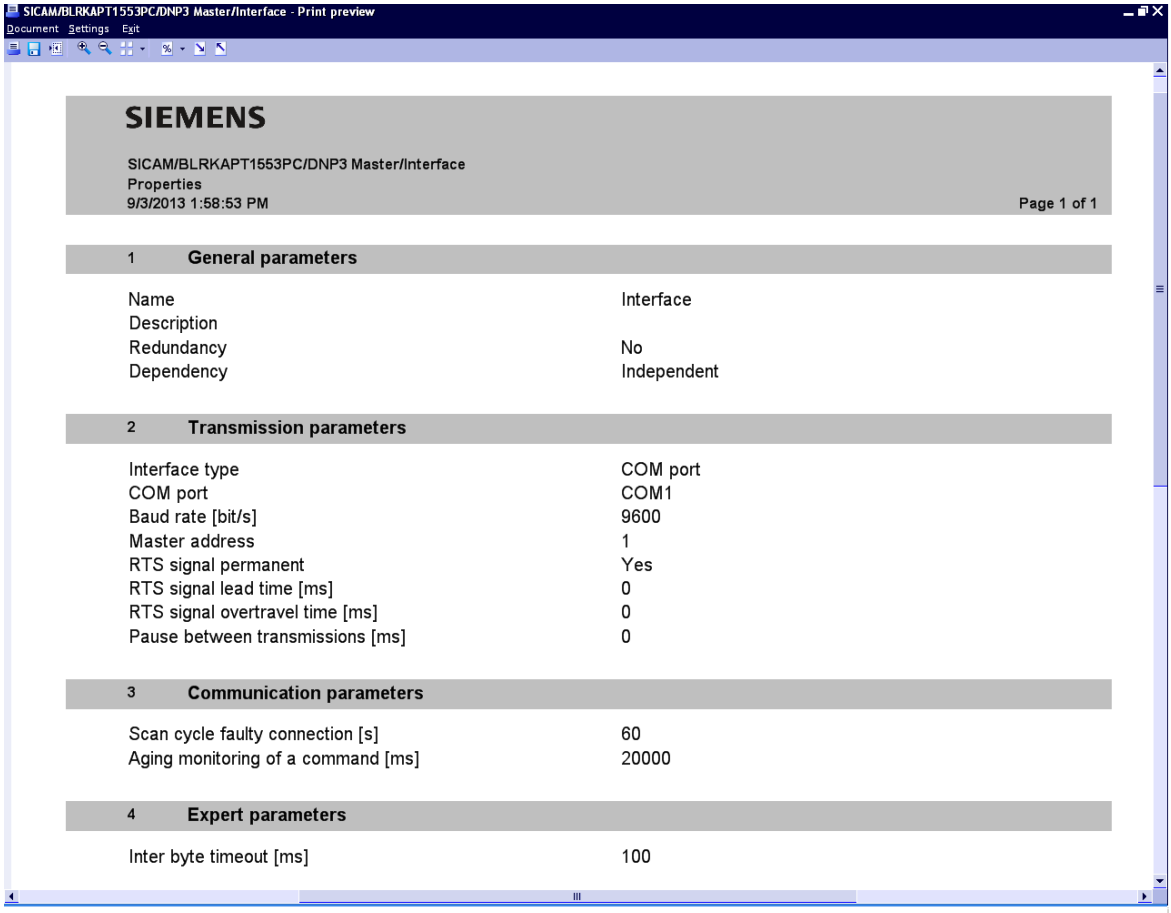
- ✧ In the **Station Documentation** window, select which parts of your configuration you require.
- ✧ Select whether you want to print out the data on **paper** or save it in the **HTML** or **XML** format.

You can display your configuration in the Print Preview.

Print

Alternatively, you can use the default print function to print the sample configuration and parameterization.

- ✧ In the **Configuration** view, select the level which you want to print, such as the interface of the bay device.
  Right-click the name of the interface in the window pane on the right-hand side.
- ✧ Select **File > Print Preview** to show the interface parameters.

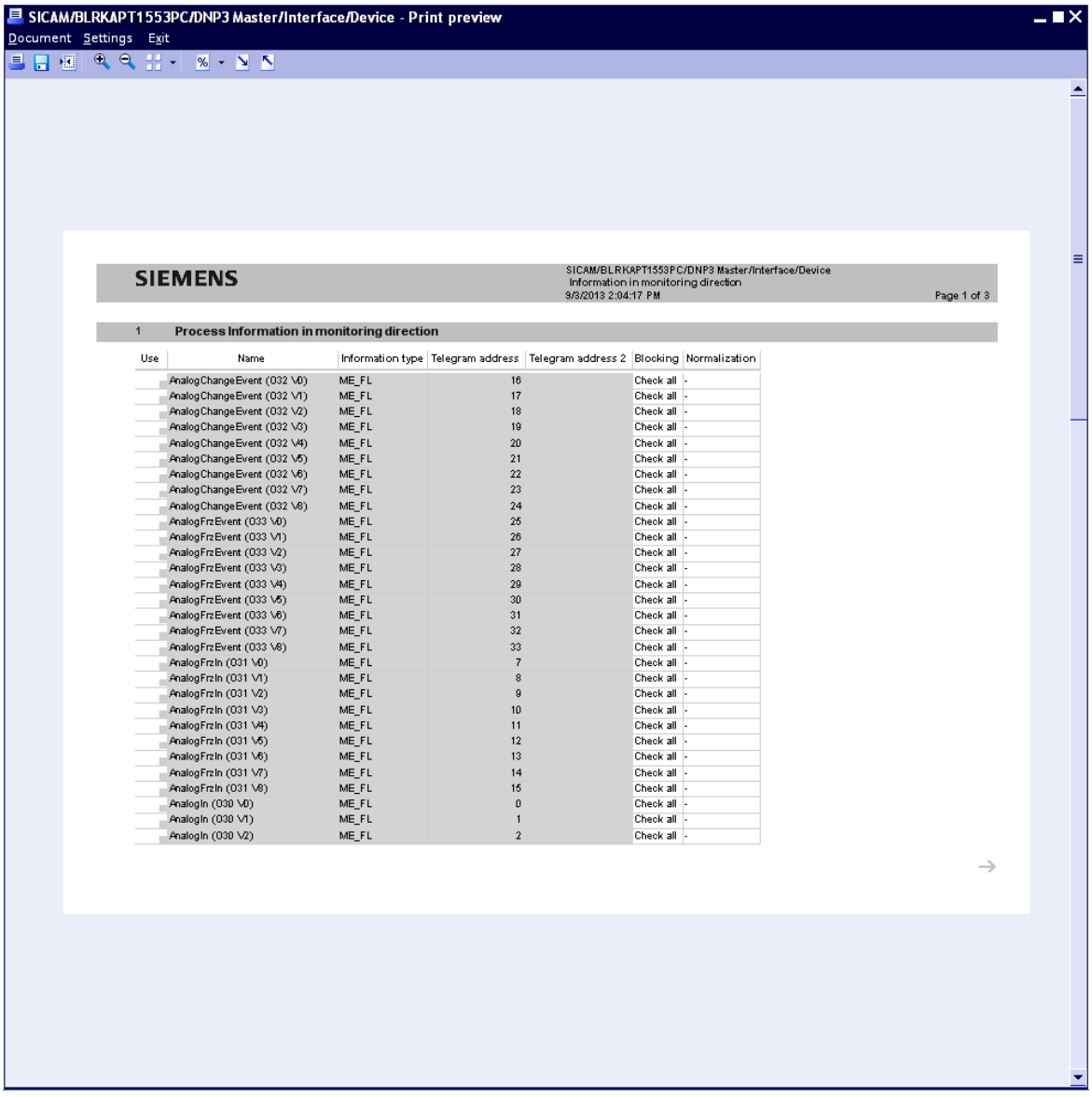


[sc_print_preview_ex, 1, en_US]

Figure 5-21 Print Preview, Example

✧ Open the **Mapping** view.

✧ Under **DNP3** in **monitoring direction** in the **Use** column, select the **True** filter. The window now only shows the device information, which has actually been mapped for the monitoring direction.



[sc_PrintPreview_Mapping_list_ex, 1, en_US]

Figure 5-22 Print Preview of the Mapping List, Example

✧ Select **File > Print**.

The configuration of this sample project is now complete.

A Appendix

A.1 SICAM PAS – Feature Enabler

NOTE

All information in this chapter applies for licenses related to Dongle/Soft-License installations.

Use the **Feature Enabler** tool to enable/check the SICAM PAS system components, which you require in your project or on the corresponding computer.

System components are referred to as **applications** and comprise of the following:

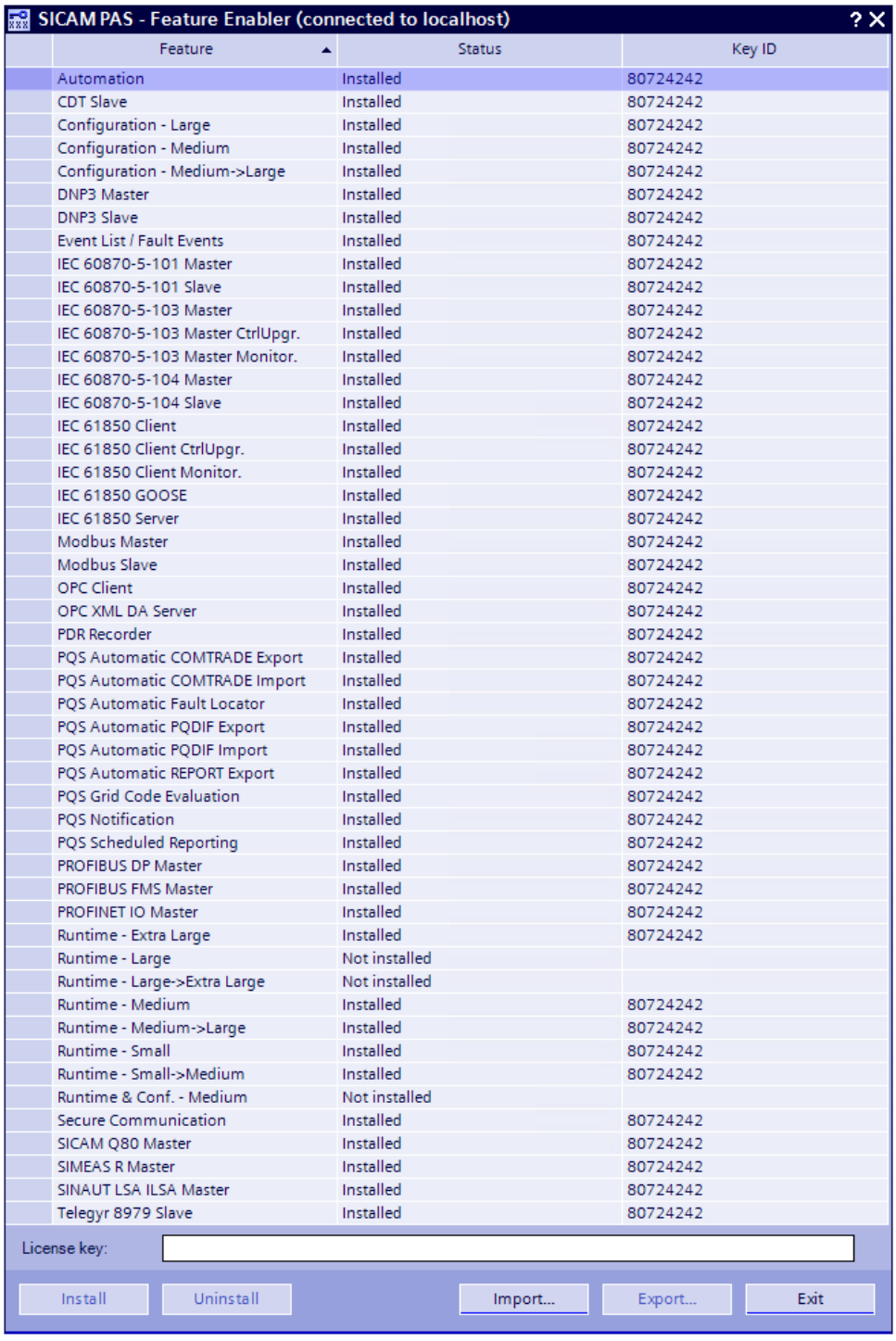
- Different protocols
- SICAM PAS UI – Configuration tool
- Automation function
- OPC connections
- SNMP Ethernet network monitoring
- Power Quality functions
- Functional extensions
- Upgrade packages

For the use of the SICAM PAS system components, you require:

- A dongle with the license keys for the individual applications
  – or –
- A Soft License
  – or –
- Online Software Delivery (OSD)

No license is required for the SNMP Client, OPC Server, SICAM MIC Master, and SIP 4 Service IF Master applications.

For more information, refer to *4 Available Variants of System Components*.



[sc_Feature_Enabler, 4, en_US]

Figure A-1 SICAM PAS – Feature Enabler

A.2 Basic Package

NOTE

All information in this chapter applies for licenses related to Dongle/Soft-License installations.

The basic package is available in different variants. It depends on your individual system architecture, which packages are necessary. The basic packages are delivered with a dongle for the USB interface. The licenses depend on the required functionality and the number of devices in your station. As an alternative to a dongle you can license the system via Internet for a computer or a virtualization solution and enable it via a Soft License.

You require the runtime packages for the operation of your SICAM PAS system.

The configuration packages serve for the configuration and parameterization of the SICAM PAS system with its connections to the other system components.

The number of usable devices is determined by the degree of extension of your station. An existing license can be extended by the upgrade packages.

NOTE

A PQ device with a used measuring channel is valuated with 133 information points.

The following packages can be ordered:

Runtime

Basic package with Feature Enabler		Number of devices or data points		
Order number (MLFB)[2]	License	≤ 4 devices	≤ 15 devices or ≤ 2000 data points	≤ 180 devices
7KE9000-.RA10...	Runtime Small	x		
6MD9000-.MA10...	Runtime Medium		x	
6MD9000-.AA10...	Runtime Large			x
6MD9000-.MA00...	Runtime & Configuration Medium		x	
6MD9000-.AA00...	Runtime & Configuration Large			x[3]

Basic package with ALM		Number of devices or data points			
Order number (MLFB)[2]	License	≤ 4 devices	≤ 15 devices or ≤ 2000 data points	≤ 180 devices	≥ 180 devices
6MD9000-3RA10...	Runtime Small	x			
6MD9000-3MA10...	Runtime Medium		x		
6MD9000-3AA10...	Runtime Large			x	
6MD9000-3BA10...	Runtime- XLarge				x
6MD9000-.MA00...	UI Configuration				x[2]
6MD9020-3MA10...	Runtime Compact		x[2]		

2 The 8th position of the order number (".") defines the license model (USB dongle or Soft License)

3 The configuration license is not limited to the number of devices

SICAM PAS Options

Basic package		Number of devices or data points	
Order number (MLFB)[2]	License	≤ 15 devices or ≤ 2000 data points	> 15 devices and > 2000 data points
6MD9000-.MA20...	Configuration Medium	x	
6MD9000-.AA20...	Configuration Large		x

Device Interface Processor (DIP)

- DIP Runtime
- DIP Runtime & Configuration

The Runtime & Configuration basic package for the Full Server includes:

- User interface
  SICAM PAS UI – Configuration for system configuration and parameterization
  SICAM PAS UI – Operation for checking the connections during runtime
- Commissioning aids through **onboard** functions
- SICAM PAS Value Viewer for tag monitoring and command output
- Normalization functions for binary and analog values
- Database system
- Central data server DSI (Distributed System Infrastructure)
- OPC Server for data exchange with other process visualization systems and with protocol drivers from third-party manufacturers
- SNMP Ethernet monitoring
- Communication with SICAM MIC
- Communication with SICAM SCC
- Manuals and online helps

NOTE

With the license for the **Runtime** basic package, you can create, change, delete, or move the parameterization using SICAM PAS UI Configuration for the following applications:

- Archive
- Event List / Fault Events
- IEC 60870-5-103 Master, only monitoring direction
- IEC 61850 Client, monitoring and control direction
- OPC DA Server
- SICAM Q80 Master
- SIMEAS R Master
- SIP 4 Service IF Master
- PQS Automatic Import
- PQS Automatic Export
- PQS Automatic Fault Location
- PQS Automatic Notification
- PQS Scheduled Reports
- SNMP Client

To parameterize all the other applications, you need a **Configuration** license. To change single parameters of these applications, you only need the license for the **Runtime** basic package.

A.3 SICAM PAS Compact

NOTE

All information in this chapter applies for licenses related to Dongle/Soft-License installations.

The SICAM PAS Compact package comprises the functionality of the **Runtime & Configuration** basic package and is available in a different scope of functions (variants A, B, and C). SICAM PAS Compact can be extended by function packages any time.

SICAM PAS Compact is subject to the following restrictions:

- SICAM PAS Compact cannot be used on a DIP.
- An increase in items of information (functional upgrade) is not possible.

SICAM PAS Compact includes the following licenses:

Runtime & Configuration

Full Server for up to 2000 items of information from connections of Master Applications, for example, bay devices

Automation

Automation based on CFC, ST, IL, and SFC

Protocols for the Connection of Bay Devices and Substations

- IEC 61850 Client
- IEC 60870-5-103 Master
- DNP3 Master
- Modbus Master
- PROFIBUS DP (variant A)

Protocols for the Connection to Higher-Level Control Centers

- IEC 60780-5-104 Slave (variant A/B)
- DNP3 Slave (variant A/C)
- Modbus Slave (variant A)
- Telegyr 8979 Slave (variant A)

A.4 Upgrades

NOTE

All information in this chapter applies for licenses related to Dongle/Soft-License installations.

Functional Upgrade – Number of Supported Devices

Basic package		Upgrade to		
Order number (MLFB)[4]	License	Medium ≤ 15 devices or ≤ 2000 data points	Large ≤ 180 devices	Extra Large > 180 devices
7KE9000-.RA10...	Runtime Small	6MD9004-0RA10	6MD9004-0RA10 plus 6MD9004-0MA10	6MD9004-0RA10 plus 6MD9004-0MA10 plus 6MD9004-0AA10
6MD9000-.MA10... or 7KE9000-.MA10...	Runtime Medium		6MD9004-0MA10	6MD9004-0MA10 plus 6MD9004-0AA10
6MD9000-.MA00...	Runtime & Configuration Medium		6MD9004-0MA00	6MD9004-0AA10
6MD9000-1MA20...	Configuration Medium		6MD9004-0MA20[5]	

4 The 8th position of the order number (".") defines the license model (USB dongle or Soft License)

5 The configuration license is not limited to the number of devices

Functional Upgrade – Runtime to Runtime & Configuration

Basic package		Upgrade to Runtime & Configuration	
Order number (MLFB)[4]	License	Medium ≤ 15 devices or ≤ 2000 data points	Large > 15 devices and > 2000 data points
6MD9000-.MA10...	Runtime Medium	6MD9004-0AA24	
6MD9000-.AA10...	Runtime Large		6MD9004-0AA23

Version Upgrade

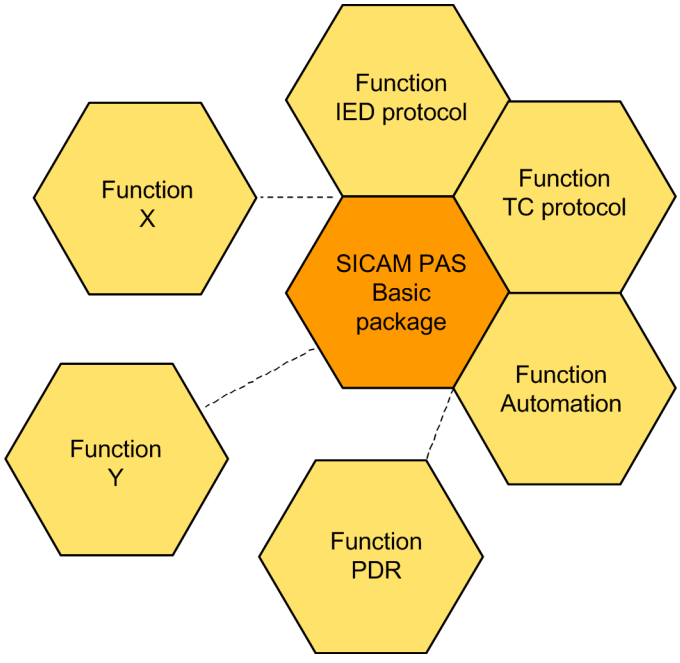
Upgrade to the latest version of SICAM PAS.

A.5 Function Packages

NOTE

All information in this chapter applies for licenses related to Dongle/Soft-License installations.

Numerous Function packages (applications) are available complementary to the basic package.



[dw_SICAMPAS_delivery_str, 1, en_US]

Figure A-2 SICAM PAS Delivery Structure

The following function packages are available:

Protocols for the Connection of Bay Devices and Substations

- IEC 61850 Client
- IEC 61850 Client (monitoring direction)
- IEC 60870-5-103 Master
- IEC 60870-5-103 Master (monitoring direction)

- IEC 60870-5-104 Master
- IEC 60870-5-101 Master
- DNP3 Master (serial, TCP/IP)
- Modbus Master (serial, TCP/IP)
- PROFIBUS DP Master
- PROFINET IO Master
- SINAUT LSA ILSA Master
- SIMEAS R Master (fault records and PQ data)
- SICAM Q80 Master (fault records and PQ data)

Protocols for the Connection to Higher-Level Control Centers

- IEC 61850 Server
- IEC 60780-5-104 Slave
- IEC 60870-5-101 Slave
- DNP3 Slave (serial, TCP/IP)
- Modbus Slave (serial, TCP/IP)
- Telegyr TG8979 Slave
- CDT Slave

Open Communication for the Data Exchange with OPC Servers

- OPC Client
- OPC XML DA Server

Automation

Automation based on CFC, ST, STL, and SFC

Secure Communication

Function package for TCP/IP-based communication protocols:

- IEC 60780-5-104 Slave (TLS encryption)
- IEC 60780-5-104 Master (TLS encryption)
- IEC 61850 Client (TLS encryption)
- IEC 61850 Server (TLS encryption)
- DNP3i Slave (TLS encryption, authentication)
- DNP3i Master (TLS encryption, authentication)

Post Disturbance Review Recorder (PDR)

Recording of selected information during a selectable period of time and with a selectable trigger criterion

Functional Upgrades for Communication Applications

- IEC 61850 Client with command direction, from IEC 61850 Client (monitoring direction)
- IEC 60870-5-103 with command direction, from IEC 60870-5-103 Master (monitoring direction)

Automatic Import

Import of fault records in COMTRADE format

Automatic Export

- Export of fault records in COMTRADE format
- Export of reports in PDF format (fault location reports)

Automatic Notification

Notification by an e-mail and/or SMS on state changes of items of information, fault records arrived, or fault location reports.

Power Quality

For more information on the type and volume of the Power Quality packages, refer to the description in */2/ SICAM PQS, Overview*.

NOTE

The installation requirements for SICAM PAS UI – Configuration are described in */3/ SICAM PAS/PQS, Installation*.

Literature

/1/ SICAM PAS, Overview
E50417-X8976-C431-C8

/2/ SICAM PQS, Overview
E50417-X8976-C464-C5

/3/ SICAM PAS/PQS, Installation
E50417-M8976-C432-C8

/4/ SICAM PAS/PQS, Configuration and Operation
E50417-P8976-C433-C9

/5/ SICAM SCC, Human Machine Interface SICAM SCC
E50417-H8976-C501-B7

/6/ SICAM Valpro, Measured/Metered Value Processing Utility SICAM Valpro
E50417-H8976-C479-A5

/7/ SICAM PAS, Automation Blocks
E50417-H8976-C436-B4

/8/ SICAM PAS/PQS, Security
E50417-H8976-C438-B9

/9/ SICAM PAS, Redundancy
E50417-H8976-C441-C1

/10/ SICAM PAS, Device Description
E50417-T8976-C437-B3

/11/ SICAM Station Unit V2.40
E50417-H8976-C381-A6

/12/ SICAM PQS, Fault Locator
E50417-H8976-C421-B2

/13/ SICAM PQ Analyzer
E50417-H8976-C397-C8

/14/ SICAM PQ Analyzer, Incident Explorer
E50417-H8976-C465-C6

/15/ SICAM PAS, CFE Test and Diagnosis
E50417-H8976-C425-A5

/16/ SIMEAS R PAR, Parameterization Tool
E50417-H1076-C439-B1

/17/ SIMEAS R, Manual Digital Fault and Power Quality Recorder
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/18/ SIMEAS R-PMU, Manual Digital Fault Recorder
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/19/ SIMEAS R-PMU, Maintenance Manual
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/20/ SICAM P850/P855 7KG85xx V2.60, Power Monitoring Device and Power Quality Recorder, Device Manual
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E50417-H1040-C606-A7

/23/ SIPROTEC 5 7KE85 V7.80 and later, Fault Recorder, Manual
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