SIEMENS

SIMATIC NET

Industrial Ethernet switches SCALANCE XB-200/XC-200/XP-200 Web Based Management

Configuration Manual

07/2016

C79000-G8976-C360-04

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

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Validity of this configuration manual

This Configuration Manual covers the following products:

- SCALANCE XB-200
- SCALANCE XC-200
- SCALANCE XP-200

Below, the products are also called IE switch, device or network component.

There are two variants of some devices with different article numbers. The two variants differ only in their factory settings. All other properties are identical.

This Configuration Manual applies to the following software versions:

- SCALANCE XB-200 firmware as of version 2.0
- SCALANCE XC-200 firmware as of version 2.1
- SCALANCE XP-200 firmware as of version 2.0

Factory settings

PROFINET variants

- Industrial Ethernet protocol: PROFINET
- Base bridge mode: 802.1D transparent bridge
- Redundancy mechanism: Ring redundancy
- Trust mode: Trust COS

EtherNet/IP variants

- Industrial Ethernet protocol: EtherNet/IP
- Base bridge mode: 802.1Q VLAN Bridge
- Redundancy mechanism: RSTP
- Trust mode: Trust COS-DSCP

Purpose of the Configuration Manual

This Configuration Manual is intended to provide you with the information you require to install, commission and operate IE switches. It provides you with the information you require to configure the IE switches.

Orientation in the documentation

Apart from the configuration manual you are currently reading, the products also have the following documentation:

- Configuration manual "SCALANCE XB-200/XC-200/XP-200 Command Line Interface""

  This document contains the CLI commands that are supported by the IE switches.

- Operating Instructions "SCALANCE XB-200", "SCALANCE XC-200" and "SCALANCE XP-200"

  These documents contain information on installing, connecting up and approvals for the products.

You will find the documentation here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support at.
  - SCALANCE XB-200 (https://support.industry.siemens.com/cs/ww/en/ps/15291/man)
  - SCALANCE XC-200 (https://support.industry.siemens.com/cs/ww/en/ps/24185/man)
  - SCALANCE XP-200 (https://support.industry.siemens.com/cs/ww/en/ps/21869/man)

Further documentation

In the system manuals "Industrial Ethernet / PROFINET Industrial Ethernet" and "Industrial Ethernet / PROFINET passive network components", you will find information on other SIMATIC NET products that you can operate along with the devices of this product line in an Industrial Ethernet network.

There, you will find among other things optical performance data of the communications partner that you require for the installation.

You will find the system manuals here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support under the following entry IDs:
  - 27069465 (http://support.automation.siemens.com/WW/view/en/27069465)
    Industrial Ethernet / PROFINET Industrial Ethernet System Manual
  - 84922825 (http://support.automation.siemens.com/WW/view/en/84922825)
    Industrial Ethernet / PROFINET - Passive network components System Manual

SIMATIC NET manuals

You will find the SIMATIC NET manuals here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/view/en).

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual Collection or product DVD

  The DVD ships with certain SIMATIC NET products.
- On the Internet under the following entry ID:

  50305045 (http://support.automation.siemens.com/WW/view/en/50305045)

Security information

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In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity (http://www.siemens.com/industrialsecurity)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under https://support.industry.siemens.com/cs/ww/en/ps/15247/pm (https://support.industry.siemens.com/cs/ww/en/ps/15247/pm).

License conditions

Note

Open source software

Read the license conditions for open source software carefully before using the product.

You can download the license conditions in the WBM on the "System > Load&Save > Copyright" page.

Trademarks

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SIMATIC NET, SCALANCE, C-PLUG, OLM

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Description

2

2.1 System functions hardware equipment

Availability of the system functions

The following table shows the availability of the system functions on the IE switches. Note that all functions are described in this configuration manual and in the online help. Depending on your IE switch, some functions are not available.

We reserve the right to make technical changes.

		SCALANCE XB-200	SCALANCE XC-200	SCALANCE XP-200
Information	ARP table	✓	✓	✓
	Log table	✓	✓	✓
	Ethernet Statistics	✓	✓	✓
	Diagnostics (temperature)	-	✓	✓
System	SMTP client	✓	✓	✓
	DHCP client	✓	✓	✓
	DHCP server	✓ (restricted)	✓	✓
	SNMP	✓	✓	✓
	Manual time setting	✓	✓	✓
	DST	-	✓	✓
	SNTP	✓	✓	✓
	NTP	✓	✓	✓
	SIMATIC Time Client	✓	✓	✓
	NFC	-	✓	-
	Auto logout	✓	✓	✓
	Syslog Client	✓	✓	✓
	Fault monitoring	✓	✓	✓
	PROFINET	✓	✓	✓
	EtherNet/IP	✓	✓	✓
	Power over Ethernet	-	-	✓ ("PoE" identifier in device names)
	Cable tester	✓	✓	✓
	SFP diagnostics	-	✓	-
	Fiber monitoring	-	✓	-

		SCALANCE XB-200	SCALANCE XC-200	SCALANCE XP-200
Layer 2	Sending priorities	-	✓	✓
	CoS assignment	✓	✓	✓
	DSCP assignment	✓	✓	✓
	QoS prioritization	✓	✓	✓
	CoS port reassignment	-	✓	✓
	Load control	✓	✓	✓
	GVRP	-	✓	✓
	Port-based VLAN	✓	✓	✓
	Switch port VLAN trunk	-	✓	✓
	Port-based mirroring	✓	✓	✓
	Dynamic MAC aging	✓	✓	✓
	Ring redundancy	✓	✓	✓
	Standby	✓	✓	✓
	Observer	-	✓	✓
	Spanning Tree	✓	✓	✓
	RSTP	✓	✓	✓
	MSTP	-	✓	✓
	Enhanced Passive Listening Compatibility	✓	✓	✓
	Loop detection	✓	✓	✓
	Link aggregation	-	✓	✓
	DCP forwarding	✓	✓	✓
	LLDP	✓	✓	✓
	Unicast filter	✓	✓	✓
	Locked ports	✓	✓	✓
	Unicast learning	✓	✓	✓
	Unicast blocking	✓	✓	✓
	Multicast groups	✓	✓	✓
	IGMP	✓	✓	✓
	GMRP	-	✓	✓
	Multicast blocking	✓	✓	✓
	Broadcast blocking	✓	✓	✓
	RMON	✓	✓	✓
	RMON history	-	✓	✓
Layer 3	DHCP relay agent	✓	✓	✓
Security	Passwords	✓	✓	✓
	RADIUS authentication	✓	✓	✓
	MAC authentication	-	✓	✓
	Guest VLAN	-	✓	✓
	802.1X reauthentication	✓	✓	✓
	Management ACL	✓	✓	✓

Availability of hardware

The following table shows the hardware of the IE switches.

We reserve the right to make technical changes.

	SCALANCE XB-200	SCALANCE XC-200	SCALANCE XP-200
C-PLUG support	-	✓	✓
SELECT/SET button	-	✓ 1) 2) 3)	✓ 2) 3)
RESET button	✓ 1)	-	✓ 1)
Signaling contact	-	✓	✓
Serial interface	✓	✓	✓
Display modes	-	✓	✓
Pluggable transceiver slots	-	✓	-

Function of the buttons:

1) Reset to factory settings

2) Switch over the redundancy manager

3) Set fault mask

2.2 Product characteristics

The IE switches have the following properties:

- The Ethernet interfaces support the following modes:
  - 10 Mbps and 100 Mbps both in full and half duplex
  - 1000 Mbps full duplex (XC206-2SFP with the appropriate pluggable transceivers and SCALANCE XP216)
  - Autonegotiation
  - Autocrossing
  - Autopolarity
- EtherNet/IP

  EtherNet/IP (Ethernet/Industrial Protocol) is an open industry standard for industrial real-time Ethernet based on TCP/IP and UDP/IP.
- PROFINET

  PROFINET (Process Field Network) is an open industry standard for industrial real-time Ethernet based on TCP/IP and IT standards. Via PROFINET distributed IO devices can be connected to a controller.
- Redundancy method Spanning Tree Protocol.

  The redundancy mechanism Spanning Tree defines several connection paths between nodes in a network, only one of which is ever active. This suppresses loops and optimizes the paths.

- Virtual networks (VLAN)

  To structure Industrial Ethernet networks with a fast growing number of nodes, a physical network can be divided into several virtual subnets.

- Load limitation when using multicast and broadcast protocols, for example video transmission

  By learning the multicast sources and destinations (IGMP snooping, IGMP querier), IE switches can filter multicast data traffic and so reduce the load in the network. Multicast and broadcast data traffic can be limited.

- Time-of-day synchronization

  Diagnostics messages such as log table entries, e-mails are given a time stamp. The local time is uniform throughout the network thanks to synchronization with a SICLOCK time transmitter or SNTP/NTP server and therefore makes the identification of diagnostics messages of several devices easier.

- Quality of Service for classification of the network traffic is according to CoS (Class of Service - IEEE 802.11Q) and DSCP (Differentiated Services Code Point - RFC 2474)

- Port mirroring

  Mirroring allows the data traffic of a port to be mirrored at another port (monitor port). The data traffic can then be analyzed at this monitor port without any effects on the data traffic.

- Network access protection complying with the standard IEEE 802.1X

  Ports can be configured for end devices that support authentication according to IEEE 802.1X. The authentication is made via a RADIUS server that must be reachable over the network.

- Log table

  The log table logs events that occur during operation. The user can specify which events cause an entry in the table.

- Link aggregation (IEEE 802.1AX) for bundling ports (SCALANCE XC-200/SCALANCE XP-200)

2.3 Requirements for installation and operation

Requirements for installation and operation of the IE switches

A PG/PC with a network connection must be available in order to configure the IE switches. An IP address must be assigned to the IE switch and it must be available in the network, see also "Initial assignment of an IP address (Page 16)".

Assignment of an IP address

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3.1 Structure of an IP address

Address classes

IP address range	Max. number of networks	Max. number of hosts/network	Class	CIDR
1.x.x.x through 126.x.x.x	126	16777214	A	/8
128.0.x.x through 191.255.x.x	16383	65534	B	/16
192.0.0.x through 223.255.255.x	2097151	254	C	/24
224.0.0.0 - 239.255.255.255	Multicast applications		D	
240.0.0.0 - 255.255.255.255	Reserved for future applications		E	

An IP address consists of 4 bytes. Each byte is represented in decimal, with a dot separating it from the previous one. This results in the following structure, where XXX stands for a number between 0 and 255:

XXX.XXX.XXX.XXX

The IP address is made up of two parts, the network ID and the host ID. This allows different subnets to be created. Depending on the bytes of the IP address used as the network ID and those used for the host ID, the IP address can be assigned to a specific address class.

Subnet mask

The bits of the host ID can be used to create subnets. The leading bits represent the address of the subnet and the remaining bits the address of the host in the subnet.

A subnet is defined by the subnet mask. The structure of the subnet mask corresponds to that of an IP address. If a "1" is used at a bit position in the subnet mask, the bit belongs to the corresponding position in the IP address of the subnet address, otherwise to the address of the computer.

Example of a class B network:

The standard subnet address for class B networks is 255.255.0.0; in other words, the last two bytes are available for defining a subnet. If 16 subnets must be defined, the third byte of the subnet address must be set to 11110000 (binary notation). In this case, this results in the subnet mask 255.255.240.0.

To find out whether two IP addresses belong to the same subnet, the two IP addresses and the subnet mask are ANDed bit by bit. If both logic operations have the save result, both IP addresses belong to the same subnet, for example, 141.120.246.210 and 141.120.252.108.

Outside the local area network, the distinction between network ID and host ID is of no significance, in this case packets are delivered based on the entire IP address.

Note

In the bit representation of the subnet mask, the "ones" must be set left-justified; in other words, there must be no "zeros" between the "ones".

3.2 Initial assignment of an IP address

Configuration options

An initial IP address for an IE switch cannot be assigned using Web Based Management (WBM) because this configuration tool can only be used if an IP address already exists.

The following options are available to assign an IP address to an unconfigured device:

- **DHCP** (factory setting)
- **Primary Setup Tool** (PST)
  - To be able to assign an IP address to the IE switch with the PST, it must be possible to reach the IE switch via Ethernet.
  - You will find the PST on the Internet pages of Siemens Industry Online Support under the entry ID 19440762 (http://support.automation.siemens.com/WW/view/en/19440762).
  - For further information about assigning the IP address with the PST, refer to the documentation "Primary Setup Tool (PST)".
- **STEP 7**

  In STEP 7, you can configure the topology, the device name and the IP address. If you connect an unconfigured IE switch to the controller, the controller assigns the configured device name and the IP address to the IE switch automatically.
  - **STEP 7**

    SCALANCE XB-200: V5.5.4 and higher

    SCALANCE XC-200: V5.5.4 HF11 and higher

    SCALANCE XP-200: V5.5.4 HF9 and higher

    For further information on the assignment of the IP address using STEP 7 refer to the documentation "Configuring Hardware and Communication Connections STEP 7", in the section "Steps For Configuring a PROFINET IO System".
  - **STEP 7 Basic or Professional**

    SCALANCE XB-200: V13 SP1 and higher

    SCALANCE XC-200: V14 and higher

    SCALANCE XP-200: V14 and higher

    For further information on assigning the IP address using STEP 7, refer to the online help "Information system", section "Addressing PROFINET devices".

- **CLI** via the serial interface
  For further information on assigning the IP address using the CLI, refer to the documentation "SCALANCE XB-200/XC-200/XP-200 Command Line Interface".
- **NCM PC**

  For further information on assigning the IP address using NCM PC, refer to the documentation "Commissioning PC stations - Manual and Quick Start", in the section "Creating a PROFINET IO system".

Note

When the product ships and following "Restore Factory Defaults and Restart", DHCP is enabled. If a DHCP server is available in the local area network, and this responds to the DHCP request of an IE switch, the IP address, subnet mask and gateway are assigned automatically when the device first starts up.

3.3 Address assignment with DHCP

Properties of DHCP

DHCP (Dynamic Host Configuration Protocol) is a method for automatic assignment of IP addresses. It has the following characteristics:

- DHCP can be used both when starting up a device and during ongoing operation.
- The assigned IP address remains valid only for a limited time known as the lease time. When half the period of validity has elapsed. the DHCP client can extend the period of the assigned IPv4 address. When the entire time has elapsed, the DHCP client needs to request a new IPv4 address.
- If the device does not reach the DHCP server with a new request on expiry of the lease time, the assigned IP address, the subnet mask and the gateway continue to be used.

  The device therefore remains accessible under the last assigned IP address even without a DHCP server. This is not the standard behavior of office devices but is necessary for problem-free operation of the plant.
- There is normally no fixed address assignment; in other words, when a client requests an IP address again, it normally receives a different address from the previous address. It is possible to configure the DHCP server so that the DHCP client always receives the same fixed address in response to its request. The parameter with which the DHCP client is identified for the fixed address assignment is set on the DHCP client and server. The address can be assigned via the MAC address, the DHCP client ID, the PROFINET or the system name. You configure the parameter in "System > DHCP > DHCP Client".

Technical basics

4

4.1 Configuration limits

Configuration limits of the device

The following table lists the configuration limits for Web Based Management and the Command Line Interface of the device.

Depending on your IE switch, some functions are not available.

	Configurable function	Maximum number		
		SCALANCE XB-200	SCALANCE XC-200	SCALANCE XP-200
System	Maximum frame size (ingress)	1632 bytes		
	Syslog server	3		
	E-mail server	3		
	DHCP pools	16 [1]	24	
	IPv4 addresses per DHCP pool	1	24	
	IPv4 addresses managed by the DHCP server (dynamic + static)	16 [1]	575	
	DHCP static assignments per DHCP pool	-	24	
	SNMP trap recipient	10		
	SNTP server	1		
	NTP server	1		
	Agent/TIA interfaces [2]	1		
Layer 2	Virtual LANs (port-based, including VLAN 1)	17	257	
	Mirroring sessions	1		
	Multiple Spanning Tree instances	-	4	
	Link aggregations or Etherchannels each with a maximum of 8 ports per aggregation	-	8	
	Ports in a link aggregation	-	8	
	Unicast filtering	128		
	Multicast addresses without active GMRP	256	512	
	Multicast addresses with activated GMRP	-	50	
	Static MAC addresses in the FDB (Forward Database)	128		
Layer 3	DHCP Relay Agent interfaces	1		
	DHCP Relay Agent server	4		

	Configurable function	Maximum number		
		SCALANCE XB-200	SCALANCE XC-200	SCALANCE XP-200
Security	IP addresses from RADIUS servers	4		
	Management ACLs (access rules for management)	10		

1) With the SCALANCE XB-200, the number of DHCP pools and manageable IPv4 addresses depends on the number of ports. The number of ports corresponds to the maximum number of DHCP pools and manageable IPv4 addresses.

2) This is an IP interface.

4.2 PROFINET

PROFINET

PROFINET is an open standard (IEC 61158/61784) for industrial automation based on Industrial Ethernet. PROFINET uses existing IT standards and allows end-to-end communication from the field level to the management level as well as plant-wide engineering. PROFINET also has the following features:

- Use of TCP/IP
- Automation of applications with real-time requirements
  - Real-Time (RT) communication
  - Isochronous Real-Time (IRT) communication
- Seamless integration of fieldbus systems

You configure PROFINET in "System > PROFINET (Page 153)".

PROFINET IO

Within the framework of PROFINET, PROFINET IO is a communications concept for implementing modular, distributed applications. PROFINET IO is implemented by the PROFINET standard for programmable controllers (IEC 61158-x-10).

4.3 EtherNet/IP

EtherNet/IP

EtherNet/IP (Ethernet/Industrial Protocol) is an open industry standard for industrial real-time Ethernet based on TCP/IP and UDP/IP. With EtherNet/IP, Ethernet is expanded by the Common Industrial Protocol (CIP) at the application layer. In EtherNet/IP, the lower layers of the OSI reference model are adopted by Ethernet with the physical, network and transport functions.

You configure EtherNet/IP in "System > EtherNet/IP (Page 155)".

Common Industrial Protocol

The Common Industrial Protocol (CIP) is an application protocol for automation that supports transition of the field buses in Industrial Ethernet and in IP networks. This industry protocol is used by field buses/industrial networks such as DeviceNet, ControlNet and EtherNet/IP at the application layer as an interface between the deterministic fieldbus world and the automation application (controller, I/O, HMI, OPC, ...). The CIP is located above the transport layer and expands the pure transport services with communications services for automation engineering. These include services for cyclic, time-critical and event-controlled data traffic. CIP distinguishes between time-critical I/O messages (implicit messages) and individual query/response frames for configuration and data acquisition (explicit messages). CIP is object-oriented; all data "visible" from the outside is accessible in the form of objects. CIP has a common configuration basis: EDS (Electronic Data Sheet).

Electronic Data Sheet

Electronic Data Sheet (EDS) is an electronic datasheet for describing devices.

The EDS required for EtherNet/IP operation can be found in "System > Load&Save (Page 93)".

4.4 Redundancy mechanism

4.4.1 Spanning Tree

Avoiding loops on redundant connections

The spanning tree algorithm allows network structures to be created in which there are several connections between two IE switches / bridges. Spanning tree prevents loops being formed in the network by allowing only one path and disabling the other (redundant) ports for data traffic. If there is an interruption, the data can be sent over an alternative path. The functionality of the spanning tree algorithm is based on the exchange of configuration and topology change frames.

Definition of the network topology using the configuration frames

The devices exchange configuration frames known as BPDUs (Bridge Protocol Data Units) with each other to calculate the topology. The root bridge is selected and the network topology created using these frames. BPDUs also bring about the status change of the root ports.

The root bridge is the bridge that controls the spanning tree algorithm for all involved components.

Once the root bridge has been specified, each device sets a root port. The root port is the port with the lowest path costs to the root bridge.

Response to changes in the network topology

If nodes are added to a network or drop out of the network, this can affect the optimum path selection for data packets. To be able to respond to such changes, the root bridge sends configuration messages at regular intervals. The interval between two configuration messages can be set with the "Hello Time" parameter.

Keeping configuration information up to date

With the "Max Age" parameter, you set the maximum age of configuration information. If a bridge has information that is older than the time set in "Max Age", it discards the message and initiates recalculation of the paths.

New configuration data is not used immediately by a bridge but only after the period specified in the "Forward Delay" parameter. This ensures that operation is only started with the new topology after all the bridges have the required information.

4.4.1.1 RSTP, MSTP, CIST

Rapid Spanning Tree Protocol (RSTP)

One disadvantage of STP is that if there is a disruption or a device fails, the network needs to reconfigure itself: The devices start to negotiate new paths only when the interruption occurs. This can take up to 30 seconds. Fur this reason, STP was expanded to create the "Rapid Spanning Tree Protocol" (RSTP, IEEE 802.1w). This differs from STP essentially in that the devices are already collecting information about alternative routes during normal operation and do not need to gather this information after a disruption has occurred. This means that the reconfiguration time for an RSTP controlled network can be reduced to a few seconds.
This is achieved by using the following functions:

- Edge ports (end node port)
  Edge ports are ports connected to an end device.
  A port that is defined as an edge port is activated immediately after connection establishment. If a spanning tree BPDU is received at an edge port, the port loses its role as edge port and it takes part in (R)STP again. If no further BPDU is received after a certain time has elapsed (3 x hello time), the port returns to the edge port status.
- Point-to-point (direct communication between two neighboring devices)
  By directly linking the devices, a status change (reconfiguration of the ports) can be made without any delays.
- Alternate port (substitute for the root port)
  A substitute for the root port is configured. If the connection to the root bridge is lost, the device can establish a connection over the alternate port without any delay due to reconfiguration.
- Reaction to events
  Rapid spanning tree reacts to events, for example an aborted connection, without delay. There is no waiting for timers as in spanning tree.
- Counter for the maximum bridge hops
  The number of bridge hops a package is allowed to make before it automatically becomes invalid.

In principle, therefore with rapid spanning tree, alternatives for many parameters are preconfigured and certain properties of the network structure taken into account to reduce the reconfiguration time.

Multiple Spanning Tree Protocol (MSTP)

The Multiple Spanning Tree Protocol (MSTP) is a further development of the Rapid Spanning Tree Protocol. Among other things, it provides the option of operating several RSTP instances within different VLANs or VLAN groups and, for example, making paths available within the individual VLANs that the single Rapid Spanning Tree Protocol would globally block.

Common and Internal Spanning Tree (CIST)

CIST identifies the internal instance used by the switch that is comparable in principle with an internal RSTP instance.

4.4.2 HRP

HRP - High Speed Redundancy Protocol

HRP is the name of a redundancy method for networks with a ring topology. The switches are interconnected via ring ports. One of the switches is configured as the redundancy manager (RM). The other switches are redundancy clients. Using test frames, the redundancy manager checks the ring to make sure it is not interrupted. The redundancy manager sends test frames via the ring ports and checks that they are received at the other ring port. The redundancy clients forward the test frames.

If the test frames of the RM no longer arrive at the other ring port due to an interruption, the RM switches through its two ring ports and informs the redundancy clients of the change immediately. The reconfiguration time after an interruption of the ring is a maximum of 300 ms.

Standby redundancy

Standby redundancy is a method with which rings each of which is protected by high-speed redundancy can be linked together redundantly. In the ring, a master/slave device pair is configured and these monitor each other via their ring ports. If a fault occurs, the data traffic is redirected from one Ethernet connection (standby port of the master or standby server) to another Ethernet connection (standby port of the slave).

Requirements

- HRP is supported in ring topologies with up to 50 devices.

  Exceeding this number of devices can lead to a loss of data traffic.
- For HRP, only devices that support this function can be used in the ring.
- Devices that do not support HRP must be linked to the ring using special devices with HRP capability. Up to the ring, this connection is not redundant.
- All devices must be interconnected via their ring ports. Multimode connections up to 3 km and single mode connections up to 26 km between two IE switches are possible. At greater distances, the specified reconfiguration time may be longer.
- A device in the ring must be configured as redundancy manager by selecting the "HRP manager" setting. On all other devices in the ring, either the "HRP Client" or "Automatic Redundancy Detection" mode must be activated.
- You configure HRP in Web Based Management, Command Line Interface or using SNMP.

4.4.3 MRP

4.4.3.1 MRP - Media Redundancy Protocol

The "MRP" method conforms to the Media Redundancy Protocol (MRP) specified in the following standard:

IEC 62439-2 Release 1.0 (2010-02) Industrial communication networks - High availability automation networks Part 2: Media Redundancy Protocol (MRP)

The reconfiguration time after an interruption of the ring is a maximum of 200 ms.

Topology

The following figure shows a possible topology for devices in a ring with MRP.

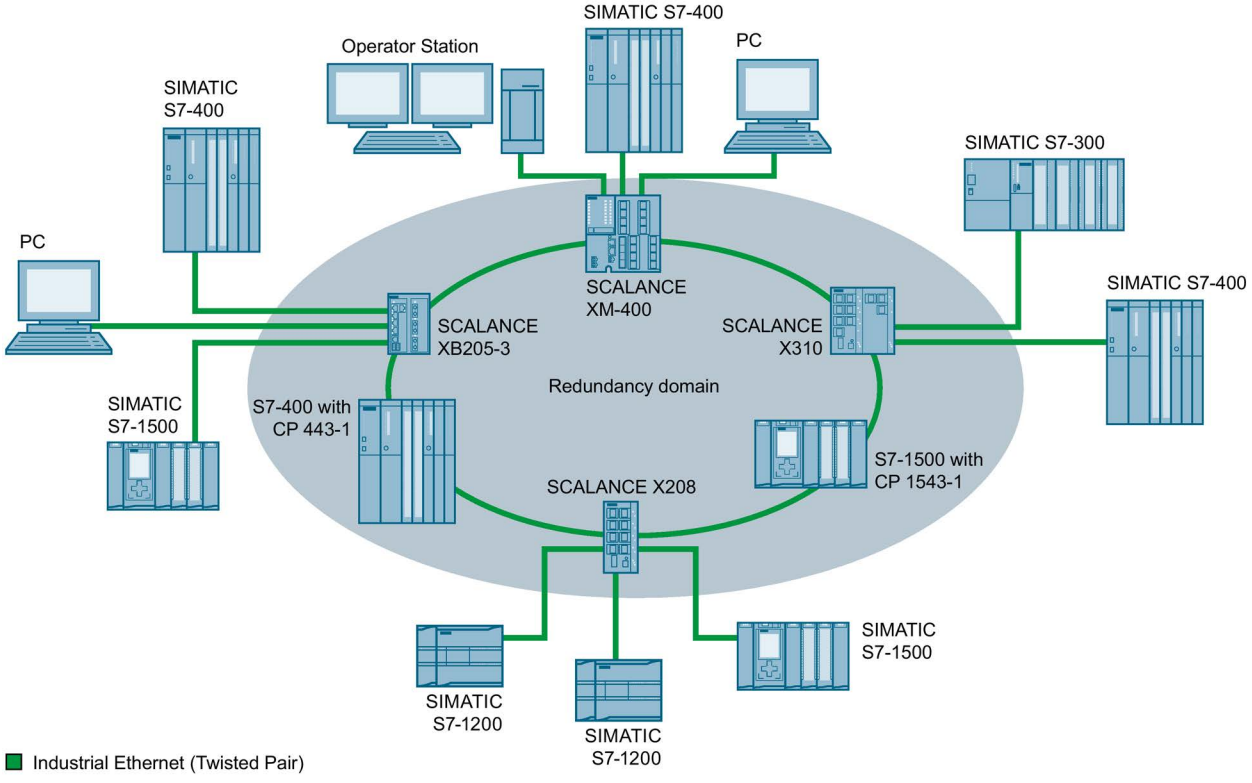


Figure 4-1 Example of a ring topology with the MRP media redundancy protocol

The following rules apply to a ring topology with media redundancy using MRP:

- All the devices connected within the ring topology are members of the same redundancy domain.
- One device in the ring is acting as redundancy manager.
- All other devices in the ring are redundancy clients.

Non MRP-compliant devices can be connected to the ring via a SCALANCE X switch or via a PC with a CP capable of MRP.

Requirements

Requirements for problem-free operation with the MRP media redundancy protocol are as follows:

- MRP is supported in ring topologies with up to 50 devices.

  Exceeding this number of devices can lead to a loss of data traffic.

- The ring in which you want to use MRP may only consist of devices that support this function.

  These include, for example, some of the Industrial Ethernet SCALANCE X switches, some of the communications processors (CPs) for SIMATIC S7 and PG/PC or non-Siemens devices that support this function.

- All devices must be interconnected via their ring ports.

  Multimode connections up to 3 km and single mode connections up to 26 km between two SCALANCE X IE switches are possible. At greater distances, the specified reconfiguration time may be longer.

- "MRP" must be activated on all devices in the ring (see section "Configuration in STEP 7 (Page 27)").

- The connection settings (transmission medium / duplex) must be set to full duplex and at least 100 Mbps for all ring ports. Otherwise there may be a loss of data traffic.
  - STEP 7: Set all the ports involved in the ring to "Automatic settings" in the "Options" tab of the properties dialog.
  - WBM: If you configure with Web Based Management, the ring ports are set automatically to autonegotiation.

4.4.3.2 Configuration in WBM

Role

The choice of role depends on the following use cases:

- You want to use MRP in a ring topology only with Siemens devices:
  - For at least one device in the ring select "Automatic Redundancy Detection" or "MRP Auto Manager".
  - For all other devices in the ring select "MRP Client" or "Automatic Redundancy Detection".
- You want to use MRP in a ring topology that also includes non-Siemens devices:
  - For exactly one device in the ring select the role "MRP Auto Manager".
  - For all other devices in the ring topology, select the role of "MRP client".

Note

The use of "Automatic Redundancy Detection" is not possible when using non-Siemens devices.

- You configure the devices in an MRP ring topology partly with WBM and partly with STEP 7:
  - With the devices you configure using WBM, select "MRP Client" for all devices.
  - With the devices that you configure using STEP 7, select precisely one device as "Manager" or "Manager (Auto)" and "MRP Client" for all other devices.

Note

If a device is assigned the role of "Manager" with STEP 7, all other devices in the ring must be assigned the "MRP Client" role. If there is a device with the "Manager" role and a device with the "Manager (Auto)"/"MRP Auto-Manager" in a ring, this can lead to circulating frames and therefore to failure of the network.

Configuration

In WBM, you configure MRP on the following pages:

- Configuration (Page 168)
- Ring (Page 192)

4.4.3.3 Configuration in STEP 7

Configuration in STEP 7

To create the configuration in STEP 7, select the parameter group "Media redundancy" on the PROFINET interface.

Set the following parameters for the MRP configuration of the device:

- Domain
- Role
- Ring port
- Diagnostic interrupts

These settings are described below.

Note

Valid MRP configuration

In the MRP configuration in STEP 7, make sure that all devices in the ring have a valid MRP configuration before you close the ring. Otherwise, there may be circulating frames that will cause a failure in the network.

One device in the ring needs to be configured as "redundancy manager" and all other devices in the ring as "clients".

Note

Note factory settings

MRP is disabled and spanning tree enabled for the following brand new IE switches and those set to the factory settings:

- SCALANCE XB-200 (Ethernet/IP variants)
- SCALANCE XP-200 (Ethernet/IP variants)
- SCALANCE XM-400
- SCALANCE XR-500

To load a PROFINET configuration into one of the specified devices, first disable spanning tree on the device.

Note

Changing the role

If you want to change the MRP role, first open the ring.

Note

Starting up and restarting

The MRP settings are still effective after a restart of the device or a power failure and hot restart.

Note

Prioritized startup

If you configure MRP in a ring, you cannot use the "prioritized startup" function in PROFINET applications on the devices involved.

If you want to use the "prioritized startup" function, then disable MRP in the configuration.

In the STEP 7 configuration, set the role of the relevant device to "Not a node in the ring".

Domain

Single MRP rings

If you want to configure a single MRP ring, leave the factory setting "mrpdomain 1" in the "Domain" drop-down list.

All devices configured in a ring with MRP must belong to the same redundancy domain. A device cannot belong to more than one redundancy domain.

If you leave the setting for "Domain" as the factory set "mrpdomain-1", the defaults for "Role" and "Ring ports" also remain active.

MRP multiple rings

If you configure multiple MRP rings, the nodes of the ring will be assigned to the individual rings with the "Domain" parameter.

Set the same domain for all devices within a ring. Set different domains for different rings. Devices that do not belong to the same ring must have different domains.

Role

The choice of role depends on the following use cases.

- You want to use MRP in a topology with **one ring** only with Siemens devices and without monitoring diagnostic interrupts:

  Assign all devices to the "mrpdomain-1" domain and the role "Manager (Auto)".

  The device that actually takes over the role of redundancy manager, is negotiated by Siemens devices automatically.

- You want to use MRP in a topology with **multiple rings** only with Siemens devices and without monitoring diagnostic interrupts (MRP multiple rings):
  - Assign the device that connects the rings the role of "Manager".
  - For all other devices in the ring topology, select the role of "Client".
- You want to use MRP in a ring topology that also includes non-Siemens devices or you want to receive diagnostic interrupts relating to the MRP status from a device (see "Diagnostic interrupts"):
  - Assign precisely one device in the ring the role of "Manager (Auto)".
  - For all other devices in the ring topology, select the role of "Client".
- You want to disable MRP:

  Select the option "Not node in the ring" if you do not want to operate the device within a ring topology with MRP.

Note

Role after resetting to factory settings

With brand new Siemens devices and those reset to the factory settings the following MRP role is set:

- "Manager (Auto)"

  CPs
- "Automatic Redundancy Detection"
  - SCALANCE X-200
  - SCALANCE XC-200
  - SCALANCE XB-200 (PROFINET variants)
  - SCALANCE XP-200 (PROFINET variants)
  - SCALANCE X-300
  - SCALANCE X-400

If you are operating a non-Siemens device as the redundancy manager in the ring, this may cause loss of the data traffic.

MRP is disabled and spanning tree enabled for the following brand new IE switches and those set to the factory settings:

- SCALANCE XB-200 (Ethernet/IP variants)
- SCALANCE XP-200 (Ethernet/IP variants)
- SCALANCE XM-400
- SCALANCE XR-500

Ring port 1 / ring port 2

Here, select the port you want to configure as ring port 1 and ring port 2.

With devices with more than 8 ports, not all ports can be selected as ring port.

The drop-down list shows the selection of possible ports for each device type. If the ports are specified in the factory, the boxes are grayed out.

NOTICE
Ring ports after resetting to factory settings If you reset to the factory settings, the ring port settings are also reset. If other ports were used previously as ring ports before resetting, with the appropriate attachment, a previously correctly configured device can cause circulating frames and therefore the failure of the data traffic.

Diagnostic interrupts

Enable the "Diagnostic interrupts" option, if you want diagnostic interrupts relating to the MRP status on the local CPU to be output.

The following diagnostic interrupts can be generated:

- Wiring or port error

  Diagnostic interrupts are generated if the following errors occur at the ring ports:

  – Connection abort on a ring port
  – A neighbor of the ring port does not support MRP.
  – A ring port is connected to a non-ring port.
  – A ring port is connected to the ring port of another MRP domain.

- Status change active/passive (redundancy manager only)

  If the status changes (active/passive) in a ring, a diagnostics interrupt is generated.

Parameter assignment of the redundancy is not set by STEP 7 (redundancy alternatives)

This option only affects SCALANCE X switches. Select this option if you want to set the properties for media redundancy using alternative mechanisms such as WBM, CLI or SNMP.

If you enable this option, existing redundancy settings from WBM, CLI or SNMP, are retained and are not overwritten. The parameters in the "MRP configuration" box are then reset and grayed out. The entries then have no meaning.

4.4.4 Standby

General

SCALANCE X switches support not only ring redundancy within a ring but also redundant linking of rings or open network segments (linear bus). In the redundant link, rings are connected together over Ethernet connections. This is achieved by configuring a master/slave device pair in one ring so that the devices monitor each other and, in the event of a fault, redirect the data traffic from the normally used master Ethernet connection to the substitute (slave) Ethernet connection.

Standby redundancy

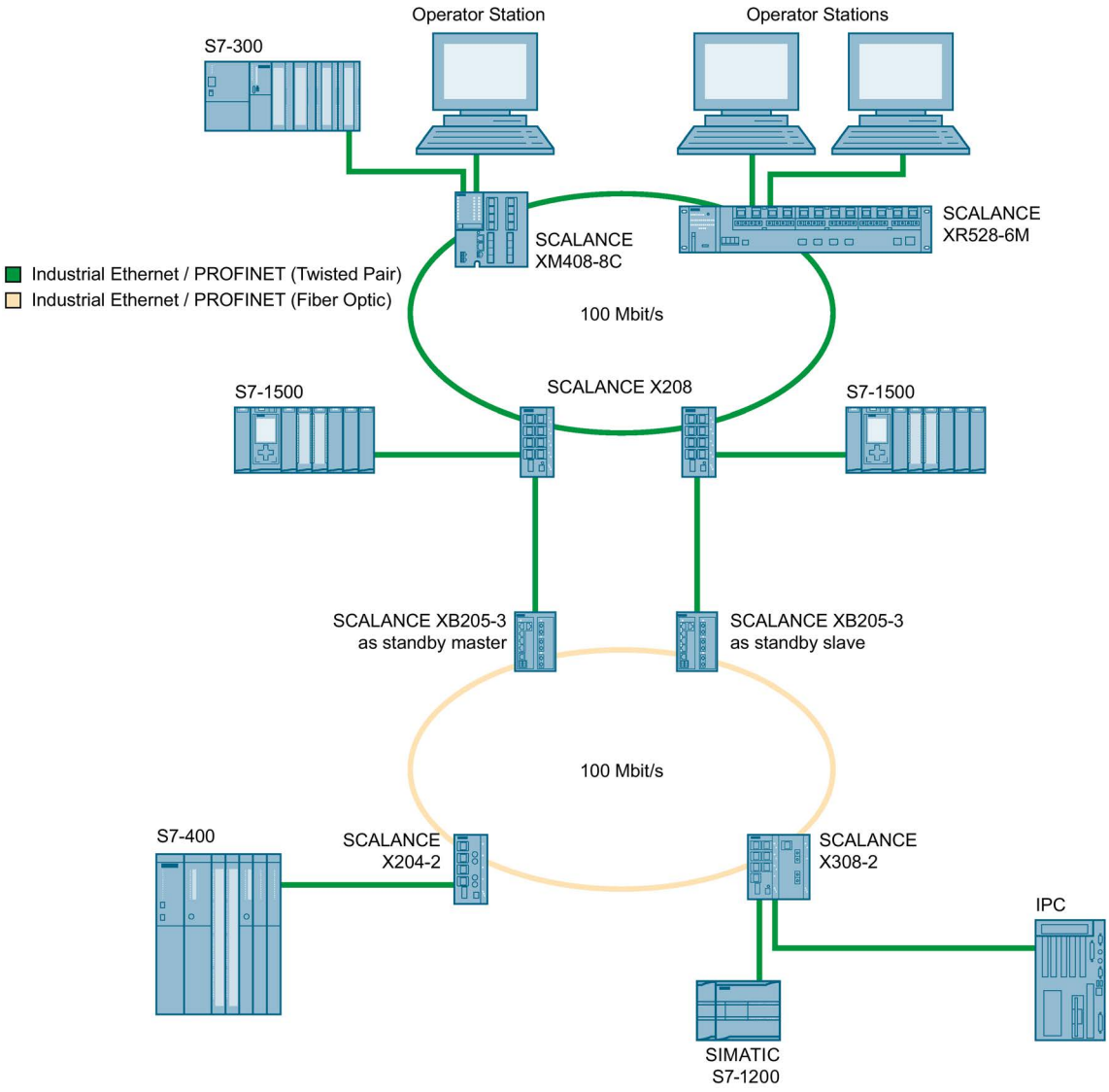


Figure 4-2 Example of a redundant link between rings

For a redundant link as shown in the figure, two devices must be configured as standby redundancy switches within a network segment. In this case, network segments are rings with a redundancy manager. Instead of rings, network segments might also be linear.

The two standby redundancy switches connected in the configuration exchange data frames with each other to synchronize their operating statuses (one device is master and the other slave). If there are no problems, only the link from the master to the other network segment is active. If this link fails (for example due to a link-down or a device failure), the slave activates its link as long as the problem persists.

4.4.5 Parallel Redundancy Protocol

Parallel Redundancy Protocol

The "Parallel Redundancy Protocol" (PRP) is a redundancy protocol for Ethernet networks. It is defined in Part 3 of the IEC 62439 standard. This redundancy method allows data communication to be maintained without interruption/reconfiguration time if there are interruptions in the network.

The PRP method is supported, for example, by the devices of the SCALANCE X-200RNA product line.

Overlong frames

When sending PRP frames, the IE switch expands the frame with a PRP trailer. With frames with the maximum length, appending the PRP trailer results in an overlong frame that exceeds the maximum permitted frame length (according to the IEEE 802.3 standard).

To prevent data loss with overlong frames, all network components located in a PRP network must support a frame length of at least 1528 bytes.

The devices described in this manual can be used in PRP networks, see also section "Configuration limits (Page 19)".

4.5 VLAN

Network definition regardless of the spatial location of the nodes

VLAN (Virtual Local Area Network) divides a physical network into several logical networks that are shielded from each other. Here, devices are grouped together to form logical groups. Only nodes of the same VLAN can address each other. Since multicast and broadcast frames are only forwarded within the particular VLAN, they are also known as broadcast domains.

The particular advantage of VLANs is the reduced network load for the nodes and network segments of other VLANs.

To identify which packet belongs to which VLAN, the frame is expanded by 4 bytes (VLAN tagging (Page 33)). This expansion includes not only the VLAN ID but also priority information.

Options for the VLAN assignment

Each port of a device is assigned a VLAN ID (port-based VLAN). You configure port-based VLAN in "Layer 2 > VLAN > Port-based VLAN (Page 185)".

4.6 VLAN tagging

Expansion of the Ethernet frames by four bytes

For CoS (Class of Service, frame priority) and VLAN (virtual network), the IEEE 802.1Q standard defined the expansion of Ethernet frames by adding the VLAN tag.

Note

The VLAN tag increases the permitted total length of the frame from 1518 to 1522 bytes. The end nodes on the networks must be checked to find out whether they can process this length / this frame type. If this is not the case, only frames of the standard length may be sent to these nodes.

The additional 4 bytes are located in the header of the Ethernet frame between the source address and the Ethernet type / length field:

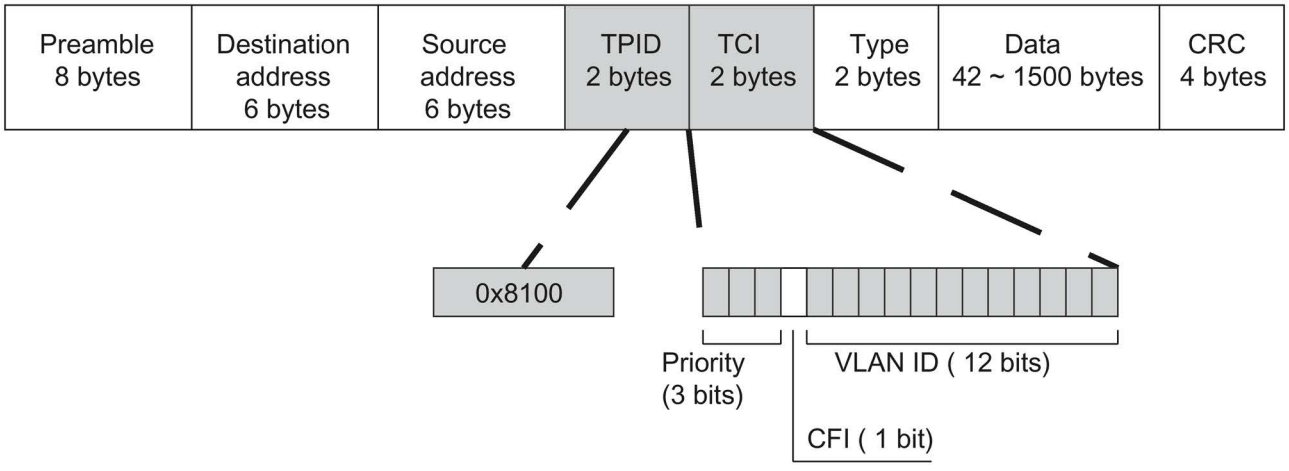


Figure 4-3 Structure of the expanded Ethernet frame

The additional bytes contain the tag protocol identifier (TPID) and the tag control information (TCI).

Tag protocol identifier (TPID)

The first 2 bytes form the Tag Protocol Identifier (TPID) and always have the value 0x8100. This value specifies that the data packet contains VLAN information or priority information.

Tag Control Information (TCI)

The 2 bytes of the Tag Control Information (TCI) contain the following information:

QoS Trust

The tagged frame has 3 bits for the priority that is also known as Class of Service (CoS), see also IEEE 802.1Q.

CoS bits	Priority	Type of the data traffic
000	0 (lowest)	Background
001	1	Best Effort
010	2	Excellent Effort
011	3	Critical Applications
100	4	Video, < 100 ms delay (latency and jitter)
101	5	Voice (language), < 10 ms delay (latency and jitter)
110	6	Internetwork Control
111	7 (highest)	Network Control

The prioritization of the data packets is possible only if there is a queue in the components in which they can buffer data packets with lower priority.

The device has multiple parallel queues in which the frames with different priorities can be processed. As default, first, the frames with the highest priority are processed. This method ensures that the frames with the highest priority are sent even if there is heavy data traffic.

Canonical Format Identifier (CFI)

The CFI is required for compatibility between Ethernet and the token Ring.
The values have the following meaning:

Value	Meaning
0	The format of the MAC address is canonical. In the canonical representation of the MAC address, the least significant bit is transferred first. Standard-setting for Ethernet switches.
1	The format of the MAC address is not canonical.

VLAN ID

In the 12-bit data field, up to 4096 VLAN IDs can be formed. The following conventions apply:

VLAN ID	Meaning
0	The frame contains only priority information (priority tagged frames) and no valid VLAN identifier.
1- 4094	Valid VLAN identifier, the frame is assigned to a VLAN and can also include priority information.
4095	Reserved

The device provides the option of simultaneously channeling incoming or outgoing data streams via other interfaces for analysis or monitoring. This has no effect on the monitored data streams. This procedure is known as mirroring. In this menu section, you enable or disable mirroring and set the parameters.

Mirroring ports

Mirroring a port means that the data traffic at a port (mirrored port) of the IE switch is copied to another port (monitor port). You can mirror one or more ports to a monitor port.

If a protocol analyzer is connected to the monitor port, the data traffic at the mirrored port can be recorded without interrupting the connection. This means that the data traffic can be investigated without being affected. This is possible only if a free port is available on the device as the monitor port.

4.7 SNMP

Introduction

With the aid of the Simple Network Management Protocol (SNMP), you monitor and control network components from a central station, for example routers or switches. SNMP controls the communication between the monitored devices and the monitoring station.

Tasks of SNMP:

- Monitoring of network components
- Remote control and remote parameter assignment of network components
- Error detection and error notification

In versions v1 and v2c, SNMP has no security mechanisms. Each user in the network can access data and also change parameter assignments using suitable software.

For the simple control of access rights without security aspects, community strings are used.

The community string is transferred along with the query. If the community string is correct, the SNMP agent responds and sends the requested data. If the community string is not correct, the SNMP agent discards the query. Define different community strings for read and write permissions. The community strings are transferred in plain text.

Standard values of the community strings:

- public
  has only read permissions
- private
  has read and write permissions

Note

Because the SNMP community strings are used for access protection, do not use the standard values "public" or "private". Change these values following the initial commissioning.

Further simple protection mechanisms at the device level:

- Allowed Host
  The IP addresses of the monitoring systems are known to the monitored system.
- Read Only
  If you assign "Read Only" to a monitored device, monitoring stations can only read out data but cannot modify it.

SNMP data packets are not encrypted and can easily be read by others.

The central station is also known as the management station. An SNMP agent is installed on the devices to be monitored with which the management station exchanges data.

The management station sends data packets of the following type:

- GET
  Request for a data record from the SNMP agent
- GETNEXT
  Calls up the next data record.
- GETBULK (available as of SNMPv2c)
  Requests multiple data records at one time, for example several rows of a table.
- SET
  Contains parameter assignment data for the relevant device.

The SNMP agent sends data packets of the following type:

- RESPONSE
  The SNMP agent returns the data requested by the manager.
- TRAP
  If a certain event occurs, the SNMP agent itself sends traps.

SNMPv1/v2c/v3 use UDP (User Datagram Protocol) and use the UDP ports 161 and 162. The data is described in a Management Information Base (MIB).

SNMPv3

Compared with the previous versions SNMPv1 and SNMPv2c, SNMPv3 introduces an extensive security concept.

SNMPv3 supports:

- Fully encrypted user authentication
- Encryption of the entire data traffic
- Access control of the MIB objects at the user/group level

4.8 Quality of service

Quality of Service (QoS) is a method to allow efficient use of the existing bandwidth in a network.

QoS is implemented by prioritization of the data traffic. Incoming frames are sorted into a Queue according to a certain prioritization and further processed. This gives certain frames priority.

The different QoS methods influence each other and are therefore taken into account in the following order:

1. The switch first checks whether the incoming frame is a broadcast or agent frame.

   → When the first condition is met, the switch takes into account the priority set on the "General (Page 171)" page.

   The switch sorts the frame into a queue according to the assignment on page "CoS Map (Page 172)".

2. If the first condition is not met the switch checks whether the frame contains a VLAN tag.

   → If the second condition is met the switch checks the settings for the priority on the "General (Page 171)" page. The switch checks whether a value other than "Do not force" is set for the priority.

   If the priority is set the switch sorts the frame into a queue according to the assignment on page "CoS Map (Page 172)".

3. If the second condition is also not met the frames are further processed according to the Trust mode. You configure the Trust mode on the page "QoS Trust (Page 175)".

Configuring with Web Based Management 5

5.1 Web Based Management

How it works

The device has an integrated HTTP server for Web Based Management (WBM). If a device is addressed using an Internet browser, it returns HTML pages to the client PC depending on the user input.

The user enters the configuration data in the HTML pages sent by the device. The device evaluates this information and generates reply pages dynamically.

The advantage of this method is that only an Internet browser is required on the client.

Note

Secure connection

WBM also allows you to establish a secure connection via HTTPS.

Use HTTPS for protected transfer of your data. If you wish to access WBM only via a secure connection, activate the option "HTTPS Server only" under "System > Configuration".

Requirements

WBM display

- The device has an IP address.
- There is a connection between the device and the client PC. With the ping command, you can check whether or not a device can be reached.
- Access using HTTPS is enabled.
- JavaScript is activated in the Internet browser.
- The Internet browser must not be set so that it reloads the page from the server each time the page is accessed. The updating of the dynamic content of the page is ensured by other mechanisms. In the Internet Explorer, you can make the appropriate setting in the "Options > Internet Options > General" menu in the section "Browsing history" with the "Settings" button. Under "Check for newer versions of stored pages:", select "Automatically".
- If a firewall is used, the relevant ports must be opened.
  - For access using HTTP: TCP port 80
  - For access using HTTPS: TCP port 443

The display of the WBM was tested with the following desktop Internet browsers:

- Microsoft Internet Explorer 11
- Mozilla Firefox 38 ESR
- Google Chrome V50

Note

Compatibility view

In Microsoft Internet Explorer, disable the compatibility view to ensure correct display and to allow problem-free configuration using WBM.

Display of the WBM on mobile devices

For mobile devices, the following minimum requirements must be met:

Resolution	Operating system
960 x 640 pixels	Android as of version 4.2.1 iOS as of version 6.0.2

Tested with the following Internet browsers for mobile devices:

- Apple Safari as of version 8 on iOS as of V8.1.3 (iPad Mini Model A1432)
- Google Chrome as of version 40 on Android as of version 5.0.2 (Nexus 7C Asus)
- Mozilla Firefox as of version 35 on Android as of version 5.0.2 (Nexus 7C Asus)

Note

Display of the WBM and working with it on mobile devices

The display on the WBM pages and how you work with them on mobile devices may differ compared with the same pages on desktop devices. Some pages also have an optimized display for mobile devices.

5.2 Login

Establishing a connection to a device

Follow the steps below to establish a connection to a device using an Internet browser:

1. There is a connection between the device and the client PC. With the ping command, you can check whether or not a device can be reached.
2. In the address box of the Internet browser, enter the IP address or the URL of the device. If there is a connection to the device, the login page of Web Based Management (WBM) is displayed.

Logging on using the Internet browser

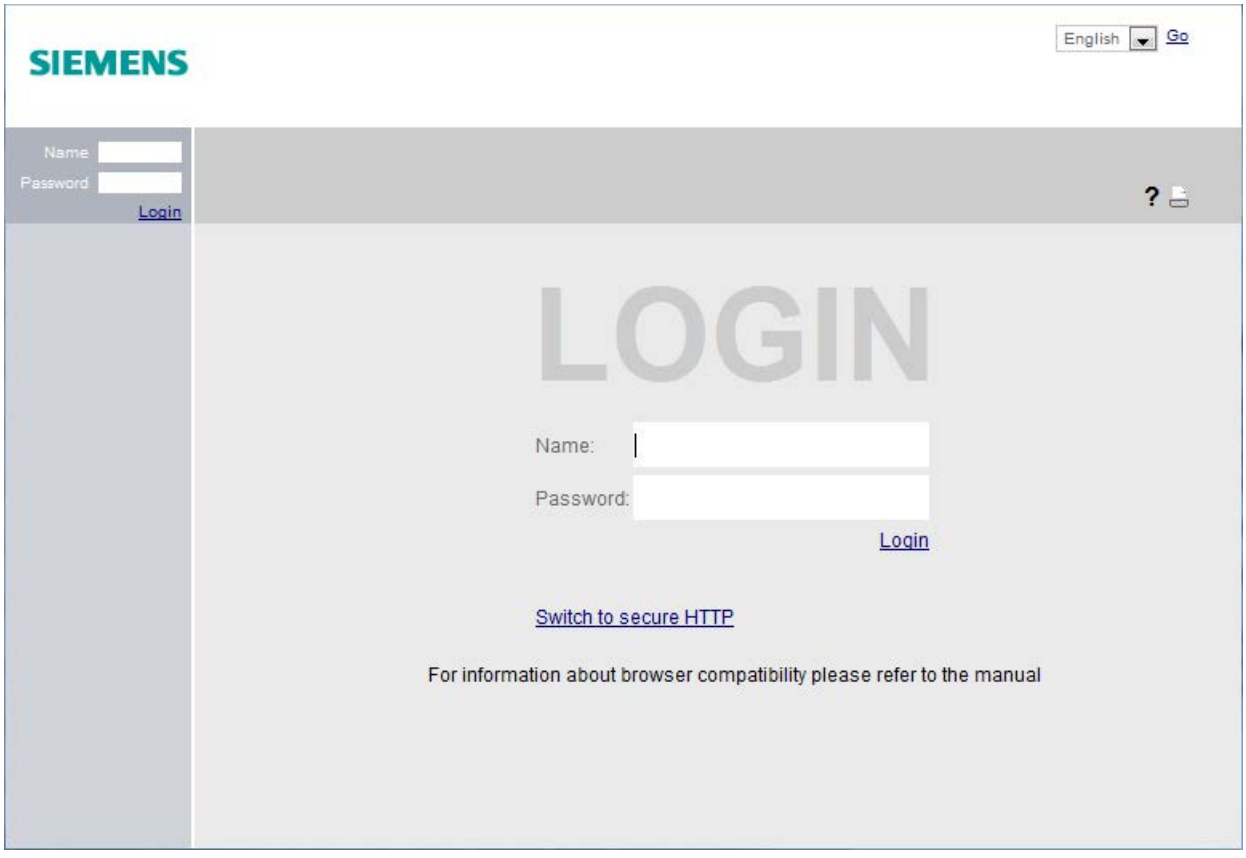
Selecting the language of the WBM

1. From the drop-down list at the top right, select the language version of the WBM pages.
2. Click the "Go" button to change to the selected language.

Note

Available languages

In this version German and English are available.



Login with HTTP

There are two ways in which you can log in via HTTP. You either use the login option in the center of the browser window or the login option in the upper left area of the browser window.

The following steps apply when logging in whichever of the above options you choose:

1. "Name" input box:
   - When you log in for the first time or following a "Restore Factory Defaults and Restart", enter the user preset in the factory "admin".

     With this user account, you can change the settings of the device (read and write access to the configuration data).

     Note

     Default user "user" set in the factory

     As of firmware version 2.1 the default user set in the factory "user" is no longer available when the product ships.

     If you update a device to the firmware V2.1 the user "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the user "user" is deleted.

     You can create users with the role "user".

   - Enter the user name of the created user account. You configure local user accounts in "Security > Users"
2. "Password" input box:
   - When you log in for the first time or following a "Restore Factory Defaults and Restart", enter the password of the default user preset in the factory "admin": "admin".
   - Enter the password of the relevant user account.
3. Click the "Login" button or confirm your input with "Enter".

   When you log in for the first time or following a "Restore Factory Defaults and Restart", with the preset user "admin" you will be prompted to change the password.

   The new password must meet the following password policies:

   - Password length: at least 8 characters, maximum 128 characters.
   - at least 1 uppercase letter
   - at least 1 special character
   - at least 1 number

   You need to repeat the password as confirmation. The password entries must match.

   Click the "Set Values" button to complete the action and activate the new password.

Once you have logged in successfully, the start page appears.

Login with HTTPS

Web Based Management also allows you to connect to the device over the secure connection of the HTTPS protocol. Follow these steps:

1. Click on the link "Switch to secure HTTP" on the login page or enter "https://" and the IP address of the device in the address box of the Internet browser.
2. Check the displayed certificate warning and confirm it if applicable.
   The logon page of Web Based Management appears.
3. "Name" input box:
   – When you log in for the first time or following a "Restore Factory Defaults and Restart", enter the user preset in the factory "admin".

     With this user account, you can change the settings of the device (read and write access to the configuration data).

     Note

     Default user "user" set in the factory

     As of firmware version 2.1 the default user set in the factory "user" is no longer available when the product ships.

     If you update a device to the firmware V2.1 the user "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the user "user" is deleted.

     You can create users with the role "user".

   – Enter the user name of the created user account. You configure local user accounts in "Security > Users"
4. "Password" input box:
   – When you log in for the first time or following a "Restore Factory Defaults and Restart", enter the password of the default user preset in the factory "admin": "admin".
   – Enter the password of the relevant user account.
5. Click the "Login" button or confirm your input with "Enter".

   When you log in for the first time or following a "Restore Factory Defaults and Restart", with the preset user "admin" you will be prompted to change the password.

   The new password must meet the following password policies:

   – Password length: at least 8 characters, maximum 128 characters.
   – at least 1 uppercase letter
   – at least 1 special character
   – at least 1 number

   You need to repeat the password as confirmation. The password entries must match.

   Click the "Set Values" button to complete the action and activate the new password.

Once you have logged in successfully, the start page appears.

5.3 The "Information" menu

5.3.1 Start page

View of the Start page

When you enter the IP address of the device, the start page is displayed after a successful login. You cannot configure anything on this page.

General layout of the WBM pages

The following areas are generally available on every WBM page:

- Selection area (1): Top area
- Display area (2): Top area
- Navigation area (3): Left-hand area
- Content area (4): Middle area


1
2
3
4
SIEMENS
English
Go
192.168.16.202/SCALANCE XP216PoE EEC
01/01/2000 00:14:34
Welcome admin
Logout
SCALANCE XP216PoE EEC
Information
System
Layer 2
Layer 3
Security
Please select one item of the menu on the left
PROFINET Name of Station:
Diagnostics Mode: PROFINET
System Name: sysName Not Set
Device Type: SCALANCE XP216PoE EEC
PROFINET AR Status: Offline
Power Line 1: Down
Power Line 2: Up
PLUG Configuration: ACCEPTED
Fault Status: No Fault
Refresh

Selection area (1)

The following is available in the selection area:

- Logo of Siemens AG

  When you click on the logo, you arrive at the Internet page of the corresponding basic device in Siemens Industry Online Support.

- Display of: "System Location / System Name"

  – "System location" contains the location of the device.
  With the settings when the device ships, the IP address of the device is displayed.

  – "System name" is the device name.
  With the settings when the device ships, the device type is displayed.

  You can change the content of this display with "System > General > Device.

- Drop-down list for language selection

- System date and time

  You can change the content of this display with "System > System Time.

Display area (2)

In the upper part of the display area, you can see name of the currently logged in user and the full title of the currently selected menu item.

In the lower part of the display area, you will find the following:

- **Logging out**
  You can log out from any WBM page by clicking the "Logout" link.

- **LED simulation** 
  Each device has one or more LEDs that provide information on the operating state of the device. Depending on its location, direct access to the device may not always be possible. Web Based Management therefore displays simulated LEDs. Unused connectors are displayed as gray LEDs. The meaning of the LED displays is described in the operating instructions.

  If you click this button, you open the window for the LED simulation. You can show this window during a change of menu and move it as necessary. To close the LED simulation, click the close button in the LED simulation window.

- **Help** 
  When you click this button, the help page of the currently selected menu item is opened in a new browser window.

  The help page contains a description of the content area. Under certain circumstances, options are described that are not available on the device.

- **Print** 
  If you click this button, a popup window opens. The popup window contains a view of the page content optimized for printers.

Note

Printing larger tables

If you want to print large tables, please use the "Print preview" function of your Internet browser.

Navigation area (3)

In the navigation area, you have various menus available. Click the individual menus to display the submenus. The submenus contain pages on which information is available or with which you can create configurations. These pages are always displayed in the content area.

Content area (4)

The content area shows a graphic of the device. The graphic always shows the device whose WBM you have called up.

The following is displayed below the device graphic:

- **PROFINET Name of Station**
  Shows the PROFINET device name.
- **Diagnostics Mode**

  Shows whether EtherNet/IP or PROFINET IO is enabled.
- **System Name**
  Shows the name of the device.
- **Device Type**
  Shows the type designation of the device.

- **PROFINET AR Status**
  Shows the PROFINET application relation status.
  - Online
    There is a connection to a PROFINET controller. The PROFINET controller has downloaded its configuration data to the device. The device can send status data to the PROFINET controller.
    In this status, the parameters set via the PROFINET controller cannot be configured on the device.
  - Offline
    There is no connection to a PROFINET controller.
- **Power Supply 1 / Power Supply 2**
  - Up
    Power supply 1 or 2 is applied
  - Down:
    Power supply 1 or 2 is not applied or is below the permitted voltage.
- **PLUG Configuration**

  Shows the status of the configuration data on the PLUG, refer to the section "System > PLUG > Configuration".
- **Fault Status**
  Shows the fault status of the device.

Buttons you require often

The pages of the WBM contain the following standard buttons:

- **Refresh the display with "Refresh"**
  Web Based Management pages that display current parameters have a "Refresh" button at the lower edge of the page. Click this button to request up-to-date information from the device for the current page.

  Note

  If you click the "Refresh" button, before you have transferred your configuration changes to the device using the "Set Values" button, your changes will be deleted and the previous configuration will be loaded from the device and displayed here.

- **Save entries with "Set Values"**
  Pages in which you can make configuration settings have a "Set Values" button at the lower edge. The button only becomes active if you change at least one value on the page. Click this button to save the configuration data you have entered on the device. Once you have saved, the button becomes inactive again.

  Note

  Changing configuration data is possible only with the "admin" role.

- **Create entries with "Create"**
  Pages in which you can make new entries have a "Create" button at the lower edge. Click this button to create a new entry. When you create an entry the page is updated.
- **Delete entries with "Delete"**
  Pages in which you can delete entries have a "Delete" button at the lower edge. Click this button to delete the previously selected entries from the device memory. When you delete an entry the page is updated.
- **Page down with "Next"**
  On pages with a lot of data records the number of data records that can be displayed on a page is limited. Click the "Next" button to page down through the data records.
- **Page back with "Prev"**
  On pages with a lot of data records the number of data records that can be displayed on a page is limited. Click the "Prev" button to page back through the data records.

Messages

If you have enabled the "Automatic Save" mode and you change a parameter the the following message appears in the display area "Changes will be saved automatically in x seconds. Press 'Write Startup Config' to save the changes immediately.

Note

Interrupting the save

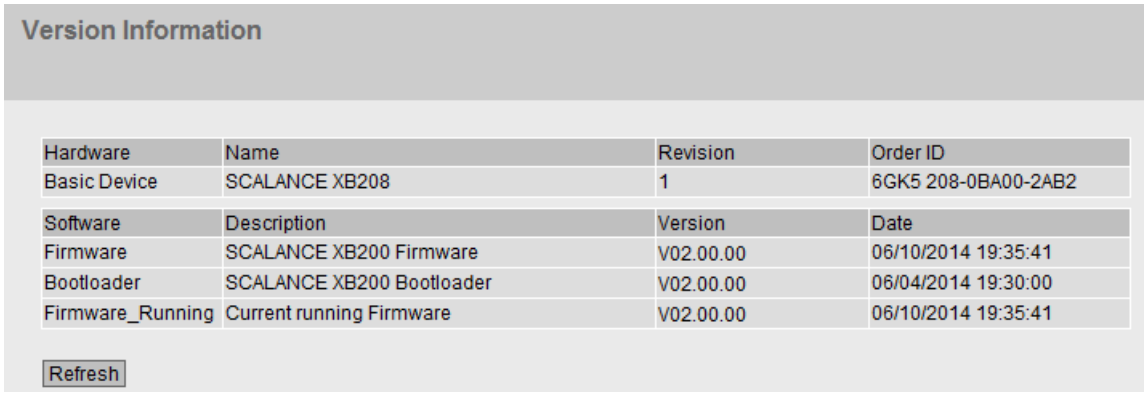
Saving starts only after the timer in the message has elapsed. In this case the following message appears "Saving configuration data in progress. Please do not switch off the device". How long saving takes depends on the device.

- Do not switch off the device immediately after the timer has elapsed.

5.3.2 Versions

Versions of hardware and software

This page shows the versions of the hardware and software of the device. You cannot configure anything on this page.



Description of the displayed values

Table 1 has the following columns:

- **Hardware -** Basic Device

  Shows the basic device.

- **Name**
  Shows the name of the device or module.
- **Revision**
  Shows the hardware version of the device.
- **Order ID**
  Shows the article number of the device or described module.

Table 2 has the following columns:

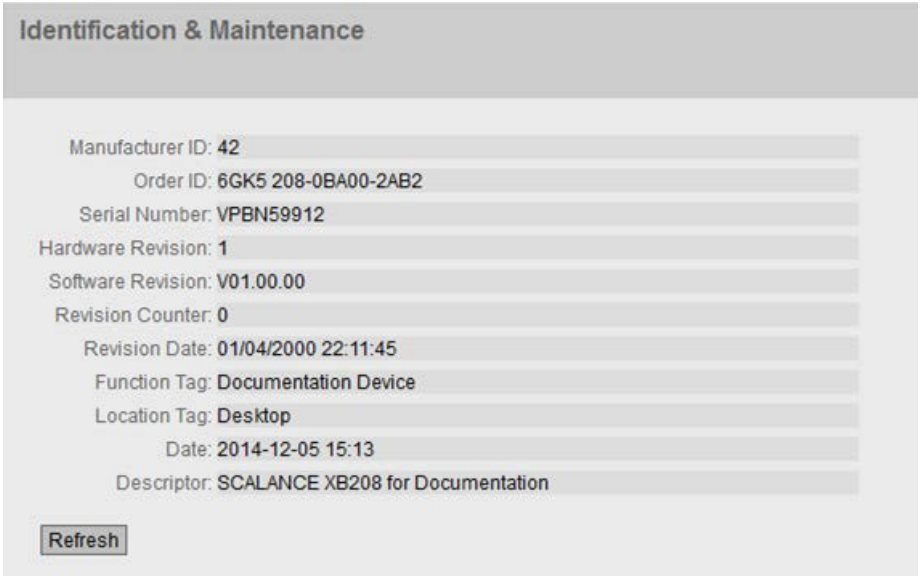
- **Software**
  - Firmware
    Shows the current firmware version. If a new firmware file was downloaded and the device has not yet restarted, the firmware version of the downloaded firmware file is displayed here. After the next restart, the downloaded firmware is activated and used.
  - Bootloader
    Shows the version of the boot software stored on the device.
  - Firmware_Running
    Shows the firmware version currently being used on the device.
- **Description**
  Shows the short description of the software.

- **Version**
  Shows the version number of the software version.
- **Date**
  Shows the date on which the software version was created.

5.3.3 I&M

Identification and Maintenance data

This page contains information about device-specific vendor and maintenance data such as the order number, serial number, version number etc. You cannot configure anything on this page.



Description of the displayed values

The table has the following rows:

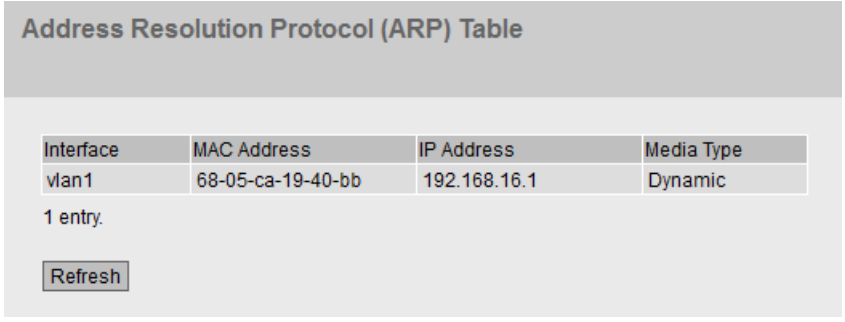
- **Manufacturer ID**
  Shows the manufacturer ID.
- **Order ID**
  Shows the order number.
- **Serial Number**
  Shows the serial number.
- **Hardware Revision**
  Shows the hardware version.
- **Software version**
  Shows the software version.

- **Revision Counter**
  Regardless of a version change, this box always displays the value "0".
- **Revision Date**
  Shows the date and time of the last revision.
- **Function tag**
  Shows the function tag (plant designation) of the device. The plant designation (HID) is created during configuration of the device with HW Config of STEP 7.
- **Location tag**
  Shows the location tag of the device. The location identifier (LID) is created during configuration of the device with HW Config of STEP 7.
- **Date**
  Shows the date created during configuration of the device with HW Config of STEP 7.
- **Descriptor**
  Shows the description created during configuration of the device with HW Config of STEP 7.

5.3.4 ARP table

Assignment of MAC address and IPv4 address

With the Address Resolution Protocol (ARP), there is a unique assignment of MAC address to IPv4 address. This assignment is kept by each network node in its own separate ARP table. The WBM page shows the ARP table of the device.



Description of the displayed values

The table has the following columns:

- **Interface**
  Shows the interface via which the row entry was learnt.
- **MAC Address**
  Shows the MAC address of the destination or source device.

- **IP Address**
  Shows the IPv4 address of the destination device.
- **Media Type**
  Shows the type of connection.
  - Dynamic
    The device recognized the address data automatically.
  - Static

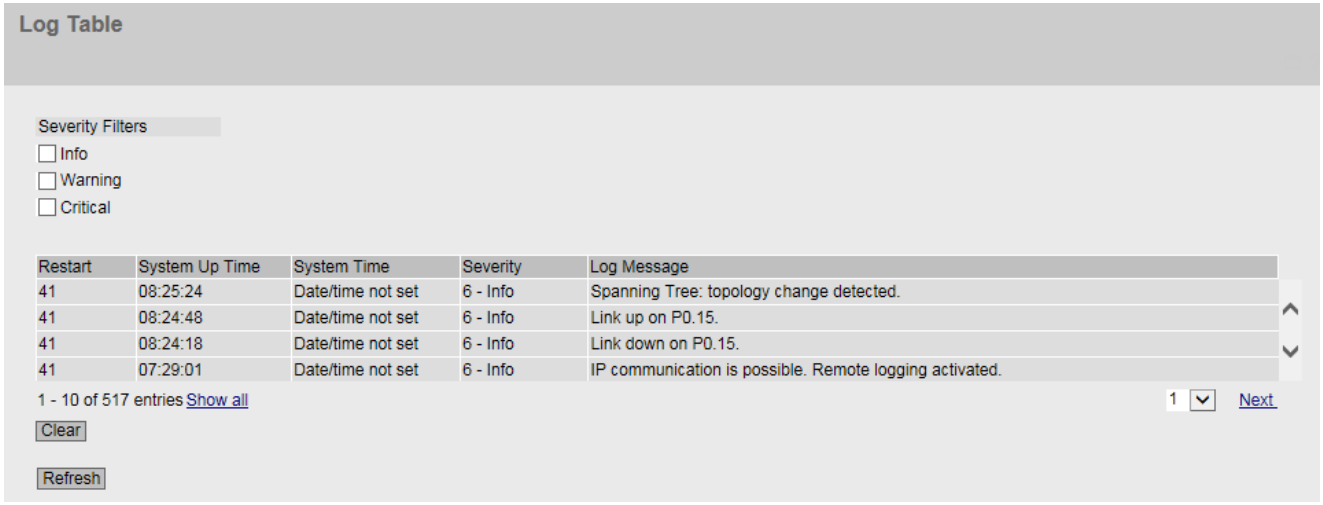
    The addresses were entered as static addresses.

5.3.5 Log Table

Logging events

The device allows you to log occurring events, some of which you can specify on the page of the "System > Events" menu. This, for example, allows you to record when an authentication attempt failed or when the connection status of a port has changed.

The content of the events log table is retained even when the device is turned off.



Description of the displayed values

Severity Filters

You can filter the entries in the table according to severity. Select the required entries in the check boxes above the table.

- **Info**

  When this parameter is enabled, all entries of the category "Info" are displayed.

- **Warning**

  When this parameter is enabled, all entries of the category "Warning" are displayed.

- **Critical**

  When this parameter is enabled, all entries of the category "Critical" are displayed.

To display all entries, select either all of them or leave the check boxes empty.

The table has the following columns:

- **Restart**
  Counts the number of restarts since you last reset to factory settings and shows the device restart after which the corresponding event occurred.
- **System Up Time**
  Shows the time the device has been running since the last restart when the described event occurred.
- **System Time**

  If the system time is set, the date and time are also displayed at which the event occurred.

- **Severity**
  Sorts the entry into the categories above.
- **Log Message**
  Displays a brief description of the event that has occurred.

Description of the buttons and input boxes

"Clear" button

Click this button to delete the content of the event log file. All entries are deleted regardless of what you have selected under "Severity Filters".

The display is also cleared. The restart counter is only reset after you have restored the device to the factory settings and restarted the device.

Note

The number of entries in this table is restricted to 1200. The table can contain 400 entries for each severity. When this number is reached, the oldest entries of the relevant severity are discarded. The table remains permanently in memory.

"Show all" button

Click this button to display all the entries on the WBM page. Note that displaying all messages can take some time.

"Next" button

Click this button to go to the next page.

"Prev" button

Click this button to go to the previous page.

Drop-down list for page change

From the drop-down list, select the page you want to go to.

"Update" button

Refreshes the display of the values in the table.

5.3.6 Faults

Error status

if an error occurs, it is shown on this page. On the device, errors are indicated by red fault LED lighting up.

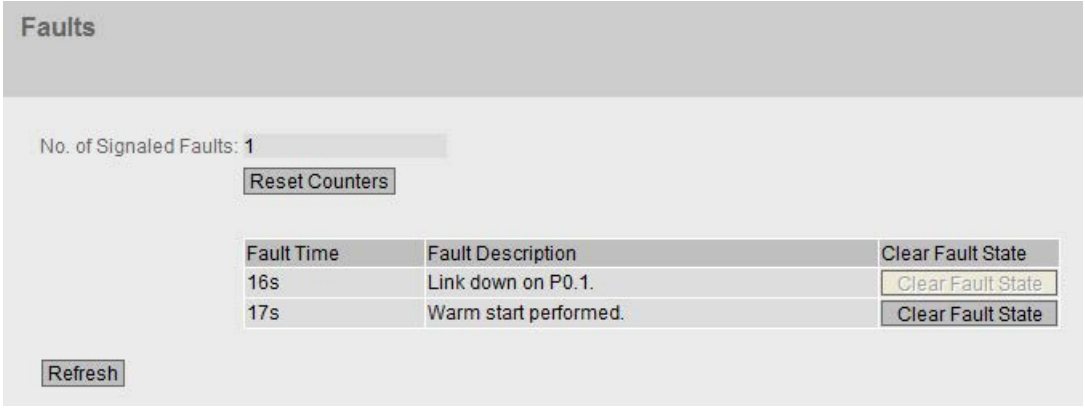
Internal errors of the device and errors that you configure on the following pages are indicated:

- System > Events"
- "System" > Fault Monitoring"

Errors of the "Cold/Warm Start" event can be deleted by a confirmation.

The calculation of the time of an error always begins after the last system start.

If there are no errors present, the fault LED switches off.



Description of the displayed values

- **No. of Signaled Faults**

  Number of errors displayed since the last startup.

- **Reset Counters**

  Click "Reset Counters" to reset all counters. The counter is reset when there is a restart.

The table contains the following columns:

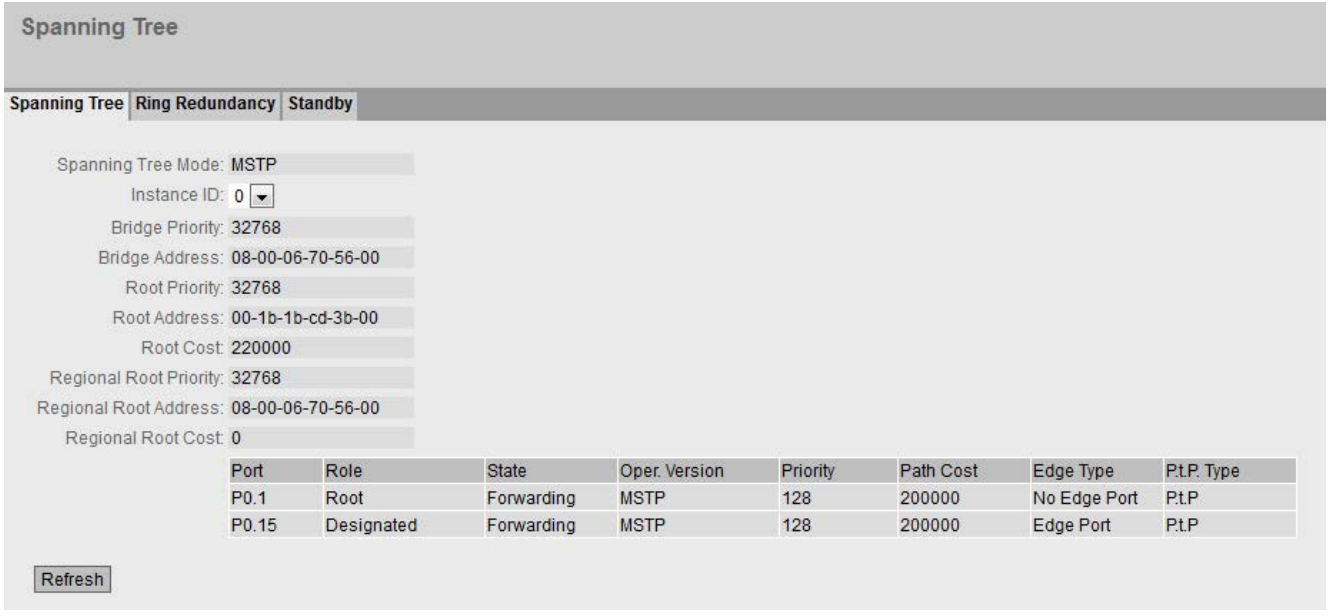
- **Fault Time**
  Shows the time the device has been running since the last system restart when the described error/fault occurred.
- **Fault Description**
  Displays a brief description of the fault/error that has occurred.
- **Clear Fault State**
  If the "Clear Fault State" button is enabled, you can delete the fault.

5.3.7 Redundancy

5.3.7.1 Spanning tree

Introduction

The page shows the current information about the spanning tree and the settings of the root bridge.



Description of the displayed values

The following fields are displayed:

- **Spanning Tree Mode**
  Shows the set mode. You specify the mode in "Layer 2 > Configuration" and in "Layer 2 > Spanning Tree > General".
  The following values are possible:
  - '-'
  - STP
  - RSTP
  - MSTP
- **Instance ID**
  Shows the number of the instance. The parameter depends on the configured mode.
- **Bridge Priority / Root Priority**
  Which device becomes the root bridge is decided by the bridge priority. The bridge with the highest priority (in other words, with the lowest value for this parameter) becomes the root bridge. If several devices in a network have the same priority, the device whose MAC address has the lowest numeric value will become the root bridge. Both parameters, bridge priority and MAC address together form the bridge identifier. Since the root bridge manages all path changes, it should be located as centrally as possible due to the delay of the frames. The value for the bridge priority is a whole multiple of 4096 with a range of values from 0 to 32768.
- **Bridge address / root address**
  The bridge address shows the MAC address of the device and the root address shows the MAC address of the root switch.
- **Root Cost**

  Shows the path costs from the device to the root bridge.
- **Bridge Status**

  Shows the status of the bridge, e.g. whether or not the device is the root bridge.
- **Regional root priority** (available only with MSTP)
  For a description, see Bridge priority / Root priority.
- **Regional root address** (available only with MSTP)
  Shows the MAC address of the device.
- **Regional Root Cost** (available only with MSTP)

  Shows the path costs from the regional root bridge to the root bridge.

The table has the following columns:

- **Port**
  Shows the port via which the device communicates. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Role**
  Shows the status of the port. The following values are possible:
  - Disabled
    The port was removed manually from the spanning tree and will no longer be taken into account by the spanning tree.
  - Designated
    The ports leading away from the root bridge.
  - Alternate
    The port with an alternative path to a network segment
  - Backup
    If a switch has several ports to the same network segment, the "poorer" Port becomes the backup port.
  - Root
    The port that provides the best route to the root bridge.
  - Master
    This port points to a root bridge located outside the MST region.
- **Status**
  Displays the current status of the port. The values are only displayed. The parameter depends on the configured protocol. The following values are possible:
  - Discarding
    The port receives BPDU frames. Other incoming or outgoing frames are discarded.
  - Listening
    The port receives and sends BPDU frames. The port is involved in the spanning tree algorithm. Other outgoing and incoming frames are discarded.
  - Learning
    The port actively learns the topology; in other words, the node addresses. Other outgoing and incoming frames are discarded.
  - Forwarding
    Following the reconfiguration time, the port is active in the network. The port receives and sends data frames.
- **Oper. Version**
  Shows the compatibility mode of Spanning Tree used by the port.
- **Priority**
  If the path calculated by the spanning tree is possible over several ports of a device, the port with the highest priority (in other words the lowest value for this parameter) is selected. A value between 0 and 240 can be entered for the priority in steps of 16. If you enter a value that cannot be divided by 16, the value is automatically adapted. The default is 128.

- **Path Cost**
  This parameter is used to calculate the path that will be selected. The path with the lowest value is selected. If several ports of a device have the same value, the port with the lowest port number will be selected.
  If the value in the "Cost Calc." box is "0", the automatically calculated value is shown. Otherwise, the value of the "Cost Calc." box is displayed.
  The calculation of the path costs is largely based on the transmission speed. The higher the achievable transmission speed is, the lower the value of the path costs.

  Typical values for path costs with rapid spanning tree:

  – 10,000 Mbps = 2,000
  – 1000 Mbps = 20,000
  – 100 Mbps = 200,000
  – 10 Mbps = 2,000,000

  You configure the "Cost Calc." on the pages "Layer 2 > Spanning Tree > CIST Port" and "Layer 2 > Spanning Tree > MST Port".

- **Edge Type**
  Shows the type of the connection. The following values are possible:

  – Edge Port
    There is an end device at this port.
  – No Edge Port
    There is a spanning tree device at this port.

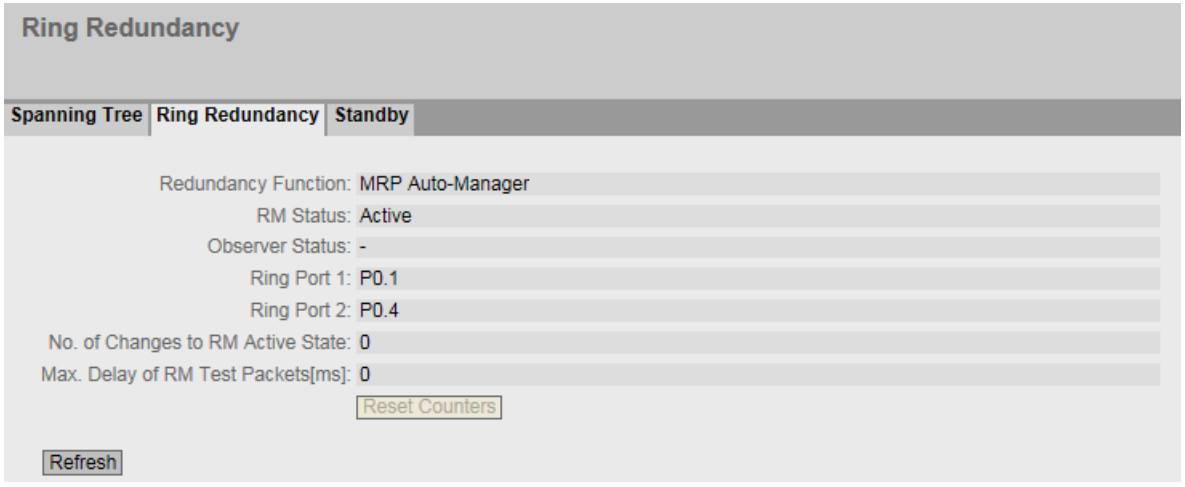
- **P.t.P Type**
  Shows the type of the point-to-point link. The following values are possible:

  – P.t.P.
    With half duplex, a point-to-point link is assumed.
  – Shared Media
    With a full duplex connection, a point-to-point link is not assumed.

5.3.7.2 Ring Redundancy

Information on ring redundancy

On this tab, you obtain information about the status of the device in terms of ring redundancy. The text boxes on this page are read-only.



Description of the displayed values

The following boxes are displayed:

- **Redundancy Function**

  The "Redundancy Function" column shows the role of the device within the ring:

  – no Ring Redundancy
  The IE switch is operating without redundancy function.

  – HRP Client
  The IE switch operates as an HRP client.

  – HRP Manager
  The IE switch operates as an HRP manager.

  – MRP Client
  The IE switch operates as an MRP client.

  – MRP Manager
  The IE switch operates as an MRP manager. Using STEP 7, the role "Manager" was set for the device.

  – MRP Auto-Manager
  The IE switch is operating as an MRP manager. Using WBM or CLI the role "MRP Auto-Manager" or using STEP 7 the role "Manager (Auto)" was set.

- **RM Status**

  The "RM Status" column shows whether or not the IE switch is operating as redundancy manager and whether it has opened or closed the ring in this role.

  – Passive
    The IE switch is operating as redundancy manager and has opened the ring; in other words, the line of switches connected to the ring ports is operating problem free. The "Passive" status is also displayed if the IE switch is not operating as the redundancy manager (Redundancy manager disabled).

  – Active
    The IE switch is operating as redundancy manager and has closed the ring; in other words, the line of switches connected to the ring ports is interrupted (problem). The redundancy manager connects its ring ports through and restores an uninterrupted linear topology.

  – "-"

    The redundancy function is disabled.

- **Observer Status**

  Shows the current status of the observer.

- **Ring Port 1/Ring Port 2**

  The "Ring Port 1"and "Ring Port 2" columns show the ports being used as ring ports. If media redundancy in ring topologies is completely disabled, ring ports configured last are displayed.

- **No. of Changes to RM Active State**

  Shows how often the device as redundancy manager switched to the active status, i.e. closed the ring.

  If the redundancy function is disabled or the device is an "HRP/MRP client" , the text "Redundancy manager disabled" appears.

- **Max. Delay of the RM Test Packets [ms]**

  Shows the maximum delay time of the test frames of the redundancy manager.

  If the redundancy function is disabled or the device is an "HRP/MRP client" , the text "Redundancy manager disabled" appears.

Description of the button

"Reset Counters" button

Click "Reset Counters" to reset all counters. The counters are reset by a restart.

5.3.7.3 Standby

Information on standby redundancy

On this tab, you obtain information about the status of the device in terms of standby redundancy. The text boxes on this page are read-only.

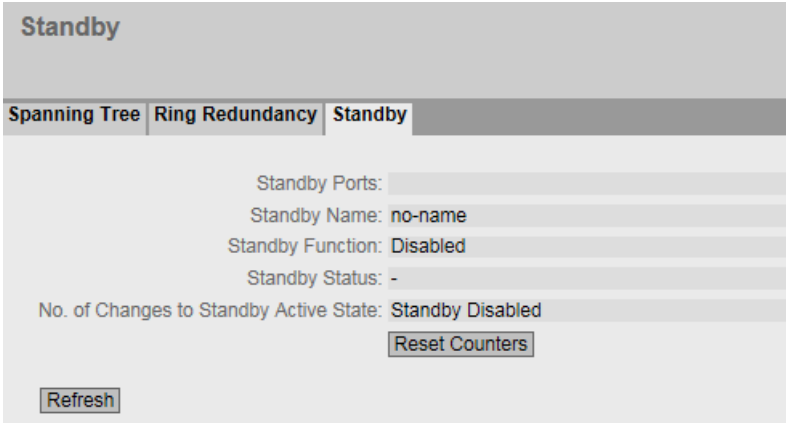
Note

Device with the higher MAC address becomes master

When linking HRP rings redundantly, two devices are always configured as a master/slave pair. This also applies to interrupted HRP rings = linear buses. When operating normally, the device with the higher MAC address adopts the role of master.

This type of assignment is important in particular when a device is replaced. Depending on the MAC addresses, the previous device with the slave function can take over the role of the standby master.

The Standby tab shows the status of the standby function:



Description of the displayed values

The following boxes are displayed:

- **Standby ports**

  Shows the standby port.

- **Standby Name**

  Standby Connection Name

- **Standby Function**
  - Master
    The device has a connection to the partner device and is operating as master. In normal operation, the standby port of this device is active.
  - Slave
    The device has a connection to the partner device and is operating as slave. In normal operation, the standby port of this device is inactive.
  - Disabled
    The standby link is disabled. The device is operating neither as master nor slave. The port configured as a standby port works as a normal port without standby function.
  - Waiting for connection
    No connection has yet been established to the partner device. The standby port is inactive. In this case, either the configuration on the partner device is inconsistent (for example incorrect connection name, standby link disabled) or there is a physical fault (for example device failure, link down).
  - Connection lost
    The existing connection to the partner device has been lost. In this case, either the configuration on the partner device was modified (for example a different connection name, standby link disabled) or there is a physical fault (for example device failure, link down).
- **Standby Status**

  The "Standby Status" display box shows the status of the standby port:
  - Active
    The standby port of this device is active; in other words is enabled for frame traffic.
  - Passive
    The standby port of this device is inactive; in other words is blocked for frame traffic.
  - "-":
    The standby function is disabled.
- **No. of Changes to Standby Active State**

  Shows how often the IE switch has changed the standby status from "Passive" to "Active". If the connection of a standby port fails on the standby master, the IE switch changes to the "active" status.

  If the standby function is disabled, the text "Standby Disabled" appears in this box.

Description of the button

"Reset Counters" button

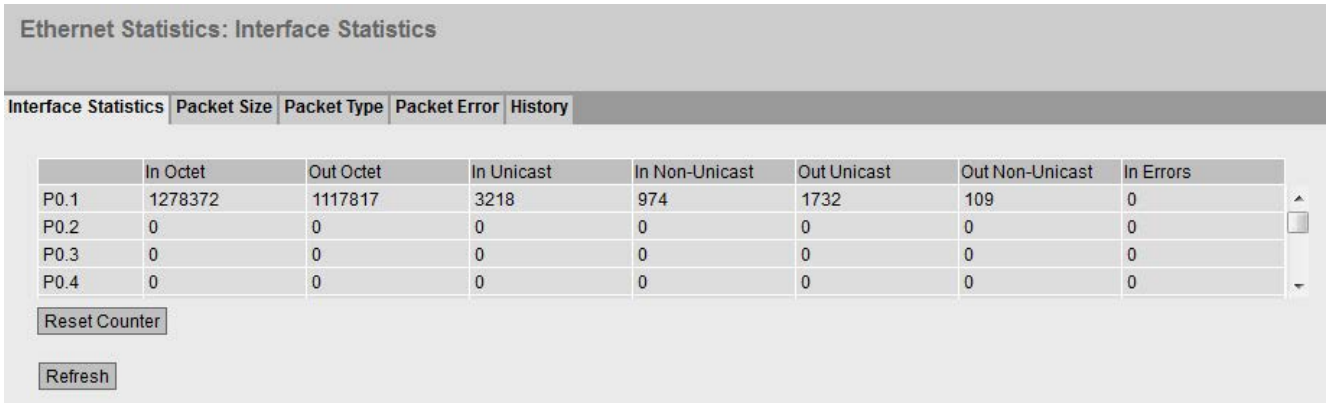
Click "Reset Counters" to reset all counters. The counter is reset when there is a restart.

5.3.8 Ethernet Statistics

5.3.8.1 Interface Statistics

Interface statistics

The page shows the statistics from the interface table of the Management Information Base (MIB).



Description of the displayed values

The table has the following columns:

- **In Octet**

  Shows the number of received bytes.
- **Out Octet**

  Shows the number of sent bytes.
- **In Unicast**

  Shows the number of received unicast frames.
- **In Non Unicast**

  Shows the number of received frames that are not of the type unicast.
- **Out Unicast**

  Shows the number of sent unicast frames.
- **Out Non Unicast**

  Shows the number of sent frames that are not of the type unicast.
- **In Errors**

  Shows the number of all possible RX errors, refer to the tab "Packet Error".

Description of the button

"Reset Counters" button

Click "Reset Counters" to reset all counters. The counters are reset by a restart.

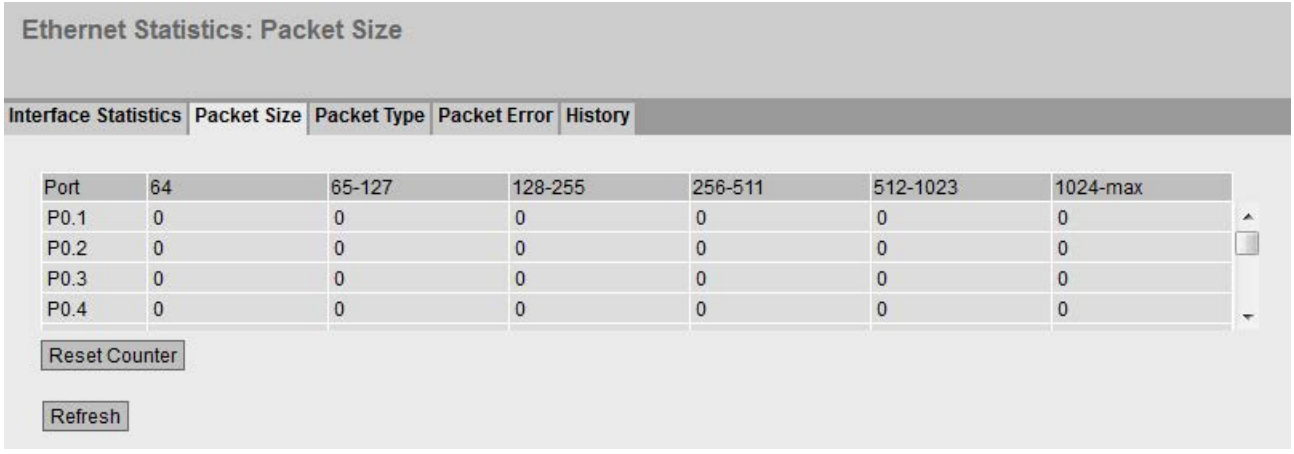
5.3.8.2 Packet Size

Frames sorted by length

This page displays how many frames of which length were sent and received at each port. You cannot configure anything on this page.

The displayed values are transferred by RMON.

On the page "Layer 2 > RMON > Statistics", you can set the ports for which values will be displayed.



Description of the displayed values

The table has the following columns:

- **Port**
  Shows the available ports and link aggregations. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

Note

Display of frame statistics

In the statistics relating to frame lengths, note that both incoming and outgoing frames are counted.

- **Frame lengths**
  The other columns after the port number contain the absolute numbers of frames according to their frame length.
  The following frame lengths are distinguished:
  - 64 bytes
  - 65 - 127 bytes
  - 128 - 255 bytes
  - 256 - 511 bytes
  - 512 - 1023 bytes
  - 1024 - Max.

Note

Data traffic on blocked ports

For technical reasons, data packets can be indicated on blocked ports.

Description of the button

"Reset Counters" button

Click "Reset Counters" to reset all counters. The counters are reset by a restart.

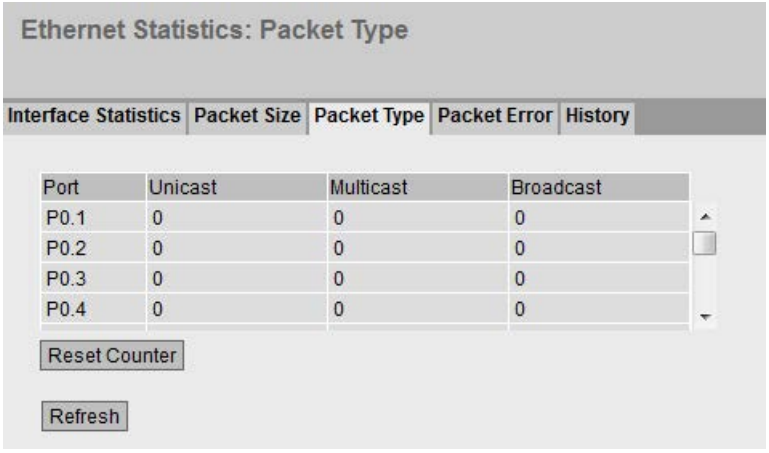
5.3.8.3 Packet Type

Received frames sorted by frame type

This page displays how many frames of the type "unicast", "multicast", and "broadcast" were received at each port. You cannot configure anything on this page.

The displayed values are transferred by RMON.

On the page "Layer 2 > RMON > Statistics", you can set the ports for which values will be displayed.



Description of the displayed values

The table has the following columns:

- **Port**
  Shows the available ports and link aggregations. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Unicast / Multicast / Broadcast**
  The other columns after the port number contain the absolute numbers of the incoming frames according to their frame type "Unicast", "Multicast" and "Broadcast".

Description of the button

"Reset Counters" button

Click "Reset Counters" to reset all counters. The counters are reset by a restart.

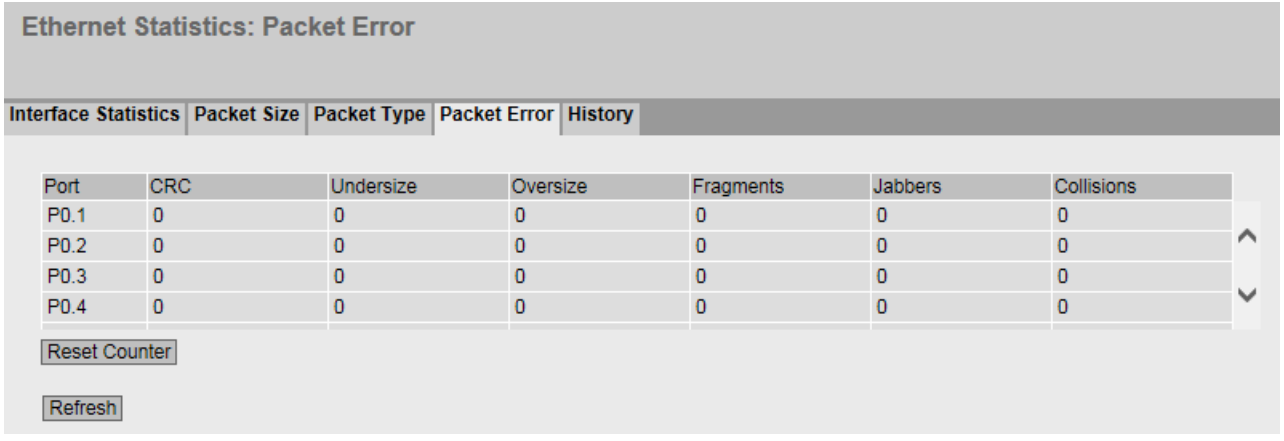
5.3.8.4 Packet Error

Received bad frames

This page shows how many bad frames were received per port. You cannot configure anything on this page.

The displayed values are transferred by RMON.

On the page "Layer 2 > RMON > Statistics", you can set the ports for which values will be displayed.



Description of the displayed values

The table has the following columns:

- **Port**
  Shows the available ports and link aggregations. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Error types**
  The other columns after the port number contain the absolute numbers of the incoming frames according to their error type.

  In the columns of the table, a distinction is made according to the following error types:

  – CRC
  Packets whose content does not match the CRC checksum.

  – Undersize
  Packets with a length less than 64 bytes.

  – Oversize
  Packets discarded because they were too long.

  – Fragments
  Packets with a length less than 64 bytes and a bad CRC checksum.

- Jabbers
  VLAN-tagged packets with an incorrect CRC checksum that were discarded because they were too long.
- Collisions
  Collisions that were detected.

Description of the button

"Reset Counters" button

Click "Reset Counters" to reset all counters. The counters are reset by a restart.

5.3.8.5 History

Samples of the statistics

The page shows samples from each port with information from the RMON statistics.

On the page "Layer 2 > RMON > History", you can set the ports for which samples will be taken.

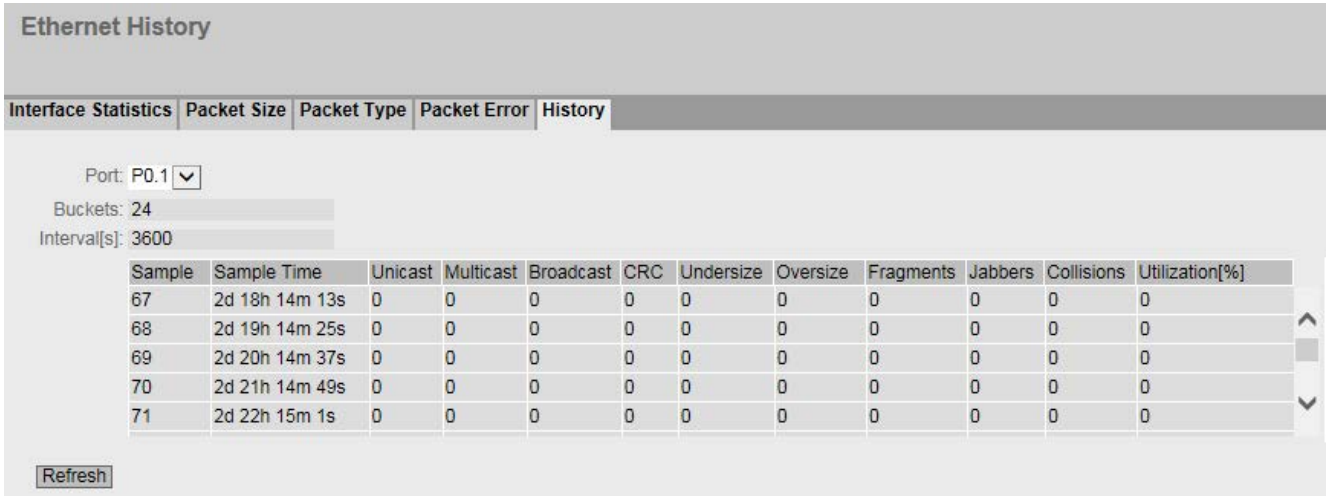


Figure 5-1 History

Settings

- **Port**

  Select the port for which the history will be displayed.

Description of the displayed values

- **Entries**

  Maximum number of samples that can be saved at the same time.

- **Interval [s]**

  Interval after which the current status of the statistics will be saved as a sample.

The table has the following columns:

- **Sample**

  Number of the sample

- **Sample Time**

  System up time at which the sample was taken.

- **Unicast**

  Number of received unicast frames.

- **Multicast**

  Number of received multicast frames.

- **Broadcast**

  Number of received broadcast frames.

- **CRC**

  Number of frames with a bad CRC checksum.

- **Undersize**

  Number of frames that are shorter than 64 bytes.

- **Oversize**

  Number of frames discarded because they were too long.

- **Fragments**

  Number of frames that are shorter than 64 bytes and have a bad CRC checksum.

- **Jabbers**

  Number of frames with a VLAN tag that have a bad CRC checksum and will be discarded because they are too long.

- **Collisions**

  Number of collisions of received frames.

- **Utilization [%]**

  Utilization of the port during a sample.

5.3.9 Unicast

Status of the unicast filter table

This page shows the current content of the unicast filter table. This table lists the source addresses of unicast address frames. Entries can be made either dynamically when a node sends a frame to a port or statically by the user setting parameters.

Dependency on the "Base bridge mode"

The displayed columns depend on which "Base bridge mode" is set. If you change the "Base bridge mode" the existing entries are lost.

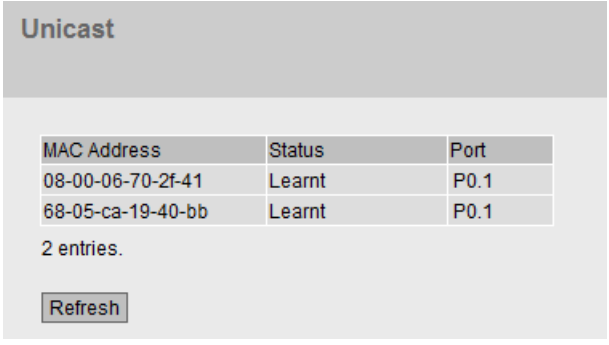


Figure 5-2 Base bridge mode: 802.1D transparent bridge

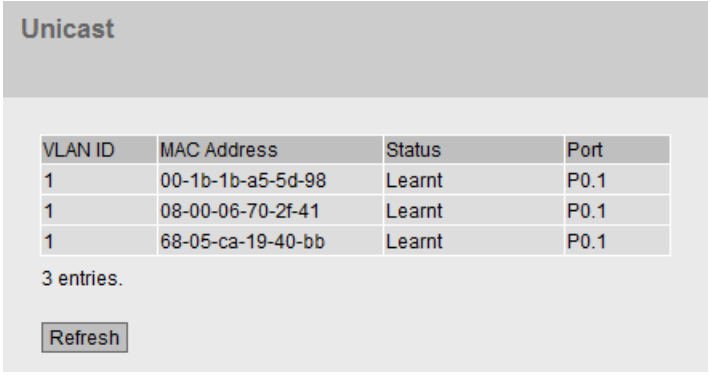


Figure 5-3 Base bridge mode: 802.1Q VLAN Bridge

Description

This table can contain the following columns:

- **VLAN ID**
  Shows the VLAN-ID assigned to this MAC address.
- **MAC Address**
  Shows the MAC address of the node that the device has learned or the user has configured.

- **Status**
  Shows the status of each address entry:
  - Learnt
    The specified address was learned by receiving a frame from this node and will be deleted when the aging time expires if no further packets are received from this node.

    Note

    If there is a link down, learned MAC entries are deleted.

  - Static
    Configured by the user. Static addresses are stored permanently; in other words, they are not deleted when the aging time expires or when the switch is restarted.
- **Port**
  Shows the port via which the node with the specified address can be reached. Frames received by the device whose destination address matches this address will be forwarded to this port.

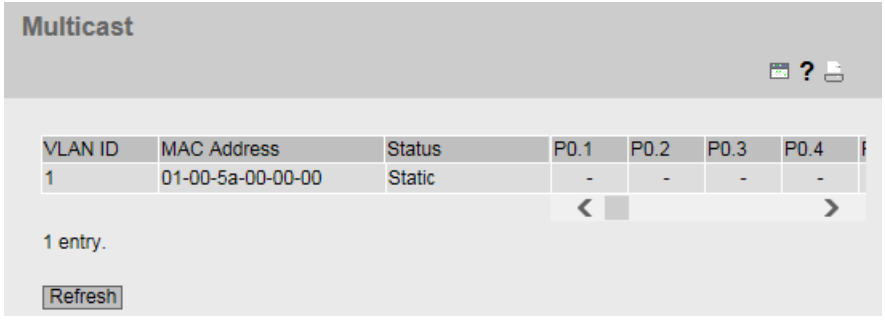
5.3.10 Multicast

Status of the multicast filter table

This table shows the multicast frames currently entered in the multicast filter table and their destination ports. The entries can be dynamic (the device has learned them) or static (the user has set them).

Dependency on the "Base bridge mode"

If you change the "Base bridge mode" the existing entries are lost.



Description

This table can contain the following columns:

- **VLAN ID**

  Shows VLAN ID of the VLAN to which the MAC multicast address is assigned.

- **MAC Address**

  Shows the MAC multicast address that the device has learned or the user has configured.

- **Status**

  Shows the status of each address entry. The following information is possible:

  – Static
  The address was entered statically by the user. Static addresses are stored permanently; in other words, they are not deleted when the aging time expires or when the device is restarted. These can be deleted by the user.

  – IGMP
  The destination port for this address was obtained using IGMP.

  – GMRP
  The destination port for this address was registered by a received GMRP frame.

- **Port List**
  There is a column for each slot. Within a column, the multicast group to which the port belongs is shown:

  – M
  (Member) Multicast frames are sent via this port.

  – R

  (Registered) Member of the multicast group, registration was by a GMRP frame.

  – I
  (IGMP) Member of the multicast group, registration was by an IGMP frame.

  – –
  Not a member of the multicast group. No multicast frames with the defined multicast MAC address are sent via this port.

  – F
  (Forbidden) Not a member of the multicast group. Moreover, on this port may not be learned dynamically with IGMP.

5.3.11 LLDP

Status of the neighborhood table

This page shows the current content of the neighborhood table. This table stores the information that the LLDP agent has received from connected devices.

You set the interfaces via which the LLDP agent receives or sends information in the following section: "Layer 2 > LLDP".

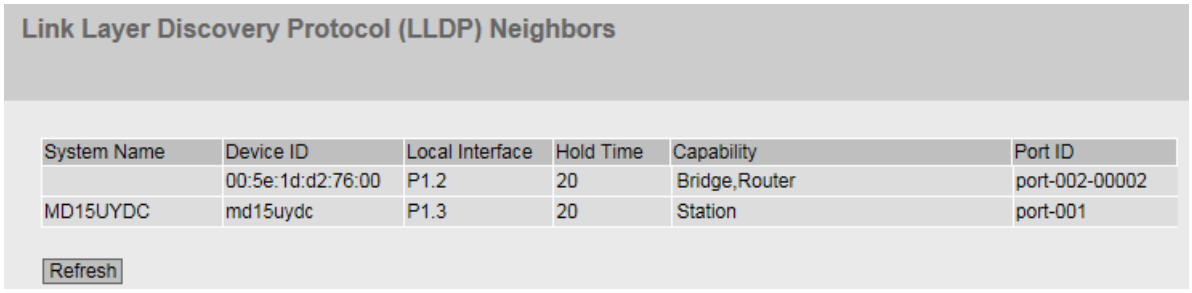


Figure 5-4 Information LLDP

Description of the displayed values

This table contains the following columns:

- **System Name**

  System name of the connected device.

- **Device ID**

  Device ID of the connected device. The device ID corresponds to the device name assigned via PST (STEP 7). If no device name is assigned, the MAC address of the device is displayed.

- **Local Interface**

  Port at which the IE switch received the information.

- **Hold Time**

  An entry remains stored on the device for the time specified here. If the IE switch does not receive any new information from the connected device during this time, the entry is deleted.

- **Capability**

  Shows the properties of the connected device:

  – Router
  – Bridge
  – Telephone
  – DOCSIS Cable Device
  – WLAN Access Point
  – Repeater
  – Station
  – Other

- **Port ID**

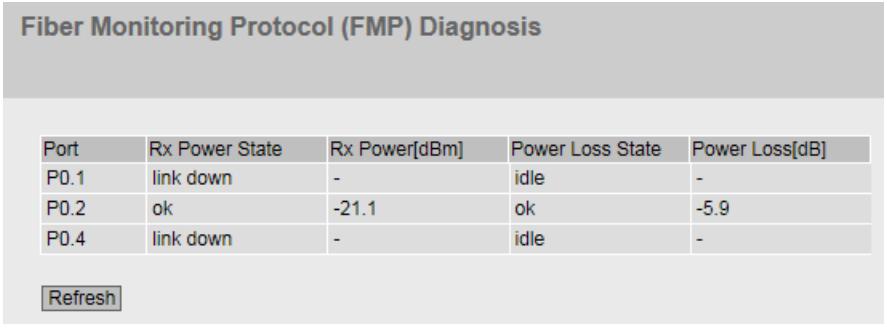
  Port of the device with which the IE switch is connected.

5.3.12 Fiber Monitoring Protocol

Monitoring optical links

With Fiber Monitoring, you can monitor optical links. The table shows the current status of the ports.

You set the values to be monitored on the following page: "Layer 2 > FMP".



Description of the displayed values

Port

Shows the optical ports that support fiber monitoring. This depends on the transceivers.

Rx Power State

- **disabled**

  Fiber monitoring is disabled.

- **ok**

  The value for the received power of the optical link is within the set limits.

- **maint. req.**

  Check the link.

  A warning is signaled.

- **maint. dem.**

  The link needs to be checked.

  An alarm is signaled and the fault LED is lit.

- **link down**

  The connection to the communications partner is down. No link is detected.

Rx Power [dBm]

Shows the current value of the received power. The value can have a tolerance of +/- 3 dB.

If there is no connection (link down) or fiber monitoring is disabled, "-" is displayed. If fiber monitoring is not enabled on the partner port, the value 0.0 is displayed.

Power Loss State

To be able to monitor the power loss of the connection the function fiber monitoring must be enabled for the optical port of the connection partner.

- **disabled**

  Fiber monitoring is disabled.

- **ok**

  The value for the power loss of the optical link is within the defined limits.

- **maint. req.**

  Check the link.

  A warning is signaled.

- **maint. dem.**

  The link needs to be checked.

  An alarm is signaled and the fault LED is lit.

- **idle**

  The port has no connection to another port with fiber monitoring enabled.

  If no diagnostics information is received from the optical port of the connection partner for 5 cycles, the fiber monitoring connection is assumed to be interrupted. A cycle lasts 5 seconds.

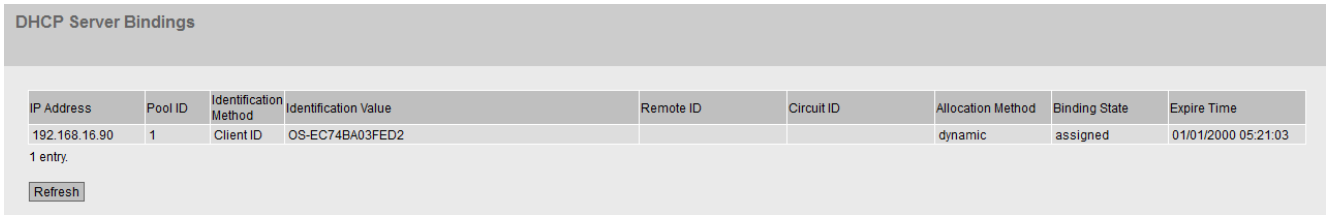
Power Loss [dB]

Shows the current value of the power loss. The value can have a tolerance of +/- 3 dB.

If there is no connection (link down), fiber monitoring is disabled or the partner port does not support fiber monitoring, "-" is displayed.

5.3.13 DHCP Server

This page shows which IPv4 addresses were assigned to the devices by the DHCP server.



Description

- **IP Address**

  Shows the IPv4 address assigned to the DHCP client.
- **Pool ID**

  Shows the number of the IPv4 address band.
- **Identification method**

  Shows the method according to which the DHCP client is identified.
- **Identification value**

  Shows the MAC address ot he client ID of the DHCP client.
- **Remote ID**

  Shows the remote ID of the DHCP client.
- **Circuit ID**

  Shows the circuit ID of the DHCP client.
- **Allocation Method**

  Shows whether the IPv4 address was assigned statically or dynamically. You configure the static entries in "System > DHCP > Static Leases".

- **Binding State**
  Shows the status of the assignment.
  - Assigned
    The assignment is used.
  - Not used
    The assignment is not used.
  - Probing
    The assignment is being checked.
  - Unknown
    The status of the assignment is unknown.
- **Expire Time**
  Shows how long the assigned IPv4 address is still valid. Once this period has elapsed, the DHCP client must either request a new IPv4 address or extend the lease time of the existing IPv4 address.

Description of the buttons and input boxes

"Show all" button

Click this button to display all the entries on the WBM page. Note that displaying all messages can take some time.

"Next" button

Click this button to go to the next page.

"Prev" button

Click this button to go to the previous page.

Drop-down list for page change

From the drop-down list, select the page you want to go to.

"Refresh" button

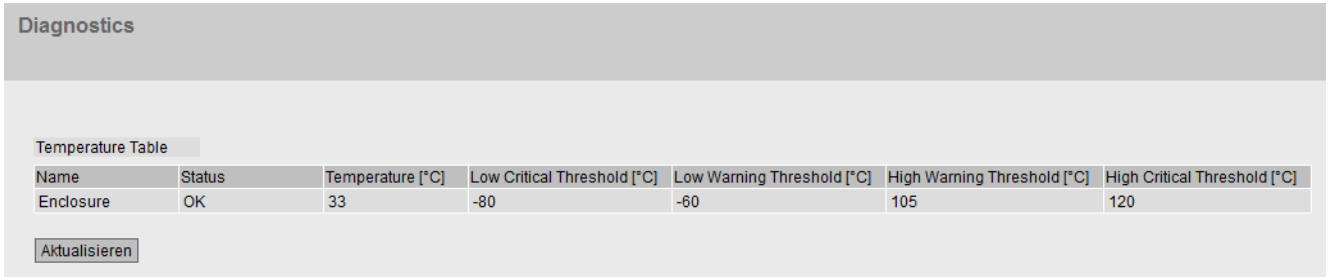
Refreshes the display of the values in the table.

5.3.14 Diagnostics

This page shows the temperature values of internal and external modules of the device. The modules are only shown if they make temperature information available. If you add or remove a module, the display is automatically adapted.

If the temperature value falls below or exceeds the displayed threshold values, the status changes accordingly.

On the "System > Events > Configuration" page, you can specify how the device signals the status change.



Description

- **Name**

  Shows the name of the module.

  The information in the row "Enclosure" or "Chassis" relates to the inner temperature of the housing.

- **Status**

  Depending on the relationship between the threshold values and the current temperature the following status values are displayed in ascending priority.

  – OK

    The temperature value is within the preset threshold values.

  – WARNING

    The lower or upper threshold value of the severity level "Warning" was exceeded.

  – CRITICAL

    The lower or upper threshold value of the severity level "Critical" was exceeded.

  – INVALID

    The value could not be read out or is invalid. In the "Temperature [°C]" box "-" is displayed.

  – INITIAL

    No data has been read out yet. "-" is displayed in all boxes.

- **Temperature [°C]**

  Shows the current value of the temperature. The display is updated at regular intervals.

  The value can have a tolerance of +/- 3 °C

- **Lower Threshold [°C] (Critical)**

  If the value falls below this value, the status changes to "CRITICAL". You can configure that you are informed by a message.

- **Lower Threshold [°C] (Warning)**

  If the value falls below this value, the status changes to "WARNING". You can configure that you are informed by a message.

- **Upper Threshold [°C] (Warning)**

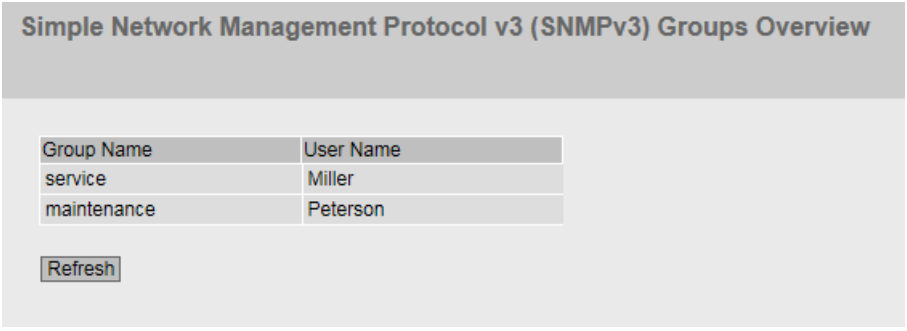
  If the value exceeds this value, the status changes to "WARNING". You can configure that you are informed by a message.

- **Upper Threshold [°C] (Critical)**

  If the value exceeds this value, the status changes to "CRITICAL". You can configure that you are informed by a message.

5.3.15 SNMP

This page displays the created SNMPv3 groups. You configure the SNMPv3 groups in "System" > SNMP"..



Description

The table has the following columns:

- **Group Name**

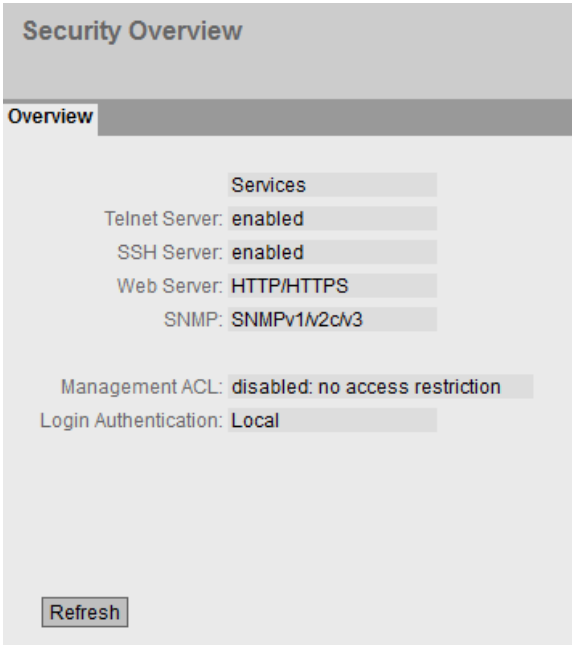
  Shows the group name.

- **User Name**

  Shows the user that is assigned to the group.

5.3.16 Security

This page shows the security settings and the local user accounts.



Description

The "Services" list shows the security settings.

- **Telnet Server**

  You configure the setting in "System > Configuration".

  – Enabled: Unencrypted access to the CLI.

  – Disabled: No unencrypted access to the CLI.

- **SSH Server**

  You configure the setting in "System > Configuration".

  – Enabled: Encrypted access to the CLI.

  – Disabled: No encrypted access to the CLI.

- **Web Server**

  You configure the setting in "System > Configuration".

  – HTTP/HTTPS: Access to the WBM is possible with HTTP and HTTPS.

  – HTTPS: Access to the WBM is only possible with HTTPS.

- **SNMP**

  You can configure the setting in "System > SNMP > General".

  – "-" (SNMP disabled)
    Access to device parameters via SNMP is not possible.

  – SNMPv1/v2c/v3
    Access to device parameters is possible with SNMP versions 1, 2c or 3.

  – SNMPv3
    Access to device parameters is possible only with SNMP version 3.

- **Management ACL**

  You configure the setting in "Security > ManagementACL".

  – Disabled: no access restriction

    The access control is disabled.

  – Enabled: no access restriction

    The access control is enabled but no access rules have been defined.

  – Enabled: restricted access only

    The access control is enabled and access rules have been defined.

- **Login Authentication**

  You configure the setting in "Security > AAA > General".

  – Local

    The authentication must be made locally on the device.

  – RADIUS

    The authentication must be handled via a RADIUS server.

  – Local and RADIUS

    The authentication is possible both with the users that exist on the device (user name and password) and via a RADIUS server.

    The user is first searched for in the local database. If the user does not exist there, a RADIUS query is sent.

  – RADIUS and fallback local

    The authentication must be handled via a RADIUS server.

    A local authentication is performed only when the RADIUS server cannot be reached in the network.

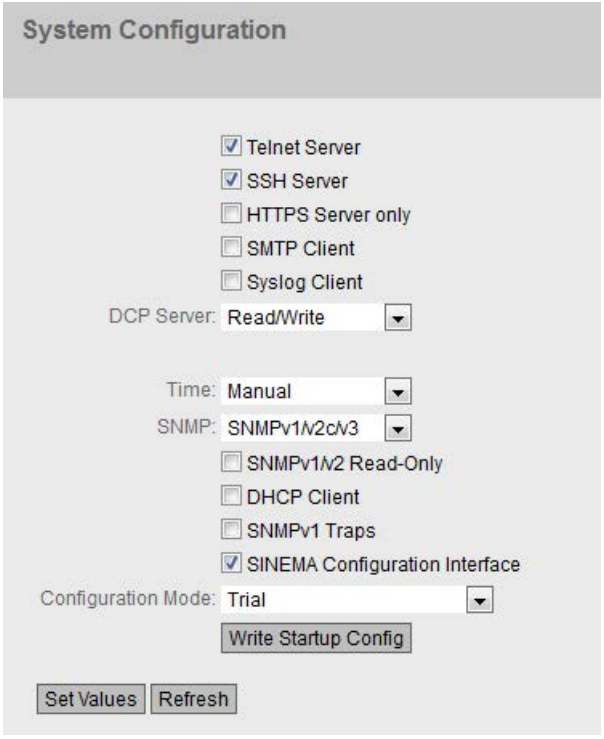
5.4 The "System" menu

5.4.1 Configuration

System configuration

The WBM page contains the configuration overview of the access options of the device.

Specify the services that access the device. With some services, there are further configuration pages on which more detailed settings can be made.



Description of the displayed boxes

The page contains the following boxes:

- **Telnet server**
  Enable or disable the "Telnet server" service for unencrypted access to the CLI.
- **SSH Server**
  Enable or disable the "SSH Server" service for encrypted access to the CLI.
- **HTTPS Server only**
  If this function is enabled, you can only access the WBM via HTTPS.
- **SMTP Client**
  Enable or disable the SMTP client. You can configure other settings in "System > SMTP Client".

- **Syslog Client**
  Enable or disable the Syslog client. You can configure other settings in "System > Syslog Client".
- **DCP Server**
  Specify whether or not the device can be accessed with DCP (Discovery and Configuration Protocol):
  - "-" (disabled)
    DCP is disabled. Device parameters can neither be read nor modified.
  - Read/Write
    With DCP, device parameters can be both read and modified.
  - Read Only
    With DCP, device parameters can be read but cannot be modified.
- **Time**
  Select the setting from the drop-down list. The following settings are possible:
  - Manual
    The system time is set manually. You can configure other settings in "System > System Time > Manual Setting".
  - SIMATIC Time
    The system time is set using a SIMATIC time transmitter. You can configure other settings in "System > System Time > SIMATIC Time Client".
  - SNTP client
    The system time is set via an SNTP server. You can configure other settings in "System > System Time > SNTP Client".
  - NTP client
    The system time is set via an NTP server. You can configure other settings in "System > System Time > NTP Client".
- **SNMP**
  Select the protocol from the drop-down list. The following settings are possible:
  - "-" (SNMP disabled)
    Access to device parameters via SNMP is not possible.
  - SNMPv1/v2c/v3
    Access to device parameters is possible with SNMP versions 1, 2c or 3. You can configure other settings in "System > SNMP > General".
  - SNMPv3
    Access to device parameters is possible only with SNMP version 3. You can configure other settings in "System > SNMP > General".
- **SNMPv1/v2 Read Only**
  Enable or disable write access to SNMP variables with SNMPv1/v2c.
- **DHCP Client**

  Enable or disable the DHCP client. You can configure other settings in "System > DHCP Client".
- **SNMPv1 Traps**
  Enable or disable the sending of SNMPv1 traps (alarm frames). You can configure other settings in "System > SNMP > Traps".

- **SINEMA configuration interface**
  If the SINEMA configuration interface is enabled, you can download configurations to the IE switch using STEP 7 Basic / Professional.
- **NFC**

  Activate or deactivate the "NFC" (near field communication) function.

  You will find further information on NFC in the operating instructions.
- **Configuration Mode**

  Select the mode from the drop-down list. The following modes are possible:

  – Automatic Save

    Automatic backup mode. Approximately 1 minute after the last parameter change or before you restart the device, the configuration is automatically saved.

    In addition to this, the following message appears in the display area "Changes will be saved automatically in x seconds. Press 'Write Startup Config' to save the changes immediately.

    Note
    Interrupting the save

    Saving starts only after the timer in the message has elapsed. How long saving takes depends on the device.

    - Do not switch off the device immediately after the timer has elapsed.

  – Trial

    Trial mode. In Trial mode, although changes are adopted, they are not saved in the configuration file (startup configuration).
    To save changes in the configuration file, use the "Write startup config" button. The display area also shows the message "Trial Mode Active – Click the "Write Startup Config" button to make your settings persistent" as soon as there are unsaved modifications. This message can be seen on every WBM page until the changes made have either been saved or the device has been restarted.

Steps in configuration

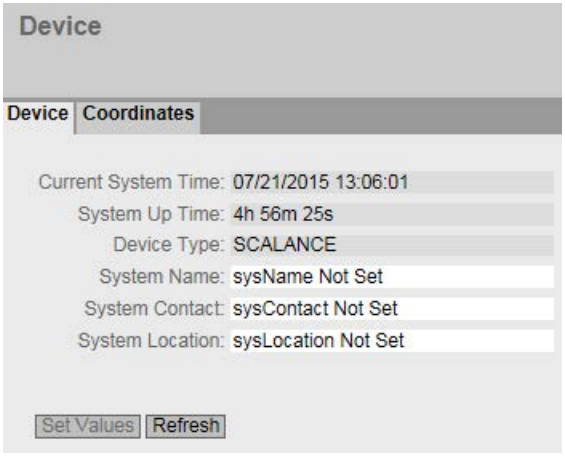
1. To use the required function, select the corresponding check box.
2. Select the options you require from the drop-down lists.
3. Click the "Set Values" button.

5.4.2 General

5.4.2.1 Device

General device information

This page contains the general device information.



The boxes "Current System Time", "System Up Time" and "Device Type" cannot be changed.

Description

The page contains the following boxes:

- **Current System Time**
  Shows the current system time. The system time is either set by the user or by a time-of-day frame: either SINEC H1 time-of-day frame, NTP or SNTP. (readonly)
- **System Up Time**
  Shows the operating time of the device since the last restart. (readonly)
- **Device Type**
  Shows the type designation of the device. (readonly)
- **System Name**
  You can enter the name of the device. The entered name is displayed in the selection area. A maximum of 255 characters are possible.
  The system name is also displayed in the CLI input prompt. The number of characters in the CLI input prompt is limited. The system name is truncated after 16 characters.

- **System Contact**
  You can enter the name of a contact person responsible for managing the device. A maximum of 255 characters are possible.
- **System Location**
  You can enter the location where the device is installed. The entered installation location is displayed in the selection area. A maximum of 255 characters are possible.

Note

The ASCII code 0x20 to 0x7e is used in the input boxes.

At the start and end of the boxes**"System name", "System Contact" and "System Location", the characters "<", ">" and "space" are not permitted.**

Procedure

1. Enter the contact person responsible for the device in the "System Contact" input box.
2. Enter the identifier for the location at which the device is installed in the "System Location" input box.
3. Enter the name of the device in the "System Name" input box.
4. Click the "Set Values" button.

5.4.2.2 Coordinates

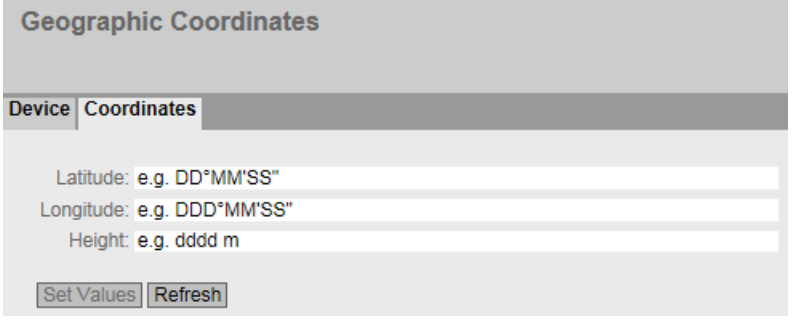
Information on geographic coordinates

In the "Geographic Coordinates" window, you can enter information on the geographic coordinates. The parameters of the geographic coordinates (latitude, longitude and the height above the ellipsoid according to WGS84) are entered directly in the input boxes of the "Geographic Coordinates" window.

Getting the coordinates

Use suitable maps for obtaining the geographic coordinates of the device.

The geographic coordinates can also be obtained using a GPS receiver. The geographic coordinates of these devices are normally displayed directly and only need to be entered in the input boxes of this page.



Description

The page contains the following boxes. These are purely information boxes with a maximum length of 32 characters.

- **"Latitude" input box**
  Geographical latitude: Here, enter the value for the northerly or southerly latitude of the location of the device.

  For example, the value +49° 1´31.67" means that the device is located at 49 degrees, 1 arc minute and 31.67 arc seconds northerly latitude.
  A southerly latitude is shown by a preceding minus character.
  You can also append the letters N (northerly latitude) or S (southerly latitude) to the numeric information (49° 1´31.67" N).
- **"Longitude" input box**
  Geographic longitude: Here, you enter the value of the eastern or western longitude of the location of the device.
  The value +8° 20´58.73" means that the device is located at 8 degrees, 20 minutes and 58.73 seconds east.
  A western longitude is indicated by a preceding minus sign.
  You can also add the letter E (easterly longitude) or W (westerly longitude) to the numeric information (8° 20´58.73" E).
- **Input box: "Height"**
  Height Here, you enter the value of the geographic height above sea level in meters.
  For example, 158 m means that the device is located at a height of 158 m above sea level.
  Heights below sea level (for example the Dead Sea) are indicated by a preceding minus sign.

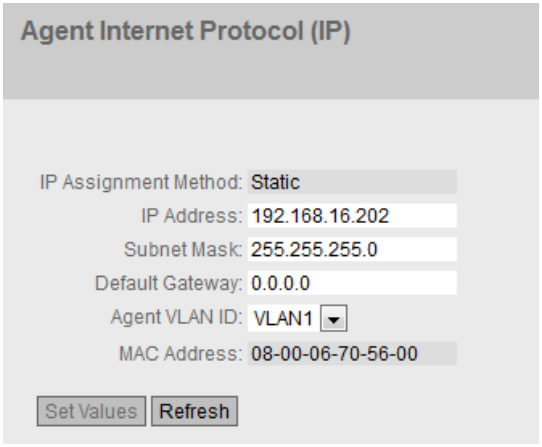
Procedure

1. Enter the calculated latitude in the "Latitude" input box.
2. Enter the calculated longitude in the "Longitude" input box.
3. Enter the height above sea level in the "Height" input box.
4. Click the "Set Values" button.

5.4.3 Agent IP

Configuration of the IP address

On this WBM page, you configure the IP address for the device.



Description

The page contains the following boxes:

- **IP Assignment Method**

  Shows how the IP address is assigned.

  – Static

    The IP address is static. You enter the IP settings in tjhe input boxes "IP Address" and "Subnet Mask".

  – Dynamic (DHCP)

    The device obtains a dynamic IP address from a DHCP server.

- **IP Address**

  Enter the IP address of the device.
  After clicking the "Set Values" button, this IP address is also displayed in the address bar of the Internet browser. If this does not take place automatically, you will need to enter the IP address in the address bar of the Internet browser manually.

- **Subnet Mask**

  Enter the subnet mask of the device.

- **Default gateway**

  Enter the IP address of the default gateway to be able to communicate with devices in another subnet, for example diagnostics stations, e-mail server.

- **Agent VLAN ID**

  Select the VLAN ID from the drop-down list. You can only select VLANs that have already been configured.

  In the mode "802.1D Transparent Bridge", this drop-down list is grayed out, see also "Layer 2 > VLAN > General".

  Note

  Changing the agent VLAN ID

  If the configuration PC is connected directly to the device via Ethernet and you change the agent VLAN ID , the device is no longer reachable via Ethernet following the change.

- **MAC Address**

  Shows the MAC address of the device. The MAC address is linked to the hardware and cannot be modified.

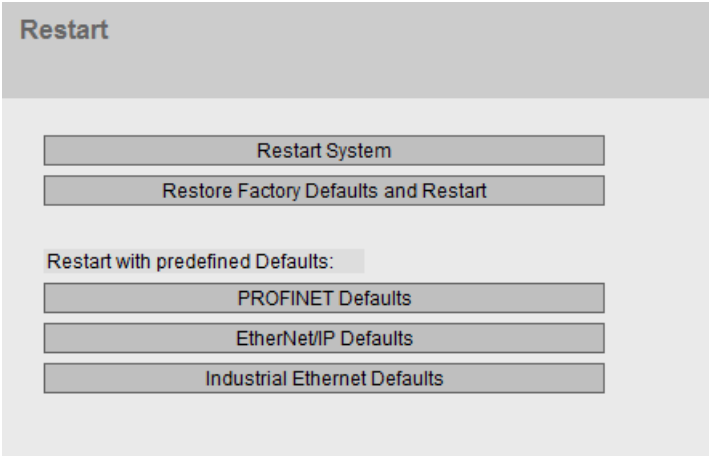
Procedure

1. In the input boxes, enter the IP address, subnet mask and the default gateway.
2. Select the assigned VLAN ID from the "Agent VLAN ID" drop-down list.
3. Click the "Set Values" button.

5.4.4 Restart

Resetting to the defaults

In this menu, there is a button with which you can restart the device and the option of resetting to the factory setting or reset the default settings of various profiles.



Restart

Note the following points about restarting a device:

- You can only restart the device with administrator privileges.
- A device should only be restarted with the buttons of this menu or with the appropriate CLI commands and not by a power cycle on the device.
- If the device is in "Trial" mode, configuration modifications must be saved manually before a restart. Any modifications you have made only become active on the device after clicking the "Set values" button on the relevant WBM page.
- If the device is in "Automatic Save" mode, the last changes are saved automatically before a restart.

Reset to Factory Defaults

By resetting all the settings to the factory settings, the IP address and the passwords are also lost. Following this, the device can only be accessed via the serial interface, using the Primary Setup Tool or using DHCP.

NOTICE
With the appropriate attachment, a previously correctly configured device can cause circulating frames after the reset and therefore the failure of the data traffic.

Resetting to defaults (profiles)

The profiles provide a preconfiguration for various use cases of the devices.

When you start a device with the default settings of a profile, the settings are reset to the factory settings and some parameters are set so that they are designed for a certain use case. In contrast to resetting to the factory settings. the users and passwords are retained after the restart. The configured IP address is lost so that device can then only be accessed via the serial interface, using the Primary Setup Tool or using DHCP.

NOTICE
With the appropriate attachment, a previously correctly configured device can cause circulating frames after the reset and therefore the failure of the data traffic.

Which settings were set specially for a profile are displayed before the restart.

The profiles can be used independently of the factory setting of the device.

Description of the displayed boxes

Note

Note the effects of the individual functions described in the sections above.

To restart the device, the buttons on this page provide you with the following options:

- **Restart**

  Click this button to restart the system. You must confirm the restart in a dialog box. During a restart, the device is reinitialized, the internal firmware is reloaded, and the device runs a self-test. The settings of the start configuration are retained, e.g. the IP address of the device. The learned entries in the address table are deleted. You can leave the browser window open while the device restarts. After the restart you will need to log in again.

- **Restore Factory Defaults and Restart**

  Click this button to restore the factory defaults of the device and to restart the device. You must confirm the restart in a dialog box.

  The factory defaults depend on the device.

To restart the device with a predefined profile, the buttons on this page provide you with the following options:

- **PROFINET Defaults**

  Click this button to restore the default settings of the PROFINET profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays the settings specially made for operation with the PROFINET protocol.

- **EtherNet/IP Defaults**

  Click this button to restore the default settings of the EtherNet/IP profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays these settings specially made for operation with the EtherNet/IP protocol.

- **Industrial Ethernet Defaults**

  Click this button to restore the default settings of the Industrial Ethernet profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays these settings specially made for operation in the Industrial Ethernet environment.

5.4.5 Load & Save

Overview of the file types

File type	Description
Config	This file contains the start configuration. Among other things, this device contains the definitions of the users. The passwords are stored the file "Users".
ConfigPack	Detailed configuration information. for example, start configuration, users, certificates ZIP file consisting of the Config, Users and LSYS fle.
Copyright	OSS licenses
Debug	This file contains information for Siemens Support. It is encrypted and can be sent by e-mail to Siemens Support without any security risk.
EDS	Electronic Data Sheet (EDS) Electronic data sheet for describing devices in the EtherNet/IP mode
Firmware	The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.
GSDML	PROFINET information on the device properties
HTTPSCert	Default HTTPS certificates including key The preset and automatically created HTTPS certificates are self-signed. We strongly recommend that you create your own HTTPS certificates and make them available. We recommend that you use HTTPS certificates signed either by a reliable external or by an internal certification authority. The HTTPS certificate checks the identity of the device and controls the encrypted data exchange. Certificates with a different format cannot be copied in.
LogFile	File with entries from the event log table
MIB	Private MSPS MIB file
RunningCLI	Text file with CLI commands This file contains an overview of the current configuration in the form of CLI commands. You can download the text file. The file is not intended to be uploaded again unchanged.
Script	Text file with CLI commands You can upload a script file in a device. The CLI commands it contains are executed appropriately.
StartupInfo	Startup log file This file contains the messages that were entered in the log during the last startup.
Users	This file contains the assignment of the user names to the corresponding passwords.

5.4.5.1 HTTP

Loading and saving data via HTTP

The WBM allows you to store device data in an external file on your client PC or to load such data from an external file from the client PC to the device. This means, for example, that you can also load new firmware from a file located on your client PC.

Note

This WBM page is available both for connections using HTTP and for connections using HTTPS.

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Note

Incompatibility with previous firmware versions with/without PLUG inserted

During the installation of a previous version, the configuration data can be lost. In this case, the device starts up with the factory settings after the firmware has been installed.

In this situation, if a PLUG is inserted in the device, following the restart, this has the status "Not Accepted" since the PLUG still has the configuration data of the previous more up-to-date firmware. This allows you to return to the previous, more up-to-date firmware without any loss of configuration data. If the original configuration on the PLUG is no longer required, the PLUG can be deleted or rewritten manually using the WBM page "System > PLUG".

Configuration files

Note

Configuration files and Trial mode /Automatic save

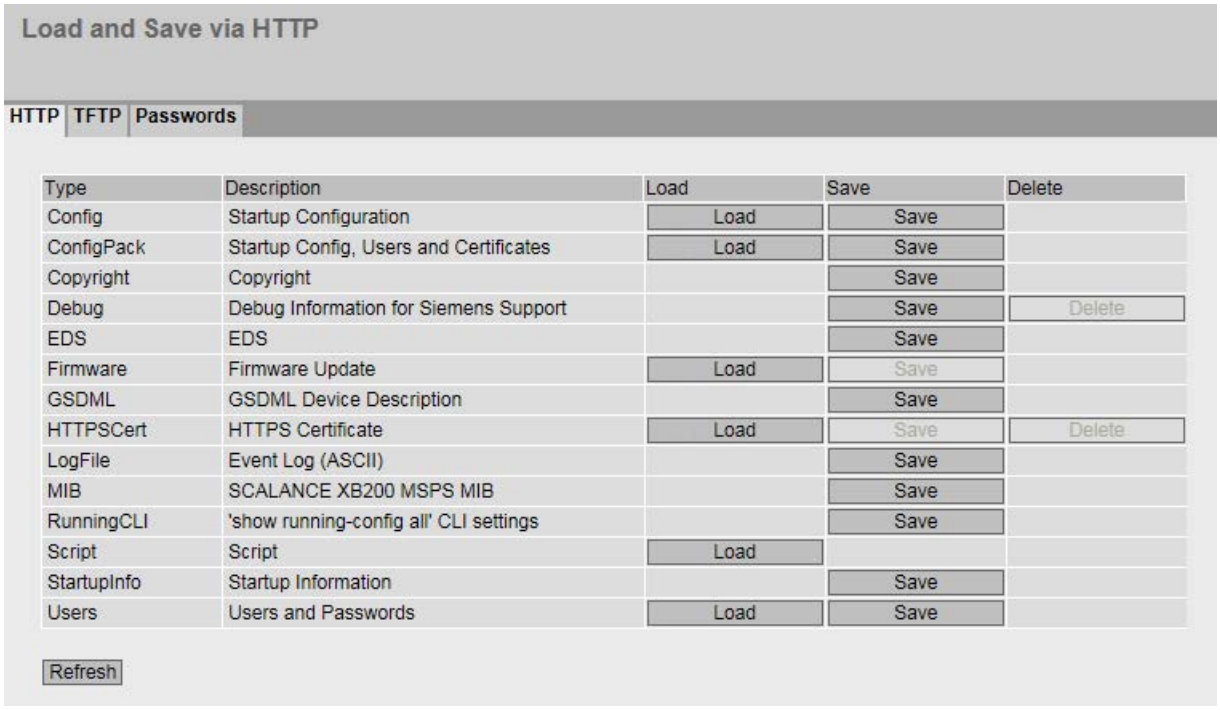
In "Automatic Save" mode, the data is saved automatically before the configuration files (ConfigPack and Config) are transferred.
In Trial mode, although the changes are adopted, they are not saved in the configuration files (ConfigPack and Config). Use the "Write Startup Config" button on the "System > Configuration" WBM page to save changes in the configuration files.

CLI script file

You can download existing CLI configurations (RunningCLI) and upload your own CLI scripts (Script).

Note

The downloadable CLI script is not intended to be uploaded again unchanged.



Description of the displayed boxes

The table has the following columns:

- **Type**
  Shows the file type.
- **Description**
  Shows the short description of the file type.
- **Load**
  With this button, you can upload files to the device. The button can be enabled, if this function is supported for the file type.
- **Save**
  With this button, you can download files from the device. The button can only be enabled if this function is supported for the file type and the file exists on the device.
- **Delete**
  With this button, you can delete files from the device. The button can only be enabled if this function is supported for the file type and the file exists on the device.

Note

Following a firmware update, delete the cache of your Internet browser.

Steps in configuration

Uploading files using HTTP

1. Start the upload function by clicking the one of the "Load" buttons.

   A dialog for uploading a file opens.

2. Select the required file and confirm the upload.

   The file is uploaded.

3. If a restart is necessary, a message to this effect will be output. Click the "OK" button and a restart will follow. If you click the "Abort" button, there is no device restart. The changes only take effect after a restart.

Downloading files using HTTP

1. Start the download by clicking the one of the "Save" buttons.
2. Select a storage location and a name for the file.
3. Save the file.

   The file is downloaded and saved.

Deleting files using HTTP

1. Start the delete function by clicking the one of the "Delete" buttons.

   The file is deleted.

Reusing configuration data

If several identical devices are to receive the same configuration and the IP addresses are assigned using DHCP, the effort for reconfiguration can be reduced by saving and reading in the configuration data.

Follow the steps below to reuse configuration data:

1. Save the configuration data of a configured device on your PC.
2. Load this configuration file on all other devices you want to configure in this way.
3. If individual settings are necessary for specific devices, these must be made online on the relevant device.

Note

Configuration data has a checksum. If you change the data, you can no longer upload it to the IE switch.

5.4.5.2 TFTP

Loading and saving data via a TFTP server

On this page, you can configure the TFTP server and the file names. The WBM allows you to store device data in an external file on a TFTP server or to load such data from an external file from the TFTP server to the devices. This means, for example, that you can also load new firmware from a file located on a TFTP server.

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Note

Incompatibility with previous firmware versions with/without PLUG inserted

During the installation of a previous version, the configuration data can be lost. In this case, the device starts up with the factory settings after the firmware has been installed.

In this situation, if a PLUG is inserted in the device, following the restart, this has the status "Not Accepted" since the PLUG still has the configuration data of the previous more up-to-date firmware. This allows you to return to the previous, more up-to-date firmware without any loss of configuration data. If the original configuration on the PLUG is no longer required, the PLUG can be deleted or rewritten manually using the WBM page "System > PLUG".

Configuration files

Note

Configuration files and Trial mode /Automatic save

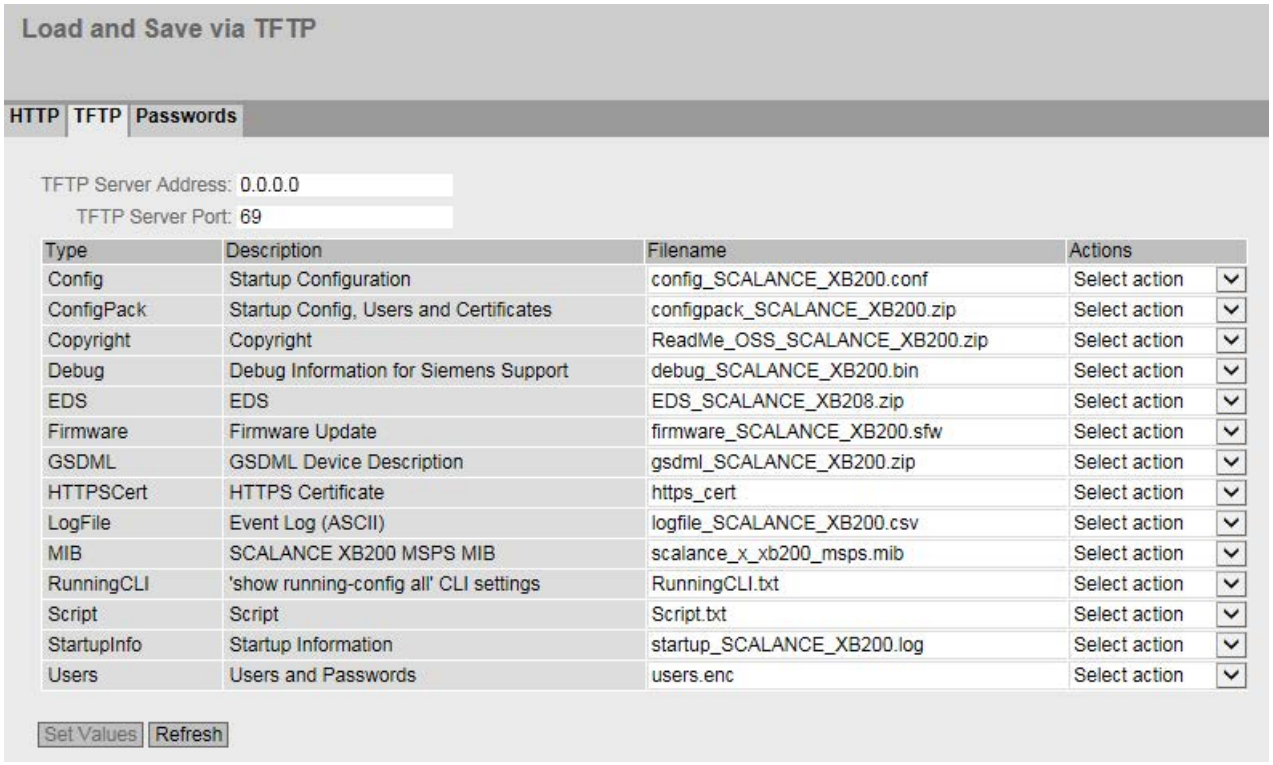
In "Automatic Save" mode, the data is saved automatically before the configuration files (ConfigPack and Config) are transferred.
In Trial mode, although the changes are adopted, they are not saved in the configuration files (ConfigPack and Config). Use the "Write Startup Config" button on the "System > Configuration" WBM page to save changes in the configuration files.

CLI script file

You can download existing CLI configurations (RunningCLI) and upload your own CLI scripts (Script).

Note

The downloadable CLI script is not intended to be uploaded again unchanged.



Description of the displayed boxes

The page contains the following boxes:

- **TFTP Server Address**
  Here, enter the IP address of the TFTP server with which you exchange data.
- **TFTP Server Port**
  Here, enter the port of the TFTP server over which data exchange will be handled. If necessary, you can change the default value 69 to your own requirements.

The table has the following columns:

- **Type**
  Shows the file type.
- **Description**
  Shows the short description of the file type.

- **Filename**
  A file name is preset here for every file type.

  Note

  Changing the file name

  You can change the file name preset in this column. After clicking the "Set Values" button, the changed name is saved on the device and can also be used with the Command Line Interface.

- **Actions**
  Select the action from the drop-down list. The selection depends on the selected file type, for example you can only save the log file.
  The following actions are possible:
  - **Save file**
    With this selection, you save a file on the TFTP server.
  - **Load file**
    With this selection, you load a file from the TFTP server.

Steps in configuration

Loading or saving data using TFTP

1. Enter the IP address of the TFTP server in the "TFTP Server Address" input box.
2. Enter the server port of the TFTP server to be used in the in the "TFTP Server Port" input box.
3. If applicable, enter the name of a file in which you want to save the data or take the data from in the "File name" input box.
4. Select the action you want to execute from the "Actions" drop-down list.
5. Click the "Set Values" button to start the selected action.
6. If a restart is necessary, a message to this effect will be output. Click the "OK" button and a restart will follow. If you click the "Abort" button, there is no device restart. The changes only take effect after a restart.

Reusing configuration data

If several identical devices are to receive the same configuration and the IP addresses are assigned using DHCP, the effort for reconfiguration can be reduced by saving and reading in the configuration data.

Follow the steps below to reuse configuration data:

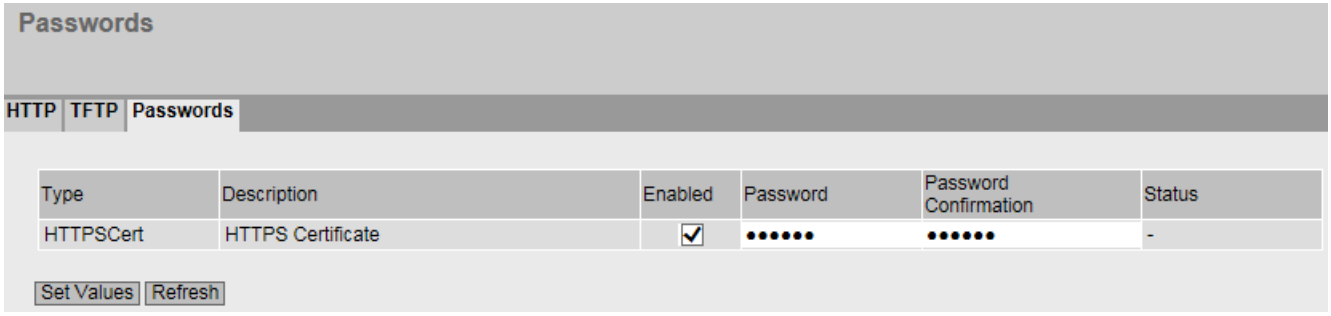
1. Save the configuration data of a configured device on your PC.
2. Load this configuration file on all other devices you want to configure in this way.
3. If individual settings are necessary for specific devices, these must be made online on the relevant device.

Note

Configuration data has a checksum. If you change the data, you can no longer upload it to the IE switch.

5.4.5.3 Passwords

There are files to which access is password protected. For example to be able to use the HTTPS certificate, you need to specify the corresponding password on this WBM page.



Description

The table has the following columns:

- **Type**
  Shows the file type.
- **Description**
  Shows the short description of the file type.
- **Enabled**
  When selected, the file is used. Can only be enabled if the password is configured.
- **Password**
  Enter the password for the file.
- **Password Confirmation**
  Confirm the password.
- **Status**
  Shows whether the current settings for the file match the device.
  - Valid
    The "Enabled" check box is selected and the password matches the file.
  - Invalid
    The "Enabled" check box is selected but the password does not match the file or no file has been loaded yet.
  - '-'
    The password cannot be evaluated or is not yet being used. The "Enabled" check box is not selected.

Procedure

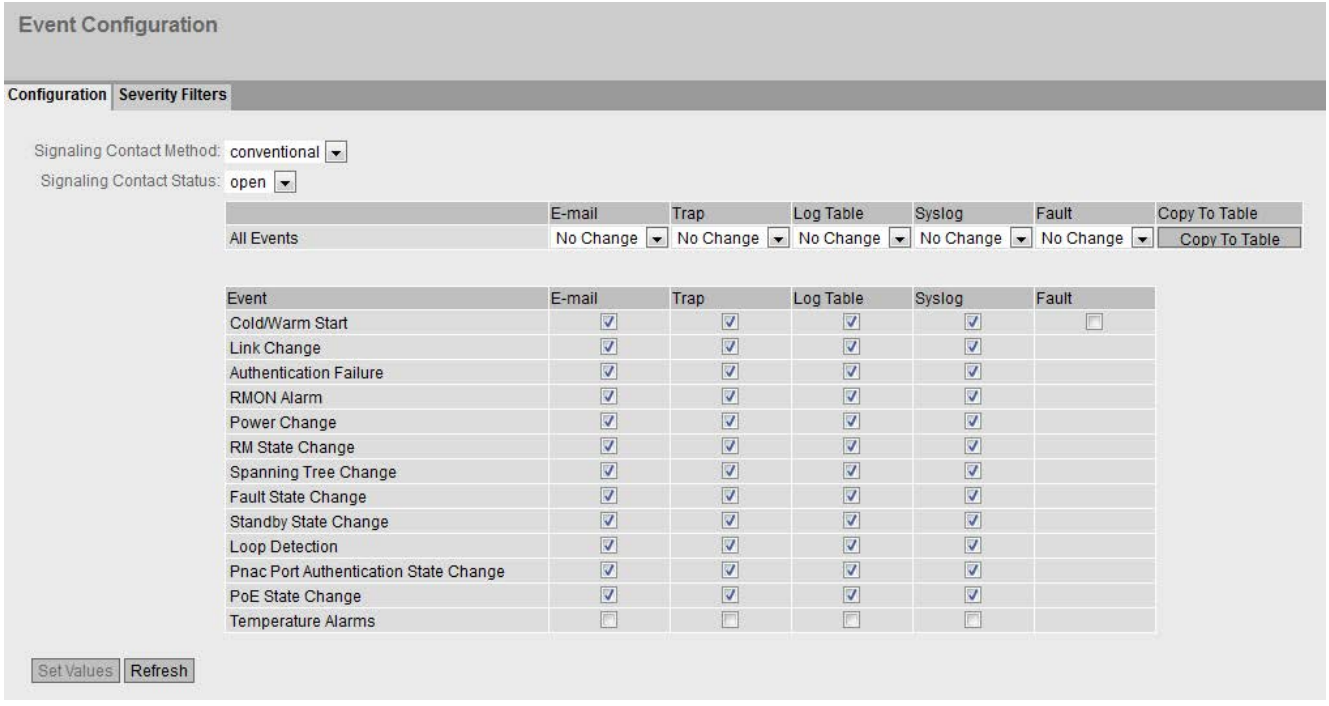
1. Enter the password in "Password".
2. To confirm the password, enter the password again in "Password Confirmation".
3. Select the "Enabled" option.
4. Click the "Set Values" button.

5.4.6 Events

5.4.6.1 Configuration

Selecting system events

On this page, you specify how a device reacts to system events. To enable or disable the options, click the relevant check boxes of the columns.



Description of the displayed boxes

The page contains the following boxes:

- **Signaling Contact Method**
  Select the reaction of the signaling contact from the drop-down list. The following reactions are possible:
  - conventional
    Default setting for the signaling contact. An error/fault is displayed by the fault LED and the signaling contact is opened. When the error/fault state no longer exists, the fault LED goes off and the signaling contact is closed.
  - User Defined
    The way the signaling contact works does not depend on the error/fault that has occurred. The signaling contact can be opened or closed as required by user actions.
- **Signaling Contact Status**

  To change the status of the signaling contact, select the "User defined" method from the "Signaling Contact Method" drop-down list.

  Select the status of the signaling contact from the drop-down list. The following statuses are possible:
  - Closed
    Signaling contact is closed.
  - Open
    Signaling contact is opened.

With Table 1, you can enable or disable all check boxes of a column of Table 2 at once. Table 1 has the following columns:

- **All Events**

  Shows that the settings are valid for all events of table 2.
- **E-mail / Trap / Log Table / Syslog / Faults**

  Enable or disable the required type of notification for all events. If "No Change" is selected, the entries of the corresponding column in table 2 remain unchanged.
- **Copy to table**

  If you click the button, the setting is adopted for all events of table 2.

Table 2 has the following columns:

- **Event**
  The column contains the following values:
  - Cold/Warm Start
    The device was turned on or restarted by the user. In the error memory of the device a new entry is generated with the type of restart performed.
  - Link Change
    This event occurs only when the port status is monitored and has changed, see "System > Fault Monitoring > Link Change".
  - Authentication Failure
    This event occurs when access is attempted with an incorrect password.
  - RMON Alarm
    An alarm or event has occurred relating to the remote monitoring of the system.
  - **Power Change**
    This event occurs only when power supply lines 1 and 2 are monitored. It indicates that there was a change to line 1 or line 2. See "System > Fault Monitoring > Power Supply".
  - RM State Change
    The redundancy manager has recognized an interruption or restoration of the ring and has switched the line over or back.
  - Spanning Tree Change
    The spanning tree topology has changed.
  - **Fault State Change**
    The fault status has changed. The fault state can relate to the activated port monitoring, the response of the signaling contact or the power supply monitoring.
  - Standby State Change
    A device with an established standby connection (master or slave) has activated or deactivated the link to the other ring (standby port). The data traffic was redirected from one Ethernet connection (standby port of the master) to another Ethernet connection (standby port of the slave).
  - Loop detection

    A loop was detected in the network segment.
  - 802.1X Port Authentication State Change
    This event occurs with 802.1X authentications.
  - PoE State Change
    The status of PoE has changed.
  - Temperature Alarm

    The temperature has fallen below or exceeded a certain limit.
- **E-mail**
  The device sends an e-mail. This is only possible if the SMTP server is set up and the "SMTP client" function is enabled.

- **Trap**
  The device sends an SNMP trap. This is only possible if "SNMPv1 Traps" is enabled in "System > Configuration".
- **Log Table**
  The device writes an entry in the event log table, see "Information > Log Table"
- **Syslog**
  The device writes an entry to the system log server. This is only possible if the system log server is set up and the "Syslog client" function is enabled.
- **Faults**
  The device triggers an error. The error LED lights up

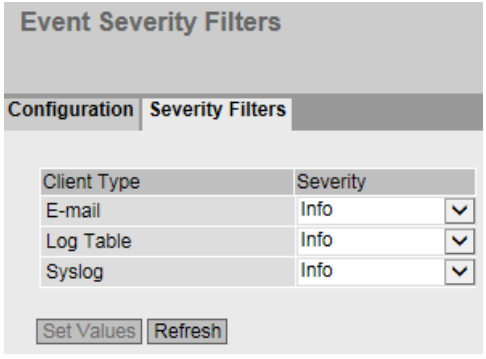
Steps in configuration

1. Select the check box in the row of the required event. Select the event in the column under the following actions:
   - E-mail
   - Trap
   - Log Table
   - Syslog
   - Faults
2. Click the "Set Values" button.

5.4.6.2 Severity Filters

Setting the Severity Filters

On this page, set the threshold levels for sending system event notifications.



The first table column shows the client type for which you are making the settings:

- **E-mail**

  Sending system event messages by e-mail

- **Log Table**

  Entry of system events in the log table

- **Syslog**

  Sending of system event messages to a Syslog server.

Select the required level from the drop-down lists of the second table column.

You can select from the following values:

- **Critical**
  System events are processed as of the severity level "Critical".
- **Warning**

  System events are processed as of the severity level "Warning".

- **Info**
  System events are processed as of the severity level "Info".

Procedure

Follow the steps below to configure the required level:

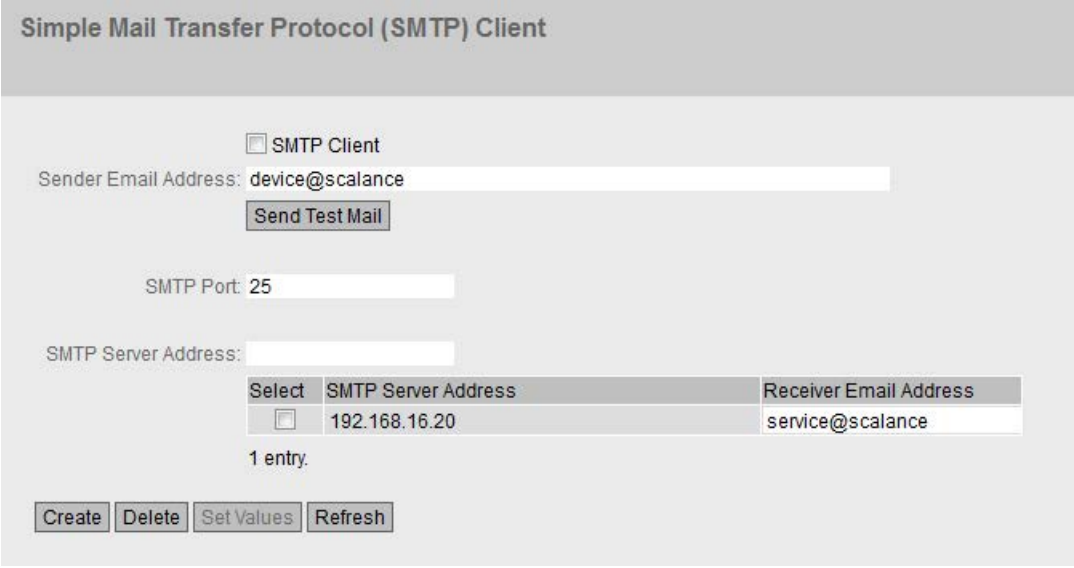
1. Select the required values from the drop-down lists of the second table column after the client types.
2. Click the "Set Values" button.

5.4.7 SMTP Client

Network monitoring with e-mails

The device provides the option of automatically sending an e-mail if an alarm event occurs (for example to the network administrator). The e-mail contains the identification of the sending device, a description of the cause of the alarm in plain language, and a time stamp. This allows centralized network monitoring to be set up for networks with few nodes based on an e-mail system. When an e-mail error message is received, the WBM can be started by the Internet browser using the identification of the sender to read out further diagnostics information.

On this page, you can configure up to three SMTP servers and the corresponding e-mail addresses.



Description

The page contains the following boxes:

- **SMTP Client**
  Enable or disable the SMTP client.
- **Sender Email Address**
  Enter the name of the sender to be included in the e-mail, for example the device name.

  This setting applies to all configured SMTP servers.
- **Send Test Mail**

  Send a test e-mail to check your configuration.
- **SMTP Port**

  Enter the port via which your SMTP server can be reached.

  Factory settings: 25

  This setting applies to all configured SMTP servers.
- **SMTP Server Address**
  Enter the IP address of the SMTP server.

This table contains the following columns:

- **Select**
  Select the check box in a row to be deleted.
- **SMTP Server Address**
  Shows the IP address of the SMTP server.
- **Receiver Email Address**
  Enter the e-mail address to which the device sends an e-mail if a fault occurs.

Procedure

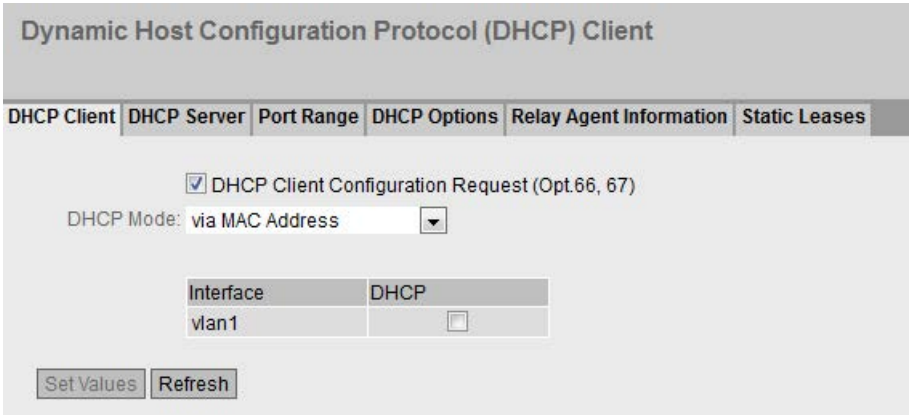
1. Enable the "SMTP Client" option.
2. Enter the relevant e-mail address in the "Sender Email Address" input box.
3. If necessary send a test e-mail.
4. Enter the IP address of a the SMTP server in the "SMTP Server Address" input box.
5. Click the "Create" button. A new entry is generated in the table.
6. In the Receiver Email Address input box. enter the e-mail address to which the device sends an e-mail if a fault occurs.
7. Click the "Set Values" button.

5.4.8 DHCP

5.4.8.1 DHCP Client

Setting of the DHCP mode

If the device is configured as a DHCP client, it starts a DHCP query. As the reply to the query the device receives an IPv4 address from the DHCP server. The server manages an address range from which it assigns IPv4 addresses. It is also possible to configure the server so that the client always receives the same IPv4 address in response to its request.



Description

The page contains the following boxes:

- **DHCP client configuration file request (opt 66, 67)**
  Select this option if you want the DHCP client to use options 66 and 67 to download and then enable a configuration file.
- **DHCP Mode**
  Select the DHCP mode from the drop-down list. The following modes are possible:
  - via MAC Address
    Identification is based on the MAC address.
  - via DHCP Client ID
    Identification is based on a freely defined DHCP client ID.
  - Via System Name
    Identification is based on the system name. If the system name is 255 characters long, the last character is not used for identification.
  - via PROFINET Name of Station
    The identification is made using the PROFINET device name.

The table has the following columns:

- **Interface**
  Interface to which the setting relates.
- **DHCP**
  Enable or disable the DHCP client for the relevant interface.

Procedure

1. Select the required mode from the "DHCP Mode" drop-down list. If you select the DHCP mode "via DHCP Client ID" an input box appears.
   - In the enabled input box "DHCP client ID" enter a string to identify the device. This is then evaluated by the DHCP server.
2. Select the "DHCP Client Configuration Request (Opt. 66, 67) option", if you want the DHCP client to use options 66 and 67 to download and then enable a configuration file.
3. Enable the "DHCP" option in the table.
4. Click the "Set Values" button.

Note

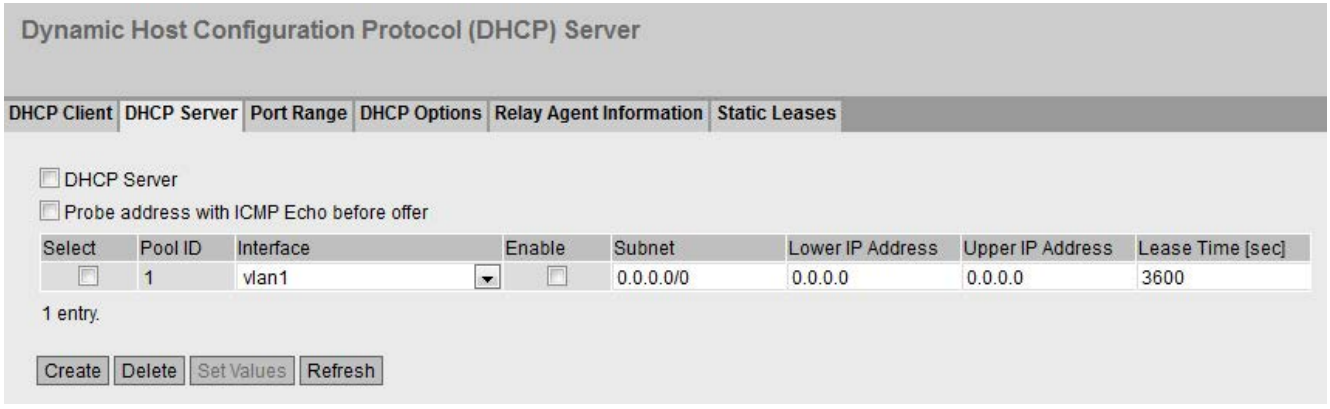
If a configuration file is downloaded, this can trigger a system restart. If the currently running configuration and the configuration in the downloaded configuration file differ, the system is restarted.

Make sure that the option "DHCP Client Configuration Request (Opt. 66, 67"is no longer set.

5.4.8.2 DHCP Server

You can operate the device as a DHCP server. This allows IP addresses to be assigned automatically to the connected devices. The IP addresses are either distributed dynamically from an address band (pool) you have specified or a specific IP address is assigned to a particular device.

On this page, specify the address band from which the connected device receives any IP address. You configure the static assignment of the IP addresses in "Static Leases".



Requirement

The connected devices are configured so that they obtain the IP address from a DHCP server.

Description

The page contains the following boxes:

- **DHCP Server**

  Enable or disable the DHCP server on the device.

  Note

  To avoid conflicts with IPv4 addresses, only one device may be configured as a DHCP server in the network.

- **Probe address with ICMP echo before offer**

  When selected, the DHCP server checks whether or not an IP address has already been assigned. To do this the DHCP server sends ICMP echo messages (ping) to this IPv4 address. If no reply is received, the IPv4 address is assigned.

  Note

  If there are devices in your network on which the echo service is disabled as default, there may be conflicts with the IPv4 addresses. To avoid this, assign these devices an IPv4 address outside the IPv4 address band used by the DHCP server.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Pool ID**

  Shows the number of the IPv4 address band. If you click the "Create" button, a new row with a unique number is created (pool ID).

- **Interface**

  Select a VLAN IP interface. The IPv4 addresses are assigned dynamically via this interface.

  The requirement for the assignment is that the IPv4 address of the interface is located in the subnet of the IPv4 address band. If this is not the case, the interface does not assign any IPv4 addresses.

- **Enable**

  Specify whether or not this IPv4 address band will be used.

  Note

  If you enable the IPv4 address band, its settings in this and the other DHCP tabs are grayed out and can no longer be edited.

- **Subnet**

  Enter the network address range that will be assigned to the devices. Use the CIDR notation.

- **Lower IP Address**

  Enter the IPv4 address that specifies the start of the dynamic IPv4 address band. The IPv4 address must be within the network address range you configured for "Subnet".

- **Upper IP address**

  Enter the IPv4 address that specifies the end of the dynamic IPv4 address band. The IPv4 address must be within the network address range you configured for "Subnet".

- **Lease Time (sec)**
  Specify for how many seconds the assigned IPv4 address remains valid. When half the period of validity has elapsed. the DHCP client can extend the period of the assigned IPv4 address. When the entire time has elapsed, the DHCP client needs to request a new IPv4 address.

Procedure

Enable DHCP server globally

1. Select the "DHCP Server"" check box.
2. Click the "Set Values" button.

Creating a DHCP pool

1. Click the "Create" button.
2. Select a VLAN IP interface.
3. Enter the subnet, the lower and the upper IPv4 address.
4. Enter the lease time.
5. Click the "Set Values" button.

   In the "Port Range" tab, all ports are enabled that currently belong to the selected VLAN.

   The standard options for the pool are created in the "DHCP Options" tab.
6. Make the settings you require for the pool in the DHCP tabs.
7. Select the "Enable" check box on this tab.

Deleting a DHCP pool

Note

You can only delete entries that are not enabled.

1. Enable the "Select" check box in the row to be deleted.

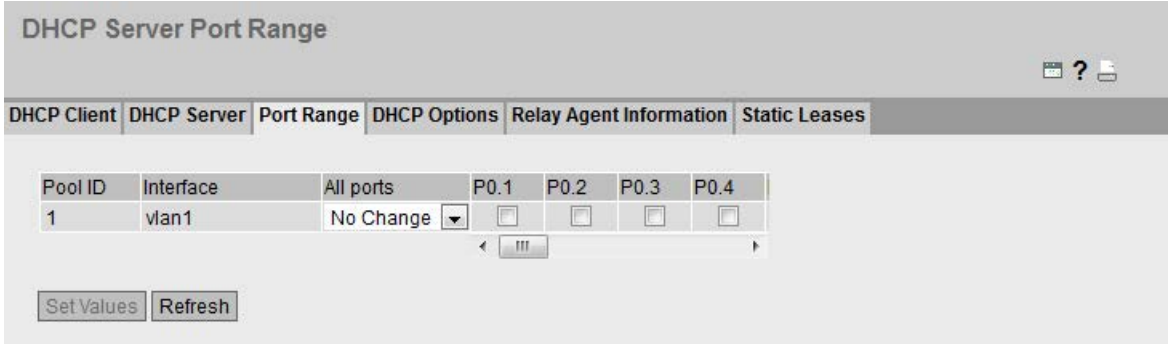
   Repeat this for all entries you want to delete.
2. Click the "Delete" button.

   The entry is deleted.

5.4.8.3 Port Range

On this page, you define the ports via which the IPv4 addresses of an address band are assigned.

After you have created an IPv4 address band in the "DHCP Server" tab, a new line is created in this tab and all ports selected that are currently located in the corresponding VLAN. If you add ports to the VLAN later, the ports are not automatically enabled in this tab.



Description

This table contains the following columns:

- **Pool ID**

  Shows the number of the IPv4 address band. A line is created for every address band.

- **Interface**

  Shows the assigned VLAN IP interface.

- **All ports**

  Select the setting from the drop-down list. You have the following setting options:

  – Enabled

    The check box is enabled for all ports of the relevant VLAN.

  – Disabled

    The check box is disabled for all ports of the relevant VLAN.

  – No Change

    The table remains unchanged.

- **Px.y**

  Specify the ports via which IPv4 addresses of the address band will be assigned.

  You can only select ports located in the corresponding VLAN.

Procedure

Configuring individual ports

1. Enable or disable the check box for the required ports.
2. Click the "Set Values" button.

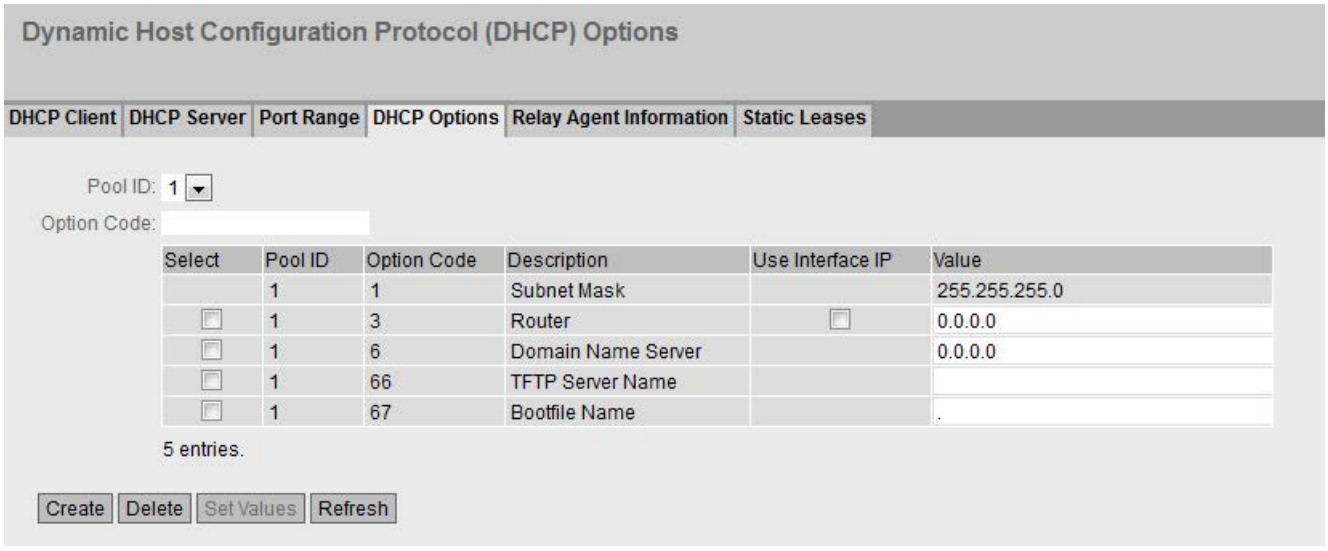
Configuring all ports

1. Select the required entry in the "All ports" drop-down list.
2. Click the "Set Values" button.

5.4.8.4 DHCP Options

On this page you specify which DHCP options the DHCP server supports. The various DHCP options are defined in RFC 2132.

The DHCP options 1, 3, 6, 66 and 67 are created automatically when the IPv4 address band is created. With the exception of DHCP option 1, the options can be deleted. With DHCP option 1 the subnet mask is set automatically that you entered for the address band in "DHCP Server". With the DHCP option 3, you can set the internal IPv4 address of the device as a DHCP parameter using a check box.



Description

The page contains the following boxes:

- **Pool ID**

  Select the required IPv4 address band.

- **Option Code**

  Enter the number of the required DHCP option. The various DHCP options are defined in RFC 2132. The supported DHCP options are listed in the following paragraph.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Pool ID**

  Shows the number of the IPv4 address band.

- **Option Code**

  Shows the number of the DHCP option.

- **Description**

  Shows a description of the DHCP option.

- **Use Interface IP**

  If you enable the check box, the IPv4 address is used as the default gateway that is assigned to the VLAN IP address. If the check box is disabled, you can enter an IPv4 address.

- **Value**
  Enter the DHCP parameter that is transferred to the DHCP client. The content depends on the DHCP option.

  – DHCP option 3 (default gateway):

    Enter the DHCP parameter as an IPv4 address, e.g. 192.168.100.2.

  – DHCP option 6 (DNS):

    Enter the DHCP parameter as an IPv4 address, e.g. 192.168.100.2. You can specify up to three IPv4 addresses separated by commas.

  – DHCP option 12 (host name)

    Enter the host name in the string format.

  – DHCP option 66 (TFTP Server):

    Enter the DHCP parameter as an IPv4 address, e.g. 192.168.100.2.

  – DHCP option 67 (boot file name)

    Enter the name of the boot file in the string format.

DHCP options supported

The following DHCP options are supported:

- Option 1
- Option 3
- Option 6
- Option 12
- Option 66
- Option 67

Procedure

Creating a DHCP option

1. Select a Pool ID.
2. Enter the option code.
3. Click the "Create" button.
4. Enter a value.
5. If applicable for option 3 enable the "Use Interface IP" check box.
6. Click the "Set Values" button.

Deleting a DHCP option

1. Enable the "Select" check box in the row to be deleted.

   Repeat this for all entries you want to delete.

2. Click the "Delete" button.

   The entry is deleted.

5.4.8.5 Relay Agent Information

On this page you define that devices with a certain remote ID and circuit ID are assigned the IPv4 addresses from a specific address band.

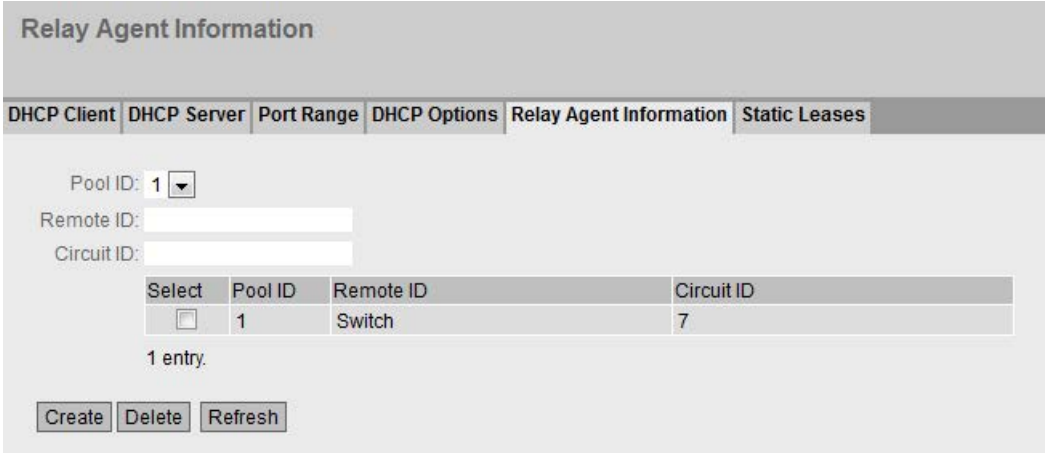
If you create such an entry for an address band, the ports of the address band only react to DHCP queries via a DHCP relay agent (option 82). You can create further address bands for the same VLAN IP interfaces so that ports react to different requests.

Note

Extension or release of an IPv4 address assigned via a relay agent.

With address assignments via a relay agent "Renew" and "Release" messages going directly from the DHCP client to the DHCP server are ignored by the server.

- The extension of the period for an IPv4 address assigned via a relay agent is achieved using a "Rebinding" message that the client sends automatically as a broadcast.
- To speed up the release of an IPv4 address assigned via a relay agent, configure a shorter period of validity.



Description

The page contains the following boxes:

- **Pool ID**

  Select the required IPv4 address band.
- **Remote ID**

  Enter the remote ID.
- **Circuit ID**

  Enter the circuit ID.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.
- **Pool ID**

  Shows the number of the IPv4 address band.
- **Remote ID**

  Shows the remote ID.
- **Circuit ID**

  Shows the circuit ID.

Procedure

Creating an entry

1. Select a Pool ID.
2. Enter the remote ID.
3. Enter the circuit ID.
4. Click the "Create" button.

Deleting an entry

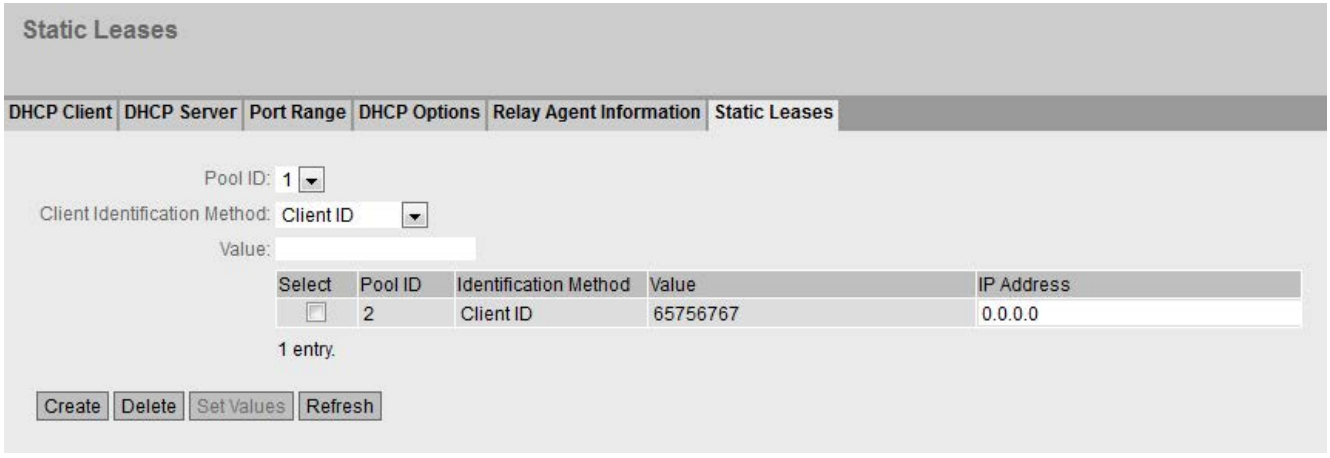
1. Enable the "Select" check box in the row to be deleted.

   Repeat this for all entries you want to delete.
2. Click the "Delete" button.

   The entry is deleted.

5.4.8.6 Static Leases

On this page you define that DHCP clients are assigned a preset IPv4 address depending on their client ID or MAC address.



Description

The page contains the following boxes:

- **Pool ID**

  Select the required IPv4 address band.

- **Client identification method**

  Select the method according to which a client is identified.

  – Ethernet MAC

    The client is identified by its MAC address.

  – Client ID

    The client is identified by a freely defined DHCP client ID.

- **Value**

  Enter the MAC address (Ethernet MAC) or the client ID of the client.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Pool ID**

  Shows the number of the IPv4 address band.

- **Identification method**

  Shows whether the client is identified by its MAC address or the client ID.

- **Value**

  Shows the MAC address or client ID of the client.

- **IP Address**

  Specify the IPv4 address that will be assigned to the client. The IPv4 address must be within the IPv4 address band.

Procedure

Creating static leases

1. Select a Pool ID.
2. Select the Client identification method.
3. Enter the value.
4. Click the "Create" button.
5. Specify the IPv4 address that will be assigned to the client.
6. Click the "Set Values" button.

Deleting static leases

1. Enable the "Select" check box in the row to be deleted.

   Repeat this for all entries you want to delete.
2. Click the "Delete" button.

   The entry is deleted.

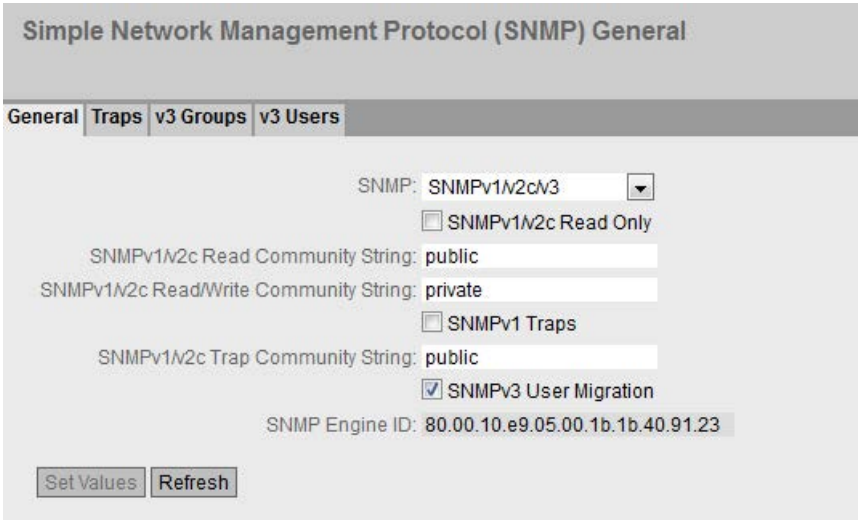
5.4.9 SNMP

You should also refer to the chapter "Technical Basics", section "SNMP (Page 35)".

5.4.9.1 General

Configuration of SNMP

On this page, you make the basic settings for SNMP. Enable the check boxes according to the function you want to use.



Description

The page contains the following boxes:

- **SNMP**
  Select the SNMP protocol from the drop-down list. The following settings are possible:
  - "-" (disabled)
    SNMP is disabled.
  - SNMPv1/v2c/v3
    SNMPv1/v2c/v3 is supported.

    Note

    Note that SNMP in versions 1 and 2c does not have any security mechanisms.
  - SNMPv3
    Only SNMPv3 is supported.
- **SNMPv1/v2c Read-Only**
  If you enable this option, SNMPv1/v2c can only read the SNMP variables.

Note

Community String

For security reasons, do not use the standard values "public" or "private". Change the community strings following the initial installation.

- **SNMPv1/v2c Read Community String**
  Enter the community string for read access of the SNMP protocol.
- **SNMPv1/v2c Read/Write Community String**
  Enter the community string for read and write access of the SNMP protocol.
- **SNMPv1 Traps**
  Enable or disable the sending of SNMPv1 traps (alarm frames). On the "Trap" tab, specify the IP addresses of the devices to which SNMPv1 traps will be sent.
- **SNMPv1/v2c Trap Community String**
  Enter the community string for sending SNMPv1/v2c messages.
- **SNMPv3 User Migration**
  - **Enabled**

    If the function is enabled, an SNMP engine ID is generated that can be migrated. You can transfer configured SNMPv3 users to a different device.

    If you enable this function and load the configuration of the device on another device, configured SNMPv3 users are retained.
  - **Disabled**

    If the function is disabled, a device-specific SNMP engine ID is generated. To generate the ID, the agent MAC address of the device is used. You cannot transfer this SNMP user configuration to other devices.

    If you load the configuration of the device on another device, all configured SNMPv3 users are deleted.
- **SNMP Engine ID**

  Shows the SNMP engine ID.

Procedure

1. Select the required option from the "SNMP" drop-down list:
   - "-" (disabled)
   - SNMPv1/v2c/v3
   - SNMPv3
2. Enable the "SNMPv1/v2c Read Only" check box if you only want read access to SNMP variables with SNMPv1/v2c.
3. Enter the required character string in the "SNMPv1/v2c Read Community String" input box.
4. Enter the required character string in the "SNMPv1/v2c Read/Write Community String" input box.
5. If necessary, enable the SNMPv3 User Migration.
6. Click the "Set Values" button.

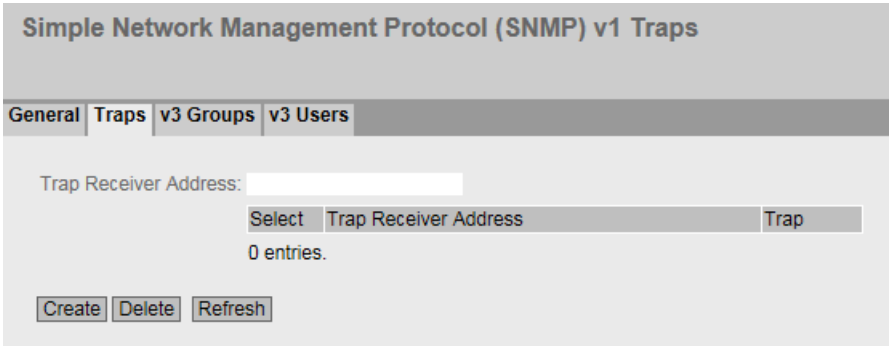
5.4.9.2 Traps

SNMP traps for alarm events

If an alarm event occurs, the device can send SNMP traps (alarm frames) to up to ten different management stations at the same time. Traps are only sent if the events specified in the "System > Events" menu occur.

Note

Traps are only sent if you have enabled the option "SNMPv1 Traps" in the "General" tab or in "System > Configuration".



Description

- **Trap Receiver Address**
  Enter the IP address of the station to which the device sends SNMP traps. You can specify up to ten different recipients servers.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Trap Receiver Address**
  If necessary, change the IP addresses of the stations.
- **Trap**
  Enable or disable the sending of traps. Stations that are entered but not activated do not receive SNMP traps.

Procedure

Creating a trap entry

1. In "Trap Receiver Address", enter the IP address of the station to which the device will send traps.
2. Click the "Create" button to create a new trap entry.

3. Select "Trap" in the required row.
4. Click the "Set Values" button.

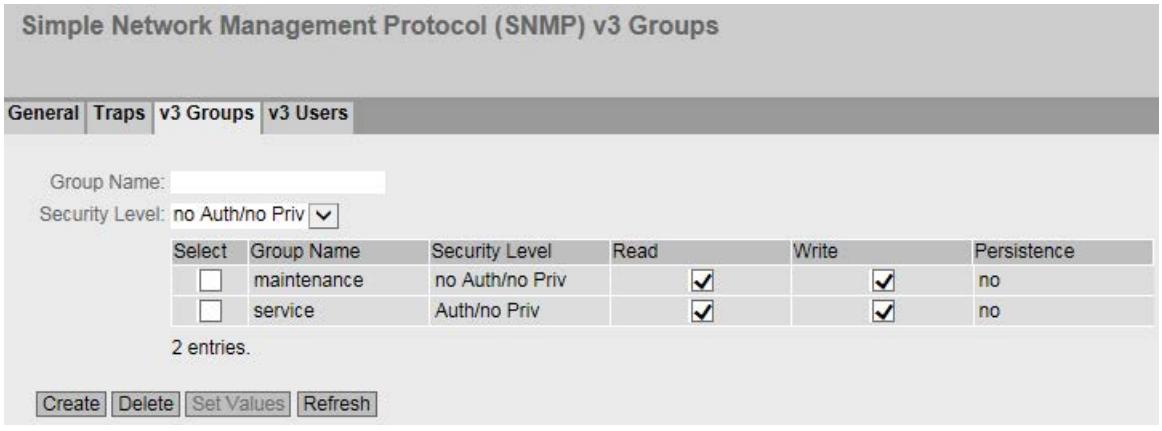
Deleting a trap entry

1. Enable "Select" in the row to be deleted.
2. Click the "Delete" button. The entry is deleted.

5.4.9.3 Groups

Security settings and assigning permissions

SNMP version 3 allows permissions to be assigned, authentication, and encryption at protocol level. The security level and read/write permissions are assigned according to groups. The settings automatically apply to every member of a group.



Description

The page contains the following boxes:

- **Group Name**
  Enter the name of the group. The maximum length is 32 characters.
- **Security Level**
  Select the security level (authentication, encryption) valid for the selected group. You have the following options for the security levels:
  - no Auth/no Priv
    No authentication enabled / no encryption enabled.
  - Auth/no Priv
    Authentication enabled / no encryption enabled.
  - Auth/Priv
    Authentication enabled / encryption enabled.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Group Name**
  Shows the defined group names.
- **Security Level**
  Shows the configured security level.
- **Read**
  Enable or disable read access for the required group.
- **Write**
  Enable or disable write access for the required group.

  Note

  For write access to work, you also need to enable read access.

- **Persistence**
  Shows whether or not the group is assigned to an SNMPv3 user. If the group is not assigned to an SNMPv3 user, no automatic saving is triggered and the configured group is deleted after restarting the device.
  - Yes

    The group is assigned to an SNMPV3 user.
  - No

    The group is not assigned to an SNMPV3 user.

Procedure

Creating a new group

1. Enter the required group name in "Group Name".
2. Select the required security level from the "Security Level" drop-down list.
3. Click the "Create" button to create a new entry.
4. Specify the required read rights for the group in " Read".
5. Specify the required write rights for the group in " Write".
6. Click the "Set Values" button.

Modifying a group

1. Specify the required read rights for the group in " Read".
2. Specify the required write rights for the group in " Write".
3. Click the "Set Values" button.

Note

Once a group name and the security level have been specified, they can no longer be modified after the group is created. If you want to change the group name or the security level , you will need to delete the group and recreate it and reconfigure it with the new name.

Deleting a group

1. Enable "Select" in the row to be deleted.
   Repeat this for all groups you want to delete.
2. Click the "Delete" button. The entries are deleted.

5.4.9.4 Users

User-specific security settings

On the WBM page, you can create new SNMPv3 users and modify or delete existing users. The user-based security model works with the concept of the user name; in other words, a user ID is added to every frame. This user name and the applicable security settings are checked by both the sender and recipient.

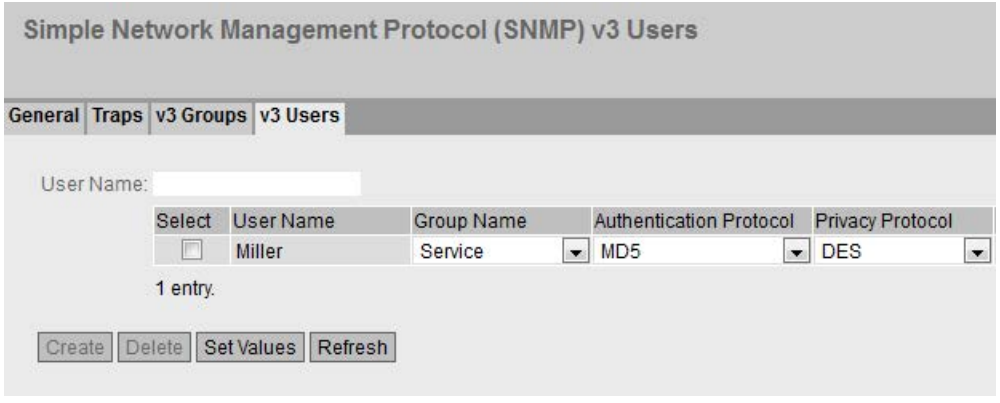


Figure 5-5 SNMPv3 user - first part of the table

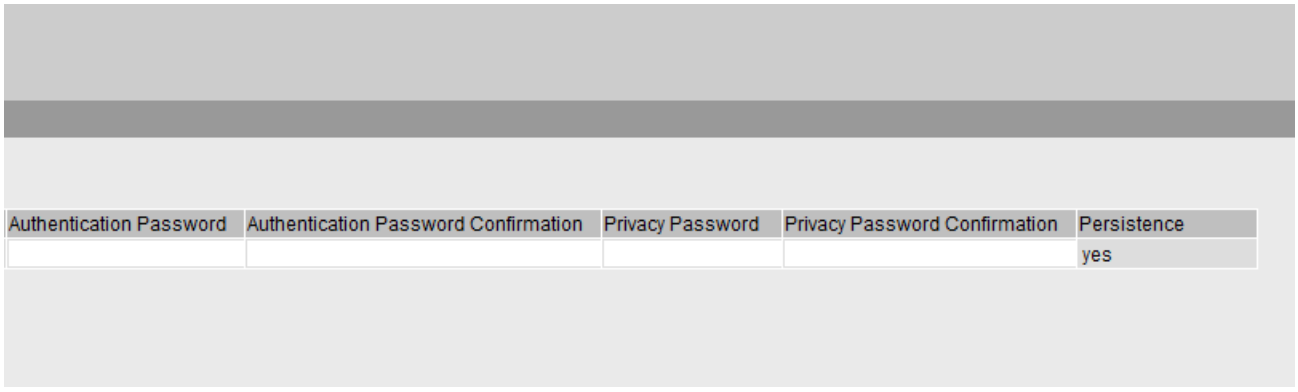


Figure 5-6 802.1X user - second part of the table

Description

The page contains the following boxes:

- **User Name**
  Enter a freely selectable user name. After you have entered the data, you can no longer modify the name.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **User Name**
  Shows the created users.
- **Group Name**
  Select the group which will be assigned to the user.
- **Authentication Protocol**

  Specify the authentication protocol for which a password will be stored.

  The following settings are available:

  – None
  – MD5
  – SHA

- **Encryption Protocol**

  Specify whether or not a password should be stored for encryption with the DES algorithm. Can only be enabled when an authentication protocol has been selected.
- **Authentication Password**
  Enter the authentication password in the first input box. This password must have at least 6 characters, the maximum length is 32 characters.
- **Authentication Password Confirmation**
  Confirm the password by repeating the entry.

- **Privacy Password**
  Enter your encryption password. This password must have at least 6 characters, the maximum length is 32 characters.
- **Privacy Password Confirmation**
  Confirm the encryption password by repeating the entry.
- **Persistence**
  Shows whether or not the user is assigned to an SNMPv3 group. If the user is not assigned to an SNMPv3 group, no automatic saving is triggered and the configured user is deleted after restarting the device.
  - Yes

    The user is assigned to an SNMPv3 group.
  - No

    The user is not assigned to an SNMPv3 group.

Procedure

Create a new user

1. Enter the name of the new user in the "User Name" input box.
2. Click the "Create" button. A new entry is generated in the table.
3. In "Group Name", select the group to which the new user will belong.

   If the group has not yet been created, change to the "v3 Groups" page and make the settings for this group.
4. If an authentication is necessary for the selected group, select the authentication algorithm in "Authentication Protocol".
   In the relevant input boxes, enter the authentication password and its confirmation.
5. If encryption was specified for the group, select the algorithm in "Privacy Protocol". In the relevant input boxes, enter the encryption password and the confirmation.
6. Click the "Set Values" button.

Delete user

1. Enable "Select" in the row to be deleted.
   Repeat this for all users you want to delete.
2. Click the "Delete" button. The entry is deleted.

5.4.10 System Time

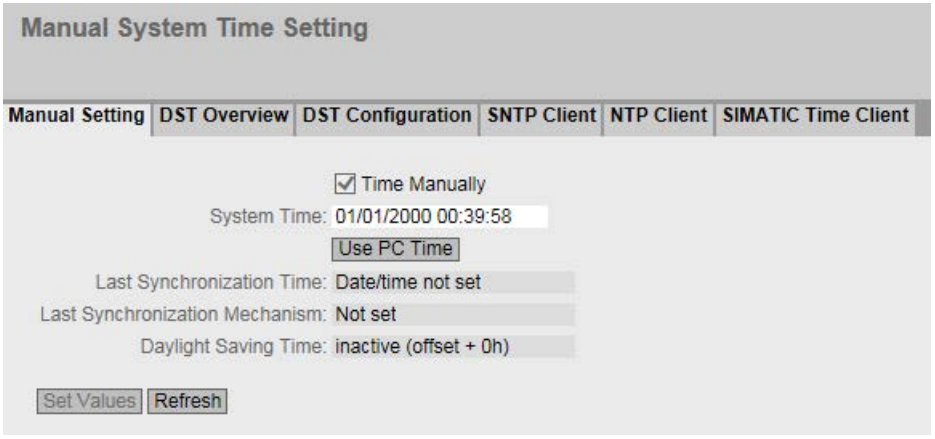
There are different methods that can be used to set the system time of the device. Only one method can be active at any one time.

If one method is activated, the previously activated method is automatically deactivated.

5.4.10.1 Manual Setting

Manual setting of the system time

On this page, you set the date and time of the system yourself. For this setting to be used, enable "Time Manually".



Description

The page contains the following boxes:

- **Time Manually**
  Enable or disable the manual time setting. If you enable the option, the "System Time" input box can be edited.
- **System Time**
  Enter the date and time in the format "MM/DD/YYYY HH:MM:SS".

  After a restart, the time of day begins at 01/01/2000 00:00:00.
- **Use PC Time**
  Click the button to use the time setting of the PC.
- **Last Synchronization Time**
  Shows when the last time-of-day synchronization took place. If no time-of-day synchronization was possible, the box displays "Date/time not set".

- **Last Synchronization Mechanism**
  Shows how the last time synchronization was performed.
  - Not set
    The time was not set.
  - Manual
    Manual time setting
  - SNTP
    Automatic time-of-day synchronization with SNTP
  - NTP
    Automatic time-of-day synchronization with NTP
  - SIMATIC
    Automatic time-of-day synchronization using the SIMATIC time frame
- **Daylight Saving Time (DST)**
  Shows whether the daylight saving time changeover is active.
  - active (offset +1 h)

    The system time was changed to daylight saving time; in other words an hour was added. You can see the current system time at the top right in the selection area of the WBM.

    The set time continues to be displayed in the "System Time" box.
  - inactive (offset +0 h)
    The current system time is not changed.

Procedure

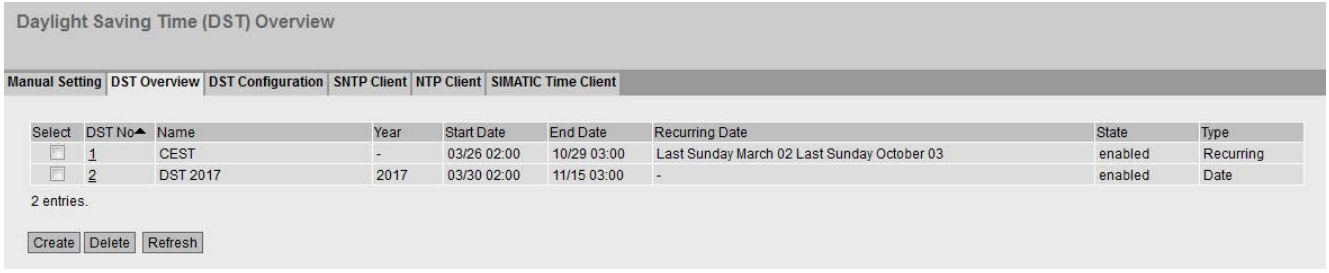
1. Enable the "Time Manually" option.
2. In the "System Time" input box, enter the date and time in the format "MM/DD/YYYY HH:MM:SS".
3. Click the "Set Values" button.
   The date and time are adopted and "Manual" is entered in "Last Synchronization Mechanism" box.

5.4.10.2 DST Overview

On this page, you can create new entries for the daylight saving time changeover.

The table provides an overview of the existing entries.

Settings



- **Select**

  Select the row you want to delete.

- **DST No.**

  Shows the number of the entry.

  If you create a new entry, a new line with a unique number is created.

- **Name**

  Shows the name of the entry.

- **Year**

  Shows the year for which the entry was created.

- **Start Date**

  Shows the month, day and time for the start of daylight saving time.

- **End Date**

  Shows the month, day and time for the end of daylight saving time.

- **Recurring Date**

  With an entry of the type "Recurring", the period in which daylight saving time is active is displayed consisting of week, day, month and time of day.

  With an entry of the type "Date" a "-" is displayed.

- **State**

  Shows the status of the entry:

  – Enabled

    The entry was created correctly.

  – Invalid

    The entry was created new and the start and end date are identical.

- **Type**

  Shows how the daylight saving time changeover is made:

  – Date

    A fixed date is entered for the daylight saving time changeover.

  – Recurring

    A rule was defined for the daylight saving time changeover.

Procedure

Creating an entry

1. Click the "Create" button.

   A new entry is created in the table.
2. Click on the required entry in the "DST No column.

   You change to the "DST Configuration" page.
3. Select the required type in the "Type" drop-down list.

   Depending on the selected type, various settings are available.
4. Enter a name name in the "Name" box.
5. If you have selected the type "Date", fill in the following boxes.
   – Year
   – Day (for start and end date)
   – Hour (for start and end date)
   – Month (for start and end date)
6. If you have selected the type "Recurring", fill in the following boxes.
   – Hour (for start and end date)
   – Month (for start and end date)
   – Week (for start and end date)
   – Day (for start and end date)
7. Click the "Set Values" button.

Deleting an entry

1. Enable "Select" in the row to be deleted.
2. Click the "Delete" button. The entry is deleted.

5.4.10.3 DST Configuration

On this page, you can configure the entries for the daylight saving time changeover. As result of the changeover to daylight saving or standard time, the system time for the local time zone is correctly set.

You can define a rule for the daylight saving time changeover or specify a fixed date.

Settings

Note

The content of this page depends on the selection in the "Type" box.

The boxes "DST No.", "Type" and "Name" are always shown.

- **DST No.**

  Select the type of the entry.

- **Type**
  Select how the daylight saving time changeover is made:
  - Date

    You can set a fixed date for the daylight saving time changeover.

    This setting is suitable for regions in which the daylight saving time changeover is not governed by rules.
  - Recurring

    You can define a rule for the daylight saving time changeover.

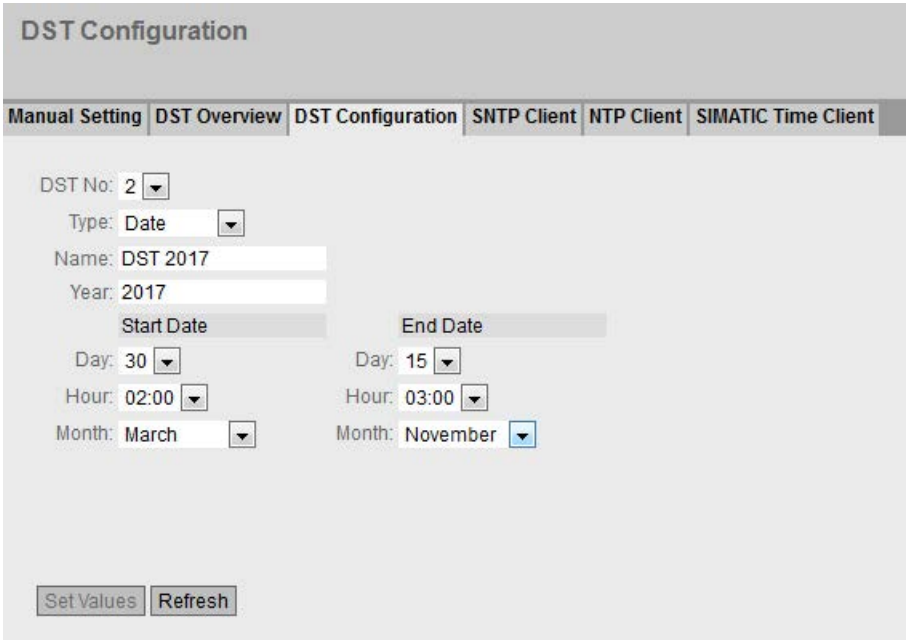
    This setting is suitable for regions in which the daylight saving time always begins or ends on a certain weekday.

- **Name**

  Enter a name for the entry.

  The name can be a maximum of 16 characters long.

Settings with "Date" selected



You can set a fixed date for the start and end of daylight saving time.

- **Year**

  Enter the year for the daylight saving time changeover.

- **Start Date**

  Enter the following values for the start of daylight saving time:

  – Day

    Specify the day.

  – Hour

    Specify the hour.

  – Month

    Specify the month.

- **End Date**

  Enter the following values for the end of daylight saving time:

  – Day

    Specify the day.

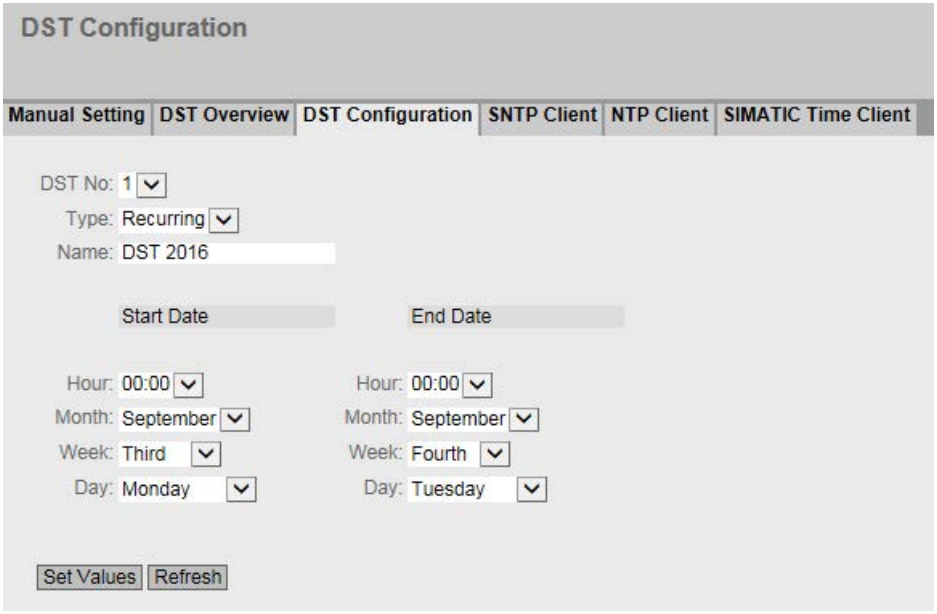
  – Hour

    Specify the hour.

  – Month

    Specify the month.

Settings with "Recurring" selected



You can create a rule for the daylight saving time changeover.

- **Start Date**

  Enter the following values for the start of daylight saving time:

  – Hour

    Specify the hour.

  – Month

    Specify the month.

  – Week

    Specify the week.

    You can select the first to fourth or the last week of the month.

  – Day

    Specify the weekday.

- **End Date**

  Enter the following values for the end of daylight saving time:

  – Hour

    Specify the hour.

  – Month

    Specify the month.

– Week

  Specify the week.

  You can select the first to fourth or the last week of the month.

– Day

  Specify the weekday.

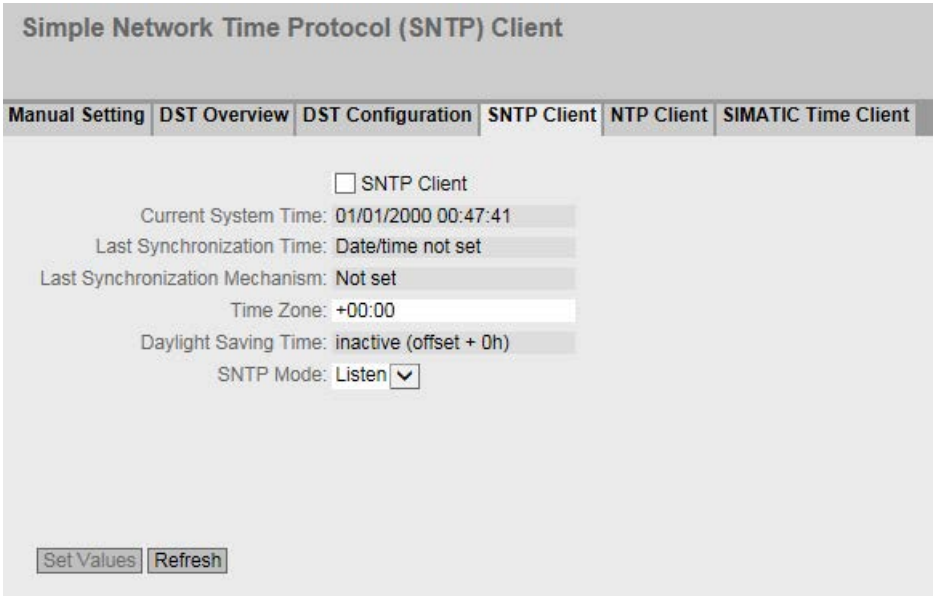
5.4.10.4 SNTP Client

Time-of-day synchronization in the network

SNTP (Simple Network Time Protocol) is used for synchronizing the time in the network. The appropriate frames are sent by an SNTP server in the network.

Note

To avoid time jumps, make sure that there is only one time server in the network.



Description

The page contains the following boxes:

- **SNTP Client**
  Enable or disable automatic time-of-day synchronization using SNTP.
- **Current System Time**
  Shows the current date and current normal time received from the server. If you specify a time zone, the time information is adapted accordingly.

- **Last Synchronization Time**
  Shows when the last time-of-day synchronization took place.
- **Last Synchronization Mechanism**
  Shows how the last time synchronization was performed. The following methods are possible:
  - Not set
    The time was not set.
  - Manual
    Manual time setting
  - SNTP
    Automatic time-of-day synchronization with SNTP
  - NTP
    Automatic time-of-day synchronization with NTP
  - SIMATIC
    Automatic time-of-day synchronization using the SIMATIC time frame
- **Time Zone**
  In this box, enter the time zone you are using in the format "+/- HH:MM". The time zone relates to UTC standard world time.

  The time in the "Current System Time" box is adapted accordingly.
- **Daylight Saving Time (DST)**
  Shows whether the daylight saving time changeover is active.
  - active (offset +1 h)

    The system time was changed to daylight saving time; in other words an hour was added. You can see the current system time at the top right in the selection area of the WBM.

    The normal time including the time zone continues to be displayed in the "Current System Time" box.
  - inactive (offset +0 h)
    The current system time is not changed.
- **SNTP Mode**
  Select the synchronization mode from the drop-down list. The following types of synchronization are possible:
  - Listen
    With this mode, the device is passive and receives SNTP frames that deliver the time of day.
  - Poll
    If you select this mode, the input boxes "SNTP Server Address", "SNTP Server Port and "Poll Interval[s]" are displayed to allow further configuration. With this type of synchronization, the device is active and sends a time query to the SNTP server.
- **SNTP Server Address**
  Enter the IP address of the SNTP server.

- **SNTP Server Port**
  Enter the port of the SNTP server.
  The following ports are possible:
  - 123 (standard port)
  - 1025 to 36564
- **Poll Interval[s]**
  Here, enter the interval between two-time queries. In this box, you enter the query interval in seconds. Possible values are 16 to 16284 seconds.

Procedure

1. Click the "SNTP Client" check box to enable the automatic time setting.
2. In the "Time Zone" input box, enter the local time difference to world time (UTC). The input format is "+/-HH:MM" (for example +02:00 for CEST), because the SNTP server always sends the UTC time. This time is then recalculated and displayed as the local time based on the specified time zone. On the device itself, there is no changeover from the daylight saving to standard time. You also need to take this into account when completing the "Time Zone" input box.
3. Select one of the following options from the "SNTP Mode" drop-down list:
   - Listen
     For this mode, you need to configure the following:
     - time difference to the time sent by the server (step 2)
     - complete the configuration with step 7.
   - Poll
     Click the "Set Values" button. Further boxes for the SNTP mode "Poll" are displayed.

     For this mode, you need to configure the following:-
     - time difference to the time sent by the server (step 2)
     - time server (step 4)
     - port (step 5)
     query interval (step 6)
     - complete the configuration with step 7.
4. In the "SNTP Server Address" input box, enter the IPv4 address of the SNTP server whose frames will be used to synchronize the time of day.
5. In the "SNTP Server Port" input box, enter the port via which the SNTP server is available. The port can only be modified if the IPv4 address of the SNTP server is entered.
6. In the "Poll Interval[s]" input box, enter the time in seconds after which a new time query is sent to the time server.
7. Click the "Set Values" button to transfer your changes to the device.

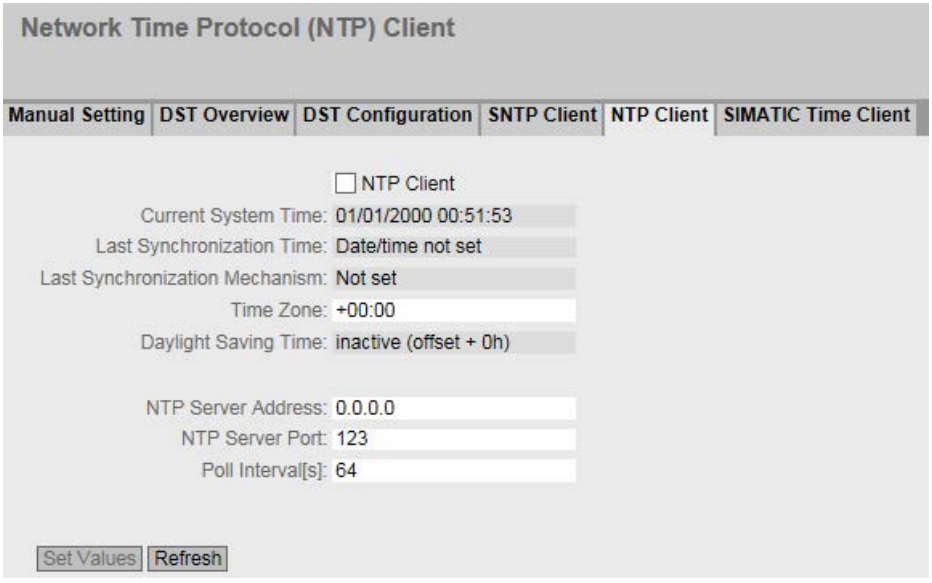
5.4.10.5 NTP Client

Automatic time-of-day setting with NTP

If you require time-of-day synchronization using NTP, you can make the relevant settings here.

Note

To avoid time jumps, make sure that there is only one time server in the network.



Description

The page contains the following boxes:

- **NTP Client**
  Select this check box to enable automatic time-of-day synchronization with NTP.
- **Current System Time**
  Shows the current date and current normal time received by the IE switch. If you specify a time zone, the time information is adapted accordingly.
- **Last Synchronization Time**
  Shows when the last time-of-day synchronization took place.

- **Last Synchronization Mechanism**
  Shows how the last time synchronization was performed. The following methods are possible:
  - Not set
    The time was not set.
  - Manual
    Manual time setting
  - SNTP
    Automatic time-of-day synchronization with SNTP
  - NTP
    Automatic time-of-day synchronization with NTP
  - SIMATIC
    Automatic time-of-day synchronization using the SIMATIC time frame
- **Time Zone**
  In this box, enter the time zone you are using in the format "+/- HH:MM". The time zone relates to UTC standard world time.

  The time in the "Current System Time" box is adapted accordingly.
- **Daylight Saving Time (DST)**
  Shows whether the daylight saving time changeover is active.
  - active (offset +1 h)

    The system time was changed to daylight saving time; in other words an hour was added. You can see the current system time at the top right in the selection area of the WBM.

    The normal time including the time zone continues to be displayed in the "Current System Time" box.
  - inactive (offset +0 h)
    The current system time is not changed.
- **NTP Server Address**
  Enter the IPv4 address of the NTP server.
- **NTP Server Port**
  Enter the port of the NTP server.
  The following ports are possible:
  - 123 (standard port)
  - 1025 to 36564
- **Poll Interval[s]**
  Here, enter the interval between two time queries. In this box, you enter the query interval in seconds. Possible values are 64 to 1024 seconds.

Procedure

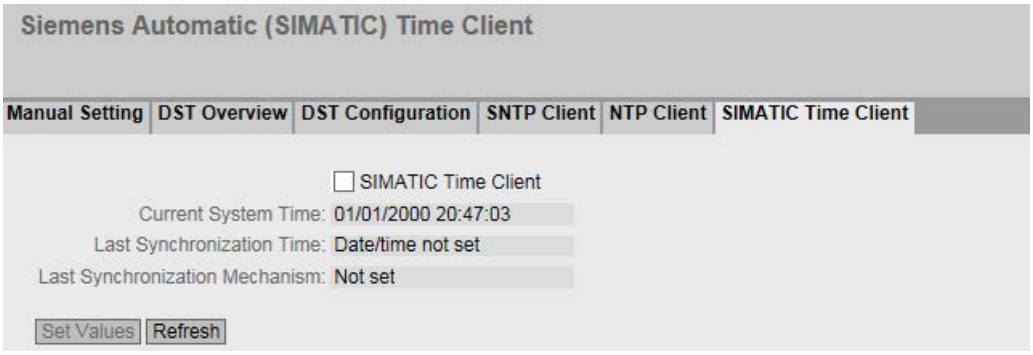
1. Click the "NTP Client" check box to enable the automatic time setting using NTP.
2. Enter the necessary values in the following boxes:
   - Time zone
   - IPv4 address of the NTP server
   - NTP server port
   - Query interval
3. Click the "Set Values" button.

5.4.10.6 SIMATIC Time Client

Time setting via SIMATIC time client

Note

To avoid time jumps, make sure that there is only one time server in the network.



Description

The page contains the following boxes:

- **SIMATIC Time Client**
  Select this check box to enable the device as a SIMATIC time client.
- **Current System Time**
  Shows the current system time.

- **Last Synchronization Time**
  Shows when the last time-of-day synchronization took place.
- **Last Synchronization Mechanism**
  Shows how the last time synchronization was performed. The following methods are possible:
  - Not set
    The time was not set.
  - Manual
    Manual time setting
  - SNTP
    Automatic time-of-day synchronization with SNTP
  - NTP
    Automatic time-of-day synchronization with NTP
  - SIMATIC
    Automatic time-of-day synchronization using the SIMATIC time frame

Procedure

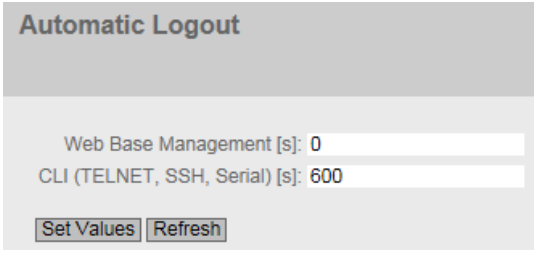
1. Click the "SIMATIC Time Client" check box to enable the SIMATIC Time Client.
2. Click the "Set Values" button.

5.4.11 Automatic logout

Setting the automatic logout

On this page, set the time intervals after which there is an automatic logout from the WBM or CLI following user inactivity.

If you have been logged out automatically, you will need to log in again.



Configuration

1. Enter a value of 60-3600 seconds in the "Web Based Management [s]" input box. If you enter the value 0, the automatic logout is disabled.
2. Enter a value of 60-600 seconds in the "CLI (TELNET, SSH, Serial) [s]" input box. If you enter the value 0, the automatic logout is disabled.
3. Click the "Set Values" button.

5.4.12 Button

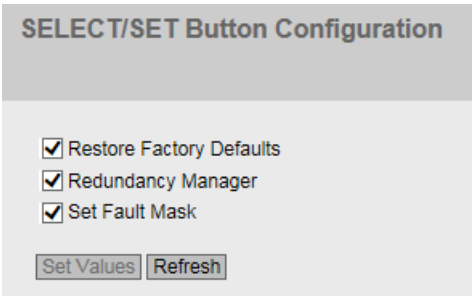
Availability of the buttons

Depending on your IE switch, different buttons and functions are available, see section "System functions hardware equipment (Page 11)".

Functionality of the button

You will find a detailed description of the function available with the button in the device operating instructions.

On this page, the functionality of the button can be enabled or disabled.



Description of the displayed boxes

The following functions are possible:

- **Restore Factory Defaults**

  if you select the check box, you can execute the function "Restore Factory Defaults" via the button.

  CAUTION

  Button function "Restore Factory Defaults**" active during startup**

  If you have disabled this function in your configuration, disabling is only valid during operation. When restarting, for example after power down, the function is active until the configuration is loaded so that the device can inadvertently be reset to the factory settings. This may cause unwanted disruption in network operation since the device then needs to be reconfigured. An inserted PLUG is also deleted and returned to the status as shipped.

- **Redundancy Manager**

  If you select the check box, you can activate or deactivate the "Redundancy Manager" function via the button.

- **Set Fault Mask**

  If you select the check box, you can define the fault mask via the button.

Steps in configuration

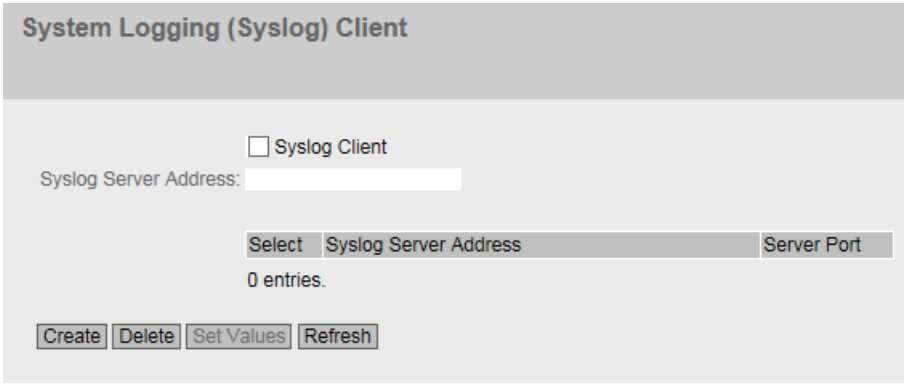
1. To use the required functionality, select the corresponding check box.
2. Click the "Set Values" button.

5.4.13 Syslog Client

Syslog according to RFC 3164 is used for transferring short, unencrypted text messages over UDP in the IP network. This requires a Syslog server.

Requirements for sending log entries

- The Syslog function is enabled on the device.
- The Syslog function is enabled for the relevant event.
- There is a Syslog server in your network that receives the log entries. Since this is a UDP connection, there is no acknowledgment to the sender.
- The IP address of the Syslog server is entered on the device.



Description

The page contains the following boxes:

- **Syslog Client**

  Enable or disable the Syslog function.

- **Syslog Server Address**

  Enter the IP address of the Syslog server.

This table contains the following columns

- **Select**

  Select the row you want to delete.

- **Syslog Server Address**

  Shows the IP address of the Syslog server.

- **Server Port**

  Enter the port of the Syslog server being used.

Procedure

Enabling function

1. Select the "Syslog Client" check box.
2. Click the "Set Values" button.

Creating a new entry

1. In the "Syslog Server Address" input box, enter the IP address of the Syslog server on which the log entries will be saved.
2. Click the "Create" button. A new row is inserted in the table.
3. In the "Server Port" input box, enter the number of the UDP port of the server.
4. Click the "Set Values" button.

Note

The default setting of the server port is 514.

Changing the entry

1. Delete the entry.
2. Create a new entry.

Deleting an entry

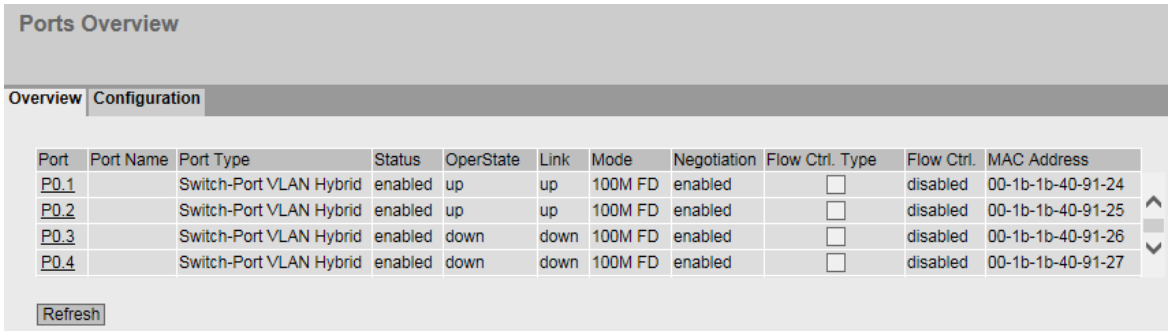
1. Select the check box in the row to be deleted.
2. Click the "Delete" button. All selected entries are deleted and the display is refreshed.

5.4.14 Ports

5.4.14.1 Overview

Overview of the port configuration

The page shows the configuration for the data transfer for all ports of the device. You cannot configure anything on this page.



Description of the displayed boxes

The table has the following columns:

- **Port**
  Shows the available ports. If you click on the port, the corresponding configuration page is opened. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Port name**
  Shows the name of the port.
- **Port Type**
  Shows the type of the port. The following types are possible:
  - Switch Port VLAN Hybrid
  - Switch Port VLAN Trunk
- **Status**
  Shows whether the port is on or off. Data traffic is possible only over an enabled port.

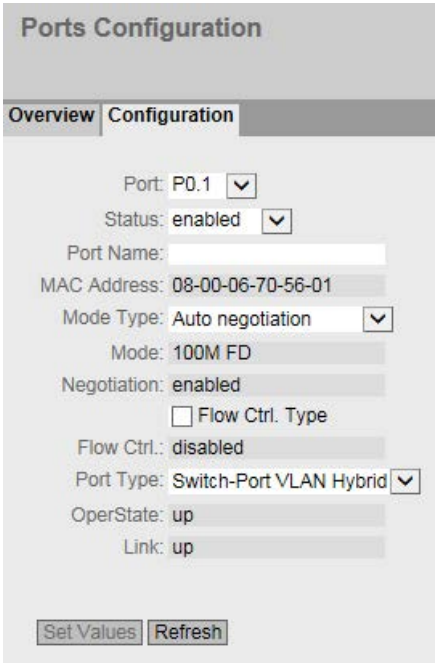
- **OperState**
  Displays the current operational status. The operational status depends on the configured "Status" and the "Link". The available options are as follows:
  - up
    You have configured the status "enabled" for the port and the port has a valid connection to the network.
  - down
    You have configured the status "disabled" or "Link down" for the port or the port has no connection.
  - not present
    With modular devices, this status is displayed when, for example, no media module is inserted.
- **Link**
  Shows the connection status to the network. With the connection status, the following is possible:
  - up
    The port has a valid link to the network, a link integrity signal is being received.
  - down
    The link is down, for example because the connected device is turned off.
- **Mode**
  Shows the transfer parameters of the port.
- **Negotiation**
  Shows whether the automatic configuration is enabled or disabled.
- **Flow Ctrl. Type**
  Shows whether flow control is enabled or disabled for the port.
- **Flow Ctrl.**
  Shows whether flow control is working on this port.
- **MAC Address**

  Shows the MAC address of the port.

5.4.14.2 Configuration

Configuring ports

On this page, you can configure all the ports of the device.



Description of the displayed boxes

The table has the following rows:

- **Port**
  Select the port to be configured from the drop-down list. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Status**
  Specify whether the port is enabled or disabled.
  - enabled
    The port is enabled. Data traffic is possible only over an enabled port.
  - disabled
    The port is disabled but the connection remains.
  - link down
    The port is disabled and the connection to the partner device is terminated.

    Note

    Reduced current consumption

    For every optical port that you set to "link down", the current consumtion of the device is reduced by 30 mA.

- **Port Name**
  Enter a name for the port here.
- **MAC Address**
  Shows the MAC address of the port.
- **Mode Type**

  From this drop-down list, select the transmission speed and the transfer mode of the port.

  If you set the mode to "Auto negotiation", these parameters are automatically negotiated with the connected partner port.

  Before the port and partner port can communicate with each other, the settings must match at both ends.

  Note

  "Auto negotiation" mode

  - If a port is set permanently to full duplex, the connected partner port must also be set to full duplex.
  - If a port operating in the "Auto negotiation" mode is connected to a partner port that is not operating in the"Auto negotiation" mode, the partner port setting must be fixed.
  - Devices not supporting "Auto negotiation" must be set permanently to 100 Mbps or 10 Mbps half duplex.

  Note

  "Auto negotiation" and Autocrossover

  - SCALANCE XB-200/SCALANCE XC-200: If you disable the "Auto negotiation" function, the "MDI/MDI-X" autocrossover function is also turned off. The use a crossover cable.
  - SCALANCE XP-200: If you disable the "Auto negotiation" function, the "MDI/MDI-X" autocrossover function remains active.

- **"Mode**
  Shows the transmission speed and the transfer mode of the port. The transmission speed can be 10 Mbps, 100 Mbps or 1000 Mbps. As the transmission mode, you can configure full duplex (FD) or half duplex (HD).
- **Negotiation**
  Shows whether the automatic configuration of the connection to the partner port is enabled or disabled.
- **Flow Ctrl. Type**
  Enable or disable flow control for the port.
- **Flow Ctrl.**
  Shows whether flow control is working on this port.

  Note

  Turning flow control on/off with Auto negotiation

  You can only enable or disable flow control when the "Auto negotiation" function is turned off. Afterwards you can enable "Auto negotiation" again.

- **Port Type**
  Select the type of port from the drop-down list.
  - Switch Port VLAN Hybrid

    The port sends tagged and untagged frames. It is not automatically a member of a VLAN.
  - Switch Port VLAN Trunk

    The port only sends tagged frames and is automatically a member of all VLANs.
- **OperState**
  Displays the current operational status. The operational status depends on the configured "Status" and the "Link". The available options are as follows:
  - up
    You have configured the status "enabled" for the port and the port has a valid connection to the network.
  - down
    You have configured the status "disabled" or "Link down" for the port or the port has no connection.
  - not present
    With modular devices, this status is displayed when, for example, no media module is inserted.
- **Link**
  Shows the connection status to the network. The available options are as follows:
  - up
    The port has a valid link to the network, a link integrity signal is being received.
  - down
    The link is down, for example because the connected device is turned off.

Changing the port configuration

Click the appropriate box to change the configuration.

Note

Optical ports only work with the full duplex mode and at maximum transmission rate. As a result, the following settings cannot be made for optical ports:

- Automatic configuration
- Transmission speed
- Transmission technique

Note

With various automatic functions, the device prevents or reduces the effect on other ports and priority classes (Class of Service) if a port is overloaded. This can mean that frames are discarded even when flow control is enabled.

Port overload occurs when the device receives more frames than it can send, for example as the result of different transmission speeds.

Steps in configuration

1. Change the settings according to your configuration.
2. Click the "Set Values" button.

5.4.15 Fault Monitoring

5.4.15.1 Power Supply

Settings for monitoring the power supply

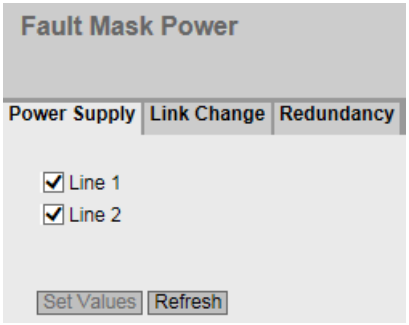
Configure whether or not the power supply should be monitored by the messaging system. Depending on the hardware variant, there are one or two power connectors (Supply 1 / Supply 2). With a redundant power supply, configure the monitoring separately for each individual feed-in line.

A fault is then signaled by the message system when there is no power on a monitored connection (Line 1 or Line 2) or when the applied voltage is too low.

Note

You will find the permitted operating voltage limits in the operating instructions of the device.

A fault causes the signaling contact to trigger and the fault LED on the device to light up and, depending on the configuration, can trigger a trap, an e-mail, or an entry in the event log table.



Procedure

1. Click the check box in front of the line name you want to monitor to enable or disable the monitoring function.
2. Click the "Set Values" button.

5.4.15.2 Link Change

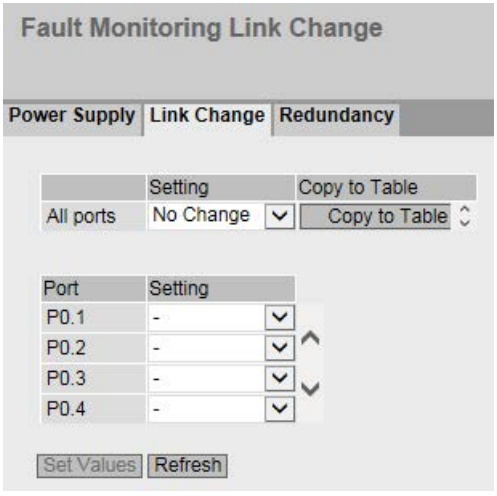
Configuration of fault monitoring of status changes on connections

On this page, you configure whether or not an error message is triggered if there is a status change on a network connection.

If connection monitoring is enabled, an error is signaled when:

- there should be a link on a port and this is missing.
- or when there should not be a link on a port but a link is detected.

A fault causes the signaling contact to trigger and the fault LED on the device to light up and, depending on the configuration, can trigger a trap, an e-mail, or an entry in the event log table.



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - "-" (disabled)
  - Up
  - Down
  - No Change: The setting in table 2 remains unchanged.
- **Copy to Table**

  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Setting**

  Select the setting from the drop-down list. You have the following options:
  - Up
    Error handling is triggered when the port changes to the active status.

    (From "Link down" to "Link up")
  - Down
    Error handling is triggered when the port changes to the inactive status.

    (From "Link up" to "Link down")
  - "-" (disabled)
    The error handling is not triggered.

Steps in configuration

Configure error monitoring for a port

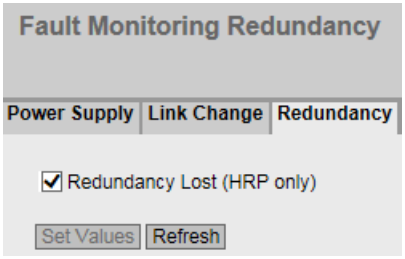
1. From the relevant drop-down list, select the options of the slots / ports whose connection status you want to monitor.
2. Click the "Set Values" button.

Configure error monitoring for all ports

1. Select the required setting from the drop-down list of the "Setting"column.
2. Click the "Copy to table" button. The setting is adopted for all ports of table 2.
3. Click the "Set Values" button.

5.4.15.3 Redundancy

On this page, you configure whether or not an error message is triggered if there is a status change on a redundant connection.



Setting

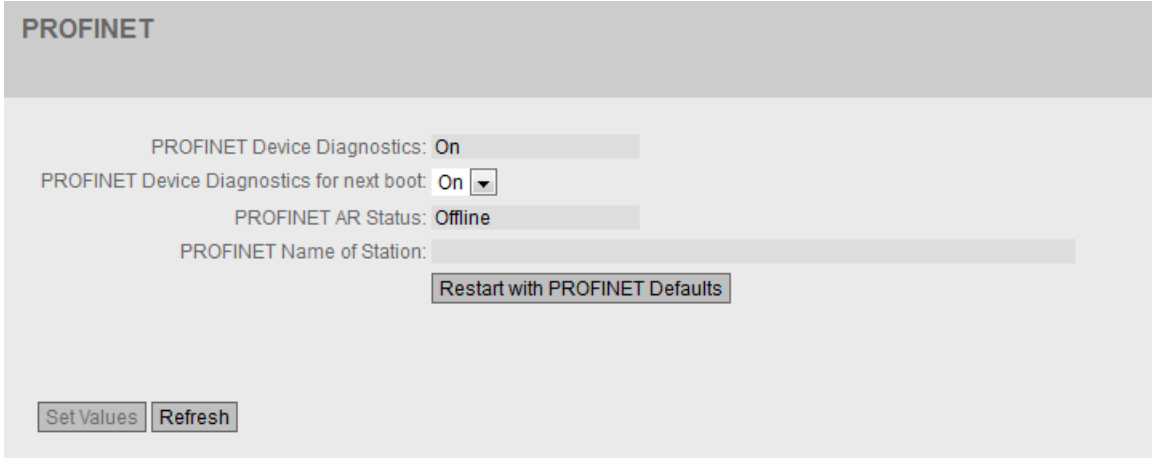
- **Redundancy loss (HRP only)**

  Enable or disable connection monitoring. If the redundancy of the connection is lost, an error is signaled.

5.4.16 PROFINET

Settings for PROFINET

On this page, you configure the mode of PROFINET.



Description of the displayed boxes

The page contains the following boxes:

- **PROFINET Device Diagnostics**

  Shows whether PROFINET is enabled ("On") or disabled ("Off").

- **PROFINET Device Diagnostics for next boot**

  Set whether PROFINET will be enabled ("On") or disabled ("Off") after the next device restart.

Note

PROFINET and EtherNet/IP

When PROFINET is turned on, EtherNet/IP is turned off. The switchover from PROFINET and EtherNet/IP has no effect on DCP.

Note

PROFINET AR Status

If a PROFINET connection is established; in other words the PROFINET AR status is "Online", you cannot disable PROFINET.

- **PROFINET AR Status**
  This box shows the status of the PROFINET connection; in other words whether the device is connected to a PROFINET controller "Online " or "Offline".
  Here, online means that a connection to a PROFINET controller exists, that this has downloaded its configuration data to the device and that the device can send status data to the PROFINET controller. In this status known as "in data exchange", the parameters set via the PROFINET controller cannot be configured.
- **PROFINET Name of Station**
  This box displays the PROFINET device name according to the configuration in HW Config of STEP 7.
- **Restart with PROFINET Defaults**

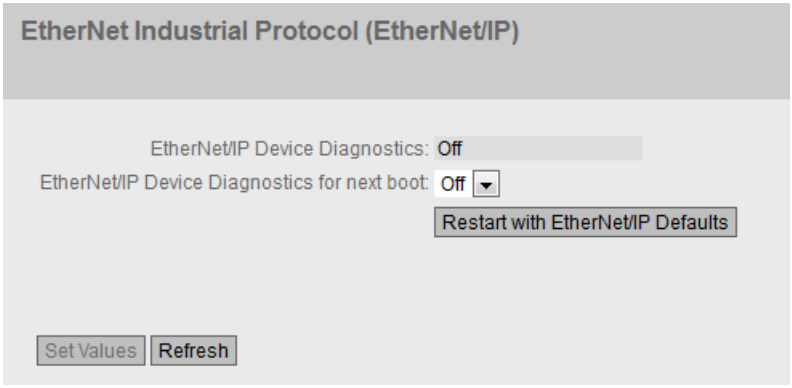
  Click this button to restore the default settings of the PROFINET profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays the settings specially made for operation with the PROFINET protocol.

NOTICE
By resetting all the settings to the default settings of a profile, the IP address is also lost. Following this, the device can only be accessed via the serial interface, using the Primary Setup Tool or using DHCP. With the appropriate attachment, a previously correctly configured device can cause circulating frames after the reset and therefore the failure of the data traffic.

5.4.17 EtherNet/IP

EtherNet Industrial Protocol (EtherNet/IP)

On this page, you configure the mode of EtherNet/IP.



Description

The page contains the following boxes:

- **EtherNet/IP Device Diagnostics**

  Shows whether EtherNet/IP is enabled ("On") or disabled ("Off").

- **EtherNet/IP Device Diagnostics for next boot**

  Set whether EtherNet/IP will be enabled ("On") or disabled ("Off") after the next device restart.

Note

EtherNet/IP and PROFINET

When EtherNet/IP is turned on, PROFINET is turned off. The switchover from EtherNet/IP and PROFINET has no effect on DCP.

Note

PROFINET AR Status

If a PROFINET connection is established; in other words the PROFINET AR status is "Online", you cannot enable EtherNet/IP.

- **Restart with EtherNet/IP Defaults**

  Click this button to restore the default settings of the EtherNet/IP profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays these settings specially made for operation with the EtherNet/IP protocol.

NOTICE
By resetting all the settings to the default settings of a profile, the IP address is also lost. Following this, the device can only be accessed via the serial interface, using the Primary Setup Tool or using DHCP. With the appropriate attachment, a previously correctly configured device can cause circulating frames after the reset and therefore the failure of the data traffic.

5.4.18 PLUG

5.4.18.1 Configuration

NOTICE
Do not remove or insert a C-PLUG during operation A PLUG may only be removed or inserted when the device is turned off. The device checks whether or not a PLUG is present at one second intervals. If it is detected that the PLUG was removed, there is a restart.

Information about the configuration of the C-PLUG

This page provides detailed information about the configuration stored on the C-PLUG. It is also possible to reset the PLUG to "factory defaults" or to load it with new contents.

Note

The action is only executed after you click the "Set Values" button.

The action cannot be undone.

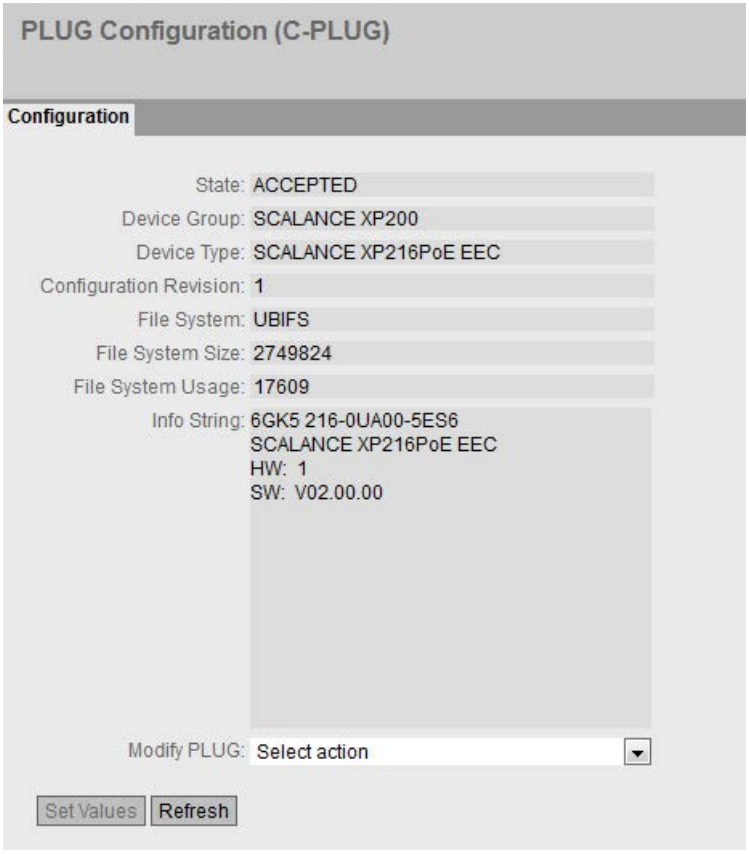
If you decide against executing the function after making your selection, click the "Refresh" button. As a result the data of this page is read from the device again and the selection is canceled.

Note

Incompatibility with older firmware versions with PLUG inserted

During the installation of an older firmware version, the configuration data can be lost. In this case, the device starts up with the factory settings after the firmware has been installed. In this situation, if a PLUG is inserted in the device, following the restart, this has the status "NOT ACCEPTED" since the PLUG still has the configuration data of the previous more up-to-date firmware. This allows you to return to the previous, more up-to-date firmware without any loss of configuration data.

If the original configuration on the PLUG is no longer required, the PLUG can be deleted or rewritten manually using "System > PLUG".



Description of the displayed boxes

The table has the following rows:

- **Status**
  Shows the status of the PLUG. The following are possible:
  - ACCEPTED
    There is a PLUG with a valid and suitable configuration in the device.
  - NOT ACCEPTED
    Invalid or incompatible configuration on the inserted PLUG.
  - NOT PRESENT
    No C-PLUG is inserted in the device.
  - FACTORY
    PLUG is inserted and does not contain a configuration. This status is also displayed when the PLUG was formatted during operation.
- **Device Group**
  Shows the SIMATIC NET product line that used the C-PLUG previously.
- **Device type**
  Shows the device type within the product line that used the C-PLUG previously.
- **Configuration Revision**
  The version of the configuration structure. This information relates to the configuration options supported by the device and has nothing to do with the concrete hardware configuration. This revision information does not therefore change if you add or remove additional components (modules or extenders), it can, however, change if you update the firmware.
- **File System**
  Displays the type of file system on the PLUG.
- **File System Size [bytes]**
  Shows the maximum storage capacity of the file system on the C-PLUG.
- **File System Usage [bytes]**
  Displays the storage space in use in the file system of the C-PLUG.
- **Info String**
  Shows additional information about the device that used the PLUG previously, for example, order number, type designation, and the versions of the hardware and software. The displayed software version corresponds to the version in which the configuration was last changed. With the "NOT ACCEPTED" status, further information on the cause of the problem is displayed.
- **Modify PLUG**
  Select the setting from the drop-down list. You have the following options for changing the configuration on the C-PLUG:
  - Write Current Configuration to the PLUG
    This option is available only if the status of the PLUG is "NOT ACCEPTED" or "FACTORY".
    The configuration in the internal flash memory of the device is copied to the PLUG.
  - Erase PLUG to factory default
    Deletes all data from the C-PLUG and triggers low-level formatting.

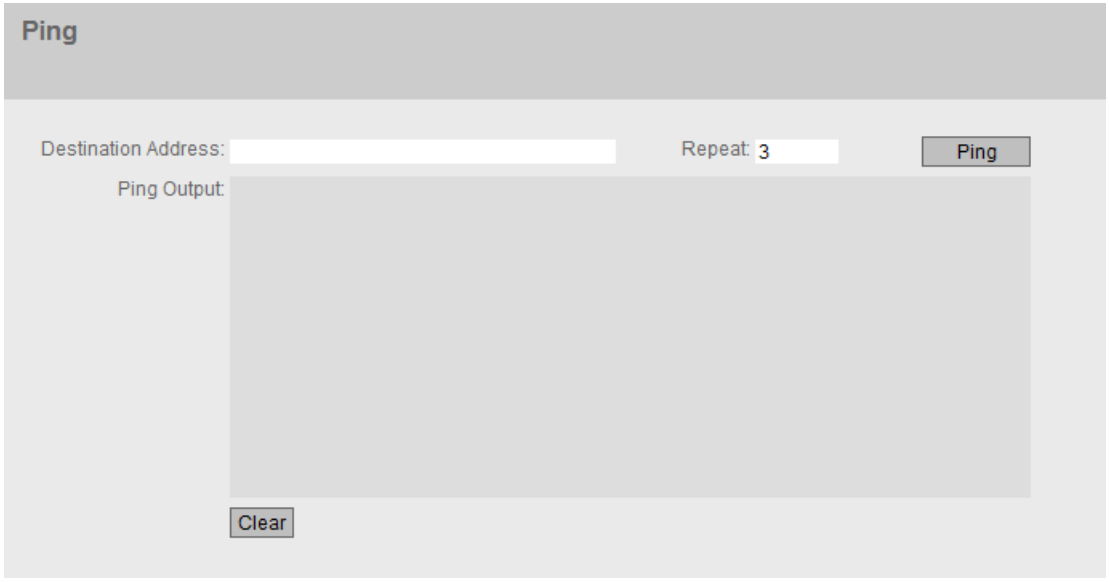
Steps in configuration

1. You can only make settings in this box if you are logged on as "Administrator". Here, you decide how you want to change the content of the PLUG.
2. Select the required option from the "Modify PLUG" drop-down list.
3. Click the "Set Values" button.

5.4.19 Ping

Reachability of an address in an IPv4 network

With the ping function, you can check whether a certain IPv4 address is reachable in the network.



Description

The table has the following columns:

- **Destination Address**
  Enter the IPv4 address of the device.
- **Repeat**
  Enter the number of ping requests.
- **Ping**
  Click this button to start the ping function.
- **Ping Output**
  This box shows the output of the ping function.
- **Clear**
  Click this button to empty the "Ping Output" box.

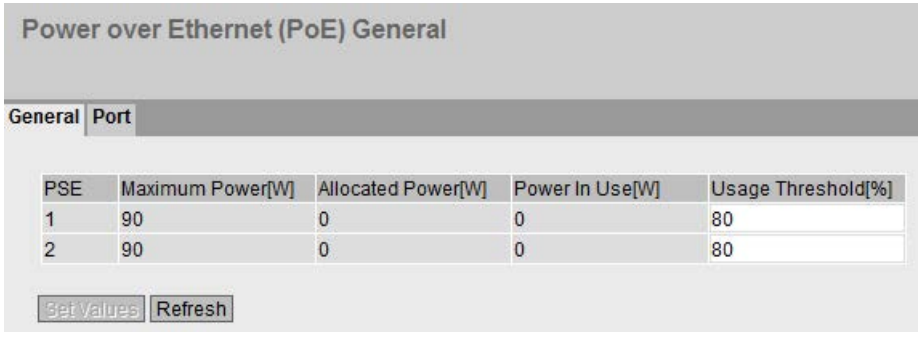
5.4.20 Power over Ethernet (PoE)

5.4.20.1 General

Settings for Power over Ethernet (PoE)

On this page, you see information about the power that the IE switch supplies with PoE.

The PoE variants of the SCALANCE XP-200 represent PSEs (Power Sourcing Equipment).



Description of the displayed boxes

- **PSE (read-only)**

  Shows the number of the PSE.
- **Maximum Power [W] (read-only)**

  Maximum power that a PSE provides to supply PoE devices.
- **Allocated Power [W] (read-only)**

  Sum of the power reserved by the PoE devices according to the "Classification".
- **Power in Use [W] (read-only)**

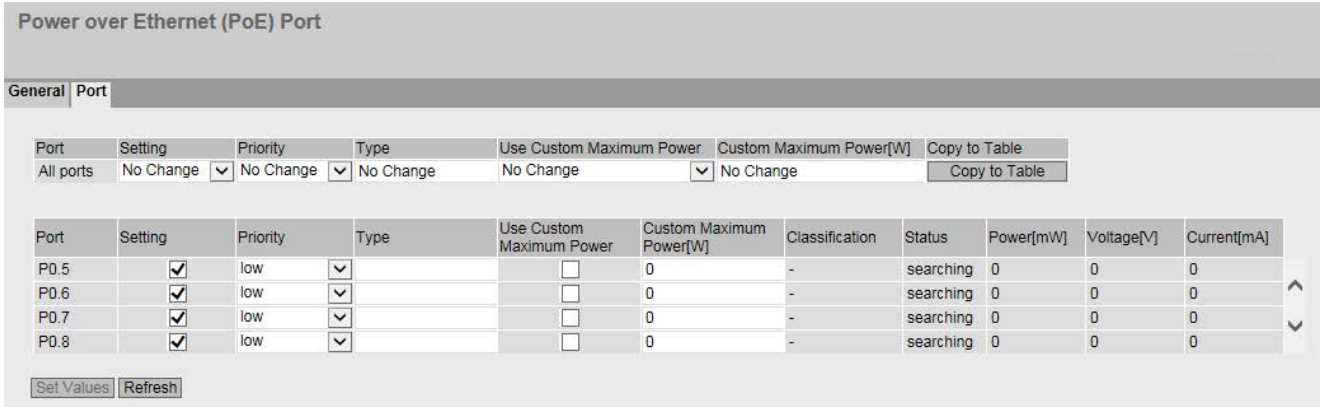
  Sum of the power used by the end devices.
- **Usage Threshold [%]**

  As soon as the power being used by the end devices exceeds the percentage shown here, an event is triggered.

5.4.20.2 Port

Settings for the ports

For each individual PoE port, you can specify whether or not the power will be supplied via Ethernet. You can also set a priority for each connected powered device (PD). Devices for which a high priority was set, take preference over other devices for the power supply.
On this page, you can see detailed information on the individual PoE ports.



Description of the displayed boxes

The page contains two tables. In table 1, you can make settings and assign them to all ports at the same time. In table 2, you can make different settings for each port.

Table 1 has the following columns:

- **Port**

  Shows that the settings are valid for all ports.

- **Setting**

  Select the required setting.

  If "No Change" is selected, the entry in table 2 remains unchanged.

- **Priority**

  Select the required priority.

  If "No Change" is selected, the entry in table 2 remains unchanged.

- **Type**

  Here, you can enter a string to describe the connected device in greater detail. The maximum length is 255 characters.

- **Use Custom Maximum Power**

  Select whether the custom maximum power is used.

  If "No Change" is selected, the entry in table 2 remains unchanged.

- **Custom Maximum Power [W]**

  Enter the maximum power that a port makes available to supply a connected device.

  This value is only taken into account when the "Use Custom Maximum Power" check box is selected.

  If "No Change" is entered, the entry in table 2 remains unchanged

- **Copy to Table**

  If you click the button, the settings are adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**

  Shows the configurable PoE ports.
  The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

- **Setting**

  Enable the PoE power supply for this port or interrupt it.

- **Priority**

  From the drop-down list, select which priority this port will have for the power supply.

  The following settings are possible, in ascending order of relevance:

  – Low

    Low priority

  – High

    Medium priority

  – Critical

    High priority

  If the power of the connected power supply is inadequate to supply all connected devices, devices with a higher priority are given preference.

  If the same priority is set for two ports, the port with the lower number will be preferred when necessary.

- **Type**

  Here, you can enter a string to describe the connected device in greater detail. The maximum length is 255 characters.

- **Use Custom Maximum Power**

  If you enable this check box for a port, the user-defined maximum power is used.

- **Custom Maximum Power [W]**

  Enter the maximum power that a port makes available to supply a connected device.

  This value is only taken into account when the "Use Custom Maximum Power" check box is selected.

  The user-defined power is compared to the range of values of the class indicated by the connected device.

  – If the user-defined power is within the class of the connected device, the user-defined value is used.
  – If the user-defined power is above the class of the connected device, the highest value of the class is used.
  – If the user-defined power is below the class of the connected device, the lowest value of the class is used.

  If the power consumption of the connected device exceeds the defined or used maximum power, the connected device is turned off.

- **Classification (read-only)**

  The classification specifies the class of the device.

- **Status (read-only)**

  Shows the current status of the port.

  The following states are possible:

  – disabled

    The PoE power supply is deactivated for this port.

  – delivering

    The PoE power supply is activated for this port and a device is connected.

  – searching

    The PoE power supply is activated for this port but there is no device connected.

  Note

  If a device is connected to a port with PoE capability, a check is made to determine whether the power of the port is adequate for the connected device.

  If the power of the port is inadequate, although PoE is enabled in "Setting", the port nevertheless has the status "disabled". This means that the port was disabled by the PoE power management.

- **Power [mW] (read-only)**

  Shows the power that the SCALANCE provides for this port.

- **Voltage [V] (read-only)**

  Shows the voltage applied to this port.

- **Current [mA] (read-only)**

  Shows the current with which a device connected to this port is supplied.

5.4.21 Port Diagnostics

5.4.21.1 Cable Tester

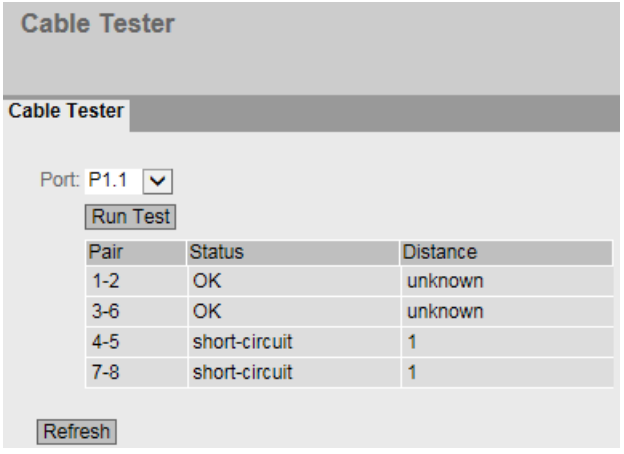
With this page, each individual Ethernet port can run independent fault diagnostics on the cable. This test is performed without needing to remove the cable, connect a cable tester and install a loopback module at the other end. Short-circuits and cable breaks can be localized to within a few meters.

Note

Please note that this test is permitted only when no data connection is established on the port to be tested.

If, however, there is a data connection to the port to be tested, this is briefly interrupted.

Automatic re-establishment of the connection can fail and then needs to be done manually.



Description

The page contains the following boxes:

- **Port**
  Select the required port from the drop-down list.
- **Run Test**
  Activates error diagnostics. The result is shown in the table.

This table contains the following columns:

- **Pair**
  Shows the wire pair in the cable.

  Note
  Wire pairs

  Wire pairs 4-5 and 7-8 of 10/100 Mbps network cables are not used.

  The wire pair assignment - pin assignment is as follows (DIN 50173):

  Pair 1 = pin 1-2

  Pair 2 = pin 3-6

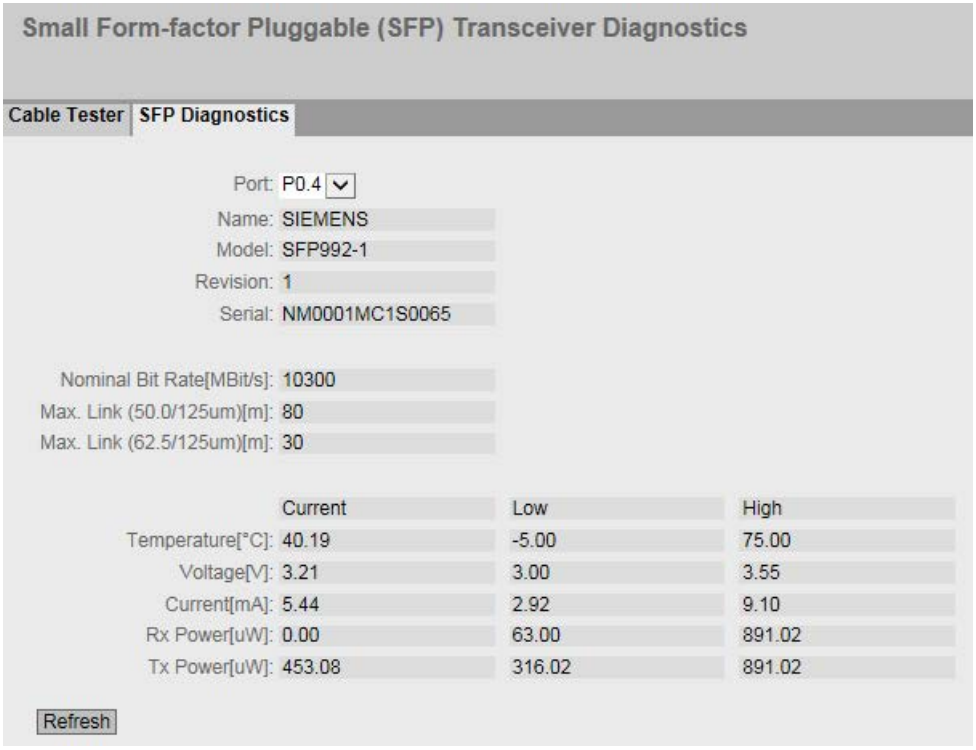
  Pair 3 = pin 4-5

  Pair 4 = pin 7-8

- **Status**
  Displays the status of the cable.
- **Distance**
  Displays the distance to the cable end, cable break, or short-circuit in meters. The value for the distance has a tolerance of +/- 1 m.

5.4.21.2 SFP diagnostics

On this page, you run independent error diagnostics for each individual SFP port. This test is performed without needing to remove the cable, connect a cable tester or install a loopback module at the other end.



Description

The page contains the following boxes:

- **Port**
  Select the required port from the drop-down list.
- **Refresh**
  Refreshes the display of the values of the set port. The result is shown in the table.

The values are shown in the following boxes:

- **Name**
  Shows the name of the interface.
- **Model**
  Shows the type of interface.
- **Revision**
  Shows the hardware version of the SFP.
- **Serial**

  Shows the serial number of the SFP.

- **Nominal Bit Rate [Mbps]**

  Shows the nominal bit rate of the interface.
- **Max. Link (50.0/125um) [m]**

  Shows the maximum distance in meters that is possible with this medium.
- **Max. Link (62.5/125um) [m]**

  Shows the maximum distance in meters that is possible with this medium.

The following table shows the values of the SFP transceiver used in this port:

- **Temperature [°C]**

  Shows the temperature of the interface.
- **Voltage [V]**

  Shows the voltage applied to the interface [V].
- **Current [mA]**

  Shows the current consumption of the interface [mA].
- **Rx Power [µW]**

  Shows the receive power of the interface [µW].
- **Tx Power [µW]**

  Shows the transmit power of the interface [µW].
- **Current** column

  Shows the current value.
- **Low** column

  Shows the lowest value.
- **High** column

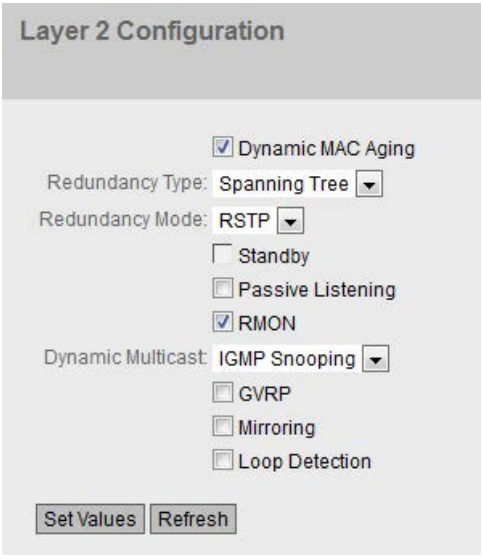
  Shows the highest value.

5.5 The "Layer 2" menu

5.5.1 Configuration

Configuring layer 2

On this page, you create a basic configuration for the functions of layer 2. On the configuration pages of these functions, you can make detailed settings. You can also check the settings on the configuration pages.



Description of the displayed boxes

- **Dynamic MAC Aging**
  Enable or disable the "Aging" mechanism. You can configure other settings in "Layer 2 > Dynamic MAC Aging".
- **Redundancy Type**
  The following settings are available:
  - **"-" (disabled)**
    The redundancy function is disabled.
  - **Spanning Tree**
    If you select this option, you specify the required redundancy mode in the "Redundancy Mode" drop-down list.
  - **Ring**

    If you select this option, you specify the required redundancy mode in the "Redundancy Mode" drop-down list.

- **Redundancy Mode**

  If you select "Ring" in the "Redundancy Type" drop-down list, the following options are then available:

  – Automatic Redundancy Detection

    Select this setting to create an automatic configuration of the redundancy mode.

    In the "Automatic Redundancy Detection" mode, the device automatically detects whether or not there is a device with the "HRP Manager" role in the ring. If there is, the device adopts the role "HRP" client.
    If no HRP manager is found, all devices with the "Automatic Redundancy Detection" or "MRP Auto Manager" setting negotiate among themselves to establish which device adopts the role of "MRP Manager". The device with the lowest MAC address will always become "MRP Manager". The other devices automatically set themselves to "MRP Client" mode.

  – MRP Auto-Manager

    In the "MRP Auto Manager" mode, the devices negotiate among themselves to establish which device will adopt the role of "MRP Manager". The device with the lowest MAC address will always become "MRP Manager". The other devices automatically set themselves to "MRP Client" mode.

    In contrast to the setting "Automatic Redundancy Detection", the devices are not capable of detecting whether or not an HRP manager is in the ring.

    Note

    MRP configuration in STEP 7

    If you set the role "Manager (Auto)" or "Manager" for the device in STEP 7, in both cases, "MRP Auto Manager" is displayed on this WBM page. In the display in the CLI, a distinction is made between the two roles.

  – MRP Client

    The device adopts the role of MRP client.

  – HRP Client

    The device adopts the role of HRP client.

  – HRP Manager

    Te device adopts the role of HRP manager.

    When you configure an HRP ring, one device must be set as HRP manager. For all other devices, "HRP Client" or "Automatic Redundancy Detection" must be set.

  If you select "Spanning Tree" in the "Redundancy Type" drop-down list, the following options are then available:

  – **STP**
    Enables the Spanning Tree Protocol (STP). Typical reconfiguration times with spanning tree are between 20 and 30 seconds. You can configure other settings in "Layer 2 > Spanning Tree".

  - **RSTP**
    Enables the Rapid Spanning Tree Protocol (RSTP). If a spanning tree frame is detected at a port, this port reverts from RSTP to spanning tree. You can configure other settings in "Layer 2 > Spanning Tree".

    Note

    When using RSTP, loops involving duplication of frames or frames being overtaken may occur briefly. If this is not acceptable in your particular application, use the slower standard spanning tree mechanism.

  - **MSTP**
    Enables the Multiple Spanning Tree Protocol (MSTP). You can configure other settings in "Layer 2 > Spanning Tree".

- **Standby**

  Enable or disable the standby redundancy function. You will find other settings in "Layer 2 > Ring Redundancy"

- **Passive Listening**

  Enable or disable the passive listening function.

  With passive listening, you can connect spanning tree networks to MRP/HRP rings. The ring nodes forward spanning tree BPDUs and therefore react to topology changes. When a topology change frame is received, the MAC address table is deleted.

- **RMON**
  If you select this check box, Remote Monitoring (RMON) allows diagnostics data to be collected on the device, prepared and read out using SNMP by a network management station that also supports RMON. This diagnostic data, for example port-related load trends, allow problems in the network to be detected early and eliminated. Some of the "Ethernet statistics counters" are part of the RMON function. If you disable RMON, the "Ethernet statistics counter" in "Information > Ethernet statistics" is no longer updated.

- **Dynamic Multicast**
  The following settings are possible:

  - **"-" (disabled)**

  - **IGMP Snooping**
    Enables IGMP (Internet Group Management Protocol). You can configure other settings in "Layer 2 > Multicast > IGMP".

  - **GMRP**
    Enables GMRP (GARP Multicast Registration Protocol). You can configure other settings in "Layer 2 > Multicast > GMRP".

    Note

    GMRP and IGMP cannot operate at the same time.

- **GVRP**
  Enable or disable "GVRP" (GARP VLAN Registration Protocol). You can configure other settings in "Layer 2 > VLAN > GVRP".

- **Mirroring**
  Enable or disable port mirroring. You can configure other settings in "Layer 2 > Mirroring".
- **Loop Detection**
  Enable or disable the loop detection function. This allows loops in the network to be detected. You will find other settings in "Layer 2 > Loop Detection"

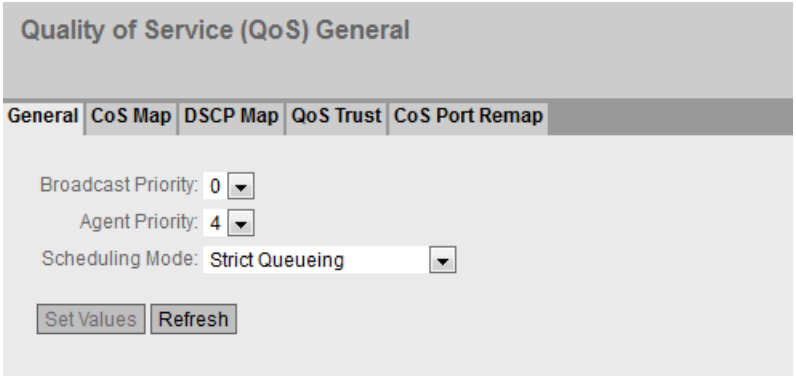
5.5.2 Quality of Service (QoS)

You should also refer to the chapter "Technical Basics", section "Quality of service (Page 37)".

5.5.2.1 General

Transmission priorities

On this page, you can specify the priorities of different frames. In addition to this, depending on the priority you can set the method according to which the processing order of the frames is specified.



Description of the displayed values

The page contains the following boxes:

- **Broadcast Priority**

  Specify the priority of broadcast frames. The switch sorts the frame into a Queue according to this prioritization. You configure the assignment of the priority to a queue on the page ""Layer 2 > QoS > CoS Map".

- **Agent Priority**

  Specify the priority of agent frames. The switch sorts the frame into a queue according to this prioritization . You configure the assignment of the priority to a queue on the page ""Layer 2 > QoS > CoS Map".

- **Scheduling Mode**

  Select the order in which the frames are processed in the queues.

  – Strict Queueing

    As long as there are frames with high priority in the queue, only these high-priority frames are processed.

  – Weighted Fair Queueing

    Even if there are frames with high priority in the queue, frames with a lower priority will be processed occasionally.

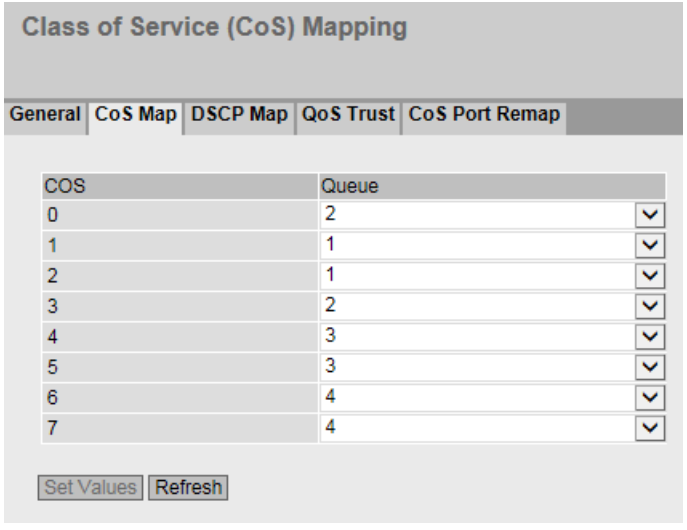
Steps in configuration

1. From the drop-down lists "Broadcast Priority" and "Agent Priority" select the priority with which the frames will be processed internally.
2. In the "Scheduling Mode" drop-down list select the method according to which the processing order of the frames is decided.
3. Click the "Set Values" button.

5.5.2.2 CoS Map

CoS Map

On this page, you can assign CoS priorities to different queues.



Description of the displayed boxes

The table has the following columns:

- **CoS**
  Shows the CoS priority of the incoming frames.
- **Queue**
  From the drop-down list, select the queue that is assigned to the CoS priority.
  The higher the number of the Queue, the higher the processing priority.

The service classes (CoS) are assigned to the queues as default as follows:

- COS 0 → Queue 2
- COS 1 → Queue 1
- COS 2 → Queue 1
- COS 3 → Queue 2
- COS 4 → Queue 3
- COS 5 → Queue 3
- COS 6 → Queue 4
- COS 7 → Queue 4

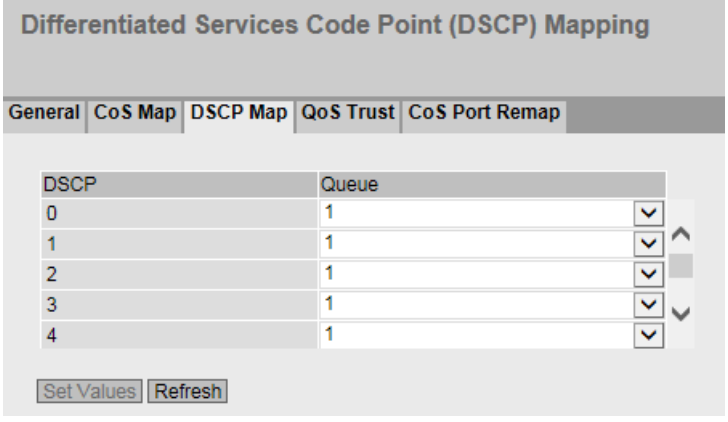
Steps in configuration

1. For each value in the "CoS" column, select the queue from the "Queue" drop-down list.
2. Click the "Set Values" button.

5.5.2.3 DSCP Map

DSCP queue

On this page, you can assign DSCP priorities to different Queues.



Description of the displayed values

The table has the following columns:

- **DSCP**
  Shows the DSCP priority of the incoming frames.
- **Queue**
  From the drop-down list, select the queue that is assigned to the DSCP priority.
  The higher the queue number the higher the processing priority

The DSCP priorities are assigned to the queues as default as follows:

- DSCP codes 0 - 15 → Queue 1
- DSCP codes 16 - 31 → Queue 2
- DSCP codes 32 - 47 → Queue 3
- DSCP codes 48 - 63 → Queue 4

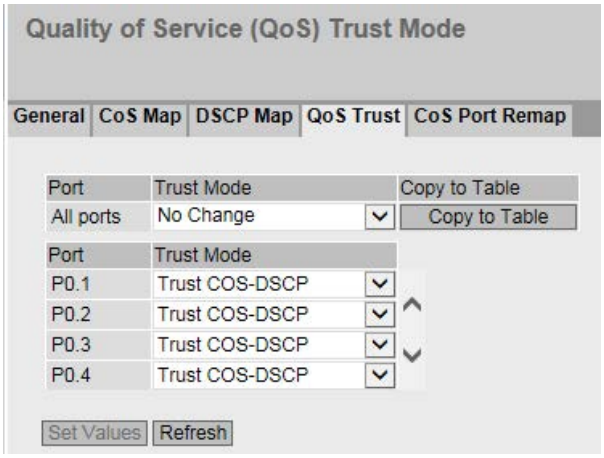
Steps in configuration

1. For each value in the "DSCP" column, select the queue from the "Queue" drop-down list.
2. Click the "Set Values" button.

5.5.2.4 QoS Trust

Specifying the subnet priority

On this page you can set the method according to which frames to be forwarded are prioritized port by port.



Description of the displayed values

Table 1 has the following columns:

- **Port**

  Shows that the setting is valid for all ports of table 2.

- **Trust Mode**

  Select the setting from the drop-down list. You have the following setting options:

  – No Trust

  – Trust COS

  – Trust DSCP

  – Trust COS-DSCP

  – No Change

  Table 2 remains unchanged.

- **Copy to Table**

  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the configurable ports.
  The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

- **Trust Mode**
  Select the required mode from the drop-down list:

  Note

  You configure the prioritization of the receiving port on the page "Layer 2 > VLAN > Port Based VLAN".

  You configure the assignment of the following priorities to a queue on the page ""Layer 2 > QoS > CoS Map".

  - Receiving port
  - VLAN tag
  - Broadcast and agent frame

  You configure the assignment of the DSCP prioritization to a queue on the page ""Layer 2 > QoS > DSCP Mapping".

  – No Trust

    The switch sorts the incoming frames into a queue according to the prioritization of the receiving port.

    If there is a DSCP value in the IP header, this is ignored. If a VLAN tag exists, its priority value is replaced by the priority value of the receiving port.

  – Trust COS

    If an incoming frame contains a VLAN tag, the switch sorts it into a queue according to this prioritization.

    If the frame does not contain a VLAN tag, the switch sorts the frame into a queue according to the prioritization of the receiving port.

    If there is a DSCP value in the IP header, this is ignored.

  – Trust DSCP

    If an incoming frame contains a DSCP prioritization, the switch sorts it into a queue according to this prioritization.

    If the frame does not contain a DSCP prioritization, the switch sorts the frame into a queue according to the prioritization of the receiving port.

    If the frame contains a VLAN tag, this is ignored.

  – Trust COS-DSCP

    With an incoming frame, there is a sequential check of which prioritization it contains.
    If it contains a DSCP prioritization, it is handled as in the "Trust DSCP" mode.
    If it contains no DSCP prioritization, the switch checks whether it contains a VLAN tag.
    If it contains a VLAN tag, the switch sorts it into a queue according to this prioritization.
    If the frame contains neither a DSCP prioritization nor a VLAN tag, the switch sorts the frame into a queue according to the prioritization of the receiving port.

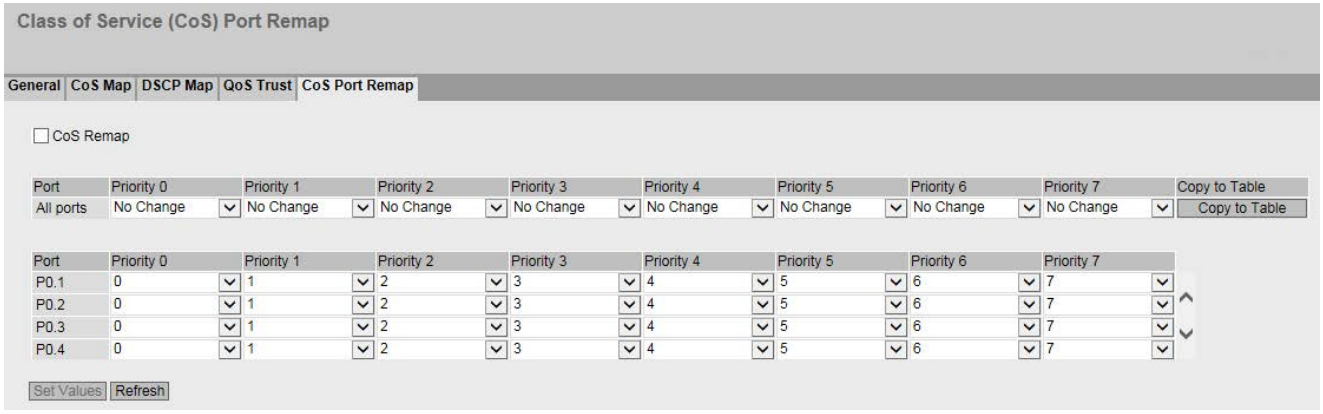
Steps in configuration

1. Select the required Trust Mode from the drop-down list.
2. Click the "Set Values" button.

5.5.2.5 CoS Port Remap

Changing priority when sending

On this page depending on the priority when receiving, you can change the priority of a frame with which it is sent.



Description of the displayed boxes

The page contains the following boxes:

- **CoS Remap**

  Enable or disable frames being sent with changed priorities according to Table 2.

Table 1 has the following columns:

- **Port**

  Shows that the settings are valid for all ports of table 2.

- **Priority 0 - 7**

  The priority in the column stands for the priority with which a frame is received.

  – 0 - 7

    Select the priority with which a frame will be sent.

  – No Change

    No change in table 2.

- **Copy to Table**

  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**

  Shows all available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

- **Priority 0 - 7**

  The priority in the column stands for the priority with which a frame is received.

  In the drop-down list select the priority with which a frame will be sent.

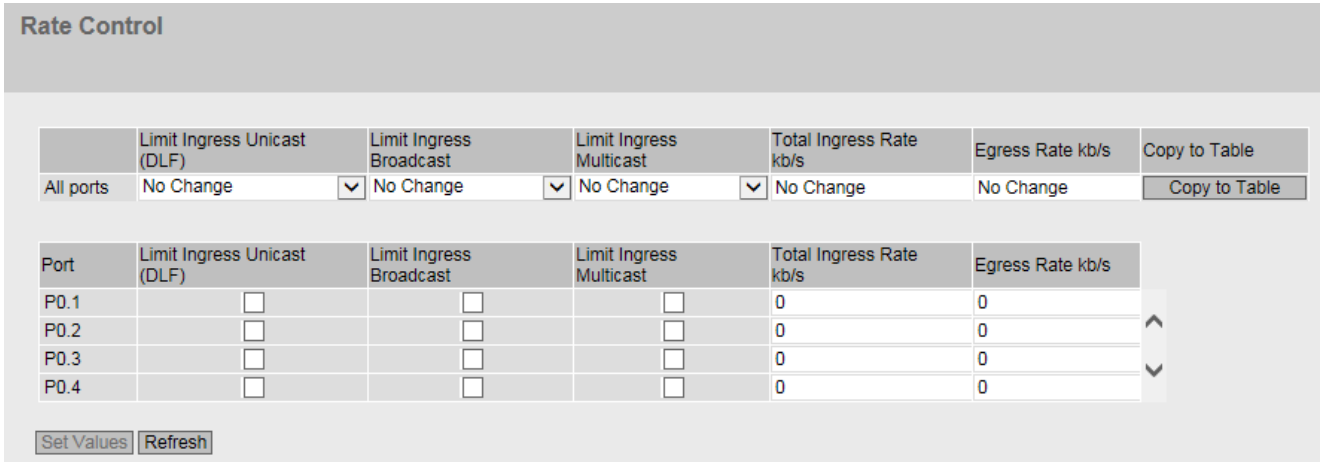
Steps in configuration

1. Select the "CoS Remap" check box.
2. Using the drop down lists select the priority for sending for each receive priority per port.
3. Click the "Set Values" button.

5.5.3 Rate Control

Limiting the transfer rate of incoming and outgoing data

On this page, you configure the load limitation for the individual ports. You can specify the category of frame for which these limit values will apply.



Description of the displayed values

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports.
- **Limit Ingress Unicast(DLF) / Limit Ingress Broadcast / Limit Ingress Multicast**
  Select the required setting in the drop-down list.
  - Enabled: Enables the function.
  - Disabled: Disables the function
  - No Change: The setting in table 2 remains unchanged
- **Total Ingress Rate kb/s**

  Specify the data rate for all incoming frames. If "No Change" is entered, the entry in table 2 remains unchanged
- **Egress Rate kb/s**

  Specify the data rate for all outgoing frames. If "No Change" is entered, the entry in table 2 remains unchanged
- **Copy to table**
  If you click the button, the settings are adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**

  Shows all available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Limit Ingress Unicast(DLF)**
  Enable or disable the data rate for limiting incoming unicast frames with an unresolvable address (Destination Lookup Failure).
- **Limit Ingress Broadcast**
  Enable or disable the data rate for limiting incoming broadcast frames.
- **Limit Ingress Multicast**
  Enable or disable the data rate for limiting incoming multicast frames.
- **Total Ingress Rate kb/s**

  Specify the data rate for all incoming frames.
- **Egress Rate kb/s**
  Specify the data rate for all outgoing frames.

Note

Rounding of the values, deviation from desired value

When you input, note that the WBM rounds to correct values.

If values are configured for Total Ingress Rate and Egress Rate, the actual values in operation can deviate slightly from the set values.

Steps in configuration

1. Enter the relevant values in the columns "Total Ingress Rate"and "Egress Rate" in the row of the port being configured.
2. To use the limitation for the incoming frames, select the check box in the row. For outgoing frames, the value in the "Egress Rate" column is used.
3. Click the "Set Values" button.

5.5.4 VLAN

5.5.4.1 General

VLAN configuration page

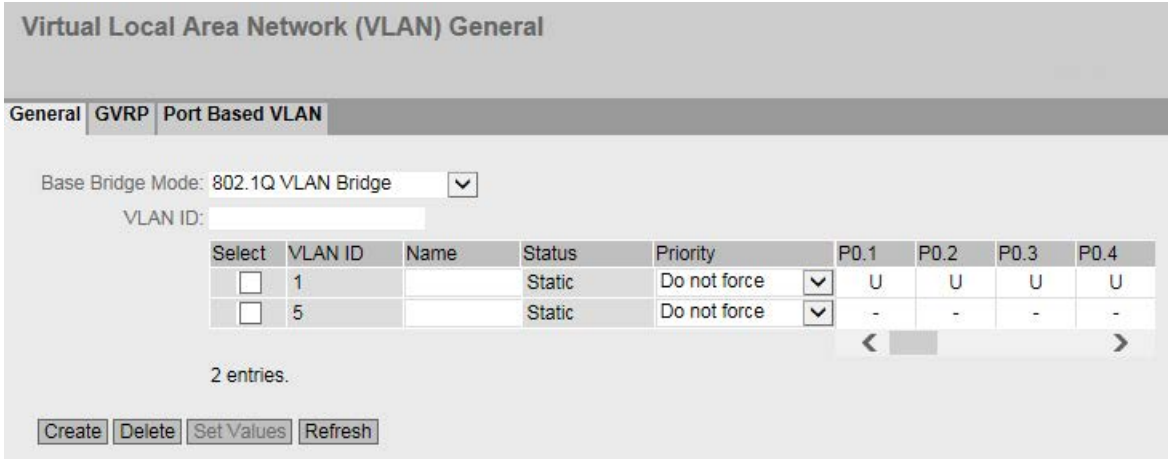
On this page you specify whether or not the device forwards frames with VLAN tags transparently (IEEE 802.1D/VLAN-unaware mode) or takes VLAN information into account (IEEE 802.1Q/VLAN-aware mode). If the device is in the "802.1Q VLAN Bridge" mode, you can define VLANs and specify the use of the ports .

The possible settings on this page depend on what you select in the "Base Bridge Mode" box.

Note

Changing the Agent VLAN ID

If the configuration PC is connected directly to the device via Ethernet and you change the agent VLAN ID, the device is no longer reachable via Ethernet following the change.



Description of the displayed boxes

The page contains the following boxes:

- **Base bridge mode**

  Note
  Changing Base bridge mode

  Note the section "Changing Base bridge mode" in this chapter. This section describes how a change affects the existing configuration.

  Select the required mode from the drop-down list. The following modes are possible:

  – 802.1Q VLAN Bridge

    Sets the mode "VLAN-aware" for the device. In this mode, VLAN information is taken into account.

  – 802.1D Transparent Bridge

    Sets the mode "VLAN-unaware" for the device. In this mode, VLAN tags are not taken into account or changed but are forwarded transparently. In this mode, you cannot create any VLANs. Only a management VLAN is available: VLAN 1.

- **VLAN ID**

  Enter the VLAN ID in the "VLAN ID" input box.
  Range of values: 1 ... 4094

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **VLAN ID**

  Shows the VLAN ID. The VLAN ID (a number between 1 and 4094) can only be assigned once when creating a new data record and can then no longer be changed. To make a change, the entire data record must be deleted and created again.

- **Name**

  Enter a name for the VLAN. The name only provides information and has no effect on the configuration.

  Length: max. 32 characters

- **State**

  Shows the status type of the entry in the internal port filter table. Here, "Static" means that the VLAN was entered statically by the user.

- **Priority**

  Select a priority to be forced for the VLAN. The selected priority is entered in all incoming frames of this VLAN. The incoming frames are processed further by the switch according to the selected priority.

  If you select "Do not force", the priority of the frames remains unchanged.

- **List of ports**
  Specify the use of the port. The following options are available:
  - "-"
    The port is not a member of the specified VLAN.
    With a new definition, all ports have the identifier "-".
  - M
    The port is a member of the VLAN. Frames sent in this VLAN are forwarded with the corresponding VLAN tag.
  - R
    The port is a member of the VLAN. A GVRP frame is used for the registration.
  - U (uppercase)
    The port is an untagged member of the VLAN. Frames sent in this VLAN are forwarded without the VLAN tag. Frames without a VLAN tag are sent from this port.
  - u (lowercase)
    The port is an untagged member of the VLAN, but the VLAN is not configured as a port VLAN. Frames sent in this VLAN are forwarded without the VLAN tag.
  - F
    The port is not a member of the specified VLAN and cannot become a member of this VLAN even if it is configured as a trunk port.
  - T
    This option is only displayed and cannot be selected in the WBM.
    This port is a trunk port making it a member in all VLANs.

Changing Base bridge mode

VLAN-unaware (802.1D transparent bridge) → VLAN-aware (802.1Q VLAN bridge)

If you change the Base bridge mode from VLAN-unaware to VLAN aware, this has the following effects

- All static and dynamic unicast entries are deleted.
- All static and dynamic multicast entries are deleted.
- With spanning tree you can set the following protocol compatibility: STP, RSTP and MSTP.

VLAN-aware (802.1Q VLAN bridge) → VLAN-unaware (802.1D transparent bridge)

If you change the Base bridge mode from VLAN-aware to VLAN-unaware, this has the following effects

- All VLAN configurations are deleted.
- A management VLAN is created: VLAN 1.
- All static and dynamic unicast entries are deleted.
- All static and dynamic multicast entries are deleted.
- With spanning tree you can set the following protocol compatibility: STP and RSTP.
- You cannot use GVRP.
- You cannot use guest VLAN.
- The VLAN assignment cannot be adopted from the RADIUS server.
- You can configure the port type.

802.1Q VLAN bridge: Important rules for VLANs

Make sure you keep to the following rules when configuring and operating your VLANs:

- Frames with the VLAN ID "0" are handled as untagged frames but retain their priority value.
- As default, all ports on the device send frames without a VLAN tag to ensure that the end node can receive these frames.
- With SCALANCE X devices, the VLAN ID "1" is the default on all ports.
- If an end node is connected to a port, outgoing frames should be sent without a tag (static access port). If, however, there is a further switch at this port, the frame should have a tag added (trunk port).

Steps in configuration

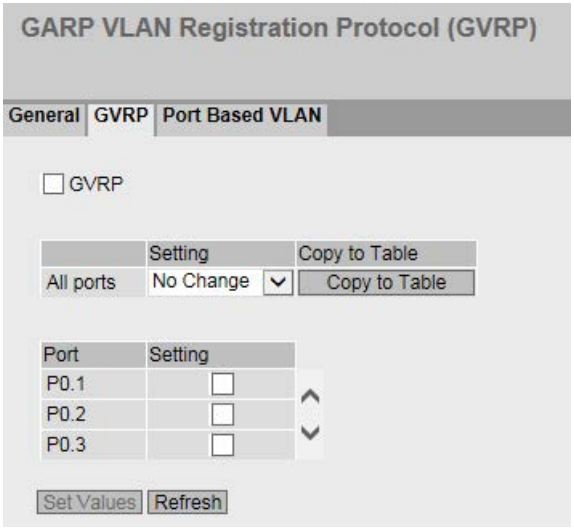
1. If "802.1Q VLAN bridge" is not set, from the drop-down list "Base Bridge Mode", select the entry "802.1Q VLAN Bridge". Click the "Set Values" button.
2. Enter an ID in the "VLAN ID" input box.
3. Click the "Create" button. A new entry is generated in the table. As default, the boxes have "-" entered.
4. If applicable, enter a name for the VLAN.
5. Specify the use of the port in the VLAN. If, for example you select "M", the port is a member of the VLAN. Frames sent in this VLAN are forwarded with the corresponding VLAN tag.
6. Click the "Set Values" button.

5.5.4.2 GVRP

Configuration of GVRP functionality

Using a GVRP frame, a different device can register at the port of the device for a specific VLAN ID. A different device, can, for example be an end device or a switch. The device can also send GVRP frames via this port.

On this page, you can enable each port for GVRP functionality.



Description of the displayed boxes

The page contains the following boxes:

- **GVRP**
  Enable or disable the GVRP function.

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Enables the sending of GVRP frames.
  - Disabled
    Disables the sending of GVRP frames.
  - No change
    No change to table 2.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Setting**
  Enable or disable the sending GVRP frames.

Steps in configuration

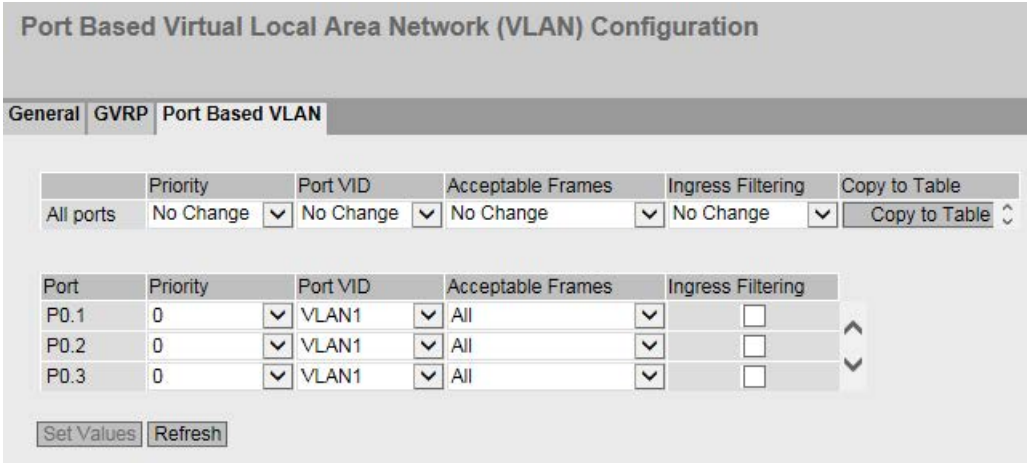
1. Click "GVRP" check box.
2. Click the check box after the port in the "Setting" column to enable or disable GVRP for this port.
   Repeat this for every port for which you want to enable or disable the function.
3. Click the "Set Values" button.

5.5.4.3 Port-based VLAN

Processing received frames

On this page, you specify the configuration of the port properties for receiving frames.

You can only configure the settings on this page if on the "General" tab you selected the "Base Bridge Mode" "802.1Q VLAN Bridge".



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports.
- **Priority / / Port VID / Acceptable Frames / Ingress Filtering**
  Select the setting in the drop-down list. If "No Change" is selected, the entry in table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Priority**

  The CoS priority (Class of Service) used in a VLAN tag. If a frame is received without a tag, it will be assigned this priority. The priority specifies how the frame is further processed compared with other frames.
  There are a total of eight priorities with values 0 to 7, where 7 represents the highest priority (IEEE 802.1P Port Priority).

  From the drop-down list, select the priority given to untagged frames.
- **Port VID**
  Select the VLAN ID from the drop-down list. Only VLAN IDs defined on the "VLAN > General" page can be selected.
  If a received frame does not have a VLAN tag, it has a tag with the VLAN ID specified here added to it and is sent according to the rules at the port.
- **Acceptable Frames**
  Specify which types of frames will be accepted. The following alternatives are possible:
  - Tagged Frames Only
    The device discards all untagged frames. Otherwise, the forwarding rules apply according to the configuration.
  - All
    The device forwards all frames.
- **Ingress Filtering**
  Specify whether the VID of received frames is evaluated
  You have the following options:
  - Enabled
    The VLAN ID of received frames decides whether they are forwarded: To forward a VLAN tagged frame, the receiving port must be a member in the same VLAN. Frames from unknown VLANs are discarded at the receiving port.
  - Disabled
    All frames are forwarded.

Steps in configuration

1. In the row of the port to be configured, click on the relevant cell in the table to configure it.
2. Enter the values to be set in the input boxes as follows.
3. Select the values to be set from the drop-down lists.
4. Click the "Set Values" button.

5.5.5 Mirroring

5.5.5.1 General

On this page, you can enable or disable the mirroring function and make the basic settings.

Note

It cannot be guaranteed when mirroring the data traffic that all packets are mirrored. This depends primarily on the load on the mirrored ports and on the number of sessions. To achieve maximum precision, a limit of one session is recommended.

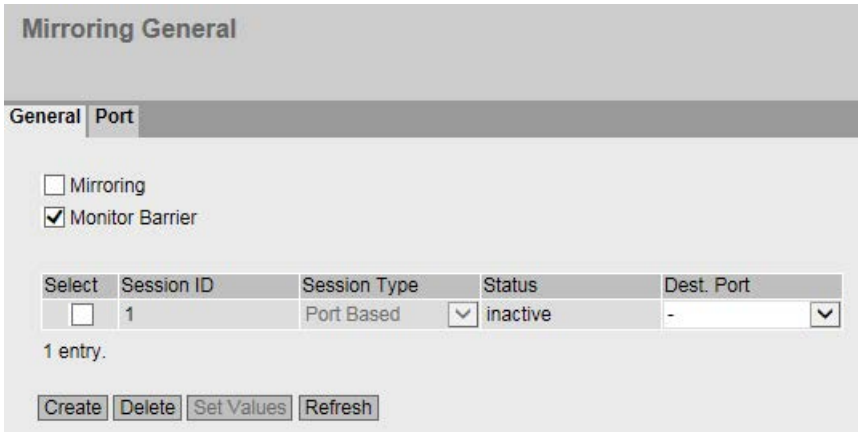
Note the data rate

If the maximum data rate of the mirrored port is higher than that of the monitor port, data may be lost and the monitor port no longer reflects the data traffic at the mirrored port. Several ports can be mirrored to one monitor port at the same time.

Several source ports from the same VLAN

If in a VLAN you select more than one source port for the port-based egress mirroring, unknown unicast and multicast frames as well as broadcast frames are forwarded only once to the destination port.

Settings



The page contains the following boxes:

- **Mirroring**

  Click this check box to enable or disable mirroring.

  Note

  You need to disable port mirroring if you want to connect a normal end device to the monitor port.

- **Monitor Barrier**

  Click this check box to enable or disable Monitor Barrier.

  Note

  Effects of Monitor Barrier

  If you enable this option, management of the switch via the monitor port is no longer reachable. The following port-specific functions are changed:

  - The DCP Forwarding is turned off.
  - LLDP is turned off.
  - Unicast, multicast and broadcast blocking are turned on.

  The previous statuses of these functions are no longer restored after disabling monitor barrier again. They are reset to the default values and may need to be reconfigured.

  You can configure these functions manually even if monitor barrier is turned on. The data traffic on the monitor port is also allowed again. If you do not require this, make sure that only the data traffic you want to monitor is forwarded to the interface.

  If mirroring is disabled, the listed port-specific functions are reset to the default values. This reset takes place regardless of whether the functions were configured manually or automatically by enabling Monitor Barrier.

The table for the basic settings contains the following boxes:

- **Select**

  Select the row you want to delete.

- **Session ID**

  The Session ID is assigned automatically when a new entry is created. You can create precisely one session.

- **Session Type**

  Shows the type of mirroring session.

- **Status**

  Shows whether or not mirroring is enabled.

- **Dest. Port**

  From the drop-down list, select the output port to which data will be mirrored in this session.

Procedure

Creating a mirroring session

1. Activate mirroring.
2. Click the "Create" button to create an entry in the table.

   The session ID is assigned automatically.
3. Select a destination port.
4. Click the "Set Values" button to save and activate the selected settings.
5. Change to the following tab to make further detailed settings for the session ID.

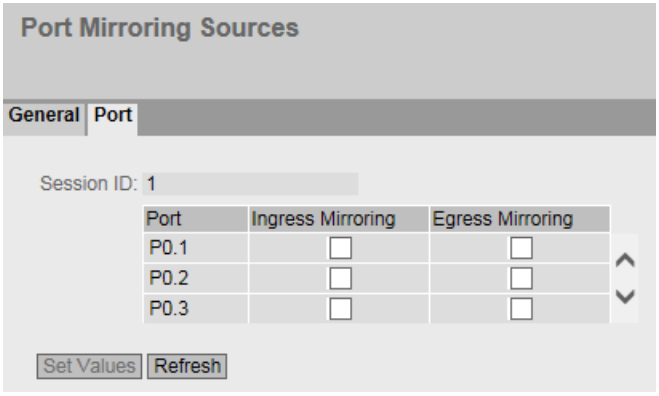
Deleting a mirroring session

1. Click the check box in the first column to select the row.
2. Click the "Delete" button to delete the selected rows.

5.5.5.2 Port

Mirroring ports

You can only configure the settings on this page if you have already generated a session ID with the session type "Port-based" on the "General" tab.



Description of the displayed boxes

The page contains the following boxes:

- **Session ID**

  Shows the session.

- **Port**
  Shows all available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

- **Ingress Mirroring**
  Enable or disable listening in on incoming packets at the required port.

- **Egress Mirroring**
  Enable or disable listening in on outgoing packets at the required port.

Note

Mirroring with ring ports

If you enable the mirroring function for a ring port, the ring port sends test frames even in the "link down" status.

Steps in configuration

1. In the table, click the check box of the row after the port to be mirrored.
   Select whether you want to monitor incoming or outgoing packets.
   To monitor the entire data traffic of the port, select both check boxes.
2. Click the "Set Values" button.

5.5.6 Dynamic MAC Aging

Protocol settings and switch functionality

The device automatically learns the source addresses of the connected nodes. This information is used to forward data frames to the nodes specifically involved. This reduces the network load for the other nodes.
If a device does not receive a frame whose source address matches a learnt address within a certain time, it deletes the learnt address. This mechanism is known as "Aging". Aging prevents frames being forwarded incorrectly, for example when an end device is connected to a different switch port.
If the check box is not enabled, a device does not delete learnt addresses automatically.

Description of the displayed boxes

The page contains the following boxes:

- **Dynamic MAC Aging**
  Enable or disable the function for automatic aging of learned MAC addresses.
- **Aging Time[s]**
  Enter the time in seconds in steps of 15. After this time, a learned address is deleted if the device does not receive any further frames from this sender address.

  Range of values: 15 - 630 (seconds)

  Factory setting: 30

  Note

  Rounding of the values, deviation from desired value

  When you input the Aging Time, note that the WBM rounds to correct values. If you enter a value that cannot be divided by 15, the value is automatically rounded down.

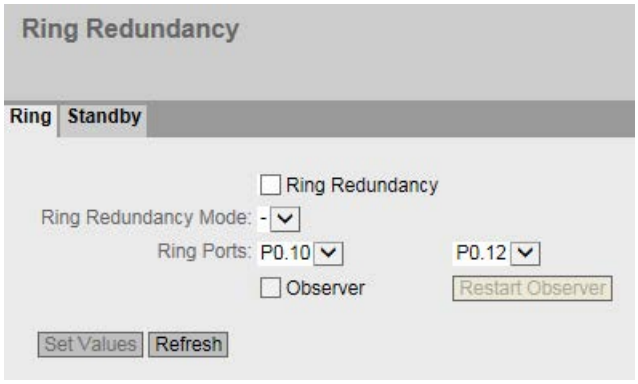
Steps in configuration

1. Select the "Dynamic MAC Aging" check box.
2. Enter the time in seconds in the "Aging Time[s]" input box.
3. Click the "Set Values" button.

5.5.7 Ring Redundancy

5.5.7.1 Ring

Configuration of ring redundancy



- **Ring Redundancy**
  If you enable the "Ring Redundancy" check box, you turn ring redundancy on. The ring ports set on this page are used.
- **Ring Redundancy mode**

  Here, you set the mode of the ring redundancy.

  The following modes are available:

  – Automatic Redundancy Detection

    Select this setting to create an automatic configuration of the redundancy mode.

    In the "Automatic Redundancy Detection" mode, the device automatically detects whether or not there is a device with the "HRP Manager" role in the ring. If there is, the device adopts the role "HRP" client.
    If no HRP manager is found, all devices with the "Automatic Redundancy Detection" or "MRP Auto Manager" setting negotiate among themselves to establish which device adopts the role of "MRP Manager". The device with the lowest MAC address will always become "MRP Manager". The other devices automatically set themselves to "MRP Client" mode.

– MRP Auto-Manager

  In the "MRP Auto Manager" mode, the devices negotiate among themselves to establish which device will adopt the role of "MRP Manager". The device with the lowest MAC address will always become "MRP Manager". The other devices automatically set themselves to "MRP Client" mode.

  In contrast to the setting "Automatic Redundancy Detection", the devices are not capable of detecting whether or not an HRP manager is in the ring.

  Note

  MRP configuration in STEP 7

  If you set the role "Manager (Auto)" or "Manager" for the device in STEP 7, in both cases, "MRP Auto Manager" is displayed on this WBM page. In the display in the CLI, a distinction is made between the two roles.

– MRP Client

  The device adopts the role of MRP client.

– HRP Client

  The device adopts the role of HRP client.

– HRP Manager

  Te device adopts the role of HRP manager.

  When you configure an HRP ring, one device must be set as HRP manager. For all other devices, "HRP Client" or "Automatic Redundancy Detection" must be set.

- **Ring ports**

  Here, you set the ports to be used as ring ports in ring redundancy.

  The ring port you select in the left-hand drop-down list is the "Isolated Port" in HRP.

  The factory setting defines the following ring ports:

Devices	Factory setting ring ports
SCALANCE XB208 and XB216	P0.1 and P0.2
SCALANCE XB205-3	P0.7 and P0.8
SCALANCE XB213-3	P0.15 and P0.16
SCALANCE XC206-2SFP, XC208, XC216 and XC224	P0.1 and P0.2
SCALANCE XC206-2	P0.7 and P0.8
SCALANCE XP208	P0.1 and P0.2
SCALANCE XP216	P0.10 and P0.12

- **Observer**

  Enable or disable the observer. The "Observer" function is only available in HRP rings.

  The ring port selected in the left-hand drop-down list is connected to the "isolated port" of an HRP manager.

  The observer monitors malfunctions of the redundancy manager or incorrect configurations of an HRP ring.

  If the observer is enabled, it can interrupt the connected ring if errors are detected. To do this, the observer switches a ring port to the "blocking" status. When the error is resolved, the observer enables the port again.

- **Restart Observer**

  If numerous errors occur in quick succession, the observer no longer enables its port automatically. The ring port remains permanently in the "blocking" status. This is signaled by the error LED and a message text.

  After the errors have been eliminated, you can enable the port again using the "Restart Observer" button.

Steps in configuration

1. Select the "Ring Redundancy" check box.
2. Select the redundancy mode.
3. Specify the ring ports.
4. Click the "Set Values" button.

Restoring factory settings

EtherNet/IP variants

If you have restored the factory defaults, ring redundancy is disabled and the ring port settings are reset. Spanning tree is enabled.

PROFINET variants

If you have restored the factory defaults, ring redundancy is enabled. If you reset to the factory settings, the ring port settings are also reset. If you used other ports previously as ring ports before resetting, a previously correctly configured device can cause circulating frames and therefore the failure of the data traffic.

Changing over the status of the ring ports with the redundancy manager (HRP)

If you configure a redundancy manager, set the status of the ring ports. The first ring port changes to the "blocking" status and the second ring port to the "forwarding" status. As long as ring redundancy is enabled, you cannot change the status of these ring ports.

Note

Make sure that you first open the ring so that there are no circulating frames.

Changing ring ports

To change the ring ports, follow the steps below:

1. Open the ring.
2. Select the new ring ports.
3. Change the cable connections.
4. Close the ring.

5.5.7.2 Standby

Redundant linking of rings

Standby redundancy allows the redundant linking of HRP rings.

To establish a standby connection, configure two neighboring devices within a ring as standby master or standby slave. The standby master and the standby slave must be connected via parallel cables to two devices in another ring.

In problem-free operation, messages are exchanged between the two rings via the master. If the master's line is disturbed, the slave takes over the forwarding of messages between the two rings.

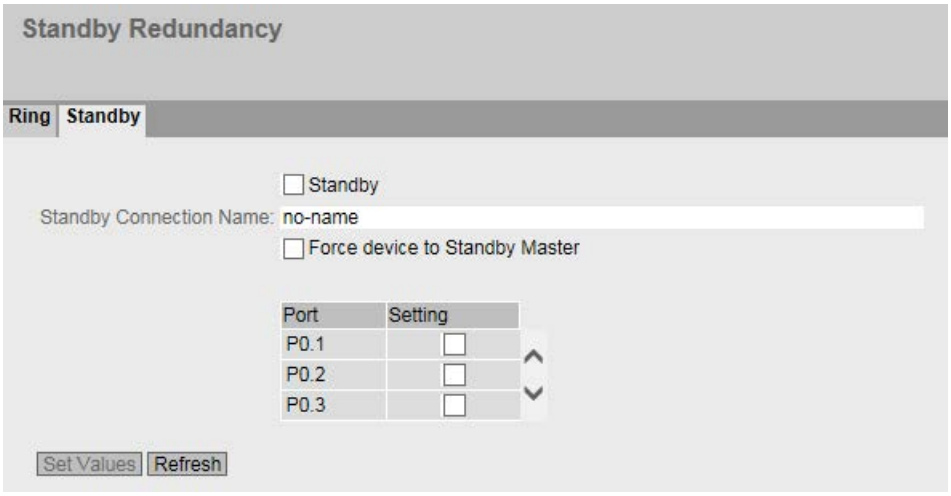
Enable standby redundancy for both standby partners and select the ports via which the device is connected to the rings you want to link to.

For the "Standby Connection Name", a name unique within the ring must be assigned for both partners. This identifies the two modules that belong together as standby partners.

Note

To be able to use the function, HRP must be activated.

The standby manager always requires an activated HRP client or HRP manager.



Description of the displayed boxes

- **Standby**
  Enable or disable the standby function.
- **Standby Connection Name**
  This name defines the master/slave device pair. Both devices must be located in the same ring.

  Here, enter the name for the standby connection. This must be identical to the name entered on the standby partner. You can select any name to suit your purposes, however, you can only use the name for one pair of devices in the entire network.
- **Force device to Standby Master**
  If you select this check box, the device is configured as a standby master regardless of its MAC address.
  - If this check box is not selected for either of the devices for which the standby master is enabled, then assuming that no error has occurred, the device with the higher MAC address adopts the role of standby master.
  - If the option is selected for both devices or if the "Force device to Standby Master" property is supported by only one device, the standby master is also selected based on the MAC address.

  This type of assignment is important in particular when a device is replaced. Depending on the MAC addresses, the previous device with the slave function can take over the role of the standby master.

Note

If two devices are linked by standby, the "Standby" function must be enabled on both devices.

- **Standby Port**

  Select the port to be standby port. The link to the other ring is via the standby port.

  The standby port is involved in the redirection of data traffic. In there are no problems, only the standby port of the master is enabled and handles the data traffic into the connected HRP ring or HRP bus.

  If the master or the Ethernet connection of the standby port of the master fails, the standby port of the master will be disabled and the standby port of the slave enabled. As a result, a functioning Ethernet connection to the connected network segment (HRP ring or HRP linear bus) is restored.

5.5.8 Spanning tree

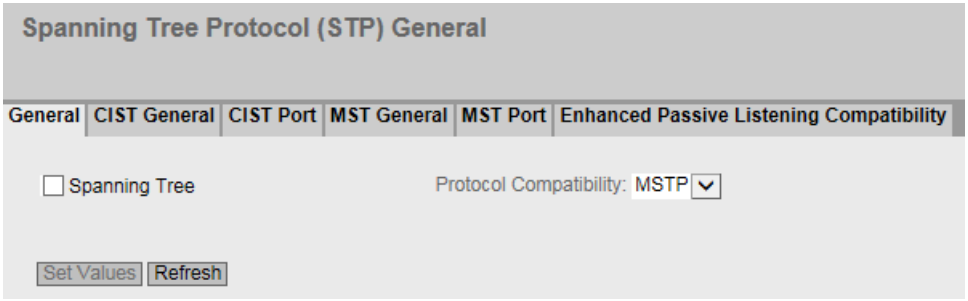
5.5.8.1 General

General settings of spanning tree

This is the basic page for spanning tree. Select the compatibility mode from the drop-down list.

On the configuration pages of these functions, you can make further settings.

Depending on the compatibility mode, you can configure the corresponding function on the relevant configuration page.



Description of the displayed boxes

The page contains the following boxes:

- **Spanning Tree**
  Enable or disable Spanning Tree.
- **Protocol Compatibility**
  Select the protocol compatibility. The following settings are available:
  - STP
  - RSTP
  - MSTP

Steps in configuration

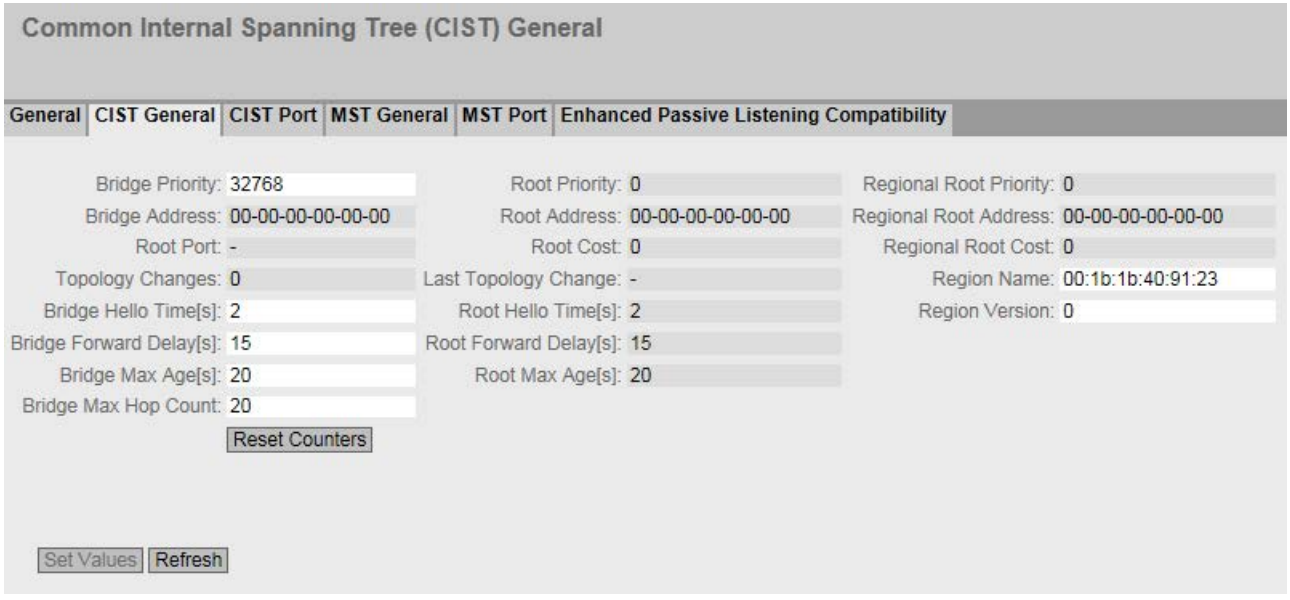
1. Select the "Spanning Tree" check box.
2. From the "Protocol Compatibility" drop-down list, select the type of compatibility.
3. Click the "Set Values" button.

5.5.8.2 CIST General

MSTP-CIST configuration

The page consists of the following parts.

- The left-hand side of the page shows the configuration of the device.
- The central part shows the configuration of the root bridge that can be derived from the spanning tree frames received by an device.
- The right-hand side shows the configuration of the regional root bridge that can be derived from the MSTP frames. The displayed data is only visible if you have enabled "Spanning Tree"on the "General" page and if "MSTP" is set for "Protocol Compatibility". This also applies to the "Bridge Max Hop Count" parameter. If the device is a root bridge, the information on the left and right matches.



Description of the displayed boxes

The page contains the following boxes:

- **Bridge Priority / Root Priority**
  The Bridge Priority decides which device becomes the Root Bridge. The Bridge with the highest priority becomes the Root Bridge. The lower the value, the higher the priority. If several devices in a network have the same priority, the device whose MAC address has the lowest numeric value will become the root bridge. Both parameters, bridge priority

and MAC address together form the bridge identifier. Since the root bridge manages all path changes, it should be located as centrally as possible due to the delay of the frames.

The value for the bridge priority is a whole multiple of 4096. Range of values: 0 - 61440

- **Bridge Address / Root Address**
  The bridge address shows the MAC address of the device and the root address shows the MAC address of the root bridge.
- **Root port**
  Shows the port via which the switch communicates with the root bridge.
- **Root Cost**
  The path costs from this device to the root bridge.
- **Topology Changes / Last Topology Change**
  The entry for the device shows the number of reconfiguration actions due to the spanning tree mechanism since the last startup. For the root bridge, the time since the last reconfiguration is displayed as follows:
  - Seconds: Unit "sec" after the number
  - Minutes: Unit min after the number
  - Hours: Unit hr after the number
- **Bridge hello time [s] / Root hello time [s]**
  Each bridge sends configuration frames (BPDUs) regularly. The interval between two configuration frames is the "Hello Time".

  Factory setting: 2 seconds

  Note

  The setting of the "Bridge Hello Time" is only possible with the Protocol compatibility RSTP. If the "Protocol compatibility MSTP is set, the "Hello Time" parameter on the page "Layer 2 > Spanning Tree > CIST Port" page is used.

- **Bridge Forward Delay[s] / Root Forward Delay[s]**
  New configuration data is not used immediately by a bridge but only after the period specified in the Forward Delay parameter. This ensures that operation is only started with the new topology after all the bridges have the required information.

  Factory setting: 15 seconds
- **Bridge Max Age[s] / Root Max Age[s]**
  If the BPDU is older than the specified "Max Age" it is discarded.

  Factory setting: 20 seconds
- **Regional root priority**
  For a description, see Bridge Priority / Root Priority
- **Regional Root Address**
  The MAC address of the device.
- **Regional Root Cost**
  The path costs from this device to the root bridge.

- **Bridge Max Hop Count**
  This parameter specifies how many MSTP nodes a BPDU may pass through. If an MSTP BPDU is received and has a hop count that exceeds the value configured here, it is discarded. The default for this parameter is 20.
- **Region Name**
  Enter the name of the MSTP region to which this device belongs. As default, the MAC address of the device is entered here. This value must be the same on all devices that belong to the same MSTP region.
- **Region Version**
  Enter the version number of the MSTP region in which the device is located. This value must be the same on all devices that belong to the same MSTP region.
- **Reset Counters**

  Click this button to reset the counters on this page.

Steps in configuration

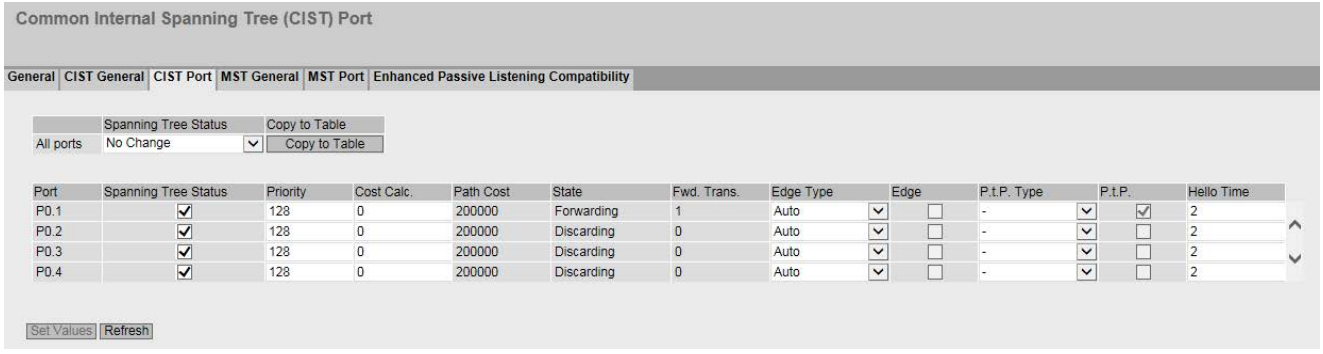
1. Enter the data required for the configuration in the input boxes.
2. Click the "Set Values" button.

5.5.8.3 CIST Port

MSTP-CIST port configuration

When the page is called, the table displays the current status of the configuration of the port parameters.

To configure them, click the relevant cells in the port table.



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Spanning Tree Status**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Port is integrated in the spanning tree.
  - Disabled
    Port is not integrated in the spanning tree.
  - No change
    Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Spanning Tree Status**
  Specify whether or not the port is integrated in the spanning tree.

  Note

  If you disable the "Spanning Tree Status" option for a port, this may cause the formation of loops. The topology must be kept in mind.

- **Priority**
  Enter the priority of the port. The priority is only evaluated when the path costs are the same.
  The value must be divisible by 16. If the value that cannot be divided by 16, the value is automatically adapted.
  Range of values: 0 - 240.
  The default is 128.
- **Cost Calc.**
  Enter the path cost calculation. If you enter the value "0" here, the automatically calculated value is displayed in the "Path costs" box.

- **Path Cost**
  This parameter is used to calculate the path that will be selected. The path with the lowest value is selected as the path. If several ports of a device have the same value for the path costs, the port with the lowest port number is selected.
  If the value in the Cost Calc." is "0", the automatically calculated value is shown. Otherwise, the value of the "Cost Calc." box is displayed.
  The calculation of the path costs is largely based on the transmission speed. The higher the achievable transmission speed is, the lower the value of the path costs.

  Typical values for path costs with rapid spanning tree:

  – 10,000 Mbps = 2,000
  – 1000 Mbps = 20,000
  – 100 Mbps = 200,000
  – 10 Mbps = 2,000,000

  The values can, however, also be set individually.

- **Status**
  Displays the current status of the port. The values are only displayed and cannot be configured. The "Status" parameter depends on the configured protocol. The following values are possible:

  – Disabled
    The port only receives and is not involved in STP, MSTP and RSTP.
  – Discarding
    In the "Discarding" mode, BPDU frames are received. Other incoming or outgoing frames are discarded.
  – Listening
    In this status, BPDUs are both received and sent. The port is involved in the spanning tree algorithm.
  – Learning
    Stage prior to the "Forwarding" status, the port is actively learning the topology (in other words, the node addresses).
  – Forwarding
    Following the reconfiguration time, the port is active in the network; it receives and forwards data frames.

- **Fwd. Trans**
  Specifies the number of changes from the "Discarding" status to the "Forwarding" status.

- **Edge Type**
  Specify the type of "edge port". You have the following options:

  – "-"
    Edge port is disabled. The port is treated as a "no Edge Port".
  – Admin
    Select this option when there is always an end device on this port. Otherwise a reconfiguration of the network will be triggered each time a connection is changed.
  – Auto
    Select this option if you want a connected end device to be detected automatically at

this port. When the connection is established the first time, the port is treated as a "no Edge Port".

– Admin/Auto
Select these options if you operate a combination of both on this port. When the connection is established the first time, the port is treated as an "Edge Port".

- **Edge**
Shows the status of the port.

  – Enabled
  An end device is connected to this port.

  – Disabled
  There is a Spanning Tree or Rapid Spanning Tree device at this port.

  With an end device, a switch can change over the port faster without taking into account spanning tree frames. If a spanning tree frame is received despite this setting, the port automatically changes to the "Disabled" setting.

- **P.t.P. Type**
Select the required option from the drop-down list. The selection depends on the port that is set.

  – "-"
  Point to point is calculated automatically. If the port is set to half duplex, a point-to-point link is not assumed.

  – P.t.P.
  Even with half duplex, a point-to-point link is assumed.

  – Shared Media
  Even with a full duplex connection, a point-to-point link is not assumed.

  Note

  Point-to-point connection means a direct connection between two devices. A shared media connection is, for example, a connection to a hub.

- **Hello Time**
Enter the interval after which the bridge sends configuration frames (BPDUs). As default, 2 seconds is set.
Range of values: 1-2 seconds

Note

The port-specific setting of the Hello time is only possible with Protocol compatibility MSTP. If the "Protocol compatibility RSTP is set, the "Bridge Hello Time" parameter on the page "Layer 2 > Spanning Tree > CIST General" page is used.

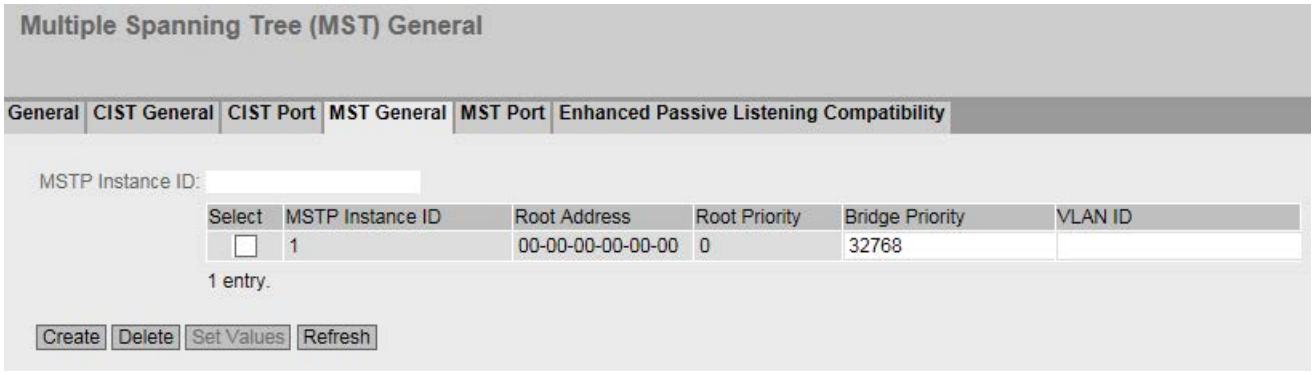
Steps in configuration

1. In the input cells of the table row, enter the values of the port you are configuring.
2. From the drop-down lists of the cells of the table row, select the values of the port you are configuring.
3. Click the "Set Values" button.

5.5.8.4 MST General

Multiple Spanning Tree configuration

With MSTP, in addition to RSTP, several VLANs can be managed in a LAN with separate RSTP trees.



Description

The page contains the following box:

- **MSTP Instance ID**
  Enter the number of the MSTP instance.
  Permitted values: 1 - 64

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **MSTP instance ID**
  Shows the number of the MSTP instance.
- **Root Address**
  Shows the MAC address of the root bridge.
- **Root Priority**
  Shows the priority of the root bridge.

- **Bridge Priority**
  Enter the bridge priority in this box. The value for the bridge priority is a whole multiple of 4096 with a range of values from 0 to 61440.
- **VLAN ID**
  Enter the VLAN ID. Here, you can also specify ranges with Start ID, "-", End ID. Several ranges or IDs are separated by ",".
  Permitted values: 1- 4094

Procedure

Creating a new entry

1. Enter the number of the MSTP instance in the "MSTP Instance ID" box.
2. Click the "Create" button.
3. Enter the ID of the VLAN in the "VLAN ID" box.
4. Enter the priority of the bridge in the "Bridge Priority" box.
5. Click the "Set Values" button.

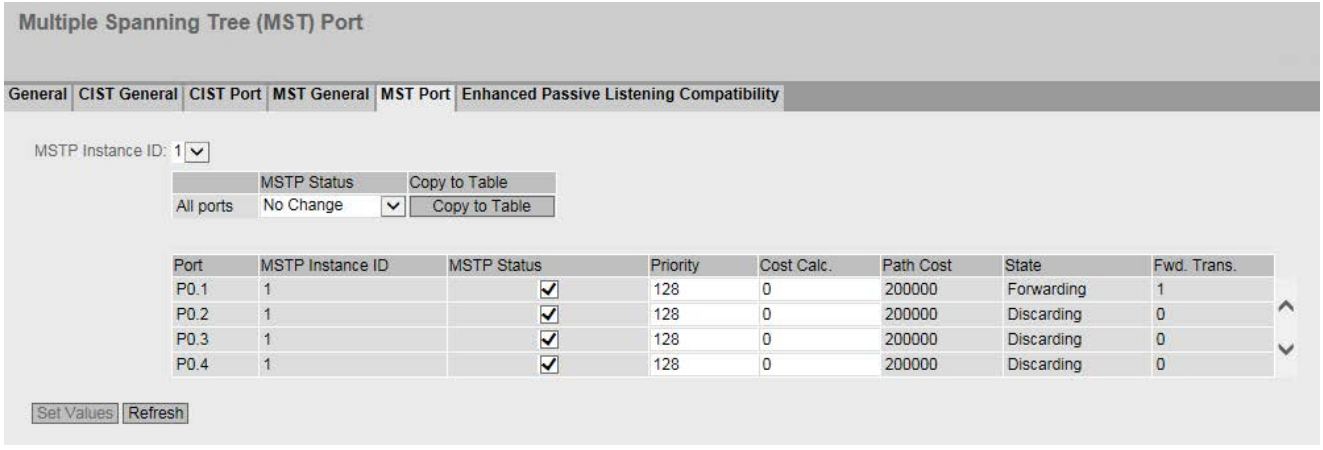
Deleting entries

1. Use the check box at the beginning of the relevant row to select the entries to be deleted.
2. Click the "Delete" button to delete the selected entries from memory. The entries are deleted from the memory of the device and the display on this page is updated.

5.5.8.5 MST Port

Configuration of the Multiple Spanning Tree port parameters

On this page, you set the parameters for the ports of the configured multiple spanning tree instances.



Description of the displayed boxes

The page contains the following box:

- **MSTP Instance ID**
  In the drop-down list, select the ID of the MSTP instance.

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports.
- **MSTP Status**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
  - Disabled
  - No Change: Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows all available ports and link aggregations.
- **MSTP Instance ID**
  ID of the MSTP instance.
- **MSTP Status**
  Click the check box to enable or disable this option.
- **Priority**
  Enter the priority of the port. The priority is only evaluated when the path costs are the same.
  The value must be divisible by 16. If the value that cannot be divided by 16, the value is automatically adapted.
  Range of values: 0 - 240.
  Factory setting: 128
- **Cost Calc.**
  Enter the path cost calculation in the input box. If you enter the value "0" here, the automatically calculated value is displayed in the next box "Path Costs".

- **Path cost**
  The path costs from this port to the root bridge. The path with the lowest value is selected as the path. If several ports of a device have the same value, the port with the lowest port number will be selected.
  If the "Cost Calc." is "0", the automatically calculated value is shown. Otherwise, the value of the "Cost Calc." box is displayed.
  The calculation of the path costs is largely based on the transmission speed. The higher the achievable transmission rate, the lower the value for the path costs will be.
  Typical values for rapid spanning tree are as follows:
  - 10,000 Mbps = 2,000
  - 1000 Mbps = 20,000
  - 100 Mbps = 200,000
  - 10 Mbps = 2,000,000

  The values can, however, also be set individually.
- **Status**
  Displays the current status of the port. The values are only displayed and cannot be configured. The following is possible for status:
  - **Discarding**
    The port exchanges MSTP information but is not involved in the data traffic.
  - **Blocked**
    In the blocking mode, BPDU frames are received.
  - **Forwarding**
    The port receives and sends data frames.
- **Fwd. Trans.**
  Specifies the number of status changes Discarding - Forwarding or Forwarding - Discarding for a port.

Steps in configuration

1. In the input cells of the table row, enter the values of the port you are configuring.
2. From the drop-down lists of the cells of the table row, select the values of the port you are configuring.
3. Click the "Set Values" button.

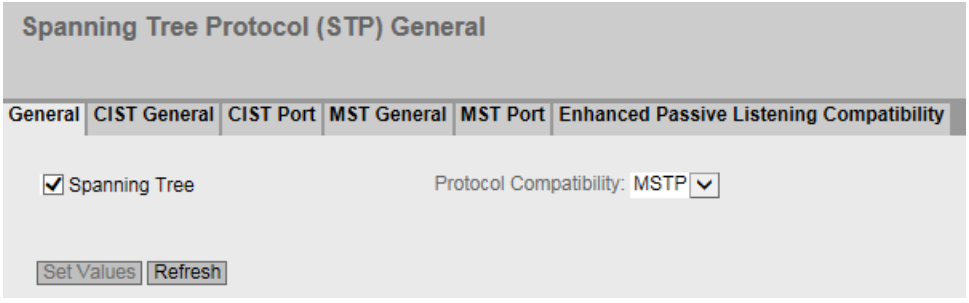
5.5.8.6 Enhanced Passive Listening Compatibility

Spanning Tree and ring redundancy

If you enable Enhanced Passive Listening Compatibility, topology change notifications will be sent via RSTP edge ports. In conjunction with the "Edge Type" function (see "Layer 2 > Spanning Tree > CIST Port"), this parameter is necessary to link spanning tree networks with HRP rings. Otherwise no TCN frames will be sent via edge ports; this is, however, necessary for the passive listening function on ring nodes.

Enabling the function

On this page, you can enable the "Enhanced Passive Listening Compatibility" function.



Description of the displayed boxes

The page contains the following box:

- **Enhanced Passive Listening Compatibility**
  Enable or disable this function for the entire device.

Steps in configuration

1. Enable or disable "Enhanced Passive Listening Compatibility"
2. Click the "Set Values" button.

5.5.9 Loop detection

With the "Loop detection" function, you specify the ports for which loop detection will be activated. The ports involved send special test frames - the loop detection frames. If these frames are sent back to the device, there is a loop.

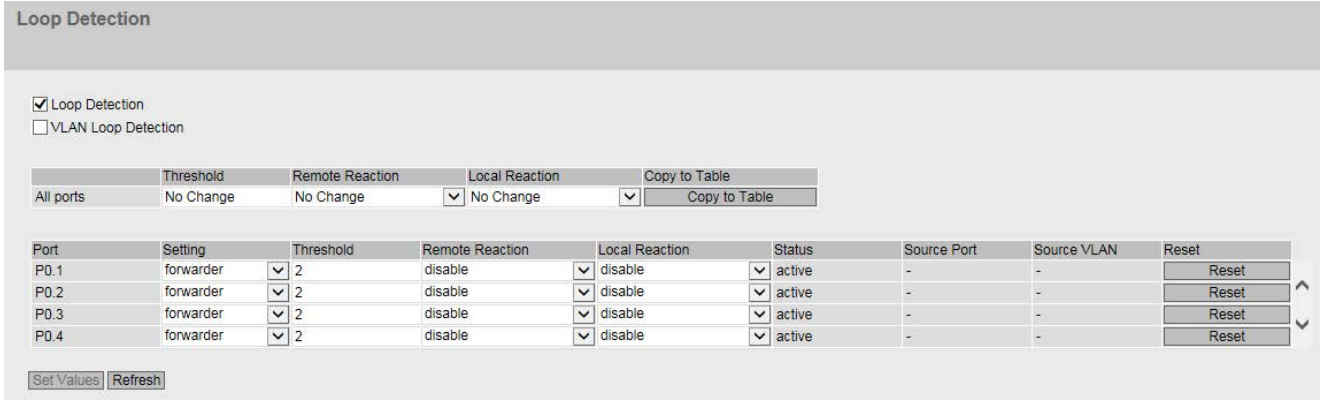
A "local loop" involving this device means that the frames are received again at a different port of the same device. If the sent frames are received again at the same port, there is a loop involving other network components "Remote Loop".

Note

A loop is an error in the network structure that needs to be eliminated. The loop detection can help to find the errors more quickly but does not eliminate them. The loop detection is not suitable for increasing network availability by deliberately including loops.

Note

Note that loop detection is only possible at ports that were not configured as ring ports or standby ports.



Description of the displayed boxes

The page contains the following boxes:

- **Loop Detection**
  Enable or disable the loop detection.
- **VLAN Loop Detection**
  Enable or disable the VLAN loop detection.

Table 1 contains the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Threshold value / Remote reaction / Local reaction**
  Make the required settings.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 contains the following columns:

- **Port**
  Shows the available ports.
- **Setting**
  Specify how the port handles loop detection frames. Select one of the following options from the drop-down list:

  Note

  Test frames create additional network load. We recommend that you only configure individual switches, for example at branch points of the ring, as "Sender" and the others as "Forwarder".

  – Sender
    Loop detection frames are sent out and forwarded.
  – Forwarder
    Loop detection frames from other devices are forwarded.
  – blocked
    The forwarding of loop detection frames is blocked.
- **Threshold**
  By entering a number, specify the number of received loop detection frames as of which a loop is assumed.
- **Remote Reaction**
  Specify how the port will react if a remote loop occurs. Select one of the two options from the drop-down list:
  – No action: A loop has no effect on the port.
  – Disable: The port is blocked.
- **Local reaction**
  Specify how the port will react if a local loop occurs. Select one of the two options from the drop-down list:
  – No action: A loop has no effect on the port.
  – Disable: The port is blocked
- **Status**
  This box shows whether loop detection is enabled or disabled for this port.
- **Source Port**
  Shows the receiving port of the loop detection frame that triggered the last reaction.
- **Source VLAN**
  This box shows the VLAN ID of the loop detection frame that triggered the last reaction. This requires that the "VLAN Loop Detection" check box is selected.
- **Reset**
  After a loop in the network has been eliminated, click the "Reset" button to reset the port again.

Changing the configured port status with loop detection

The configuration of the port status can be changed with the "Loop Detection" function. If, for example, the administrator has disabled a port, the port can be enabled again after a device restart with "enabled". The port status "Link down" is not changed by "Loop Detection".

5.5.10 Link aggregation

Bundling network connections for redundancy and higher bandwidth

A link aggregation according to IEEE 802.3AD allows several connections between neighboring devices to be bundled to achieve higher bandwidths and to protect against failure.

Ports on both partner devices are included in link aggregations and the devices are then connected via these ports. To assign ports correctly to a partner device, the Link Aggregation Control Protocol (LACP) from the IEEE 802.3AD standard is used.

Up to 8 link aggregations can be defined. A maximum of 8 ports can be assigned to each link aggregation.

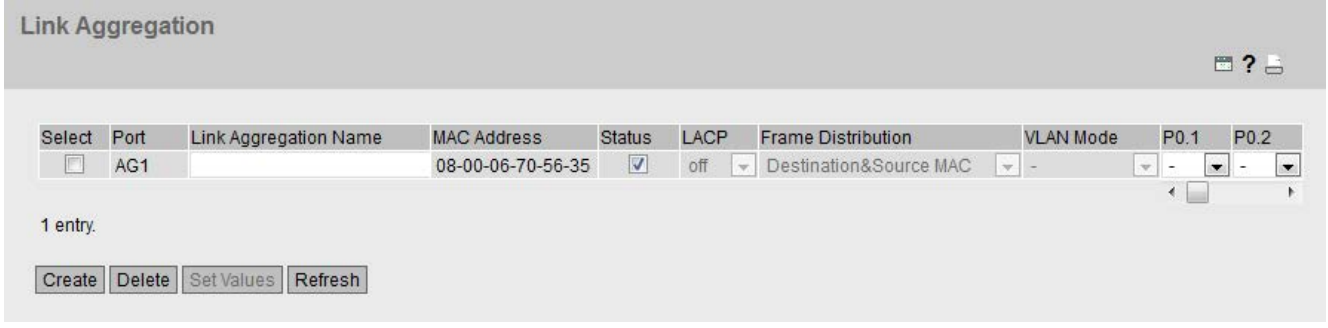
Note

When a port is assigned to a link aggregation but is not active (e.g. link down), the values displayed may differ from the values configured for the link aggregation.

If the port in the link aggregation becomes active, individual port configurations such as DCP forwarding are overwritten with the configured values of the link aggregation.

Display of the configured aggregation

This page displays all the configured link aggregations.



Description of the displayed boxes

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Port**
  Shows the virtual port number of this link aggregation. This identifier is assigned internally by the firmware.
- **Link Aggregation Name**
  Shows the name of the link aggregation. This name can be specified by the user during configuration. The name is not absolutely necessary but can be useful to distinguish between the various link aggregations.
- **MAC Address**
  Shows the MAC address.
- **Status**
  Enable or disable link aggregation.
- **LACP**
  - On
    Enables the sending of LACP frames.
  - Off
    Disables the sending of LACP frames.
- **Frame Distribution** - Destination&Source MAC

  The distribution of packets to the individual links of a aggregation is based on a combination of the destination and source MAC address.
- **VLAN Mode**
  Specify how the link aggregation is entered in a VLAN:
  - Hybrid
    The link aggregation sends tagged and untagged frames. It is not automatically a member of a VLAN.
  - Trunk
    The link aggregation only sends tagged frames and is automatically a member of all VLANs.

- **Port**
  Shows the ports that belong to this link aggregation. The following values can be selected from the drop-down list:
  - "-" (disabled)
    Link aggregation is disabled.
  - "a" (active)
    The port sends LACP frames and is only involved in the link aggregation when LACP frames are received.
  - "p" (passive)
    The port is only involved in the link aggregation when LACP frames are received.
  - o" (on)
    The port is involved in the link aggregation and does not send any LACP frames.

  Note

  Within a link aggregation, only ports with the following configuration are possible:
  - all ports with "o"
  - all ports with "a" or "p".

Steps in configuration

Basics prior to configuration

1. First, identify the ports you want to connect to form a link aggregation between the devices.
2. Configure the link aggregation on the devices.
3. Adopt the configuration for all devices.
4. Perform the last step, the cabling.

Note

If you cable aggregated links prior to configuration, it is possible that you will create loops in the network. The network involved may deteriorate badly due to this or complete disruption may occur.

Creating a new link aggregation

1. Click the "Create" button to create a new link aggregation.

   This creates a new row.
2. Select the ports that will belong to this link aggregation.
3. Click the "Set Values" button.

Deleting a link aggregation

1. Select the check box in the row to be deleted.

   Repeat this for all entries you want to delete.
2. Click the "Delete" button.

Changing a link aggregation

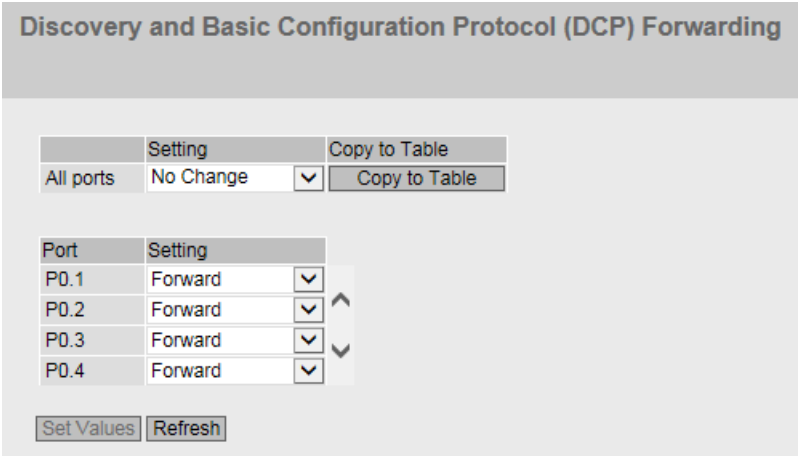
1. In the overview, click on the relevant table entry to change the configuration of a created link aggregation.
2. Make all the changes.
3. Click the "Set Values" button.

5.5.11 DCP forwarding

Applications

The DCP protocol is used by STEP 7 and the Primary Setup Tool (PST) for configuration and diagnostics. When shipped, DCP is enabled on all ports; in other words, DCP frames are forwarded at all ports. With this option, you can disable the sending of these frames for individual ports, for example to prevent individual parts of the network from being configured with the PST or to divide the full network into smaller subnetworks for configuration and diagnostics.

All the ports of the device are displayed on this page. After each displayed port, there is a drop-down list for function selection.



Description of the displayed values

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. If "No Change" is selected, the entry in table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Setting**
  From the drop-down list, select whether the port should block or forward outgoing DCP frames. You have the following options available:
  - Forward
    DCP frames are forwarded via this port.
  - Block
    No outgoing DCP frames are forwarded via this port. It is nevertheless still possible to receive via this port.

Steps in configuration

1. From the options in the drop-down list in the row, select which ports should support sending DCP frames.
2. Click the "Set Values" button.

5.5.12 LLDP

Identifying the network topology

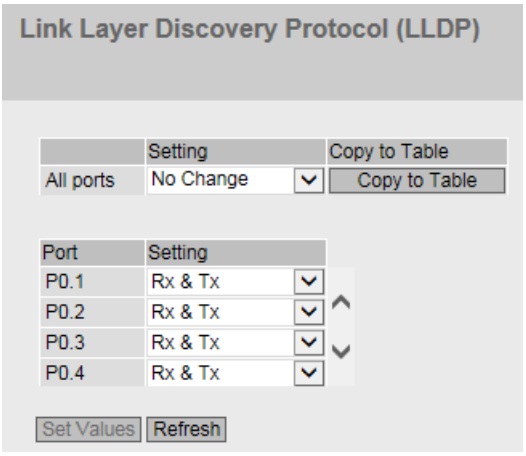
LLDP (Link Layer Discovery Protocol) is defined in the IEEE 802.1AB standard.

LLDP is a method used to discover the network topology. Network components exchange information with their neighbor devices using LLDP.

Network components that support LLDP have an LLDP agent. The LLDP agent sends information about itself and receives information from connected devices at periodic intervals. The received information is stored on the device.

Applications

PROFINET uses LLDP for topology diagnostics. In the default setting, LLDP is enabled for all ports; in other words, LLDP frames are sent and received on all ports. With this function, you have the option of enabling or disabling sending and/or receiving per port.



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports.
- **Setting**
  Select the setting from the drop-down list. If "No Change" is selected, the entry in table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.
- **Settting**
  From the drop-down list, select whether or not the port will send or receive LLDP frames. You have the following options available:
  - Rx
    This port can only receive LLDP frames.
  - Tx
    This port can only send LLDP frames.
  - Rx & Tx
    This port can receive and send LLDP frames.
  - "-" (disabled)
    This port can neither receive nor send LLDP frames.

Steps in configuration

1. Select the LLDP functionality of the port from the "Setting" drop-down list.
2. Click the "Set Values" button.

5.5.13 Fiber Monitoring Protocol

Requirements

- You can only use Fiber Monitoring with transceivers capable of diagnostics. Note the documentation of the devices.
- To be able to use the fiber monitoring function, enable LLDP. The fiber monitoring information is appended to the LLDP packets.

Monitoring optical links

With Fiber Monitoring, you can monitor the received power and the loss of power on optical links between two switches.

If you enable fiber monitoring on an optical port, the device sends the current transmit power of the port to its connection partner using LLDP packets. In addition to sending, the device also checks whether corresponding information is received from the connection partner.

Regardless of whether the IE switch receives diagnostics information from its connection partner, it monitors the received power measured at the optical port for the set limit values.

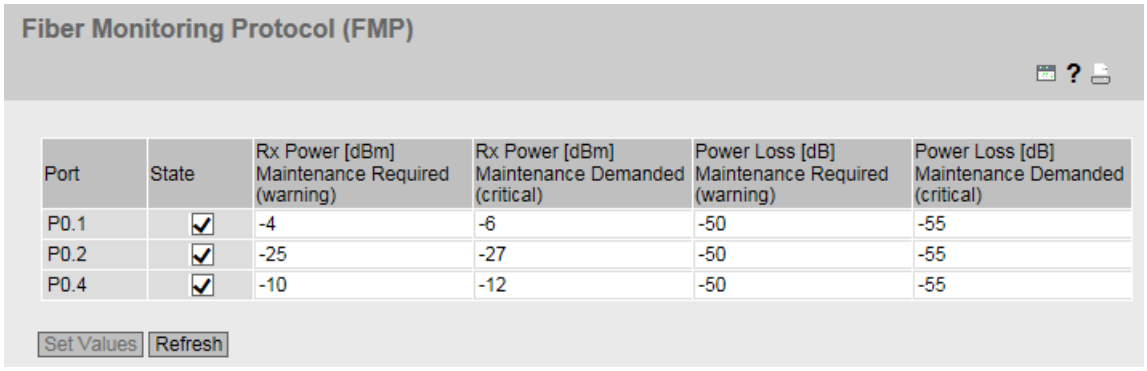
If fiber monitoring is enabled on the connection partner, the connection partner transfers the current value for the transmit power of the port to the device. The device compares the value it has received for the transmit power with the actually received power. The difference between the received power and the transmit power represents the power loss on the link. The calculated power loss is also monitored for the set limit values.

If the value of the received power or the power loss falls below or exceeds the set limit values, an event is triggered. You can set limit values in two stages for messages with the severity levels "Warning" and "Critical".

In "System > Events > Configuration", you can specify how the IE switch indicates the event.

Note

If you have enabled fiber monitoring and a pluggable transceiver with diagnostics capability is pulled, fiber monitoring is automatically disabled for this port and the set limit values and a possibly pending error status are deleted.



Description of the displayed boxes

In the table you can specify the limit values for the measured received power too be monitored and the calculated power loss.

- **Port**

  Shows the optical ports that support fiber monitoring. This depends on the transceivers.

- **Status**

  Enable or disable fiber monitoring.

  As default, the function is disabled.

- **Rx Power [dBm] maintenance required (Warning)**

  Specify the value at which you are informed of the deterioration of the received power by a message of the severity level "Warning"

  The default value depends on the relevant transceiver.

- **Rx Power [dBm] maintenance demanded (Critical)**

  Specify the value at which you are informed of the deterioration of the received power by a message of the severity level "Critical"

  The default value depends on the relevant transceiver.

- **Power Loss [dB] maintenance required (Warning)**

  Specify the value at which you are informed of the power loss of the connection by a message of the severity level "Warning"

  Default: -50 dB

- **Power Loss [dB] maintenance demanded (Critical)**

  Specify the value at which you are informed of the power loss of the connection by a message of the severity level "Critical"

  Default: -55 dB

Steps in configuration

Activating fiber monitoring

Follow the steps below to activate the monitoring of a port:

1. Select the appropriate check box in the "Status" column.
2. For your setup, enter practical values value at which you want to be informed of deterioration of the received power and the power loss of the connection.
3. Click the "Set Values" button.

Deactivating fiber monitoring

Follow the steps below to deactivate the monitoring of a port:

1. Deselect the appropriate check box in the "Status" column.
2. Click the "Set Values" button.

5.5.14 Unicast

5.5.14.1 Filtering

Address filtering

This table shows the source addresses of unicast address frames entered statically by the user during parameter assignment.

On this page, you also define the static unicast filters.

Dependency on the "Base bridge mode"

The displayed boxes depend on which "Base bridge mode" is set. If you change the "Base bridge mode" the existing entries are lost.

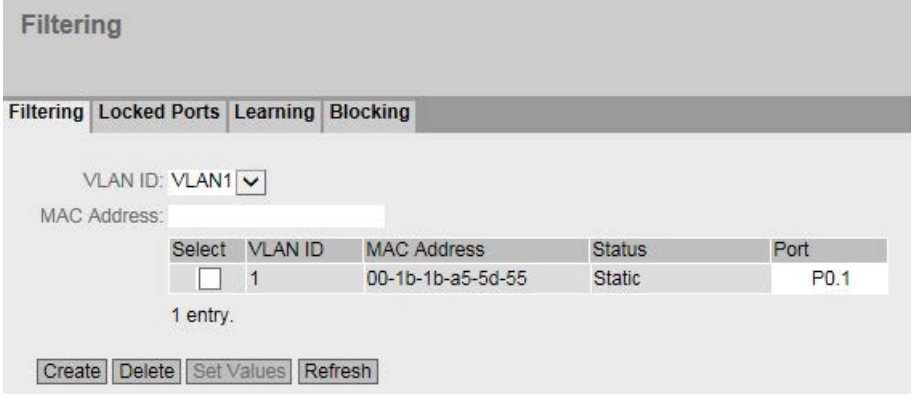


Figure 5-7 Base bridge mode: 802.1Q VLAN Bridge

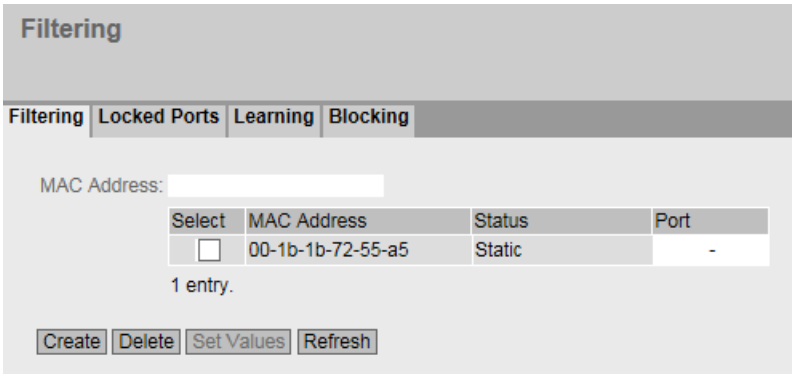


Figure 5-8 Base bridge mode: 802.1D transparent bridge

Description of the displayed boxes

The page can contain the following boxes:

- **VLAN ID**

  Select the VLAN ID for which you configure a new static MAC address. If nothing is set, "VLAN1" is set as the basic setting.

- **MAC Address**
  Enter the MAC address here.

This table contains the following columns:

- **Select**

  Select the row you want to delete.

- **VLAN ID**

  Shows the VLAN ID assigned to this MAC address.

- **MAC Address**
  Shows the MAC address of the node that the device has learned or the user has configured.

- **Status** - Static
  Shows the status of each address entry. The address was entered statically by the user. Static addresses are stored permanently; in other words, they are not deleted when the aging time expires or when the device is restarted. These must be deleted by the user.

- **Port**

  Shows the port via which the node with the specified address can be reached. Frames received by the device whose destination address matches this address will be forwarded to this port.

  Note

  You can only specify **one** port for unicast addresses.

Steps in configuration

To edit the entries, follow the steps below.

Creating a new entry

1. In "Base bridge mode: 802.1Q VLAN Bridge" select the appropriate VLAN ID.
2. Enter the MAC address in the "MAC Address" input box.
3. Click the "Create" button to create a new entry in the table.
4. Click the "Refresh" button.
5. Select the relevant port from the drop-down list.
6. Click the "Set Values" button.

Changing the entry

1. Select the relevant port.
2. Click the "Set Values" button.

Deleting an entry

1. Select the check box in the row to be deleted.
   Repeat this for all entries you want to delete.
2. Click the "Delete" button to delete the selected entries from the filter table.
3. Click the "Refresh" button.

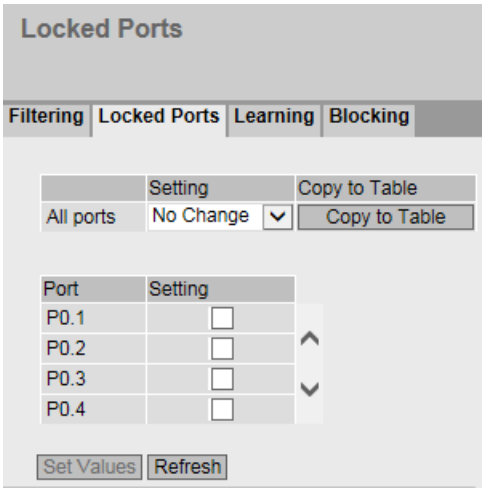
5.5.14.2 Locked Ports

Activating the access control

On this page, you can block individual ports for unknown nodes.

If the Port Lock function is enabled, packets arriving at this port from unknown MAC addresses are discarded immediately. Packets from known nodes are accepted by the port. Since ports with the Port Lock function enabled cannot learn any MAC addresses, learned addresses on these ports are automatically deleted after the Port Lock function is enabled. The port accepts only static MAC addresses that were created previously either manually or with the "Start learning" function and the "Stop learning" function.

To enter all connected nodes automatically, there is a function for automatic learning (see "Layer 2 > Unicast > Learning").



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Enables the port lock function.
  - Disabled
    Disables the port lock function.
  - No change
    Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  This column lists all the ports available on this device.
- **Setting**
  Enable or disable access control for the port.

Steps in configuration

Enabling access control for an individual port

1. Select the check box in the relevant row in table 2.
2. To apply the changes, click the "Set Values" button.

Enabling access control for all ports

1. In the "Setting" drop-down list, select the "Enabled" entry.
2. Click the "Copy to table" button. The check box is enabled for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

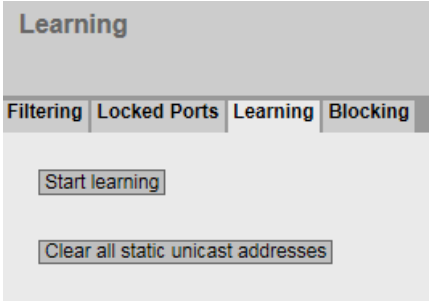
5.5.14.3 Learning

Starting/stopping learning

With the automatic learning function, all connected devices are automatically entered statically in the unicast filter table. As long as the "Start learning" function is enabled, all learned unicast addresses are created immediately as static unicast entries.
The learning process is ended only after clicking the "Stop learning" button. With this method, learning can take a few minutes or several hours in larger networks before all nodes have been found. Only nodes that send packets during the learning phase are found.
By subsequently enabling the Port Lock function, only packets from the nodes known after the end of the learning phase (static unicast entries) will be accepted at the relevant ports.

Note

If the Port Lock function was already active on individual ports prior to the automatic learning phase, no addresses will be learned on these ports. This makes it possible to restrict learning to certain ports. To do this, first enable the Port Lock function of the ports that are not intended to learn addresses.



Steps in configuration

Learning addresses

1. Click the "Start learning" button to start the learning phase.
   After starting the learning phase, the "Start learning" button is replaced by the "Stop learning" button.
   The device now enters the addresses of connected devices until you stop the function.
2. Click the "Stop learning" button to stop the learning function.
   The button is once again replaced by the "Start learning" button. The learned entries are stored.

Deleting all static unicast addresses

1. Click the "Clear all static unicast addresses" button to delete all static entries.
   In large networks with numerous nodes, automatic learning may lead to a lot of undesired static entries. To avoid having to delete these individually, this button can be used to delete all static entries. This function is disabled during automatic learning.

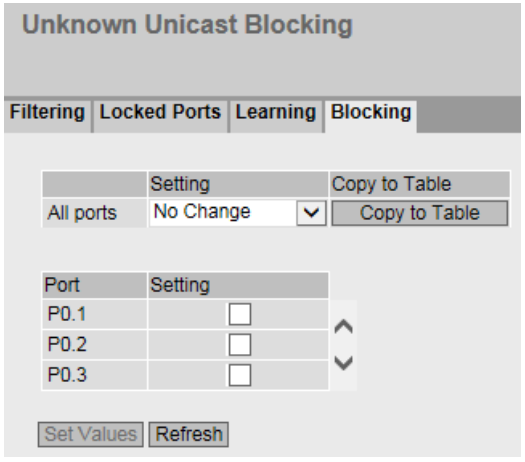
Note

Depending on the number of entries involved, deleting may take some time.

5.5.14.4 Unknown Unicast Blocking

Blocking forwarding of unknown unicast frames

On this page, you can block the forwarding of unknown unicast frames for individual ports.



Description of the displayed values

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Blocking of unicast frames is enabled.
  - Disabled
    Blocking of unicast frames is disabled.
  - No change
    Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**

  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

  Note

  Shows the available ports. The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.ring redundancy / standby

  If ring redundancy or standby is enabled, the ports configured for this are not included in the unicast blocking.

- **Setting**
  Enable or disable the blocking of unicast frames.

Steps in configuration

Enabling blocking for an individual port

1. Select the check box in the relevant row in table 2.
2. To apply the changes, click the "Set Values" button.

Enabling blocking for all ports

1. In the "Setting" drop-down list, select the "Enabled" entry.
2. Click the "Copy to table" button. The check box is enabled for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

5.5.15 Multicast

5.5.15.1 Groups

Multicast applications

In the majority of cases, a frame is sent with a unicast address to a particular recipient. If an application sends the same data to several recipients, the amount of data can be reduced by sending the data using one multicast address. For some applications, there are fixed multicast addresses (NTP, IETF1 Audio, IETF1 Video etc.).

Reducing network load

In contrast to unicast frames, multicast frames represent a higher load for the device. Generally, multicast frames are sent to all ports. The following options are available for reducing the load caused by multicast frames:

- Static entry of the addresses in the multicast filter table.
- Dynamic entry of the addresses by listening in on IGMP parameter assignment frames (IGMP Configuration).
- Active dynamic assignment of addresses by GMRP frames.

The result of all these methods is that multicast frames are sent only to ports for which an appropriate address is entered.

The "Multicast" menu item, shows the multicast frames currently entered in the filter table and their destination ports that the user set in the parameters.

Dependency on the "Base bridge mode"

The displayed boxes depend on which "Base bridge mode" is set. If you change the "Base bridge mode" the existing entries are lost.

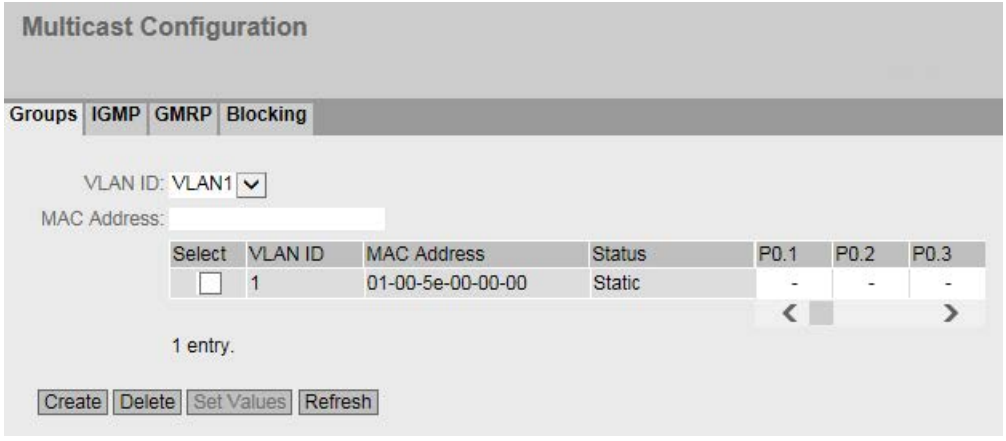


Figure 5-9 Base bridge mode: 802.1Q VLAN Bridge

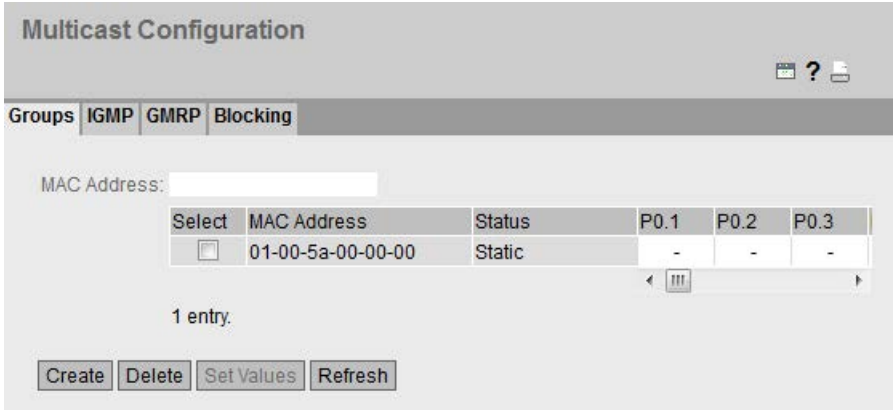


Figure 5-10 Base bridge mode: 802.1D transparent bridge

Description of the displayed boxes

The page can contain the following boxes:

- **VLAN ID**
  If you click on this text box, a drop-down list is displayed. Here you can select the VLAN ID of a new MAC address you want to configure.
- **MAC address**
  Here you enter a new MAC multicast address you want to configure.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **VLAN ID**
  Here, the VLAN ID of the VLAN is displayed to which the MAC multicast address of this row is assigned.
- **MAC Address**
  Here, the MAC multicast address is displayed that the device has learned or the user has configured.
- **Status -** Static
  Shows the status of each address entry. The address was entered statically by the user. Static addresses are stored permanently; in other words, they are not deleted when the aging time expires or when the device is restarted. These must be deleted by the user.
- **Port List**
  There is a column for each port. Within every column, the multicast group to which the port belongs is shown. The drop-down list provides the following options:
  - M
    (Member) Multicast frames are sent via this port.
  - F
    (Forbidden) Not a member of the multicast group. This address must also not be an address learned dynamically with GMRP or IGMP.
  - I

    (IGMP) Member of the multicast group, registration was by an IGMP frame. This value is only dynamically assigned.
  - –
    Not a member of the multicast group. No multicast frames with the defined multicast MAC address are sent via this port.

Steps in configuration

Creating a new entry

Note

You cannot create any static multicast entries if GMRP is enabled.

1. In "Base bridge mode: 802.1Q VLAN Bridge", select the required VLAN ID from the "VLAN ID"drop-down list.
2. Enter the MAC address in the "MAC Address" input box.
3. Click the "Create" button. A new entry is generated in the table.
4. Assign the relevant ports to the MAC address.
5. Click the "Set Values" button.

Deleting an entry

1. Select the check box in the row to be deleted.
2. Click the "Delete" button.
   All selected entries are deleted and the display is refreshed.

Creating layer 2 multicast addresses with a script and GMRP

If you want to create several layer 2 multicast addresses using a script, GMRP must be disabled as long as the script is executing. Follow the steps outlined below:

1. If GMRP is enabled, disable it. You configure GMRP on the "Layer 2 > Multicast > GMRP" page.
2. Run the script.
3. Enable GMRP only after the script has fully completed and the layer 2 multicast addresses have been created.

5.5.15.2 IGMP

Function

The device supports "IGMP Snooping" and the "IGMP Querier" function. If "IGMP Snooping" is enabled, IGMP frames (Internet Group Management Protocol) are evaluated and the multicast filter table is updated with this information. If "IGMP Querier" is also enabled, the device also sends IGMP queries that trigger responses from IGMP-compliant nodes.

IGMP Snooping Aging Time

In this menu, you can configure the aging time for IGMP Configuration. When the time elapses, entries created by IGMP are deleted from the address table if they are not updated by a new IGMP frame.

This applies to all ports; a port-specific configuration is not possible.

IGMP Snooping Aging Time depending on the querier

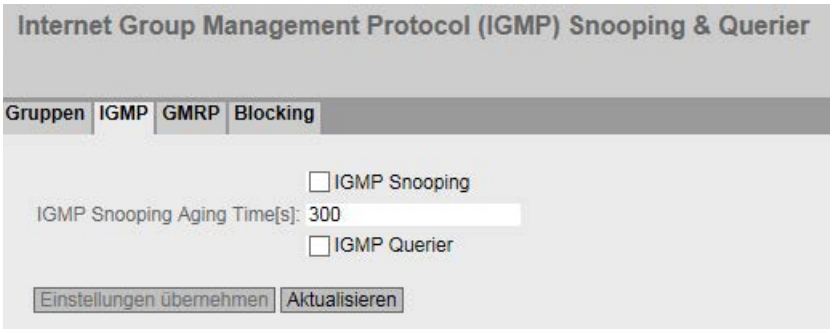
The IE switch as IGMP querier

If the IE switch is used as an IGMP querier, the query interval is 125 seconds. For the "IGMP Snooping Aging Time", set at least 250 seconds.

Other IGMP queriers

If a different IGMP querier is used, the value of the "IGMP Snooping Aging Time" should be at least twice as long as the query interval.

Description of the displayed boxes



The page contains the following boxes:

- **IGMP Snooping**
  Enable or disable IGMP snooping. The function allows the assignment of IP addresses to multicast groups. If the check box is selected, IGMP entries are included in the table and IGMP frames are forwarded.
- **IGMP Snooping Aging Time[s]**
  In this box, enter the value for the aging time in seconds. As default, 300 seconds is set. Valid values: 130 - 1225 seconds
- **IGMP Querier**
  Enable or disable "IGMP Querier". The device sends IGMP queries.

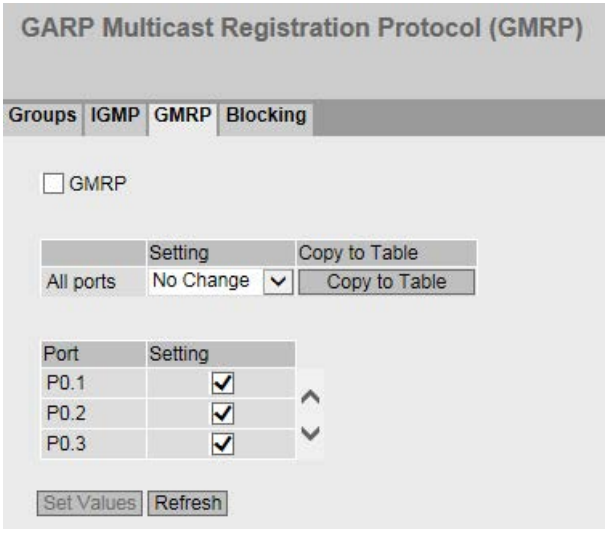
Steps in configuration

1. Select the "IGMP Snooping" check box.
2. Enter the value for the aging time in seconds in the "IGMP Snooping Aging Time" box.
3. Select the "IGMP Querier" check box.
4. Click the "Set Values" button.

5.5.15.3 GMRP

Activating GMRP

On this page, you specify whether or not GMRP is used for each individual port. If "GMRP" is disabled for a port, no registrations are made for it and it cannot send GMRP frames.



Description of the displayed boxes

The page contains the following box:

- **GMRP**
  Enable or disable the GMRP function.

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Enables the sending of GMRP frames.
  - Disabled
    Disables the sending of GMRP frames.
  - No change
    Table 2 remains unchanged.
- **Copy to table**
  If you click the button, the settings are adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  This column shows all the ports available on the device as well as the link aggregations.
- **Setting**
  With this check box, you enable or disable GMRP for the port or link aggregation.

Steps in configuration

Enabling the sending of GMRP frames for an individual port

1. Select the "GMRPGMRP" check box.
2. Select the check box in the relevant row in table 2.
3. To apply the changes, click the "Set Values" button.

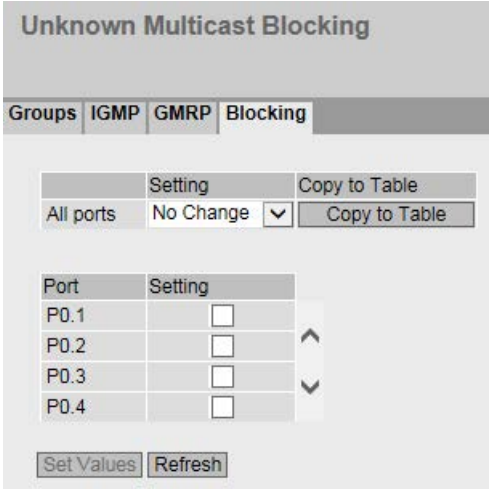
Enabling the sending of GMRP frames for all ports

1. Select the "GMRPGMRP" check box.
2. In the "Setting" drop-down list, select the "Enabled" entry.
3. Click the "Copy to table" button. The check box is enabled for all ports in table 2.
4. To apply the changes, click the "Set Values" button.

5.5.15.4 Multicast blocking

Disabling the forwarding of unknown multicast frames

On this page, you can block the forwarding of unknown multicast frames for individual ports.



Description of the displayed values

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    Blocking of multicast frames is enabled.
  - Disabled
    Blocking of multicast frames is disabled.
  - No change
    Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  All available ports are listed in this column. Unavailable ports are not displayed.
- **Setting**
  Enable or disable the blocking of multicast frames.

Steps in configuration

Enabling blocking for an individual port

1. Select the check box in the relevant row in table 2.
2. To apply the changes, click the "Set Values" button.

Enabling blocking for all ports

1. In the "Setting" drop-down list, select the "Enabled" entry.
2. Click the "Copy to table" button. The check box is enabled for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

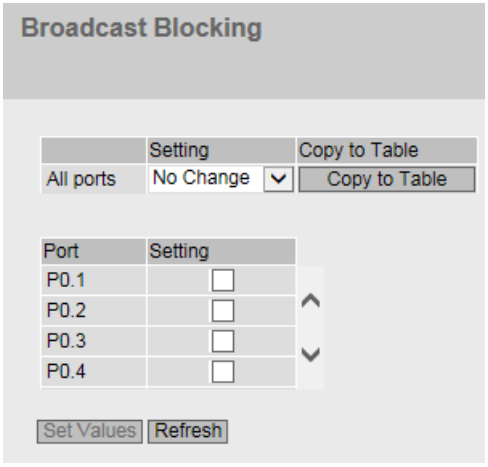
5.5.16 Broadcast

Blocking the forwarding of broadcast frames

On this page, you can block the forwarding of broadcast frames for individual ports.

Note

Some communication protocols work only with the support of broadcast. In these cases, blocking can lead to loss of data communication. Block broadcast only when you are sure that you do not need it on the selected ports.



Description of the displayed boxes

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **Setting**
  Select the setting from the drop-down list. You have the following setting options:
  - Enabled
    The blocking of broadcast frames is enabled.
  - Disabled
    The blocking of broadcast frames is disabled.
  - No change
    Table 2 remains unchanged.
- **Copy to Table**
  If you click the button, the setting is adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  All available ports are displayed.
- **Setting**
  Enable or disable the blocking of broadcast frames.

Steps in configuration

Enabling the blocking of broadcast frames for an individual port

1. Select the check box in the relevant row in table 2.
2. To apply the changes, click the "Set Values" button.

Enabling the blocking of broadcast frames for all ports

1. In the "Setting" drop-down list in table 1, select the "Enabled" entry.
2. Click the "Copy to Table" button. The check box is enabled for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

5.5.17 RMON

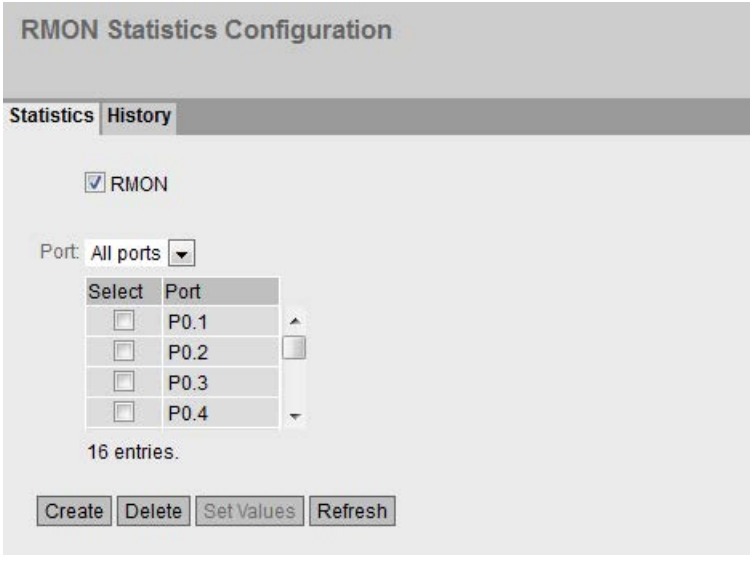
5.5.17.1 Statistics

Statistics

On this page you can specify the ports for which RMON statistics are displayed.

The RMON statistics are shown on the page “Information > Ethernet Statistics” in “Packet Size”, “Packet Type” and “Packet Error” tabs.

Settings



- **RMON**

  If you select this check box, Remote Monitoring (RMON) allows diagnostics data to be collected on the device, prepared and read out using SNMP by a network management station that also supports RMON. This diagnostic data, for example port-related load trends, allow problems in the network to be detected early and eliminated.

  Note

  If you disable RMON, these statistics are not deleted but retain their last status.

- **Port**

  Select the ports for which statistics will be displayed.

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **Port**

  Shows the ports for which statistics will be displayed.

Steps in configuration

Enabling the function

1. Select the "RMON" check box.
2. Click the "Set Values" button.

   The "RMON" function is enabled.

Enabling RMON statistics for ports

Note

Requirement

To allow RMON statistics to be displayed for a port, the "RMON" function must be enabled.

---

1. Select the required port from the "Port" drop-down list or the entry "All Ports".
2. Click the "Create" button.

   RMON statistics can be displayed for the selected port or for all ports.

Disabling RMON statistics for ports

1. Select the row you want to delete in the "Select" column.
2. Click the "Delete" button.

   No RMON statistics are displayed for the selected port.

5.5.17.2 History

Samples of the statistics

On this page, you can specify whether or not samples of the statistics are saved for a port. You can specify how many entries should be saved and at which intervals samples should be taken.

Settings

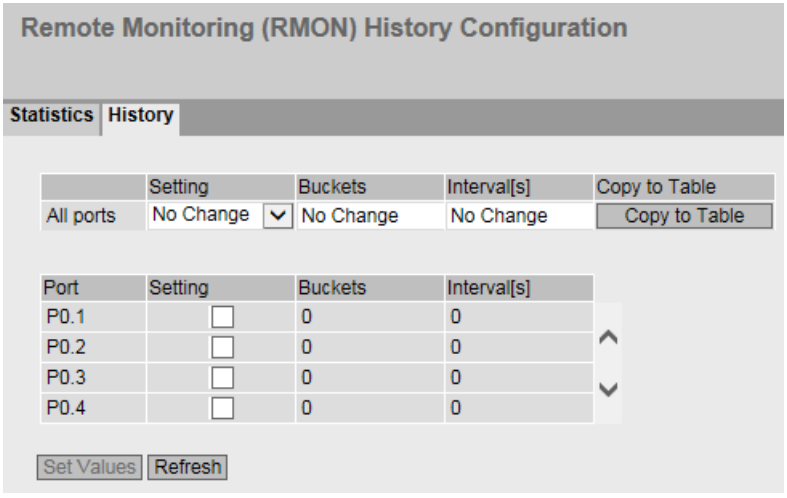


Table 1 has the following columns:

- **1st column**

  Shows that the settings are valid for all ports.

- **Setting**

  Select the required setting. If "No Change" is selected, the entry in table 2 remains unchanged.

- **Entries**

  Enter the maximum number of samples to be stored at the same time. If "No Change" is entered, the entry in table 2 remains unchanged

- **Interval [s]**

  Enter the interval after which the current status of the statistics will be saved as a sample. If "No Change" is entered, the entry in table 2 remains unchanged

- **Copy to Table**

  If you click the button, the settings are adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**

  Shows the port to which the settings relate.

- **Setting**

  Enable or disable the recording of the history on the relevant port.

- **Entries**

  Enter the maximum number of samples to be stored at the same time.

  Range of values: 1 - 65535

  Factory setting: 24

- **Interval [s]**

  Enter the interval after which the current status of the statistics will be saved as a sample.

  Range of values: 1 - 3600

  Factory setting: 3600

Steps in configuration

Enabling RMON statistics for individual ports

1. Select the check box "Setting" in the relevant row in table 2.

   The "Entries" and "Interval[s]" boxes become active with the factory settings.
2. Enter the required values in the "Entries" and "Interval[s]" boxes.
3. Click the "Set Values" button.

Enabling RMON statistics for all ports

1. In the "Setting" drop-down list, select the "Enabled" entry in table 1.
2. Enter the required values in the "Entries" and "Interval[s]" boxes. If you do not change the entries in both boxes, the factory defaults will be used for all ports.
3. Click the "Copy to Table" button.

   The settings are adopted for all ports of table 2.
4. Click the "Set Values" button.

5.6 The "Layer 3" menu

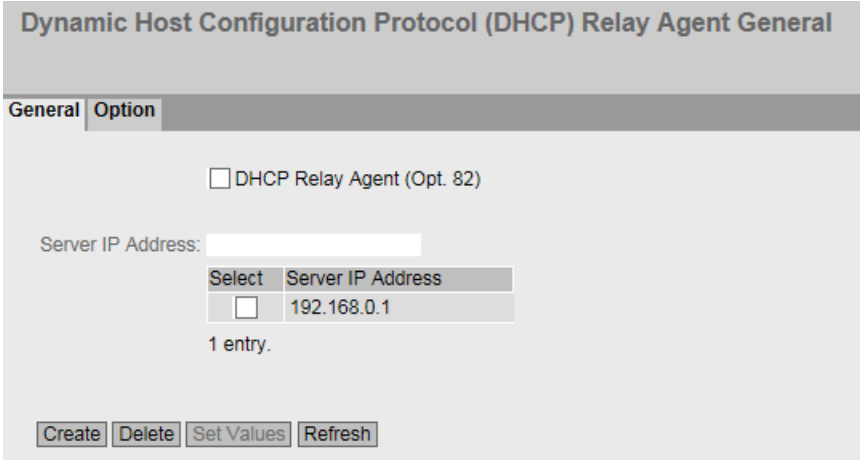
5.6.1 DHCP Relay Agent

5.6.1.1 General

DHCP Relay Agent

If the DHCP server is in a different network, the device cannot reach the DHCP server. The DHCP relay agent intercedes between a DHCP server and the device. The DHCP relay agent forwards the port number of the device with the DHCP query to the DHCP server.

You can specify up to 4 DHCP servers for the DHCP relay agent. If a DHCP server is unreachable, the device can switch to a different DHCP server.



Description of the displayed values

The page contains the following boxes:

- **DHCP Relay Agent (opt. 82)**
  Enable or disable the DHCP relay agent.
- **Server IP Address**
  Enter the IPv4 address of the DHCP server.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Server IP Address**
  Shows the IPv4 address of the DHCP server.

Steps in configuration

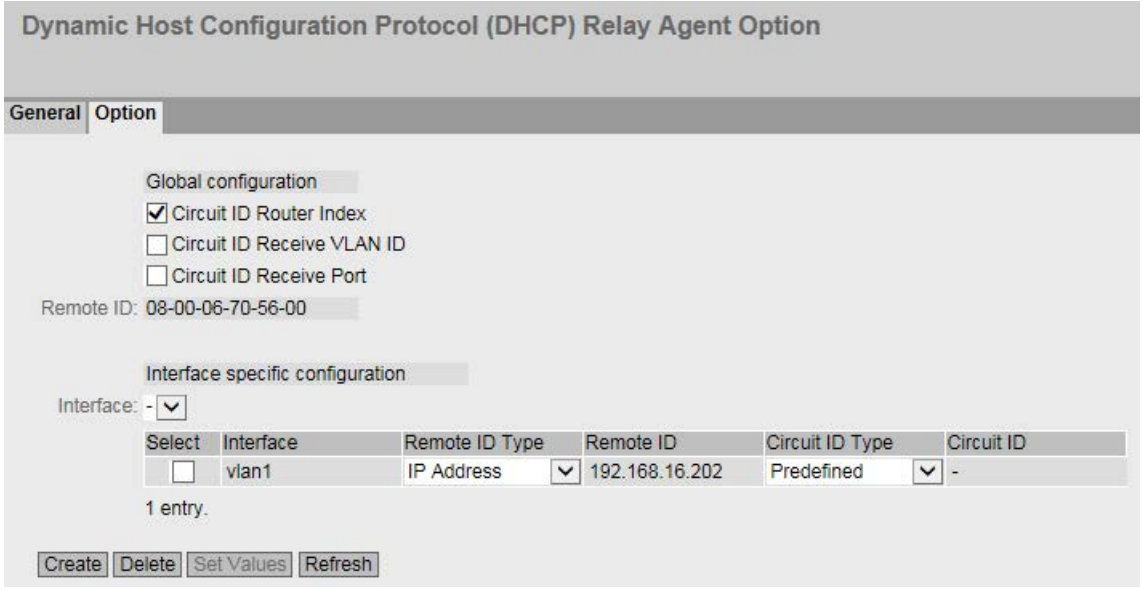
1. Enter the IPv4 address of the DHCP server in the "Server IP Address" input box.
2. Click the "Create" button. A new entry is generated in the table.
3. Select the "DHCP Relay Agent (Opt. 82)" check box.
4. Click the "Set Values" button.

5.6.1.2 Option

Parameters of the DHCP relay agent

On this page, you can specify parameters for the DHCP server, for example the circuit ID.The circuit ID describes the origin of the DHCP query, for example which port received the DHCP query.

You specify the DHCP server on the "General" tab.



Description of the displayed values

The page contains the following boxes:

Global configuration

- **Circuit ID router index**

  Enable or disable the check box. If you enable the check box, the router-Index is added to the generated circuit ID.

- **Circuit ID Receive VLAN ID**
  Enable or disable the check box. If you enable the check box, the VLAN ID is added to the generated circuit ID.

- **Circuit ID Receive Port**
  Enable or disable the check box. If you enable the check box, the receiving port is added to the generated circuit ID.

  Note

  You need to select a least one option.

- **Remote ID**
  Shows the device ID.

Interface-specific configuration

- **Interface**
  Select the interface from the drop-down list.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Interface**
  Shows the interface.

  Note

  If you have not created an interface-specific configuration, the global configuration with the MAC address is used as the device ID.

- **Remote ID Type**
  Select the type of device ID from the drop-down list. You have the following options:
  - IP Address
    The IPv4 address of the device is used as the device ID.
  - MAC Address
    The MAC address of the device is used as the device ID.
  - Free Text
    If you use "Free Text", you can enter the device name as the device identifier in "Remote ID".
- **Remote ID**
  Enter the device name. The box can only be edited if you select the entry "Free Text" for "Remote ID Type".
- **Circuit ID Type**
  Select the type of circuit ID from the drop-down list. You have the following options:
  - Predefined
    The circuit ID is created automatically based on the router index, VLAN ID or port.
  - Free Number
    If you use "Free Number", you can enter the ID for "Circuit ID".
- **Circuit ID**
  Enter the circuit ID. The box can only be edited if you select the "Free Number" entry for the "Circuit ID Type".

Steps in configuration

Follow the steps below to specify automatic assignment of the parameters:

1. Select the "Circuit ID router index" check box.
2. Select the interface from the "Interface" drop-down list.
3. Click the "Create" button. A new row is inserted in the table.
4. Select the "IP Address" entry in the "Remote ID Type" drop-down list. The IPv4 address is used as the device ID.
5. Select the "Predefined" entry in the "Circuit ID Type" drop-down list. The router index is added to the generated Circuit ID.
6. Click the "Set Values" button.

Follow the steps below to specify the parameters manually:

1. Select the "Circuit ID router index" check box.
2. Select the interface from the "Interface" drop-down list.
3. Click the "Create" button. A new row is inserted in the table
4. Select the "Free Text" entry in the "Remote ID Type" drop-down list. Enter the device ID in "Remote ID".
5. Select the "Free Number" entry in the "Circuit ID Type" drop-down list. Enter the ID in "Circuit ID".
6. Click the "Set Values" button.

5.7 The "Security" menu

5.7.1 User management

Overview of user management

Access to the device is managed by configurable user settings. Set up users with a password for authentication. Assign a role with suitable rights to the users.

The authentication of users can either be performed locally by the device or by an external RADIUS server. You configure how the authentication is handled on the "Security > AAA > General" page.

Note

When you transfer the configuration of a device to STEP 7 (TIA Portal), the configured users are not transferred.

Local logon

The local logging on of users by the device runs as follows:

1. The user logs on with user name and password on the device.
2. The device checks whether an entry exists for the user.

   → If an entry exists, the user is logged in with the rights of the associated role.

   → If no corresponding entry exists, the user is denied access.

Login via an external RADIUS server

RADIUS(Remote Authentication Dial-In User Service) is a protocol for authenticating and authorizing users by servers on which user data can be stored centrally.

The authentication of users via a RADIUS server is as follows:

1. The user logs on with user name and password on the device.
2. The device sends an authentication request with the login data to the RADIUS server.
3. The RADIUS server runs a check and signals the result back to the device.
   - The RADIUS server reports a successful authentication and for the "Service Type" attribute returns the value "Administrative User" to the device

     → The user is logged in with read/write rights.
   - The RADIUS server reports a successful authentication and returns a different or even no value to the device for the attribute "Service Type".

     → The user is logged in with read rights.
   - The RADIUS server reports a failed authentication to the device:

     → The user is denied access.

Assignment of a VLAN via RADIUS or guest VLAN in Base Bridge mode "802.1Q VLAN Bridge"

Authentication with a change to the VLAN configuration

If during authentication a port is assigned to a VLAN dynamically using the function "RADIUS VLAN Assignment Allowed" or "Guest VLAN" the options are as follows:

- If the VLAN that is to be assigned has not been created on the device, the authentication is rejected.
- If the VLAN that is to be assigned has been created on the device:
  - The port becomes an untagged member in the assigned VLAN if it was not already.

    → This makes it possible for the static configuration of the port in this VLAN to be overwritten and not restored if the authentication is retracted.
  - The port VID of the port is changed to the ID of the assigned VLAN.

Note

If the port is only to be assigned to one VLAN, you need to adapt the VLAN configuration manually. As default, all ports are untagged members in "VLAN 1".

If the authentication is canceled, e.g. by link down, the dynamic changes are canceled.

- The port is no longer a member in the assigned VLAN.
- The port VID of the port is reset to the value it had prior to authentication.

Note

If the port VID corresponds to the assigned port VID prior to authentication, the port remains an untagged member in this VLAN.

Authentication without a change to the VLAN configuration

If during authentication no VLAN is assigned either by the function "RADIUS VLAN Assignment Allowed" or by "Guest VLAN", the existing VLAN configuration of the port remains unchanged.

5.7.2 Users

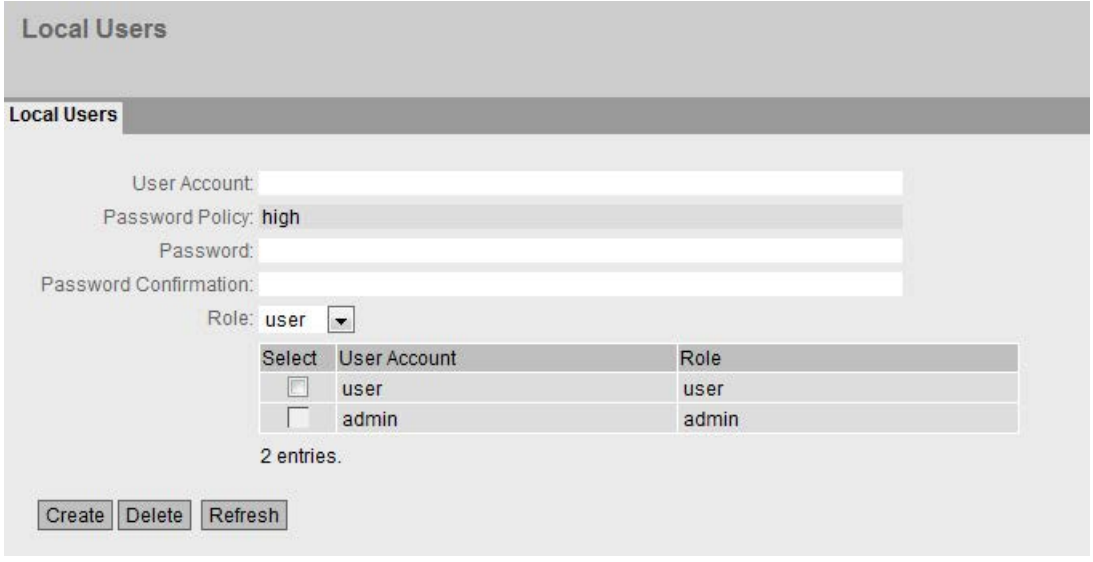
5.7.2.1 Local Users

Local users

On this page, you create local users with the corresponding rights.

Note

The values displayed depend on the rights of the logged-in user.



Description

The page contains the following:

- **User Account**

  Enter the name for the user. The name must meet the following conditions:

  – It must be unique.

  – It must be between 1 and 250 characters long.

  Note

  User name cannot be changed

  After creating a user, the user name can no longer be modified.

  If a user name needs to be changed, the user must be deleted and a new user created.

  Note

  Default user "user" set in the factory

  As of firmware version 2.1 the default user set in the factory "user" is no longer available when the product ships.

  If you update a device to the firmware V2.1 the user "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the user "user" is deleted.

  You can create new users with the role "user".

- **Password Policy**

  Shows which password policy is being used on the device:

  – High

    Password length: at least 8 characters, maximum 128 characters

    At least 1 uppercase letter

    At least 1 special character

    At least 1 number

  – Low

    Password length: at least 6 characters, maximum 128 characters

  You configure the password policy of the device on the page "Security > Passwords > Options".

- **Password**

  Enter the password. The strength of the password depends on the set password policy.

- **Password Confirmation**

  Enter the password again to confirm it.

- **Role**

  Select a role:

  – user

    Users with this role can read device parameters but cannot change them. Users with this role can change their own password.

  – admin

    Users with this role can both read and change device parameters.

The table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

  Note

  The users preset in the factory as well as logged in users cannot be deleted or changed.

- **User Account**

  Shows the user name.

- **Role**

  Shows the role of the user.

Procedure

Creating users

1. Enter the name for the user.
2. Enter the password for the user.
3. Enter the password again to confirm it.
4. Select the role of the user.
5. Click the "Create" button.

Deleting users

1. Select the check box in the row to be deleted.
2. Click the "Delete" button. The entries are deleted and the page is updated.

5.7.3 Passwords

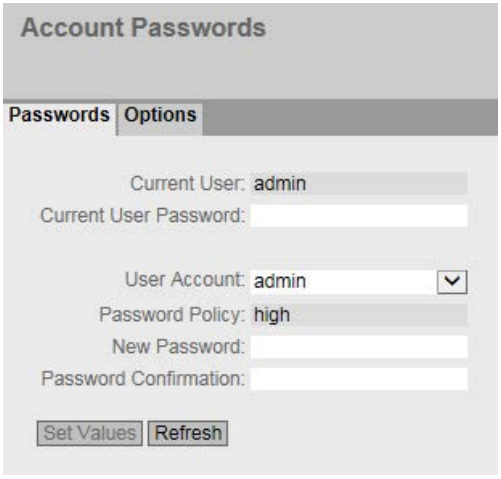
5.7.3.1 Passwords

Configuration of the device passwords

Note

If you are logged in via a RADIUS server, you cannot change any passwords.

On this page, you can change passwords. If you are logged on with read/write rights, you can change the passwords for all user accounts. If you are logged in with read rights, you can only change your own password.



Description of the displayed boxes

- **Current User**

  Shows the user that is currently logged in.

- **Current User Password**

  Enter the password for the currently logged in user.

- **User Account**

  Select the user whose password you want to change.

- **Password Policy**

  Shows which password policy is being used when assigning new passwords.

  – High

    Password length: at least 8 characters, maximum 128 characters

    at least 1 uppercase letter

    at least 1 special character

    at least 1 number

  – Low

    Password length: at least 6 characters, maximum 128 characters

- **New Password**

  Enter the new password for the selected user.

- **Password Confirmation**

  Enter the new password again to confirm it.

Procedure

Note

When you log in for the first time or following a "Restore Factory Defaults and Restart", with the preset user "admin" you will be prompted to change the password.

The factory setting for the password when the devices ship is as follows:

- admin: admin

Note

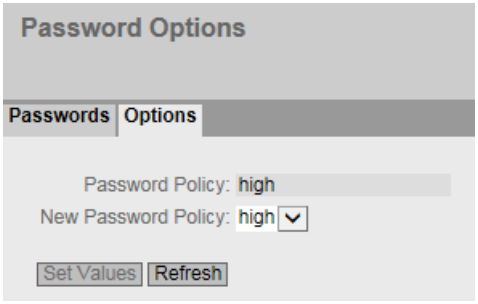
Changing the password in Trial mode

Even if you change the password in Trial mode, this change is saved immediately.

1. Enter the password for the currently logged in user in the "Current User Password" input box.
2. In the "User Account" drop-down list select the user whose password you want to change.
3. Enter the new password for the selected user in the "New Password" input box.
4. Repeat the new password in the "Password Confirmation" input box.
5. Click the "Set Values" button.

5.7.3.2 Options

On this page you specify which password policy will be used when assigning new passwords.



Description

- **Password Policy**

  Shows which password policy is currently being used

- **New Password Policy**

  Select the required setting from the drop-down list.

  – High

    Password length: at least 8 characters, maximum 128 characters

    at least 1 uppercase letter

    at least 1 special character

    at least 1 number

  – Low

    Password length: at least 6 characters, maximum 128 characters

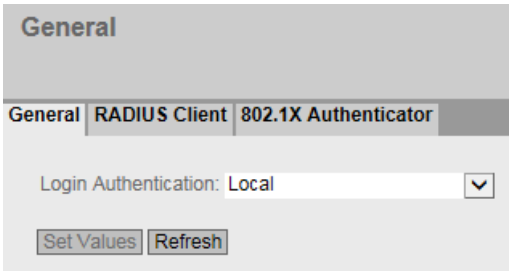
5.7.4 AAA

5.7.4.1 General

Login of network nodes

The designation used "AAA"" stands for "Authentication, Authorization, Accounting". This feature is used to identify and allow network nodes and to make the corresponding services available to them.

On this page, you configure the login.



Description of the displayed boxes

The page contains the following boxes:

Note

To be able to use the login authentication "RADIUS", a RADIUS server must be stored and configured for user authentication.

- **Login Authentication**
  Specify how the login is made:
  - Local

    The authentication must be made locally on the device.
  - RADIUS

    The authentication must be handled via a RADIUS server.
  - Local and RADIUS

    The authentication is possible both with the users that exist on the device (user name and password) and via a RADIUS server.

    The user is first searched for in the local database. If the user does not exist there, a RADIUS request is sent.
  - RADIUS and fallback Local

    The authentication must be handled via a RADIUS server.

    A local authentication is performed only when the RADIUS server cannot be reached in the network.

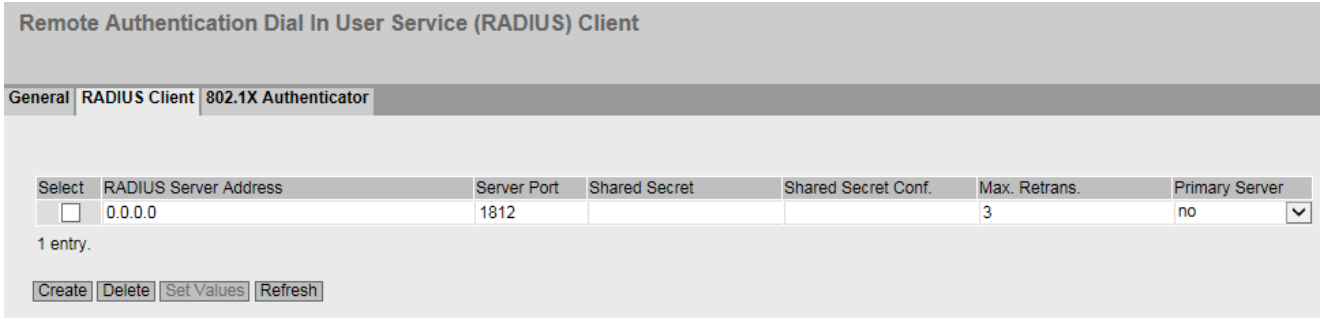
5.7.4.2 RADIUS Client

Login via an external server

The concept of RADIUS is based on an external authentication server.

Each row of the table contains access data for one server. In the search order, the primary server is queried first. If the primary server cannot be reached, secondary servers are queried in the order in which they are entered.

If no server responds, there is no authentication.



Description of the displayed boxes

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Auth. Server Type**

  Select which authentication method the server will be used for.

  – Login

    The server is used only for the login authentication.

  – 802.1X

    The server is used only for the 802.1X authentication.

  – Login & 802.1X

    The server is used for both authentication procedures.
- **RADIUS Server Address**
  Enter the IPv4 address of the RADIUS server.
- **Server Port**
  Here, enter the input port on the RADIUS server. As default, input port 1812 is set.

  Range of values: 1 - 65535
- **Shared Secret**
  Enter the access identifier of the RADIUS server.

  Range of values: 1 ... 128 characters

- **Shared Secret Conf.**
  Enter your access ID again as confirmation.
- **Max. Retrans.**

  Here, enter the maximum number of retries for an attempted request.

  The initial connection attempt is repeated the number of times specified here before another configured RADIUS server is queried or the login counts as having failed. As default 3 retries are set, this means 4 connection attempts.

  Range of values: 1 - 5
- **Primary Server**
  Using the options in the drop-down list, specify whether or not a server is the primary server. You can select one of the options "yes" or "no". You can only define one primary server.
- **Test**
  With this button, you can test whether or not the specified RADIUS server is available. The test is performed once and not repeated cyclically.
- **Test Result**

  Shows whether or not the RADIUS server is available:

  – Failed, no test packet sent

    The IP address is not reachable.

    The IP address is reachable, the RADIUS server is, however, not running.

  – Reachable, key not accepted

    The IP address is reachable, the RADIUS server does not, however accept the specified shared secret.

  – Reachable, key accepted

    The IP address is reachable, the RADIUS server accepts the specified shared secret.

  The test result is not automatically updated. To delete the test result click the "Refresh" button.

Steps in configuration

Entering a new server

1. Click the "Create" button. A new entry is generated in the table.
   The following default values are entered in the table:
   – Auth. Server Type: Login & 802.1X
   – RADIUS Server Address: 0.0.0.0
   – Server Port: 1812
   – Max. Retrans.: 3
   – Primary server: No

2. In the relevant row, enter the following data in the input boxes:
   - Auth. Server Type
   - RADIUS Server Address
   - Server Port
   - Shared Secret
   - Shared Secret Confirmation
   - Max. Retrans.: 3
   - Primary server: No
3. Click the "Set Values" button.
4. If necessary, test the reachability of the RADIUS server.

Repeat this procedure for every server you want to enter.

Modifying servers

1. In the relevant row, enter the following data in the input boxes:
   - Auth. Server Type
   - RADIUS Server Address
   - Server Port
   - Shared Secret
   - Shared Secret Confirmation
   - Max. Retrans.
   - Primary Server
2. Click the "Set Values" button.
3. If necessary, test the reachability of the RADIUS server.

Repeat this procedure for every server whose entry you want to modify.

Deleting servers

1. Click the check box in the first column before the row you want to delete to select the entry for deletion.
   Repeat this for all entries you want to delete.
2. Click the "Delete" button.

   All selected entries are deleted and the display is refreshed.

5.7.4.3 802.1x Authenticator

Setting up network access

An end device can only access the network after the device has verified the login data of the device with the authentication server. The authentication can be via 802.1X or the MAC address.

When authenticating using 802.1X both the end device and the authentication server must support the EAP protocol (Extensive Authentication Protocol).

Enabling authentication for individual ports

By enabling the relevant options , you specify for each port whether or not network access protection according to IEEE 802.1X is enabled on this port.

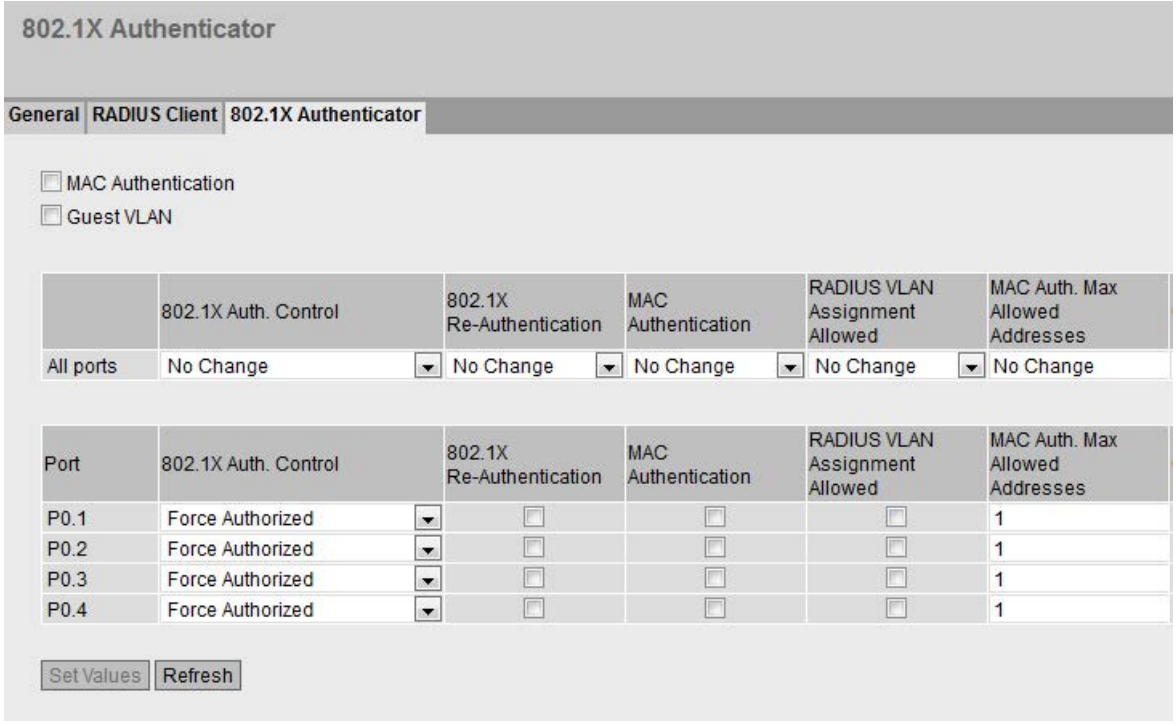
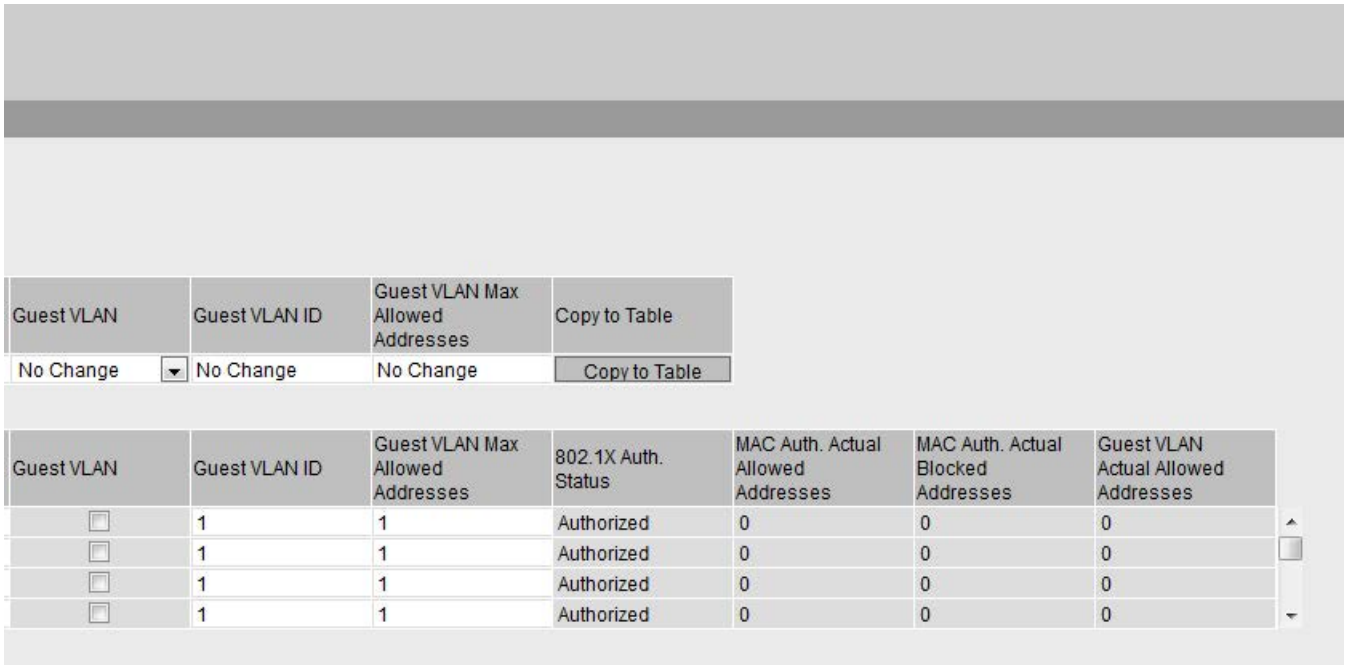


Figure 5-11 802.1x Authenticator - first part of the table



Guest VLAN	Guest VLAN ID	Guest VLAN Max Allowed Addresses	Copy to Table
No Change	No Change	No Change	Copy to Table

Guest VLAN	Guest VLAN ID	Guest VLAN Max Allowed Addresses	802.1X Auth. Status	MAC Auth. Actual Allowed Addresses	MAC Auth. Actual Blocked Addresses	Guest VLAN Actual Allowed Addresses
	1	1	Authorized	0	0	0
	1	1	Authorized	0	0	0
	1	1	Authorized	0	0	0
	1	1	Authorized	0	0	0

Figure 5-12 802.1X Authenticator - second part of the table

Description of the displayed boxes

The page contains the following boxes:

- **MAC Authentication**

  Enable or disable MAC Authentication for the device.

- **Guest VLAN**

  Enable or disable the "Guest VLAN" function for the device.

Table 1 has the following columns:

- **1st column**
  Shows that the settings are valid for all ports of table 2.
- **802.1X Auth. Control**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **802.1x Re-authentication**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **MAC Authentication**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **RADIUS VLAN Assignment Allowed**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.

- **MAC Auth. Max Allowed Addresses**
  Specify how many MAC addresses can communicate on the port at the same time.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **Guest VLAN**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **Guest VLAN ID**
  Select the required setting.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **Guest VLAN Max Allowed Addresses**
  Specify how many end devices are permitted in the "guest VLAN" on this port at the same time.
  If "No Change" is selected, the entry in table 2 remains unchanged.
- **Copy to table**
  If you click the button, the settings are adopted for all ports of table 2.

Table 2 has the following columns:

- **Port**
  This column lists all the ports available on this device.
- **802.1X Auth. Control**
  Specify the authentication of the port:
  - Force Unauthorized

    Data traffic via the port is blocked.
  - Force Authorized

    Data traffic via the port is allowed without any restrictions.

    Default setting
  - Auto

    End devices are authenticated on the port with the "802.1X" method.

    The data traffic via the port is permitted or blocked depending on the authentication result.
- **802.1X Re-Authentication**
  Enable this option if you want reauthentication of an already authenticated end device to be repeated cyclically.
- **MAC Authentication**
  Enable this option if you want end devices to be authenticated with the "MAC Authentication" method.

  If "Auto is configured for "802.1x Auth. Control and the " MAC Authentication is enabled, the timeout for the "802.1X procedure is 5 seconds. If manual input is necessary at a port for the authentication with the 802.1X" procedure, the 5 seconds may not be not adequate. To be able to run authentication using "802.1X", disable the MAC authentication on this port.

- **Adopt RADIUS VLAN Assignment**

  The RADIUS server informs the IE switch of the VLAN to which the port will belong. Enable this option if you want the information of the server to be taken into account.

  The port can only be assigned to the VLAN, if the VLAN has been created on the device. Otherwise Authentication (Page 242) is rejected.

- **MAC Auth. Max Allowed Addresses**
  Specify how many MAC addresses can communicate on the port at the same time.

  Note

  If a device uses several MAC addresses, all MAC addresses must be authenticated. Store all the MAC addresses to be authenticated on the RADIUS server. Enter the number in the "MAC Auth. Max Permitted Addresses" box.

- **Guest VLAN**

  Enable this option if you want the end device to be permitted in the guest VLAN if authentication fails.

  The port can only be assigned to the VLAN, if the VLAN has been created on the device. Otherwise Authentication (Page 242) is rejected.

  This function is also known as "Authentication failed VLAN".

- **Guest VLAN ID**
  Enter the VLAN ID of the guest VLANs.

- **Guest VLAN Max Allowed Addresses**
  Enter how many end devices are allowed on this port in the "guest VLAN" at the same time.

- **802.1X Auth. Status**
  Shows the status of the authentication of the port:
  - Authorized
  - Not Authorized

- **MAC Auth. Actual Allowed Addresses**
  Shows the number of currently permitted MAC addresses.

- **MAC Auth. Actual Blocked Addreses**
  Shows the number of currently blocked MAC addresses.

- **Guest VLAN Actual Allowed Addresses**
  Shows how many end devices are currently allowed in the "guest VLAN".

Steps in configuration

Enabling authentication for an individual port

1. Select the required options in the relevant row in table 2.
2. To apply the changes, click the "Set Values" button.

Enabling authentication for all ports

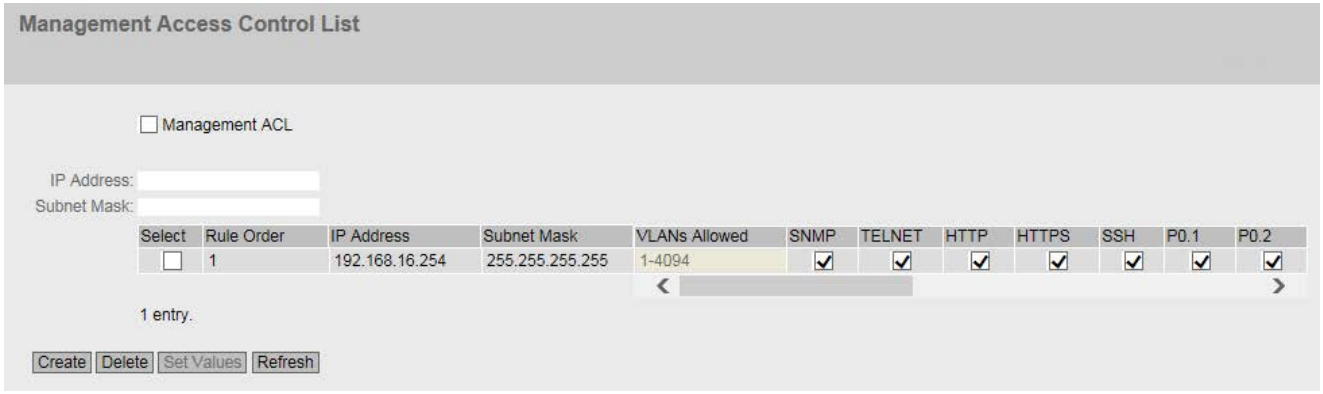
1. Select the required options in table 1.
2. Click the "Copy to table" button. The relevant settings are adopted for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

5.7.5 Management ACL

Description of configuration

On this page, you can increase the security of your device. To specify which station with which IP address is allowed to access your device, configure the IP address or an entire address range.

You can select the protocols and the ports of the station with which it is allowed to access the device.



Description of the displayed boxes

Note

Before you enable this function, note the following

A bad configuration may mean that you can no longer access the device. You can then only remedy this by resetting the device to the factory defaults and then reconfiguring. You should therefore configure an access rule that allows access to the management before you enable the function.

The page contains the following boxes:

- **Management ACL**
  Enable or disable access control to the management of the IE switch.

  As default, the function is disabled.

  Note

  If the function is disabled, there is unrestricted access to the management of the IE switch. The configured access rules are only taken into account when the function is enabled.

- **IP Address**
  Enter the IPv4 address or the network address for which the rule will apply. If you use the IPv4 address 0.0.0.0, the settings apply to all IPv4 addresses.
- **Subnet Mask**
  Enter the subnet mask. The subnet mask 255.255.255.255 is for a specific IPv4 address. If you want to allow a subnet, for example a class C subnet, enter 255.255.255.0. The subnet mask 0.0.0.0 applies to all subnets.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Rule Order**
  Shows the order in which the ACL rules are checked. As soon as a rule matches, it is used. The following rules are ignored.
- **IP Address**
  Shows the IPv4 address.
- **Subnet Mask**
  Shows the subnet mask.
- **VLANs Allowed**
  You cannot define any access rules relating to VLANs. The rules apply to all VLANs.

  Note

  Compatibility with older firmware versions

  If you have defined certain VLANs with a firmware version < 1.2, the configuration of the VLANs will be replaced during a firmware update with the default value "1-4094".

- **SNMP**
  Specify whether the station (or the IPv4 address) can access the device using the SNMP protocol.
- **TELNET**
  Specify whether the station (or the IPv4 address) can access the device using the TELNET protocol.
- **HTTP**
  Specify whether the station (or the IPv4 address) can access the device using the HTTP protocol.

- **HTTPS**
  Specify whether the station (or the IPv4 address) can access the device using the HTTPS protocol.
- **SSH**
  Specify whether the station (or the IPv4 address) can access the device using the SSH protocol.
- **Px.y**
  Specify whether the station (or the IPv4 address) can access the device via this port.

  The port is made up of the module number and the port number, for example port 0.1 is module 0, port 1.

Steps in configuration

Note

Before you enable this function, note the following

A bad configuration may mean that you can no longer access the device. You can then only remedy this by resetting the device to the factory defaults and then reconfiguring. You should therefore configure an access rule that allows access to the management before you enable the function.

Note

Keep to the order

The order in which you create the ACL rules corresponds to the order in which the rules are checked. As soon as a rule matches, it is used. The following rules are ignored.

Create new rule

1. Enter the IP address address in the "IP Address" input box.
2. Enter the subnet mask in the "Subnet Mask" input box.
3. Click the "Create" button to create a new row in the table.
4. Configure the entries of the new row.
5. Click the "Set Values" button to transfer the new entry to the device.

Enabling function

1. Select the "Management ACL" check box.
2. Click the "Set Values" button to enable the configured access rules.

Change rule

1. Configure the data of the rule you want to change.
2. Click the "Set Values" button to transfer the changes to the device.

Delete rule

1. Select the check box in the row to be deleted.
2. Repeat this procedure for every entry you want to delete.
3. Click the "Delete" button. The rules are deleted and the page is updated.

Troubleshooting/FAQ

6

6.1 Downloading new firmware using TFTP without WBM and CLI

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Operating the button

To load new firmware, you require the button. When pressing the button, remember the information in the appropriate operating instructions.

Press the "RESET" button on the SCALANCE XB-200 with only slight force.

Press the "SELECT/SET" button on the SCALANCE XC-200.

Press the "RESET" button on the SCALANCE XP-200 as far as the pressure point.

Procedure with Microsoft Windows

Using TFTP, you can supply a device with new firmware even when it cannot be reached using WBM or CLI. This section explains the procedure based on the example of Microsoft Windows.

Follow the steps below to load new firmware using TFTP:

1. Turn off the power to the device.
2. Press the button and reconnect the power supply to the device while holding down the button.
3. Hold down the button until the red fault LED "F" starts to flash.
4. Release the button as long as the red error LED is still flashing..

   Note

   This time only lasts a few seconds.

   The bootloader of the device waits in this status for a new firmware file that you can download by TFTP.
5. Connect a PC to port 0.1 via an Ethernet cable.
6. Assign an IP address to the device using DHCP or the Primary Setup Tool.

7. Open a Windows command prompt and change to the directory where the file with the new firmware is located and then execute the following command :
   ```
   tftp -i <IP address> put <firmware file>
   ```

   Note

   You can enable TFTP in Microsoft Windows as follows:

   "Control Panel" > "Programs and Features" > "Turn Windows features on or off" > "TFTP Client".

8. Once the firmware has been transferred completely to the device and validated, there is an automatic restart on the device. This may take several minutes.

6.2 Message: SINEMA configuration not yet accepted

When the following message is displayed in the display area an error has occurred transferring the configuration from STEP 7 Basic / Professional as of V13 to the device:

"SINEMA Configuration not accepted yet. With restart of device, all configuration changes will be lost."

One possible cause is, for example, that during transfer the device was not reachable.

If you now change a parameter directly on the device (WBM/CLI/SNMP) these changes are lost when the device restarts.

Solution

1. Open the relevant STEP 7 project in STEP 7 Basic / Professional
2. Open the project view.
3. Select the device in the project tree.
4. Select the "Go to network view" command in the shortcut menu.
5. Select the device in the network view.
6. In the shortcut menu of the selected device select the command "SCALANCE configuration > Save as start configuration".

Result

The configuration is saved on the device. The message is no longer visible in the display area. A configuration change directly on the device is no longer lost due to a restart of the device.

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