SIEMENS

SIMATIC NET

Industrial Ethernet switches SCALANCE XM-400/XR-500 Web Based Management (WBM)

Configuration Manual

06/2016

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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.

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⚠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.

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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 1

1.1 Information on this configuration manual

Validity of the configuration manual

This Configuration Manual covers the following products:

- SCALANCE XR-500
  - SCALANCE XR524-8C
  - SCALANCE XR526-8C
  - SCALANCE XR528-6M
  - SCALANCE XR552-12M

  The devices are available with or without routing functions. The routing function can either be integrated in the devices or made available with a KEY-PLUG.
- SCALANCE XM-400
  - SCALANCE XM408-4C
  - SCALANCE XM408-8C
  - SCALANCE XM416-4C

  The devices are available with or without routing functions. The routing function can either be integrated in the devices or made available with a KEY-PLUG.

This Configuration Manual applies to the following software version:

- SCALANCE XR-500 firmware as of version 6.0
- SCALANCE XM-400 firmware as of version 6.0

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 this configuration manual, the products also have the following documentation:

- Configuration Manual:
  - SCALANCE XM-400/XR-500 Command Line Interface (CLI)

  This document contains the CLI commands that are supported by the IE switches SCALANCE XM-400 and SCALANCE X-500.
- Operating instructions:
  - SCALANCE XR-500
  - MM900 media modules for SCALANCE XR-500M
  - Fan unit FAN597-1 for SCALANCE XR-500M
  - Power supply PS598-1 for SCALANCE XR-500M
  - SCALANCE XM-400
  - Extender for SCALANCE XM-400
  - Pluggable transceiver SFP/SFP+/SCP/STP
  - PoE power supply SCALANCE PS9230 PoE / SCALANCE PS924 PoE

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

The following documentation is also available from SIMATIC NET on the topic of Industrial Ethernet:

- System manual "Industrial Ethernet / PROFINET"
- System manual "Industrial Ethernet / PROFINET - Passive network components"

All these documents are available on the SCALANCE X DVD.

Terms used

The designation . . .	stands for . . .
IE switch	Industrial Ethernet switch
IPv4 address	IPv4 address
IPv6 address	IPv6 address
IP address	IPv4/IPv6 address
IPv4 interface	Interface that supports IPv4.
IPv6 interface	Interface that supports IPv6. The interface can have more than one IPv6 address The IPv6 addresses have different ranges (scope), e.g. link local
IP interface	Interface that supports both IPv4 and IPv6. As default the IPv4 support is already activated. The IPv6 support needs to be activated extra.

What's new as of version 6.0?

Below, you will find an overview of the most important function expansions:

- Information in the configuration limits
- System > Restart > Profiles
- "Layer 2 > Private VLAN
- System > DHCP Server
- Layer 3 functions
  - NAT (IPv4)
  - VRID-Tracking
  - Interface Tracking (VRRP)
- Configuration of IPv6 functionalities.
  - System > System Time > SNTP
  - System > System Time > NTP

Note

Default user "user" set in the factory

As of firmware version 6.0 the default user set in the factory "user" is no longer available when the product ships.

If you update a device to the firmware V6.0 the default user set in the factory "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the default user set in the factory "user" is deleted.

You can create new users with the role "user".

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 address:

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

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To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit http://support.automation.siemens.com.

License conditions

Note

Open source software

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

You will find license conditions in the following documents on the supplied data medium:

- DOC_OSS-SCALANCE-X_74.pdf
- DC_LicenseSummaryScalanceXM400_76.pdf
- DC_LicenseSummaryScalanceXR500_76.pdf

You will find these documents on the product DVD in the following directory: /Open Source Information

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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 Product characteristics

Properties of the IE switches

- The Ethernet interfaces support the following modes:
  - 10 Mbps and 100 Mbps both in full and half duplex
  - 1000 Mbps full duplex
  - Autocrossing
  - Autopolarity
- Redundancy protocols Multiple Spanning Tree Protocol (MSTP), Rapid Spanning Tree Protocol (RSTP) and Spanning Tree Protocol (STP)

  This means part of a network can be connected redundantly to a higher-level company network. The reconfiguration time of the network is in the seconds range and therefore takes longer than the ring redundancy method.
- 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. Port-based, protocol-based and subnet-based VLANs are available.
- Load limitation when using multicast protocols, for example video transmission
  By learning the multicast sources and destinations (IGMP snooping, IGMP querier), the IE switches can filter multicast data traffic and limit the load in the network. Multicast and broadcast data traffic can be limited.
- Time-of-day synchronization

  Diagnostics messages (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/PTP server and therefore makes the identification of diagnostics messages of several devices easier.
- Link aggregation (IEEE 802.1AX) for bundling ports
- 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)

Layer 3 functions

The following functions are only available on devices with routing functions:

- Static routing
- OSPF / OSPFv3

- VRRP / VRRPv3
- RIP / RIPng

There are devices that natively support all routing functions. You will find the order numbers in the operating instructions of the devices.

On the devices that only support layer 2, you can enable the routing functions with a KEY-PLUG.

IPv6 addresses

As of firmware version 5.0 you can configure IPv6 functionalities using the Command Line Interface. As of firmware version 5.1 you can configure IPv6 functionalities in the Web Based Management. You can recognize IPv6 addresses by the name "Subnet Mask/Prefix2.

Naming interfaces

Interface names with SCALANCE XM-400

- Interfaces of the basic device

  The interfaces of the basic device SCALANCE XM-400 are called module 1.
- Interfaces of extenders

  The port extenders are called module 2 and module 3 starting from the basic device. The number of port extenders depends on the number of ports of the basic device.

  The extender function is called module 0.

Interface names with SCALANCE XR-500

- Permanently integrated Interfaces

  The interfaces permanently installed in the SCALANCE XR-500 are identified with module 0.
- Interfaces of modules

  The slots for modules are called module 1 followed by numbers. The numbering range depends on the hardware configuration. The numbering is fixed and does not depend on the number of modules being used.

  Each module has 4 ports numbered 1 to 4.

Combo ports

Combo port is the name for two communication ports. A combo port has the two following plug-in options:

- a fixed RJ-45 port
- an SFP transceiver slot that can be equipped individually

Of these two ports, only one can ever be active.

You can set the active port with the command `media-type`.

2.2 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. If no DHCP server is available, a PG/PC on which the Primary Setup Tool (PST) is installed is necessary for the initial assignment of an IP address to the IE switches. For the other configuration settings, a PG/PC with Telnet or an Internet browser is necessary.

Serial interface

The IE switches have a serial interface. An IP address is unnecessary to be able to access the device via the serial interface. A serial cable ships with the products.

Set the following parameters for the connection:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

2.3 C-PLUG / KEY-PLUG

Configuration information on the C-PLUG / KEY-PLUG

The C-PLUG / KEY-PLUG is used to transfer the configuration of the old device to the new device when a device is replaced.

NOTICE
Do not remove or insert a C-PLUG / KEY-PLUG during operation!
A C-PLUG / KEY-PLUG may only be removed or inserted when the device is turned off. The device regularly checks whether or not a KEY-PLUG is present. If it is detected that the KEY-PLUG was removed, there is a restart. If a valid KEY-PLUG was inserted in the device, the device changes to a defined error state following the restart.

When the new device starts up with the C-PLUG / KEY-PLUG, it then continues automatically with exactly the same configuration as the old device. One exception to this can be the IP configuration if it is set over DHCP and the DHCP server has not been reconfigured accordingly.

A reconfiguration is necessary if you use functions based on MAC addresses.

Note

In terms of the C-PLUG / KEY-PLUG, the SCALANCE devices work in two modes:

- **Without C-PLUG / KEY-PLUG**
  The device stores the configuration in internal memory. This mode is active when no C-PLUG / KEY-PLUG is inserted.
- **With C-PLUG / KEY-PLUG**
  The configuration stored on the C-PLUG / KEY-PLUG is displayed over the user interfaces. If changes are made to the configuration, the device stores the configuration directly on the C-PLUG / KEY-PLUG and in the internal memory. This mode is active as soon as a C-PLUG / KEY-PLUG is inserted. When the device is started with a C-PLUG / KEY-PLUG inserted, the device starts up with the configuration data on the C-PLUG / KEY-PLUG.

Note

Incompatibility with previous versions with C-PLUG / KEY-PLUG inserted

During the installation of a previous version of the firmware, 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 C-PLUG / KEY-PLUG is inserted in the device, following the restart, this has the status "Not Accepted" since the C-PLUG / KEY-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 C-PLUG / KEY-PLUG is no longer required, the C-PLUG / KEY-PLUG can be deleted or rewritten manually.

License information on the KEY-PLUG

In addition to the configuration, the KEY-PLUG also contains a license that allows the use of layer 3 functions.

2.4 Power over Ethernet (PoE)

General

"Power over Ethernet" (PoE) is a power supply technique for network components according to IEEE 802.3af or IEEE 802.3at. The power is supplied over the Ethernet cables that connect the individual network components together. This makes an additional power cable unnecessary. PoE can be used with all PoE-compliant network components that require a power of max. 25.50 W.

Cable used for the power supply

- **Alternative A (redundant wires)**
  In Fast Ethernet, the wire pairs 1, 2 and 3, 6 are used to transfer data. Pairs 4, 5 and 7, 8 are then used to supply power. If there are only four wires available, the voltage is modulated onto the wires 1, 2 and 3, 6 (see variant 2). This alternative is suitable for a data transmission rate of 10/100 Mbps. This type of power supply is not suitable for 1 Gbps since with gigabit all eight wires are used for data transfer.
- **Alternative B (phantom power)**
  With phantom power, the power is supplied over the pairs that are used for data transfer, in other words, all eight (1 Gbps) or four (10/100 Mbps) wires are used both for the data transfer and the power supply.

A PoE-compliant end device must support both alternative A and alternative B over redundant wires.
A switch with PoE capability can supply the end device either using

- alternative A or
- Alternative B or
- alternative A and alternative B.

Note

The SCALANCE PE408PoE extender supports alternative B.

Endspan

With endspan, the power is supplied via a switch that can reach a device over an Ethernet cable. The switch must be capable of PoE, for example a SCALANCE X108PoE, SCALANCE X308-2M PoE, all SCALANCE XM400 switches with PE408PoE, SCALANCE XR552-12M.

Midspan

Midspan is used when the switch is not PoE-compliant. The power is supplied by an additional device between the switch and end device. In this case, only data rates of 10/100 Mbps can be achieved because the power is supplied on redundant wires.

A Siemens power insert can also be used as the interface for the power input. Since a power insert supports a power supply of 24 VDC, it does not conform with IEEE 802.3af or IEEE 802.3at. The following restrictions relating to the use of power inserts should be noted:

⚠ **WARNING**

Operate the power insert only when the following conditions apply:

- with extra low voltages SELV, PELV complying with IEC 60364-4-41
- in USA/CAN with power supplies complying with NEC class 2
- in USA/CAN, the cabling must meet the requirements of NEC/CEC
- Current load maximum 0.5 A

Cable lengths

Table 2- 1 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 2- 2 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC standard cable, 4×2, 24 AWG IE FC flexible cable, 4×2, 24 AWG	with IE FC RJ-45 Plug 180, 4x2	0 to 90 m
IE FC standard cable, 4×2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC flexible cable, 4×2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Table 2- 3 Fitting connectors

PIN	IE FC outlet RJ-45	IE FC RJ-45 modular outlet	Use	
			1000BaseT	10BaseT, 100BaseTX
1	Yellow	Green/white	D1+	Tx+
2	Orange	Green	D1-	Rx+
3	White	Orange/white	D2+	Tx-
6	Blue	Orange	D2-	Rx-
4	-	Blue	D3-	-
5	-	Blue/white	D3+	-
7	-	Brown/white	D4-	-
8	-	Brown	D4+	-

IP addresses 3

3.1 IPv4 / IPv6

What are the essential differences?

	IPv4	IPv6
IP configuration	• DHCP server • Manual	• Automatic: – Creates a link local address for every interface on which IPv6 is activated. – Stateless Address Autoconfiguration (SLAAC): Stateless autoconfiguration using NDP (Neighbor Discovery Protocol) • Manual • Stateful DHCPv6
Available IP addresses	32-bit: 4, 29 * 10^9 addresses	128-bit: 3, 4 * 10^{38} addresses
Address format	Decimal: 192.168.1.1 with port: 192.168.1.1:20	Hexadecimal: 2a00:ad80::0123 with port: [2a00:ad80::0123]:20
Loopback	127.0.0.1	::1
IP addresses of the interface	4 IP addresses	Multiple IP addresses • LLA: A link local address (formed automatically) fe80::/128 per interface • ULA: Several unique local unicast addresses per interface • GUA: Several global unicast addresses per interface
Header	• Checksum • Variable length • Fragmentation in the header • No security	• Checking at a higher layer • Fixed size • Fragmentation in the extension header
Fragmentation	Host and router	Only endpoint of the communication
Quality of service	Type of Service (ToS) for prioritization	The prioritization is specified in the header field "Traffic Class".
Types of frame	Broadcast, multicast, unicast	Multicast, unicast, anycast

	IPv4	IPv6
Identification of DHCP clients/server	Client ID: MAC address	DUID + IAID(s) = exactly one interface of the host DUID = DHCP unique identifier Identifies server and clients uniquely and should not change, not even when replacing network components! IAID = Identity Association Identifier At least one per interface is generated by the client and remains unchanged when the DHCP client restarts Three methods of obtaining the DUID • DUID-LLT • DUID-EN • DUID-LL
DHCP	via UDP with broadcast	via UDP with unicast RFC 3315, RFC 3363 **Stateful DHCPv6** Status-dependent configuration in which the IPv6 address and the configuration settings are transferred. Four DHVPv6 messages are exchanged between client and server: 1. SOLICIT: Sent by the DHCPv6 client to localize DHCPv6 servers. 2. ADVERTISE The available DHCPv6 servers reply to this. 3. REQUEST The DHCPv6 client requests an IPv6 address and the configuration settings from the DHCPv6 server. 4. REPLY The DHCPv6 server sends the IPv6 address and the configuration settings. If the client and server support the function "Rapid commit" the procedure is shortened to two DHCPv6 messages SOLICIT and REPLY . **Stateless autoconfiguration** In stateless DHCPv6, only the configuration settings are transferred. **Prefix delegation** The DHCPv6 server delegates the distribution of IPv6 prefixes to the DHCPv6 client. The DHCPv6 client is also known as PD router.
Resolution of IP addresses in hardware addresses	ARP (Address Resolution Protocol)	NDP (Neighbor Discovery Protocol)

3.2 IPv4 address

3.2.1 Structure of an IPv4 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".

3.2.2 Initial assignment of an IPv4 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** (default)
- **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 at Siemens Industry Automation and Drives Service & Support on the Internet 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)".
- **STEP7**

  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 as of V5.5 SP4**

    For further information on the assignment of the IP address using STEP 7 refer to the documentation "Configuring Hardware and Connections with STEP 7", in the section "Steps For Configuring a PROFINET IO System".
  - **STEP 7 Basic as of V12 SP1** or **STEP 7 Professional as of V12 SP1**

    For further information on assigning the IP address using STEP 7 (as of V12 SP1), 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 XM-400/XR-500 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.

3.2.3 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.
- 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. The address can be assigned via the MAC address, the DHCP client ID or the system name. You configure the parameter in "System > DHCP Client".

- The following DHCP options are supported:
  - DHCP option 6: Assignment of a DNS server address
  - DHCP option 66: Assignment of a dynamic TFTP server name
  - DHCP option 67: Assignment of a dynamic boot file name
  - DHCP option 82: Assignment of IP addresses depending on the device index, switch port, the VLAN ID or user-defined identification values of the DHCP relay agent.

Note

DHCP uses a mechanism with which the IP address is assigned for only a short time (lease time). 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.

3.3 IPv6 addresses

3.3.1 IPv6 terms

Network node

A network node is a device that is connected to one or more networks via one or more interfaces.

Router

A network node that forwards IPv6 packets.

Host

A network node that represents an end point for IPv6 communication relations.

Link

A link is, according to IPv6 terminology, a direct layer 3 connection within an IPv6 network.

Neighbor

A network node located on the same link as the network node.

IPv6 interface

Physical or logical interface on which IPv6 is activated.

Path MTU

Maximum permitted packet size on a path from a sender to a recipient.

Path MTU discovery

Mechanism for determining the maximum permitted packet size along the entire path from a sender to a recipient.

LLA

Link local address FE80::/10

As soon as IPv6 is activated on the interface, a link local address is formed automatically. Can only be reached by accounts located on the same link.

ULA

Unique Local Address

Defined in RFC 4193. Via this address, the IPv6 interface can be reached in the LAN.

GUA

Global Unicast Address Via this address, the IPv6 interface can be reached, e.g. via the Internet.

Interface ID

The interface ID is formed with the EUI-64 method or manually.

EUI-64

Extended Unique Identifier (RFC 4291); method for forming the interface ID. In Ethernet, the interface ID is formed from the MAC address of the interface. Divides the MAC address into the manufacturer-specific part (OUI) and the network-specific part (NIC) and inserts FFFE between the two parts.

Example:

MAC address = AA:BB:CC:DD:EE:FF

OUI = AA:BB:CC

NIC = DD:EE:FF

EUI-64 = OUI + **FFFE** + NIC = AA:BB:CC:**FF:FE**:DD:EE:FF

Scope

Defines the range of the IPv6 address.

3.3.2 Structure of an IPv6 address

IPv6 address format - notation

IPv6 addresses consist of 8 fields each with four-character hexadecimal numbers (128 bits in total). The fields are separated by a colon.

Example:

fd00:0000:0000:ffff:02d1:7d01:0000:8f21

Rules / simplifications:

- If one or more fields have the value 0, a shortened notation is possible.

  The address fd00:**0000:0000**:ffff:02d1:7d01:0000:8f21 can also be shortened and written as follows:

  fd00**::**ffff:02d1:7d01:0000:8f21

  To ensure uniqueness, this shortened form can only be used once within the entire address.

- Leading zeros within a field can be omitted.

  The address fd00:0000:0000:ffff:**02d1**:7d01:0000:8f21 can also be shortened and written as follows:

  fd00**::**ffff:**2d1**:7d01:0000:8f21

- Decimal notation with periods

  The last 2 fields or 4 bytes can be written in the normal decimal notation with periods.

  Example: The IPv6 address fd00::ffff.125.1.0.1 is equivalent to fd00::ffff:7d01:1

Structure of the IPv6 address

The IPv6 protocol distinguishes three types of address: Unicast , anycast and multicast. The following section describes the structure of the global unicast addresses.

IPv6 prefix		**Suffix**
Global prefix: n bits	Subnet ID m bits	Interface ID 128 - n - m bits
Assigned address range	Description of the location, also subnet prefix or subnet	Unique assignment of the host in the network. The ID is generated from the MAC address.

The prefix for the link local address is always fe80:0000:0000:0000. The prefix is shortened and noted as follows: fe80::

IPv6 prefix

Specified in: RFC 4291

The IPv6 prefix represents the subnet identifier.

Prefixes and IPv6 addresses are specified in the same way as with the CIDR notation (Classless Inter-Domain Routing) for IPv4.

Design

IPv6 address / prefix length

Example

IPv6 address: 2001:0db8:1234::1111/48

Prefix: 2001:0db8:1234::/48

Interface ID: ::1111

Entry and appearance

The entry of IPv6 addresses is possible in the notations described above. IPv6 addresses are always shown in the hexadecimal notation.

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.

The usability of various functions depends on the device type you are using and whether or not a KEY-PLUG is inserted.

	Configurable function	Maximum number
System	DNS server	3
	Syslog server	3
	E-mail server	3
	SNMPv1 trap recipient	10
	SNTP server	2
	NTP server	3
	DHCP pools	24
	IPv4 addresses managed by the DHCP server (dynamic + static)	575
	Relay agent information for DHCP	5
	DHCP static assignments per DHCP pool	24
Layer 2	Virtual LANs (port-based; including VLAN 1)	257
	Protocol-based VLAN groups	12
	Protocol-based VLAN groups per port	12
	IPv4 subnet-based VLANs	150
	Private VLAN	1
	Primary PVLANs	1
	Secondary isolated PVLANs	24
	Secondary community PVLANs	256
	Multiple Spanning Tree instances	16
	Link aggregations or Etherchannels each with a maximum of 8 ports per aggregation	8
	Ports in a link aggregation	8
	Static MAC addresses in the Forward Database (FDB)	256
	Multicast addresses without active GMRP	512
	Multicast addresses with active GMRP	50
	VLANs whose data traffic can be mirrored to a monitor port	255
	RSPAN sessions	1

	Configurable function	Maximum number
Layer 3	IP interfaces	127
	Entries in the hardware routing table	4096
	Static routes	100
	Possible routes to the same destination	8
	DHCP Relay Agent interfaces	127
	DHCP Relay Agent server	4
	NAT interfaces	5
	VRRP router interfaces (only VLAN interfaces)	52
	OSPF areas per device	5
	OSPFv2 area range entries per OSPF area (intra-area summary)	3
	OSPFv3 area range entries per OSPF area (intra-area summary)	10
	OSPF interfaces	40
	OSPF interfaces per OSPF area	40
	OSPF virtual links (within an autonomous system)	8
	OSPFv3 neighbors	300
	OSPFv3 neighbors per interface	8
	OSPFv3 routes	1500
	OSPFv2 interfaces authentication keysl	200 (40 interfaces each with 5 keys)
	OSPFv2 virtual links authentication keys	40 (8 virtual links each with 5 keys)
	PIM components	1
	Rendezvous points	3
	Candidates for rendezvous points	3
	Static rendezvous points	3
Security	Roles	29
	Users	30 (incl. user preset in the factory "admin")
	Groups	32
	RADIUS Server	4
	Management ACLs (access rules for management)	10
	Rules for port ACL MAC	128
	Ingress and egress rules for port ACL MAC (total)	364
	Rules for port ACL IP	128
	Ingress and egress rules for port ACL IP (total)	364
	Rules for VLAN ACL IP	128

Note

Restriction of the number of rules

If you change one of the following values on the "Security > ACL IP Protocol Configuration" page, a comparator is required in each case.

- Source Port Min.
- Source Port Max.
- Dest. Port Min.
- Dest. Port Max.

Per port and transmission direction (ingress/egress) you can use 8 comparators.

4.2 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

With the introduction of SNMPv3 you can no longer transfer user configurations to other devices without taking special action, e.g. by loading a configuration file or replacing the C-PLUG.

According to the standard, the SNMPv3 protocol uses a unique SNMP engine ID as an internal identifier for an SNMP agent. This ID must be unique in the network. It is used to authenticate access data of SNMPv3 users and to encrypt it.

Depending on whether you have enabled or disabled the “SNMPv3 User Migration” function, the SNMP engine ID is generated differently.

Restriction when using the function

Use the "SNMPv3 User Migration" function only to transfer configured SNMPv3 users to a substitute device when replacing a device.
Do not use the function to transfer configured SNMPv3 users to multiple devices. If you load a configuration with created SNMPv3 users on several devices, these devices use the same SNMP engine ID. If you use these devices in the same network, your configuration contradicts the SNMP standard.

Compatibility with predecessor products

You can only transfer SNMPv3 users to a different device if you have created the users as migratable users. To create a migratable user the "SNMPv3 User Migration" function must be activated when you create the user.

4.3 VLAN

4.3.1 Basics

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 38)). This expansion includes not only the VLAN ID but also priority information.

Options for the VLAN assignment

There are various options for the assignment to VLANs:

- Port-based VLAN

  Each port of a device is assigned a VLAN ID. You configure port-based VLAN in "Layer 2 > VLAN > Port-based VLAN (Page 252)".

- Protocol-based VLAN
  Each port of a device is assigned a protocol group. You configure protocol-based VLAN in "Layer 2 > VLAN > Protocol-based VLAN port (Page 255)".

- IPv4 Subnet-based VLAN
  The IPv4 address of the device is assigned a VLAN ID. You configure subnet-based VLAN in "Layer 2 > VLAN > IPv4 subnet-based VLAN (Page 256)".

processing the VLAN assignment

If more than one VLAN assignment is created on the device, the assignments are processed in the following order:

1. IPv4 subnet-based VLAN
2. Protocol-based VLAN
3. Port-based VLAN

The frame is first examined for the IPv4 address. If a rule on the "IPv4 subnet-based VLAN" tab applies, the frame is sent to the corresponding VLAN. If no rule applies, the protocol type of the frame is examined. If a rule on the "Protocol-based VLAN port" tab applies, the frame is sent to the corresponding VLAN. If no rule applies, the frame is sent via the port-based VLAN. The rules for the port-based VLAN are specified on the "Port-based VLAN" tab.

4.3.2 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:

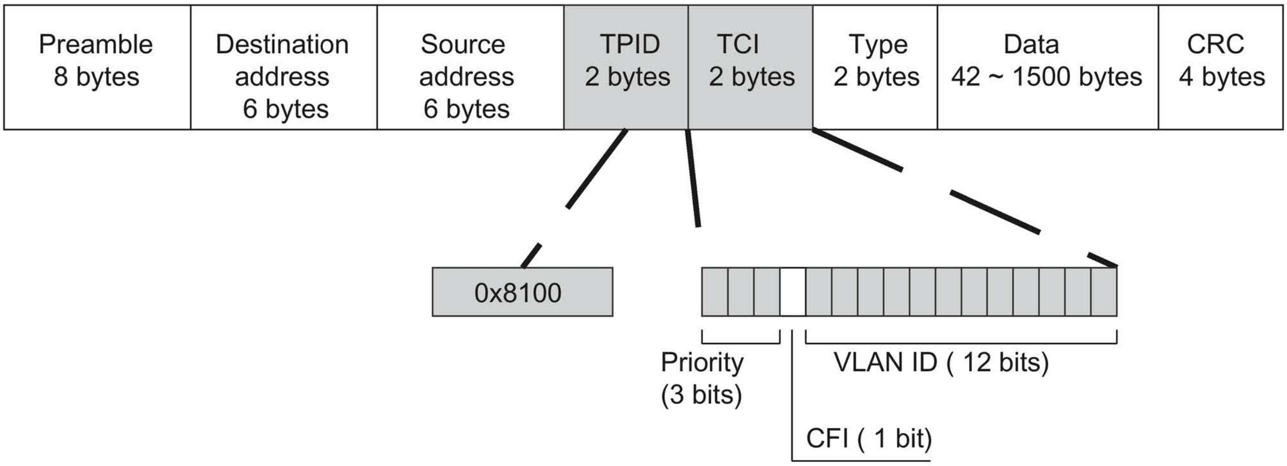


Image 4-1 Structure of the expanded Ethernet frame

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). The priority according to IEEE 802.1P is as follows:

CoS bits	Type of data
000	Non time-critical data traffic (less then best effort [basic setting])
001	Normal data traffic (best effort [background])
010	Reserved (standard)
011	Reserved (excellent effort)
100	Data transfer with max. 100 ms delay
101	Guaranteed service, interactive multimedia
110	Guaranteed service, interactive voice transmission
111	Reserved

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. First, the frames with the highest priority ("Strict Priority" method) 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

4.3.3 Private VLAN

With a private VLAN (PVLAN) you can divide up the layer 2 broadcast domains of a VLAN.

A private VLAN consists of the following units:

- A primary private VLAN (primary PVLAN)

  The VLAN that is divided up is called primary private VLAN.

- secondary private VLANs (secondary PVLAN)

  Secondary PVLANs exist only within a primary PVLAN. Every secondary PVLAN has a specific VLAN ID and is connected to the primary PVLAN.

  Secondary PVLANs are divided into the following types:

  – Isolated Secondary PVLAN

    Devices within an isolated secondary PVLAN cannot communicate with each other via layer 2.

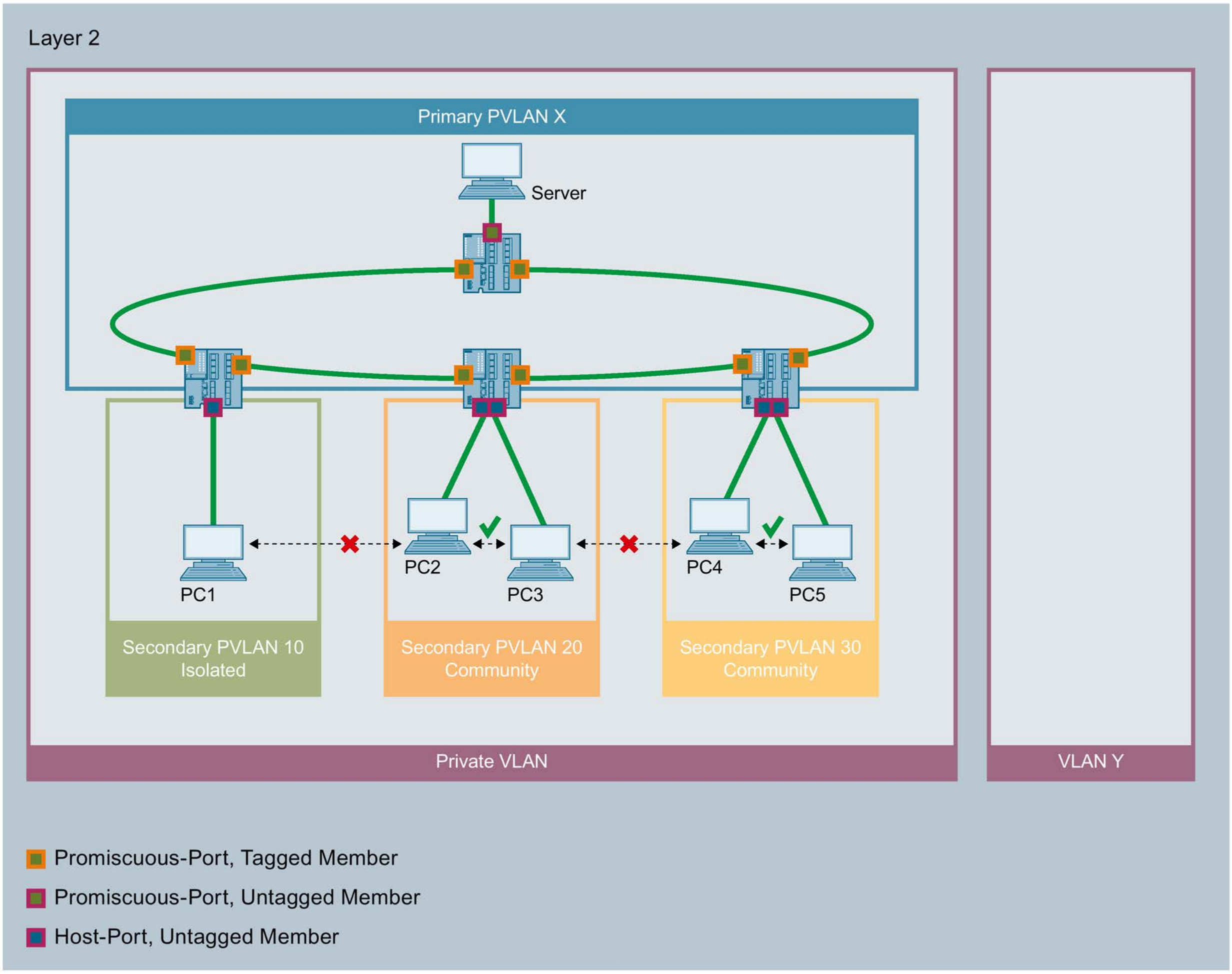
  – Community Secondary PVLAN

    Devices within a community secondary PVLAN can communicate with each other directly via layer 2. The devices cannot communicate with devices in other communities of the PVLAN via layer 2.

Note

VALAN ID with secondary PVLANs

If you use the same VLAN ID for secondary PVLANs on different IE switches, the end devices in these secondary PVLANs can communicate with other via layer 2 across the different switches.



In this example, the ports of the IE switches that connect them to other IE switches are promiscuous ports. These network ports are tagged members in all PVLANs: Primary PVLAN and all secondary PVLANs.

The ports to which the PCs are connected are host ports. The host ports are all untagged members in the primary PVLAN and in their secondary PVLAN.

The port to which the server is connected is a promiscuous port. This promiscuous port ports is an untagged member in all PVLANs: Primary PVLAN and all secondary PVLANs.

In this example all PCs can communicate with the server. The server can communicate with all PCs. PC1 cannot communicate with any other PC. The PCs within a community secondary PVLAN can communicate with each other but not with the PCs in another secondary PVLAN.

4.4 Mirroring

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

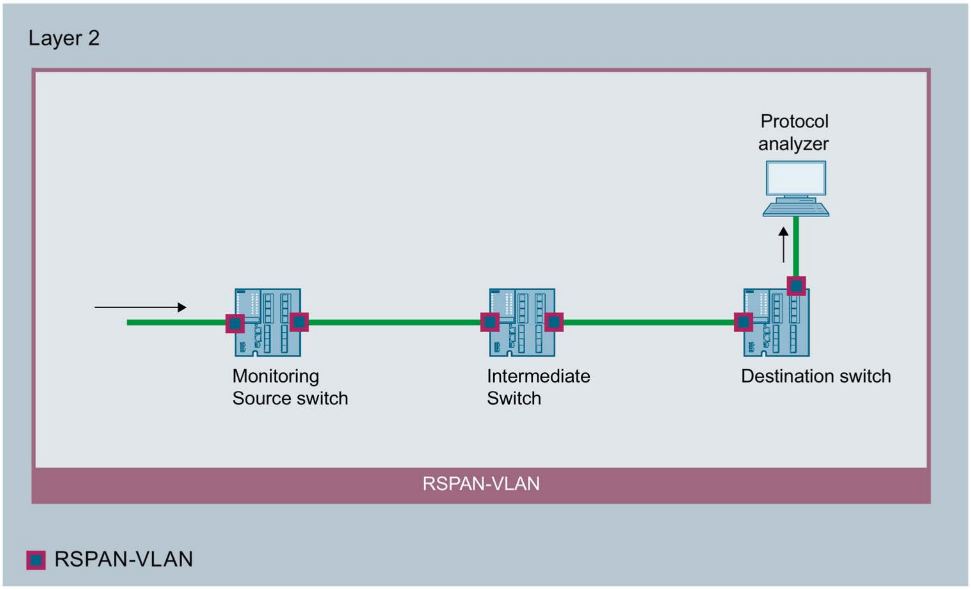
Mirroring a port means that the data traffic at a port (mirrored port) of the IE switch is copied to another port (monitor port). You can mirror one or more ports to a monitor port.

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.

RSPAN

With RSPAN (Remote Switched Port Analyzer) you can forward the data traffic of a mirroring session to the monitor port via a VLAN. On the RSPAN VLAN, the mirrored data traffic is not disturbed by other data.

Frames addressed directly to the monitoring source switch cannot be mirrored on the RSPAN destination port.



Function Extender BUS ANALYZER Agent XM-400

You can use the Function Extender BUS ANALYZER Agent XM-400 with the basic devices SCALANCE XM-400 as of firmware version 5.1.

The function extender BUS ANALYZER Agent XM-400 is a modular network component with 4 internal monitor ports for port mirroring. Ports of the basic device can be mirrored on the internal ports of the function extender BUS ANALYZER Agent XM-400 and their data traffic recorded. You do not need to reserve any ports of the basic device or a port extender for this.

- The mirrored data traffic is available on the management port (M1) of the BUS ANALYZER Agent XM-400.
- To record the mirrored data traffic, the software BUS ANALYZER SCOPE is used.

4.5 Redundancy mechanism

4.5.1 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 stations. 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.

4.5.1.1 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.

4.5.2 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 0.3 seconds.

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.
- All devices must be interconnected via their ring ports.
- 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.

4.5.3 MRP

4.5.3.1 MRP - Media Redundancy Protocol

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

IEC 62439-2 Edition 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 0.2 seconds.

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.

  Except in PROFINET IO systems, topologies with up to 100 SCALANCE X-200 and SCALANCE X-300 IE switches were tested successfully.

  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 49)").
- 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.

Topology

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

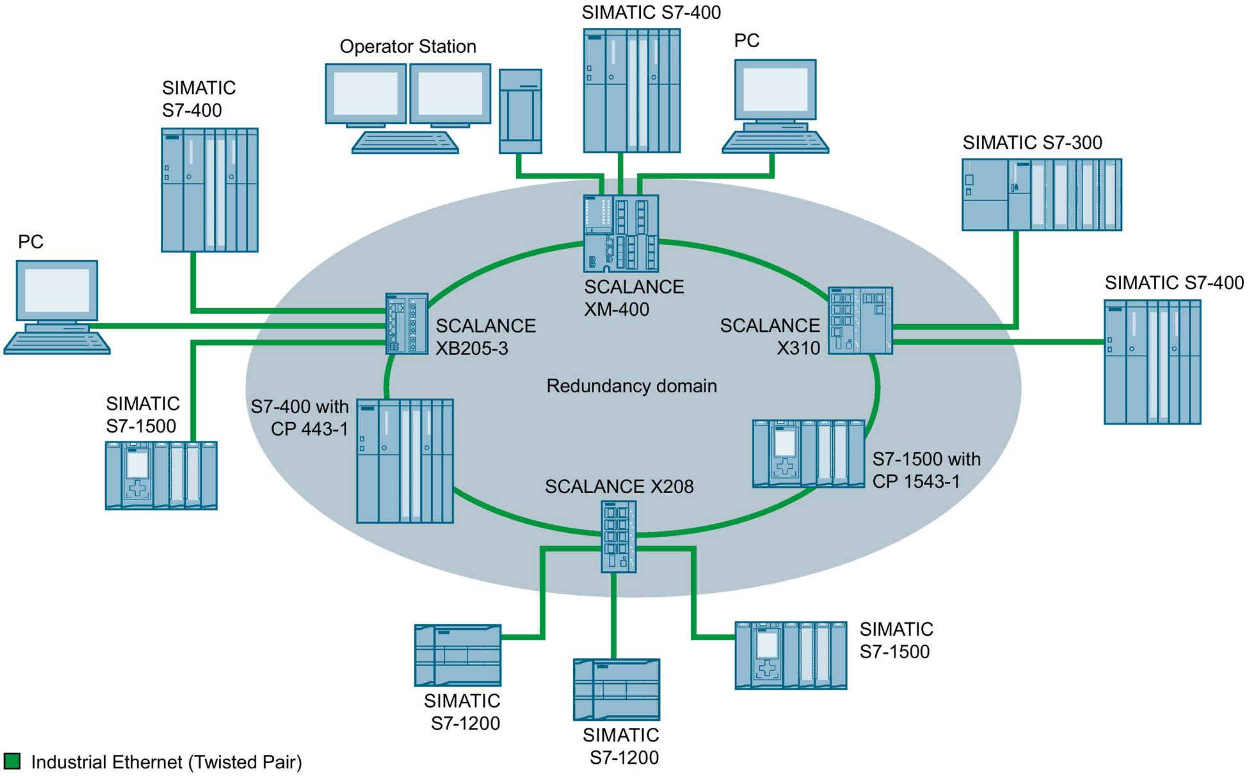


Image 4-2 Example of a ring topology with the MRP media redundancy protocol

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 1616.

4.5.3.2 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 236)
- Ring (Page 270)

4.5.3.3 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

With brand new SCALANCE XB-200/SCALANCE XP-200 (EtherNet/IP variants), SCALANCE XM-400 and SCALANCE XR-500 switches and those set to the factory settings, MRP is disabled and spanning tree enabled.

To load a PROFINET configuration on one of the devices named using MRP, first disable spanning tree on the device using the WBM or CLI.

Note

Changing the role

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

Note

Starting up and restarting

The MRP settings remain in effect following a restart of the device or following a power down 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:

- CPs:

  "Manager (Auto)"
- SCALANCE X-200, SCALANCE XC-200, SCALANCE XB-200/SCALANCE XP-200 (PROFINET variants), SCALANCE X-300 and SCALANCE X-400:

  "Automatic Redundancy Detection"

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

With brand new SCALANCE XB-200/SCALANCE XP-200 (EtherNet/IP variants), SCALANCE XM-400 and SCALANCE XR-500 IE switches and those set to the factory settings, MRP is disabled and spanning tree enabled.

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.

4.5.4 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

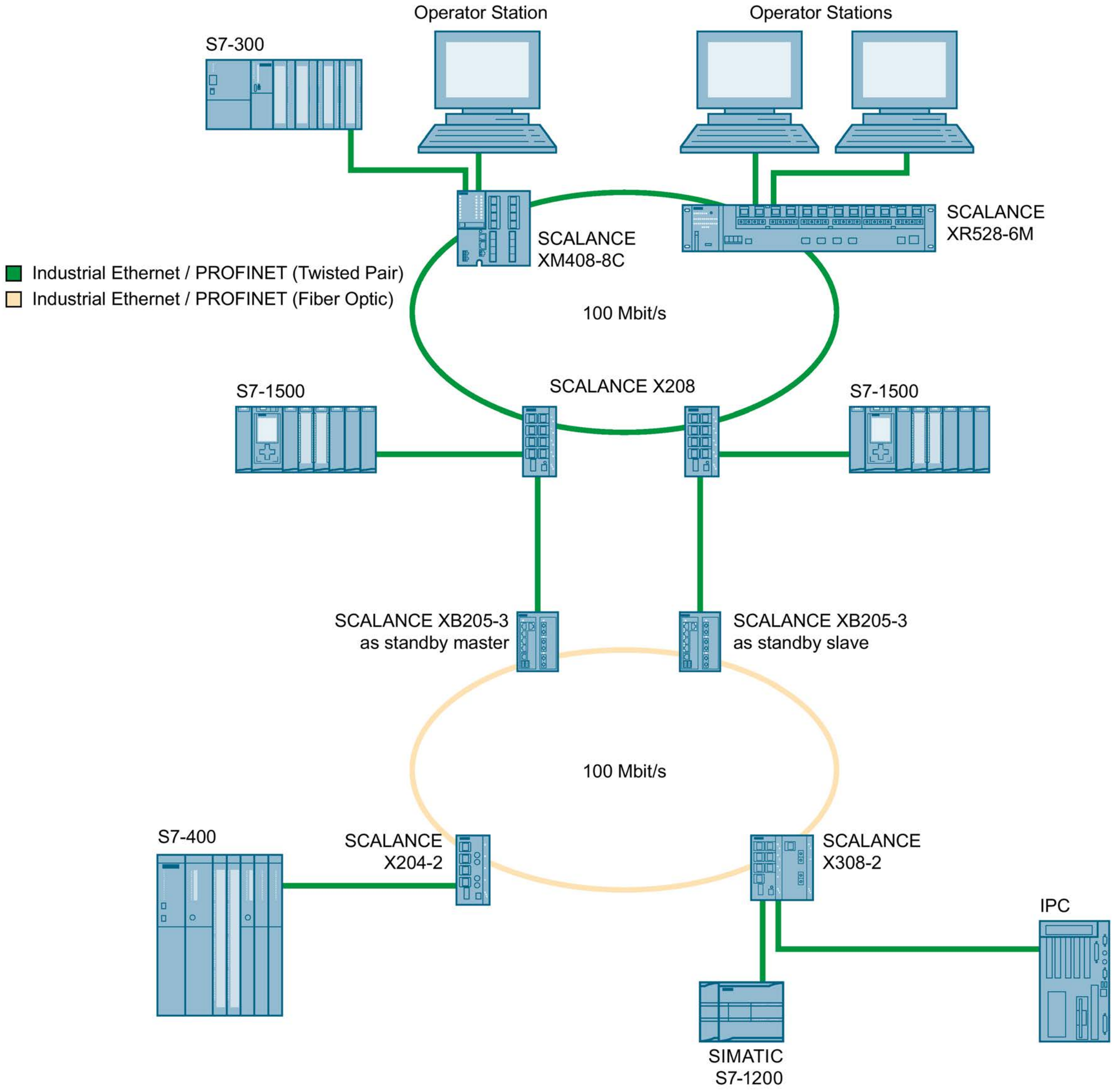


Image 4-3 Example of a redundant link between rings

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.

4.6 Link aggregation

Link aggregation

With link aggregation, several parallel physical connections with the same transmission speed are grouped together to form a logical connection with a higher transmission speed. This method based on IEEE 802.3ad is also known as port trunking or channel bundling.

Link aggregation works only with full duplex connections with the same transmission speed in point-to-point mode. This achieves multiplication of the bandwidth or transmission speed. If part of the connection fails, the data traffic is handled via the remaining parts of the connection.

To control and monitor, the Link Aggregation Control Layer (LACL) and the Link Aggregation Control Protocol (LACP) are used.

4.7 Routing function

Introduction

The term routing describes the specification of routes for communication between different networks; in other words, how does a data packet from subnet A get to subnet B.

SCALANCE X supports the following routing functions:

- Static routing
  With static routing, the routes are entered manually in the routing table.
- Router redundancy
  With standardized VRRP (Virtual Router Redundancy Protocol), the availability of important gateways is increased by redundant routers.
  - VRRPv2 (IPv4)
  - VRRPv3 (IPv4 / IPv6)
- Dynamic routing
  The entries in the routing table are dynamic and are updated continuously. The entries are created with one of the following dynamic routing protocols:
  - OSPFv2 (IPv4)
  - OSPFv3 (IPv6)
  - RIPv2 (IPv4)
  - RIPng (IPv6)

4.7.1 Static routing

The route is entered manually in the routing table. Enter the route in the routing table on the following pages.

- Layer 3 (IPv4) > Static Routes
- Layer 3 (IPv6) > Static Routes

See also

Static Routes (Page 335)

4.7.2 VRRP

4.7.2.1 VRRPv2

Router redundancy with VRRP

With the Virtual Router Redundancy Protocol (VRRP), the failure of a router in a network can be countered.

VRRP can only be used with virtual IP interfaces (VLAN interfaces) and not with router ports.

Several VRRP routers in a network segment are put together as a logical group representing a virtual router (VR). The group is defined using the virtual ID (VRID). Within the group, the VRID must be the same. The VRID can no longer be used for other groups.

The virtual router is assigned a virtual IP address and a virtual MAC address. One of the VRRP routers within the group is specified as the master router. The master router has priority 255. The other VRRP routers are backup routers. The master router assigns the virtual IP address and the virtual MAC address to its network interface. The master router sends VRRP packets (advertisements) to the backup routers at specific intervals. With the VRRP packets, the master router signals that it is still functioning. The master router also replies to the ARP queries.

If the virtual master router fails, a backup router takes over the role of the master router. The backup router with the highest priority becomes the master router. If the priority of the backup routers is the same, the higher MAC address decides. The backup router becomes the new virtual master router.

The new virtual master router adopts the virtual MAC and IP address. This means that no routing tables or ARP tables need to be updated. The consequences of a device failure are therefore minimized.

You configure VRRP in "Layer 3 (IPv4) > VRRP (Page 346)".

4.7.2.2 VRRP3

Version 3 of VRRP is based on version 2.

Note

- Enable routing to be able to use VRRPv3.
- You can only use VRRPv3 in conjunction with VLAN interfaces. Router ports are not supported.
- Simultaneous operation of VRRP and VRRPv3 is not possible.
- VRRPv3 supports IPv4 and IPv6. Both can be configured and operated at the same time with VRRP3.

You configure VRRPv3 in:

IPv4: Layer 3 (IPv4)> VRRPv3 (Page 354)

IPv6: Layer 3 (IPv6)> VRRPv3 (Page 398)

4.7.3 OSPF

4.7.3.1 OSPFv2

Dynamic routing with OSPFv2

OSPF (Open Shortest Path First) is a cost-based routing protocol. To calculate the shortest and most cost-effective route, the Short Path First algorithm by Dijkstra is used. OSPF was developed by the IETF (Internet Engineering Task Force).

You configure OSPFv2 in "Layer 3 (IPv4) > OSPFv2 (Page 364)".

OSPFv2 divides an autonomous system (AS) into different areas.

Areas in OSPF

The following areas exist:

- Backbone
  The backbone area is area 0.0.0.0. All other areas are connected to this area. The backbone area is connected either directly or via virtual connections with other areas.
  All routing information is available in the backbone area. As a result, the backbone area is responsible for forwarding information between different areas.
- Stub Area
  This area contains the routes within its area within the autonomous system and the standard route out of the autonomous system. The destinations outside this autonomous system are assigned to the standard route.

- Totally Stubby Area
  This area knows only the routes within its area and the standard route out of the area.
- Not So Stubby Area (NSSA)
  This area can forward (redistribute) packets from other autonomous systems into the areas of its own autonomous system. The packets are further distributed by the NSSA router.

Routers of OSPF

OSPF distinguishes the following router types:

- Internal router (IR)
  All OSPF interfaces of the router are assigned to the same area.
- Area Border Router (ABR)
  The OSPF interfaces of the router are assigned to different areas. One OSPF interface is assigned to the backbone area. Where possible, routes are grouped together.
- Backbone Router (BR)
  At least one of the OSPF interfaces is assigned to the backbone area.
- Autonomous System Border Router (ASBR)
  One interface of the router is connected to a different AS, for example an AS that uses the routing protocol RIP.

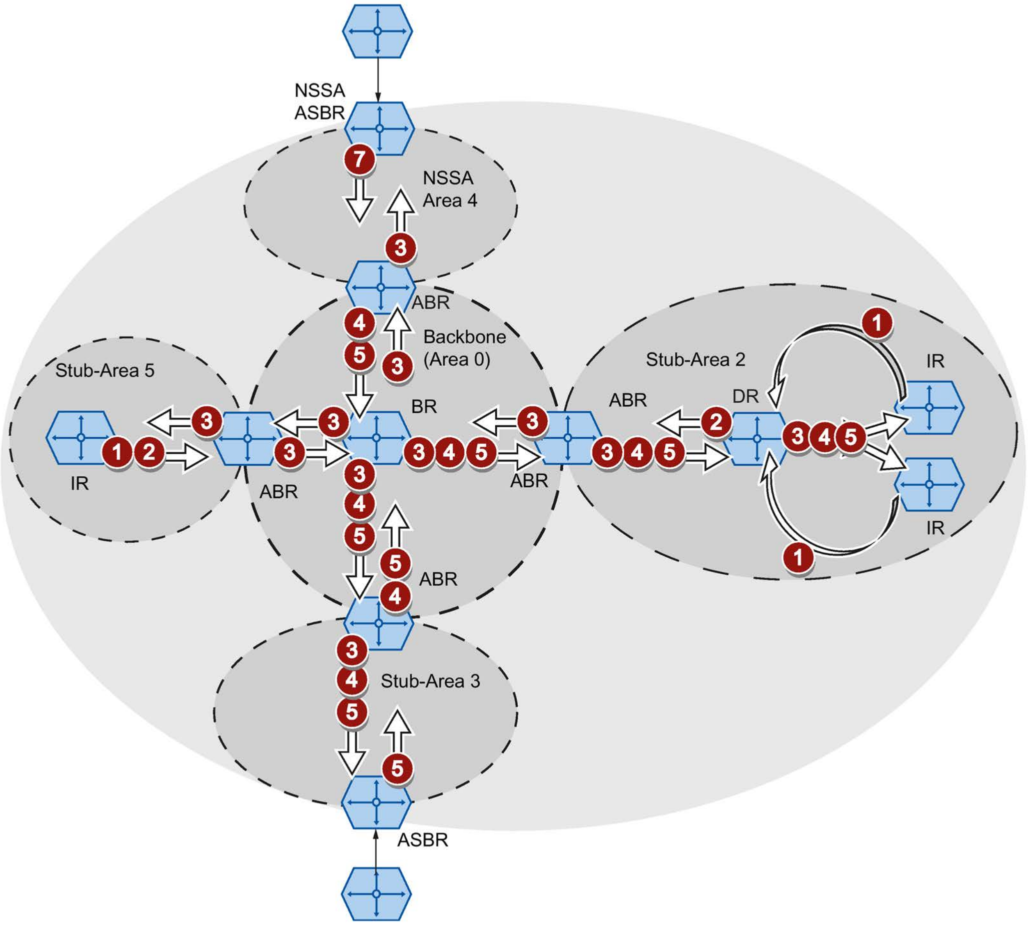
Virtual connection

Each area must be connected to the backbone area. In some situations a direct physical connection is not possible. In this case, a router of the relevant area must be connected to a backbone router via a virtual connection.

LSA types

Within the autonomous system, packets are exchanged that contain information about the connections of a router and the connection status message. The packets are also known as LSAs (Link State Advertisements). The LSAs are always sent from the router to the neighbor router.

If there are changes in the network, LSAs are sent to all routers in the network. The information depends on the LSA type.



❶ **Router LSA (LSA Type 1**)
The LSA Type 1 is only sent within an area. For each active connection of the router that belongs to the area in consideration, an LSA Type 1 is generated. The LSA Type 1 contains information about the status and the costs of the connection, for example IP address, network mask, network type

❷ **Network LSA (LSA Type 2)**
The LSA Type 2 is sent only within an area. For each network that belongs to the relevant area, the router generates an LSA Type 2. If several routers are interconnected in a network, the LSA Type 2 is sent by the designated router (DR). The LSA Type 2 includes the network address, the network mask and a list of routers that are connected to the network

③ ④ **Summary LSA (LSA Type 3 / LSA Type 4)**
The Summary LSA is generated by the area border router and sent into the area. The Summary LSA contains information about routes outside the area but inside the AS. Where possible, the routes are grouped together.

- Summary LSA (LSA Type 3)
  The LSA Type 3 describes the routes to the networks and advertises the standard route to the areas.
- AS Summary LSA (LSA Type 4)
  The LSA Type 4 describes the routes to the ASBR.

⑤ ⑦ **External LSA (LSA Type 5 / LSA Type 7)**
The External LSA is generated by the ASBR. The LSA type depends on the area.

- AS External LSA (LSA Type 5)
  The LSA Type 5 is sent by the AS border router into the areas of the autonomous system except the Stub and NSSA areas. The LSA contains information about routes to a network in another AS. The routes are either created manually or learned externally. The ASBR uses LSA Type 5 to distribute standard routes to the backbone area.
- NSSA External LSA (LSA Type 7)
  The LSA Type 7 is generated by the AS border router of an NSSA. The router is also known as the NSSA ASBR. The LSA Type 7 is sent only within the NSSA. If the P bit in LSA Type 7 = 1, these LSAs are converted to LSA Type 5 by the ABR and sent to the backbone area.

Establishing the neighborhood

The router runs through the following statuses to establish a connection to the neighbor router.

1. Attempt state / Init state

   The router activates OSPF and begins to send and receive Hello packets. Based on the received Hello packets, the router learns which OSPF routers are in its vicinity. The router checks the content of the Hello packet. The Hello packet also contains the list of the neighbor routers (neighbor table) of the "sender".

2. Two way state

   If, for example, the ID of the area, the area type and the settings for the times match, a connection (adjacency) can be established to the neighbor. In a point-to-point network, the connection is established directly. If several neighbor routers can be reached in a network, the designated router (DR) and the designated backup router (DBR) are identified based on Hello packets. The router with the highest router priority becomes the designated router. If two routers have the same router priority, the router with the highest router ID becomes the designated router. The router establishes a connection to the designated router.

3. Exchangestart state

   The neighbor routers decide which router starts communication. The router with the higher router ID becomes the designated router.

4. Exchange state

   The neighbor routers send packets that describe the content of their neighborhood database. The neighborhood database (link state database - LSDB) contains information on the topology of the network.

5. Loading state

   The router completes the received information. If the router still has questions relating to the status of a specific connection, it sends a link state request. The neighbor router sends a response (link state update). The response contains a suitable LSA. The router confirms receipt of the response (link state acknowledge).

6. Full State

   The information exchange with the neighbor router is completed. The neighborhood database of the neighbor router is the same. Based on the Short Path First algorithm, the router calculates a route to every destination. The route is entered in the routing table.

Check the neighborhood

The Hello packets are only used to establish the neighborhood relations. Hello packets are used to check the connection to the neighbor router by sending them cyclically. If no Hello packet is received within a certain interval (dead interval), the connection to the neighbor is marked as "down". The relevant entries are deleted.

Updating the neighborhood database

Once the neighborhood database is established, LSAs are sent to all routers in the network if there are changes in the topology.

4.7.3.2 OSPFv3

Version 3 of OSPF is based on version 2 and is only used with IPv6. A large part of the routing mechanisms was adopted. OSPFv3 is defined in the RFCs 2740 and 5340.

You configure OSPFv3 under "Layer 3 (IPv6) > OSPFv3".

The following has not changed:

- The statuses that a router runs through to establish a connection to the neighbor router.
- The areas : Backbone, Stub Area, Totally Stubby Area, Not So Stubby Area (NSSA)
- The router types: Internal Router (IR), Area Border Router (ABR), Backbone Router (BR), Autonomous System Area Border Router (ASBR), Designated Router (DR)
- The router ID, the area ID and the ID of the LSA are entered in the IPv4 address format: x.x.x.x

What has changed?

Terms

The terms network or subnet are replaced by link.

Authentication

The authentication was removed. Instead OSPFv3 uses IPsec, that is implemented in IPv6.

Neighbor routers

The neighbor routers are identified via the router ID.

Neighbor database

The neighbor database (link state database - LSDB) is divided into different areas of application:

- Link scope LSDB

  Contains the link LSA
- Area scope LSDB
  contains the following LSAs
  - Router LSA
  - Network LSA
  - Inter-area prefix LSA
  - Inter area router LSA
  - Intra area prefix LSA
- AS scope LSDB

  Contains the AS external LSA

LSA types

Two new LSA types were defined for OSPFv3.

OSPFv2		OSPFv3		Who	Within	Description
1	Router LSA	0x2001	Router LSA	every router	Area	No longer contains address information. This is contained in the new LSA type 2009.
2	Network LSA	0x2002	Network LSA	DR	Area	No longer contains address information. This is contained in the new LSA type 2009.
3	Summary LSA	0x2003	Inter-area prefix LSA	ABR	Area	Same function as in OSPFv2, simply renamed
4	AS Summary LSA	0x2004	Inter-Area Router LSA	ABR	Area	Same function as in OSPFv2, simply renamed
5	AS External LSA	0x4005	AS External LSA	ASBR	AS	Same function as in OSPFv2, simply renamed
7	NSSA External LSA	0x2007	Type 7 LSA	NSSA ASBR	NSSA	Same function as in OSPFv2, simply renamed
		0x2008	Link LSA	every router	Link	The LSA is sent by the router to every router linked to it. The LSA contains the link local address of the router and a list with IPv6 prefixes configured on the link.
		0x2009	Intra area prefix LSA	every router	Area	The LSA is sent only within an area. The LSA contains the IPv6 prefixes connected to the router or network.

In contrast to OSPFv2, OSPFv3 can forward unknown LSA types. Previously these were deleted and not distributed further.

4.7.4 RIP

4.7.4.1 RIPv2

Dynamic routing with RIPv2

The Routing Information Protocol (RIPv2) is used to create routing tables automatically. RIPv2 is used in autonomous systems (AS) with a maximum of 15 routers. It is based on the Distance-Vector algorithm.

RIPv2 was developed by the IETF (Internet Engineering Task Force) and is described in RFC 2453.

You configure RIPv2 in "Layer 3 (IPv4) > RIPv2".

Setting up a routing table

Since a router initially only knows its directly connected networks, it sends a request to its direct neighbor routers. As the reply, it receives the routing tables of the neighbor routers. Based on the information it receives, the router set up its own routing table.

The routing table contains entries for all possible destinations. Each entry includes the distance to the destination and the first router on the route.

The distance is also known as the metric. This indicates the number of routers to be passed through on the route to the destination (hop count). The maximum distance is 15 routers (hops).

Updating the routing table

Once the routing table is set up, the router sends its routing table to each direct neighbor router via the UDP port 520 at intervals of 30 seconds.

The router compares new routing information with its existing routing table. If the new information includes shorter routes, the existing routes are overwritten. The router only keeps the shortest route to a destination.

Checking neighbor routers

If a router does not receive messages from a neighbor router for longer than 180 seconds, it marks the router as being invalid. The router assigns the metric 16 for the neighbor router.

4.7.4.2 RIPng

RIPng (RIP next generation) is only used with IPv6 and is defined in RFC 2080. As with RIP (IPv4), RIPng is based on the distance vector algorithm of Bellman-Ford.

In contrast to RIPv2, RIPng is activated directly on the layer 3 interface (VLAN interface / router port) and not globally on the device.

RIPng uses the UDP port 521 and RIP the UDP port 520.

You configure RIPng in "Layer 3 (IPv6) > RIPng".

4.8 NAT/NAPT

Note

NAT/NAPT is possible only on layer 3 of the ISO/OSI reference model. To use the NAT function, the networks must use the IP protocol.

When using the ISO protocol that operates at layer 2, it is not possible to use NAT.

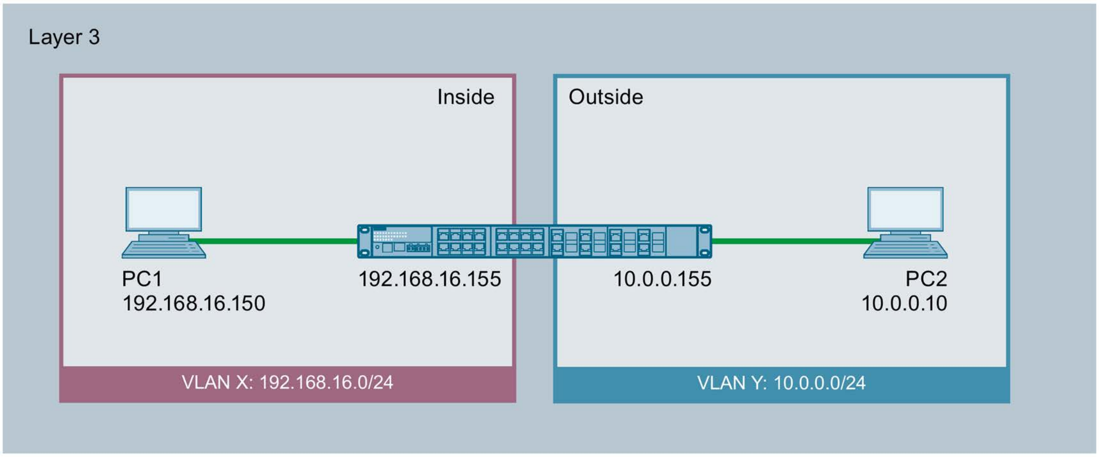
In Network Address Translation (NAT) IP subnets are divided into "Inside" and "Outside". The division is from the perspective of a NAT interface. All networks reachable via the NAT interface itself count as "Outside" for this interface. All networks reachable via other IP interfaces of the same device count as "Inside" for the NAT interface.

If there s routing via the NAT interface, the source or destination IP addresses of the transferred data packets are changed at the transition between "Inside" and "Outside". Whether or not the source or destination IP address is changed depends on the communications direction. It is always the IP address of the communications node that is located "Inside" that is adapted. Depending on the perspective the IP address of a communications node is always designated as "Local" or "Global".

		Perspective	
		Local	**Global**
Position	**Inside**	An actual IP address that is assigned to a device in the internal network. This address cannot be reached from the external network.	An IP address at which an internal device can be reached from the external network.
	Outside	An actual IP address that is assigned to a device in the external network. Since only "Inside" addresses are converted, there is no distinction made between outside local and outside global.	

Example

In the example two IP subnets are connected together via an IE switch. The division is from the perspective of the NAT interface 10.0.0.155. The communication of PC2 with PC1 is implemented via NAT/NAPT.



The actual IP address of PC1 (inside local) is implemented statically with NAT. For PC2, PC1 can be reached at the inside global address.

		Perspective	
		Local	**Global**
Position	**Inside**	192.168.16.150	10.0.0.7
	Outside	10.0.0.10	

The actual IP address of PC1 (inside local) is implemented statically with NAPT. For PC2, PC1 can be reached at the inside global address.

		Perspective	
		Local	**Global**
Position	**Inside**	192.168.16.150:80	10.0.0.7:80
	Outside	10.0.0.10:1660	

Computing capacity

Due to the load limitation of the CPU packet receipt of the device is limited to 300 packets a second. This corresponds to a maximum data through of 1.7 Mbps. This load limitation does not apply per interface but generally for all packets going the CPU.

The entire NAT communication runs via the CPU and therefore represents competition for IP communication going to the CPU, e.g. WBM and Telnet.

Note that a large part of the computing capacity is occupied if you use NAT.

NAT

With Network Address Translation (NAT), the IP address in a data packet is replaced by another. NAT is normally used on a gateway between an internal network and an external network.

With source NAT, the inside local source address of an IP packet from a device in the internal network is rewritten by a NAT device to an inside global address at the gateway.

With destination NAT, the inside global source address of an IP packet from a device in the external network is rewritten by a NAT device to an inside local address at the gateway.

To translate the internal into the external IP address and back, the NAT device maintains a translation list. The address assignment can be dynamic or static. You configure NAT in "Layer 3 (IPv4) > NAT (Page 328)".

NAPT

In "Network Address Port Translation" (NAPT), several internal source IP addresses are translated into the same external IP address. To identify the individual nodes, the port of the internal device is also stored in the translation list of the NAT device and translated for the external address.

If several internal devices send a query to the same external destination IP address via the NAT device, the NAT device enters its own external source IP address in the header of these forwarded frames. Since the forwarded frames have the same external source IP address, the NAT device assigns the frames to the devices using a different port number.

If a device from the external network wants to use a service in the internal network, the translation list for the static address assignment needs to be configured. You configure NAPT in "Layer 3 (IPv4) > NAT > NAPT (Page 333)".

NAT/NAPT and IP routing

You can enable NAT/NAPT and IP routing at the same time. In this case, you need to regulate the reachability of internal addresses from external networks with ACL rules.

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	Internet browser
960 x 640 pixels	Android as of version 4.2.1 iOS as of version 6.0.2	Chrome as of version 18 on Android Safari as of version 6 on iOS

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

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 connection exists.
2. In the address box of the Internet browser, enter the IP address or the URL of the device. If there is a problem-free connection to the device, the logon page of Web Based Management (WBM)is displayed.

Logging on using the Internet browser

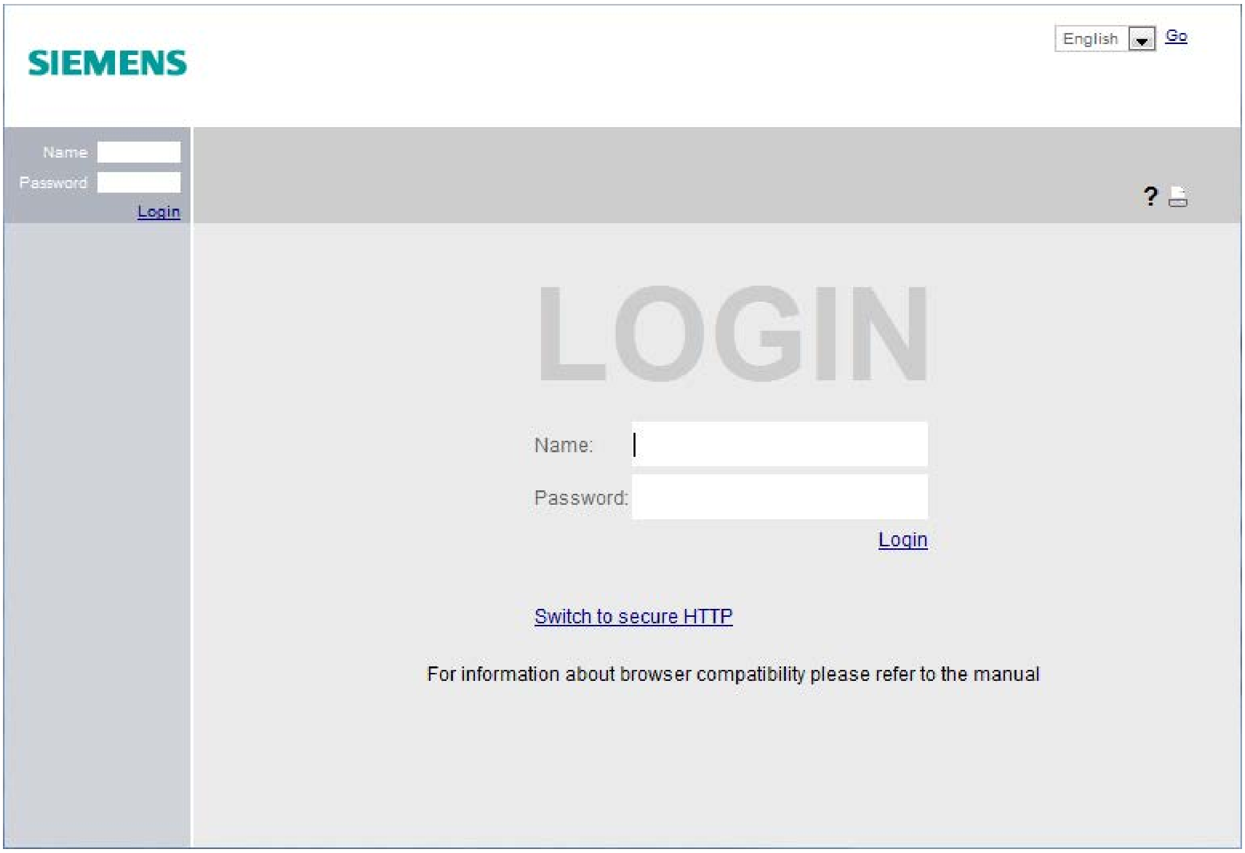
Selecting the language of the WBM

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

As of version 5.0 English and German are available. Other languages will follow in a later version.



Logon with HTTP

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

The following steps apply when logging on, 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 6.0 the default user set in the factory "user" is no longer available when the product ships.

     If you update a device to the firmware V6.0 the default user set in the factory "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the default user set in the factory "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 and roles 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.

Logon 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 6.0 the default user set in the factory "user" is no longer available when the product ships.

     If you update a device to the firmware V6.0 the default user set in the factory "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the default user set in the factory "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 and roles 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

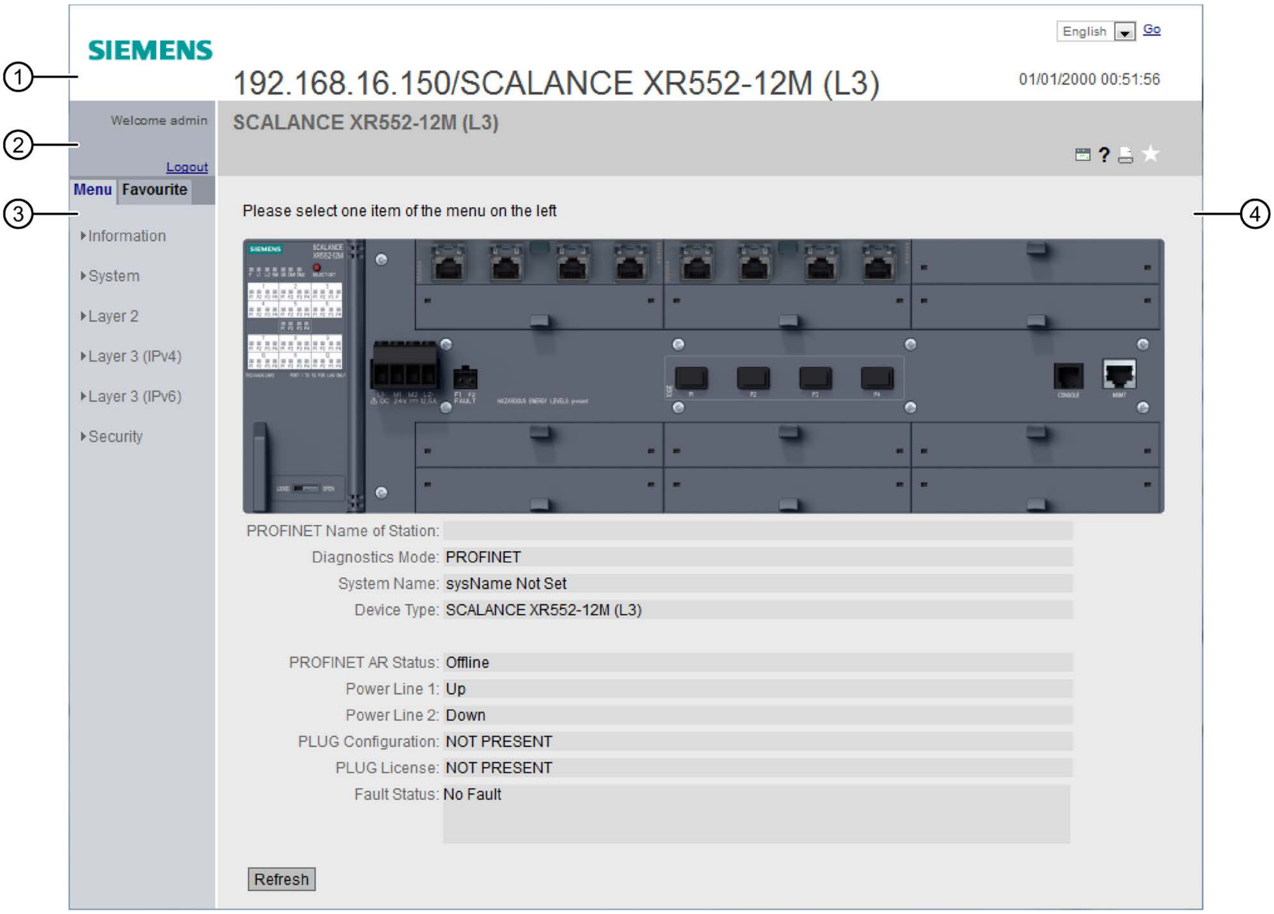
View of the Start page

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



192.168.16.150/SCALANCE XR552-12M (L3)

01/01/2000 00:51:56

SCALANCE XR552-12M (L3)

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 XR552-12M (L3)
PROFINET AR Status:	Offline
Power Line 1:	Up
Power Line 2:	Down
PLUG Configuration:	NOT PRESENT
PLUG License:	NOT PRESENT
Fault Status:	No Fault

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 in-band port 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 > Devices".

- Drop-down list for language selection

- System time and date

  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 the full title of the currently selected menu item.

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

- **Logout**

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

- **LED simulation**

  Each component of a 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. Unoccupied slots or unused connectors are displayed as gray LEDs. The meaning of the LED displays is described in the operating instructions.

  If you click the simulated "SELECT/SET" button, you can change the display mode (LEDs DM or D1/D2).

  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** 🖶

  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.

- **Favorites**

  When the product ships, the button is disabled on all pages ☆.

  If you click this button, the symbol ★ changes and the currently open page or currently open tap is marked as favorite. Once you have enabled the button once, the navigation area is divided into two tabs. The first tab "Menu" contains all the available menus as previously. The second tab "Favorites" contains all the pages/tabs that you selected as favourites. On the "Favorites" tab the pages/tabs are arranged according to the structure in the "Menu" tab.

  If you disable all the favorites you have created, the "Favorites" is removed again.

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.

If you have created favorites, the navigation area is divided into two tabs: "Menu" and "Favorites".

Content area (4)

The content area shows a graphic of the device. The graphic is dynamic. The basic device is always shown. If extenders/media modules are connected to the basic device, these are also shown.

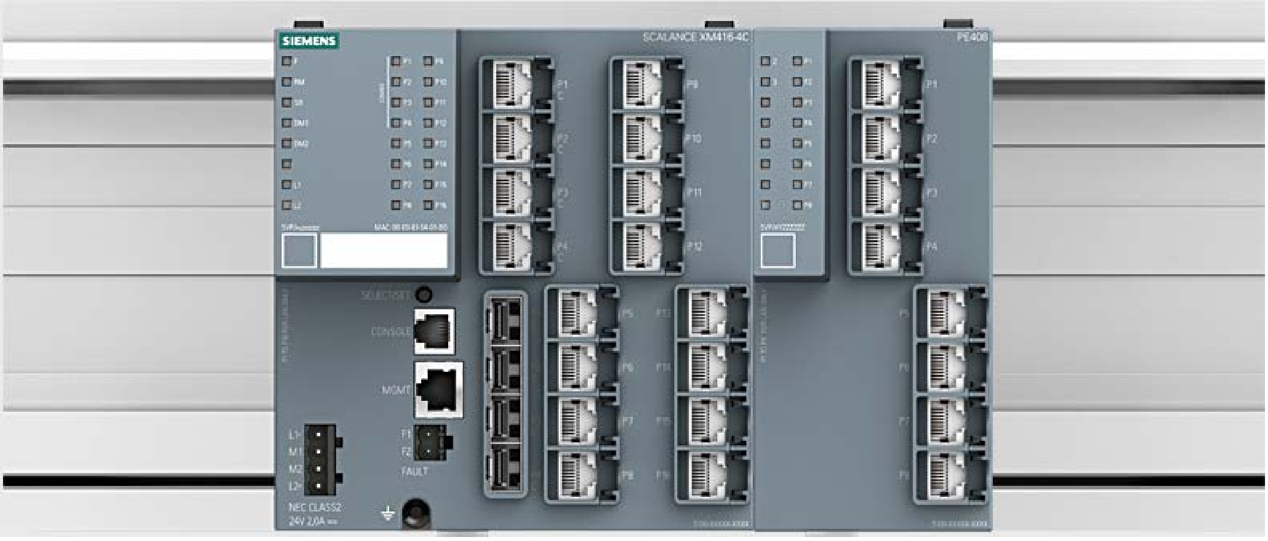


Image 5-1 Example of a device graphic: SCALANCE XM416-4C with one port extender PE408

The following is displayed below the device graphic:

- **PROFINET Name of Station**
  Shows the PROFINET device name.
- **System Name**
  Shows the name of the device.
- **Device Type**
  Shows the type designation of the device.
- **PROFINET AR Status**
  Shows the PROFINET IO 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 > PLUG Configuration".

- **PLUG License**

  Shows the status of the license on the PLUG, refer to the section "System >PLUG > PLUG License".

- **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.

- **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. Deleting also results in an update of the page in the WBM.

- **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.

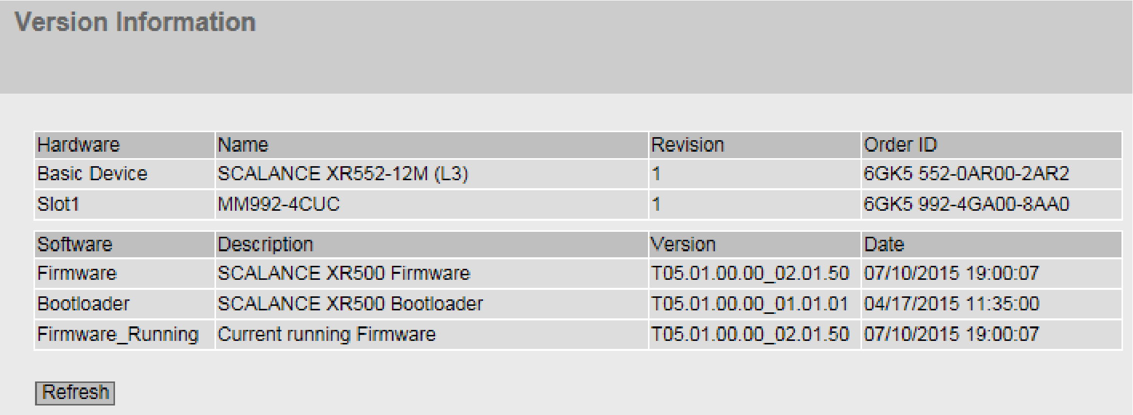
Messages

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. Saving starts only after the timer in the message has elapsed. In this case the following message "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.



Version Information

Hardware	Name	Revision	Order ID
Basic Device	SCALANCE XR552-12M (L3)	1	6GK5 552-0AR00-2AR2
Slot1	MM992-4CUC	1	6GK5 992-4GA00-8AA0

Software	Description	Version	Date
Firmware	SCALANCE XR500 Firmware	T05.01.00.00_02.01.50	07/10/2015 19:00:07
Bootloader	SCALANCE XR500 Bootloader	T05.01.00.00_01.01.01	04/17/2015 11:35:00
Firmware_Running	Current running Firmware	T05.01.00.00_02.01.50	07/10/2015 19:00:07

Description of the displayed values

Table 1 has the following columns:

- **Hardware**
  - Basic Device
    Shows the basic device.
  - PX.X
    X.X = port in which the SFP module is inserted.
  - Slot X
    "X" = slot number: Module plugged into this slot.
- **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.

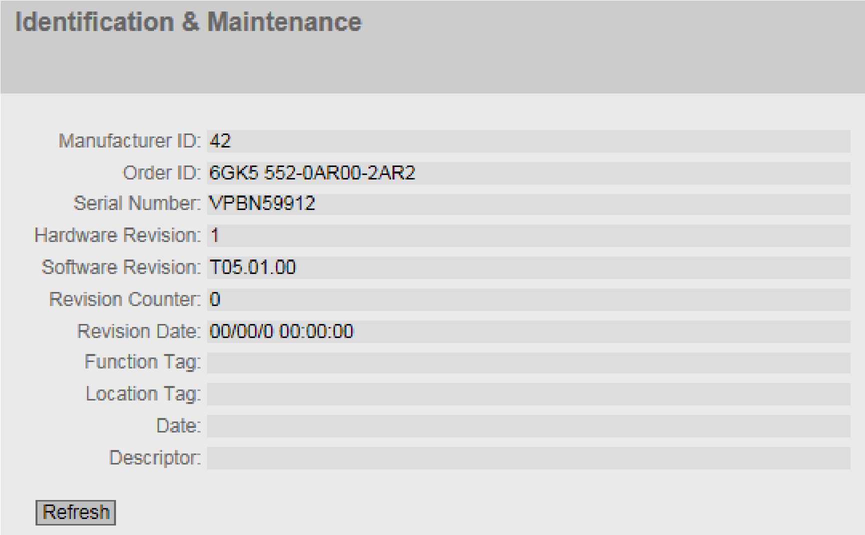
Table 2 has the following columns:

- **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.
- **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 Identification & Maintenance

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.



Identification & Maintenance

Manufacturer ID: 42
Order ID: 6GK5 552-0AR00-2AR2
Serial Number: VPBN59912
Hardware Revision: 1
Software Revision: T05.01.00
Revision Counter: 0
Revision Date: 00/00/0 00:00:00
Function Tag:
Location Tag:
Date:
Descriptor:

Description of the displayed values

The table has the following rows:

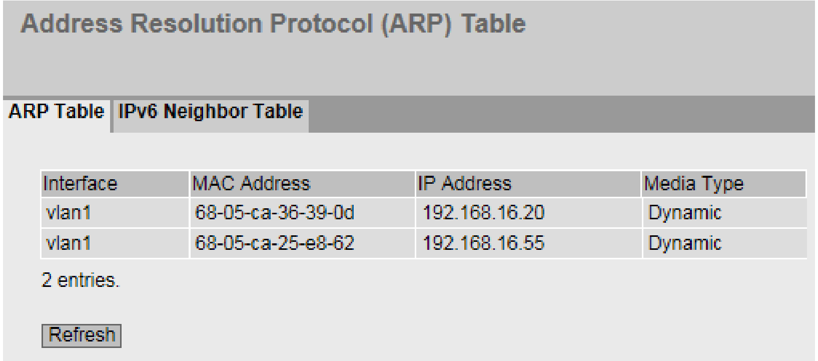
- **Manufacturer ID**
  Shows the manufacturer ID.
- **Order ID**
  Shows the order number.
- **Serial Number**
  Shows the serial number.
- **Hardware Revision**
  Shows the hardware version.
- **Software version**
  Shows the software version.
- **Revision Counter**
  Regardless of a version change, this box always displays the value "0".
- **Revision Date**
  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 / Neighbors

5.3.4.1 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.



Address Resolution Protocol (ARP) Table

Interface	MAC Address	IP Address	Media Type
vlan1	68-05-ca-36-39-0d	192.168.16.20	Dynamic
vlan1	68-05-ca-25-e8-62	192.168.16.55	Dynamic

2 entries.

Description of the displayed values

The table has the following columns:

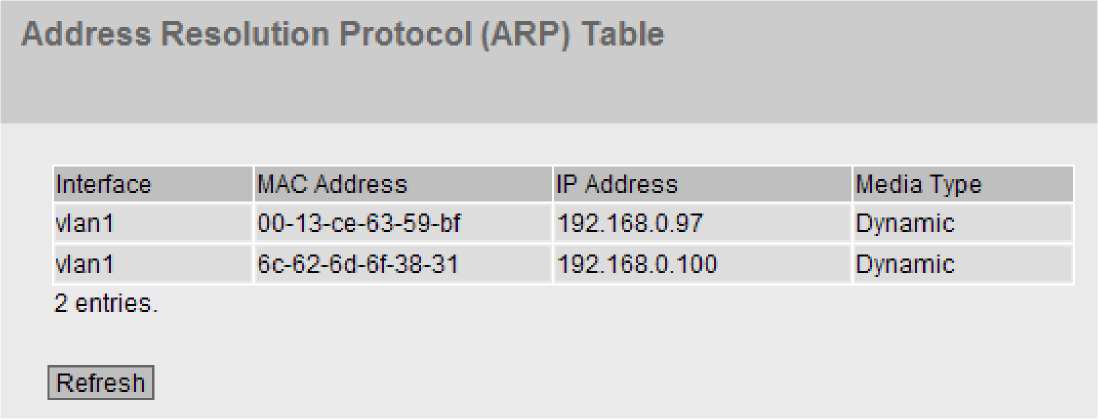
- Interface
  Shows the interface via which the row entry was learnt.
- MAC Address
  Shows the MAC address of the destination or source device.
- IP Address
  Shows the IP address of the destination device.
- Media Type
  Shows the type of connection.
  - Dynamic
    The device recognized the address data automatically.
  - Static

    The addresses were entered as static addresses.

5.3.4.2 IPv6 Neighbor Table

Assignment of MAC address and IPv6 address

Via the IPv6 neighbor table, there is a unique assignment of MAC address to IPv6 address. This assignment is kept by each network node in its own separate neighbor table.



Address Resolution Protocol (ARP) Table

Interface	MAC Address	IP Address	Media Type
vlan1	00-13-ce-63-59-bf	192.168.0.97	Dynamic
vlan1	6c-62-6d-6f-38-31	192.168.0.100	Dynamic

2 entries.

Description of the displayed values

The table has the following columns:

- **Interface**

  Displays 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 IPv6 address of the destination device.

- **Media Type**

  Shows the type of connection.

  – Dynamic
  The device recognized the address data automatically.

  – Static

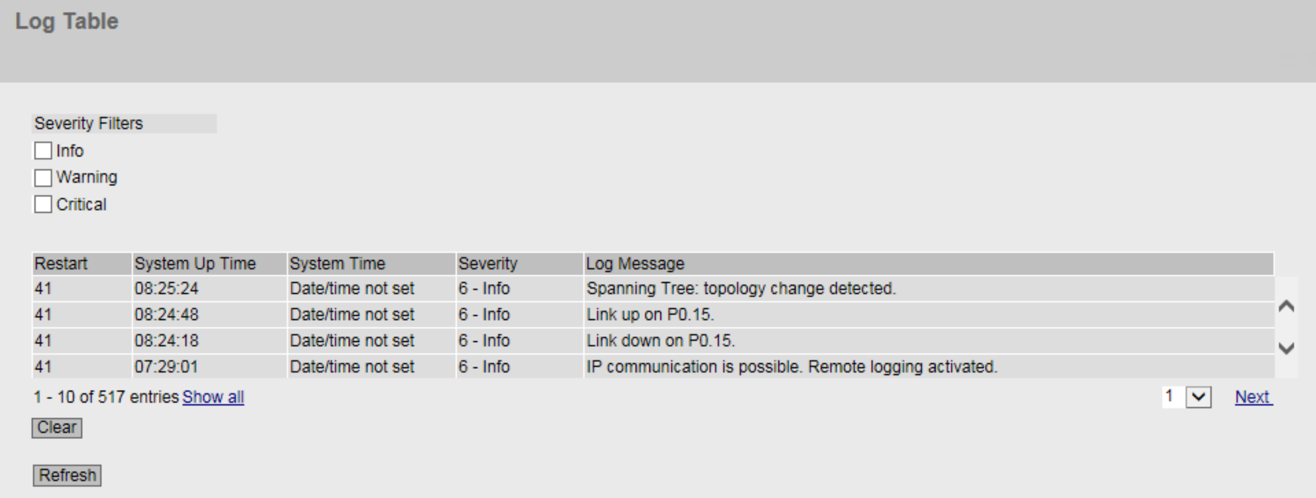
  The addresses were entered as static addresses.

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.



Log Table

Severity Filters
□ Info
□ Warning
□ Critical

Restart	System Up Time	System Time	Severity	Log Message
41	08:25:24	Date/time not set	6 - Info	Spanning Tree: topology change detected.
41	08:24:48	Date/time not set	6 - Info	Link up on P0.15.
41	08:24:18	Date/time not set	6 - Info	Link down on P0.15.
41	07:29:01	Date/time not set	6 - Info	IP communication is possible. Remote logging activated.

1 - 10 of 517 entries Show all

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.

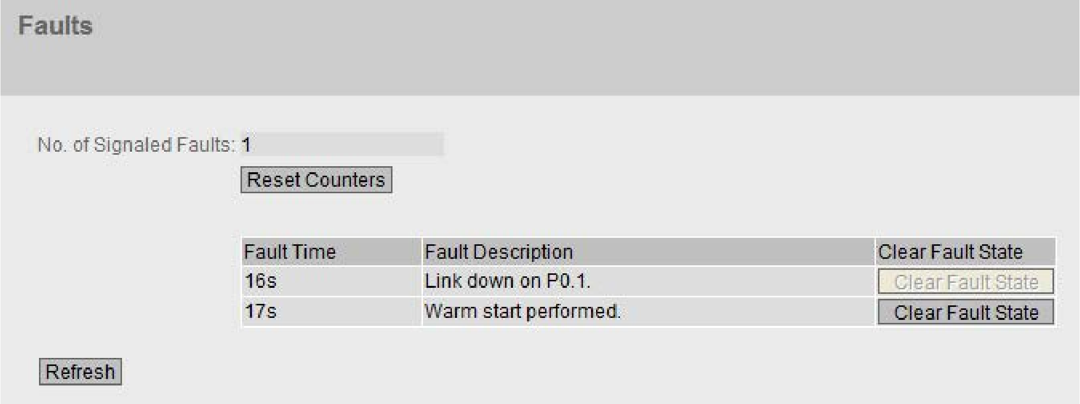
Internal errors of the device and errors that you configure on the following pages are indicated:

- 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.


Faults

No. of Signaled Faults: 1

Fault Time	Fault Description	Clear Fault State
16s	Link down on P0.1.	Clear Fault State
17s	Warm start performed.	Clear Fault State

Description of the displayed values

- **No. of Signaled Faults**

  Number of errors displayed since the last startup.

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.

Description of the button

"Reset Counters" button

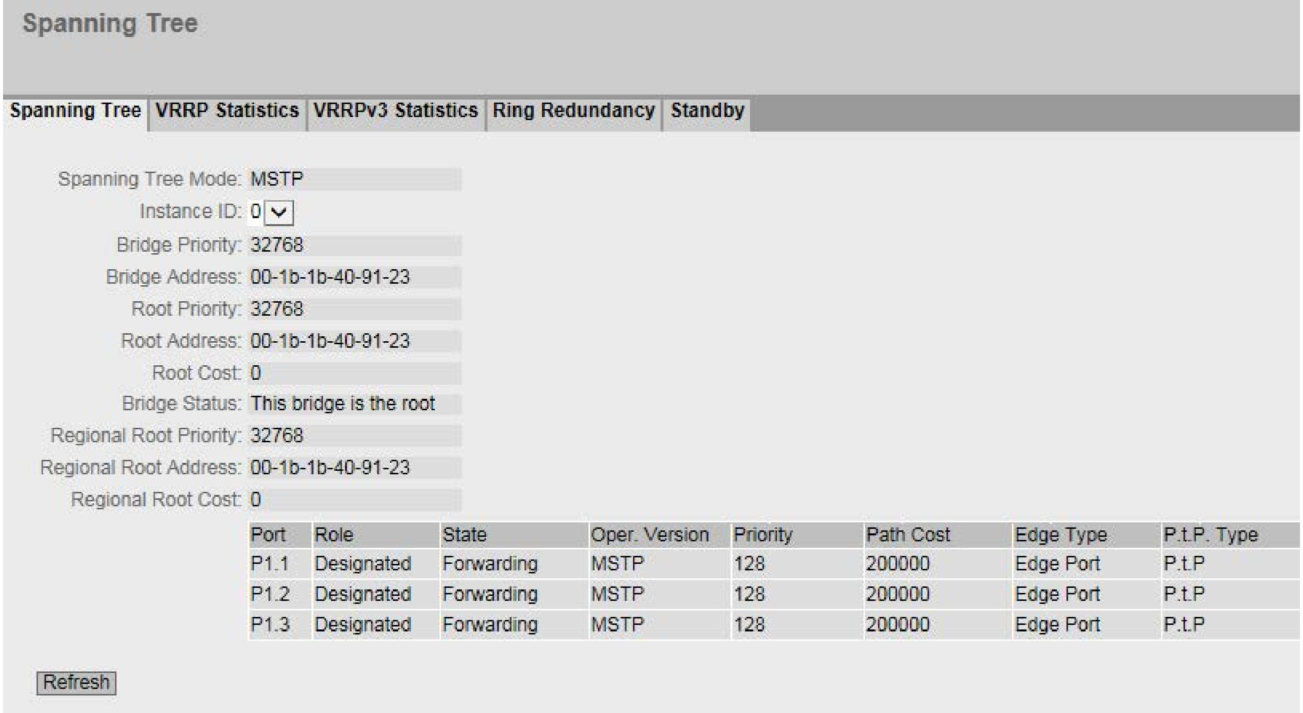
Click "Reset Counters" to reset all counters. The counters are reset by a restart.

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.



Spanning Tree Mode: MSTP
Instance ID: 0
Bridge Priority: 32768
Bridge Address: 00-1b-1b-40-91-23
Root Priority: 32768
Root Address: 00-1b-1b-40-91-23
Root Cost: 0
Bridge Status: This bridge is the root
Regional Root Priority: 32768
Regional Root Address: 00-1b-1b-40-91-23
Regional Root Cost: 0

Port	Role	State	Oper. Version	Priority	Path Cost	Edge Type	P.t.P. Type
P1.1	Designated	Forwarding	MSTP	128	200000	Edge Port	P.t.P
P1.2	Designated	Forwarding	MSTP	128	200000	Edge Port	P.t.P
P1.3	Designated	Forwarding	MSTP	128	200000	Edge Port	P.t.P

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 > MSTP > 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 route 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 statuses 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**
  Describes the type of spanning tree in which the port operates
- **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." 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.

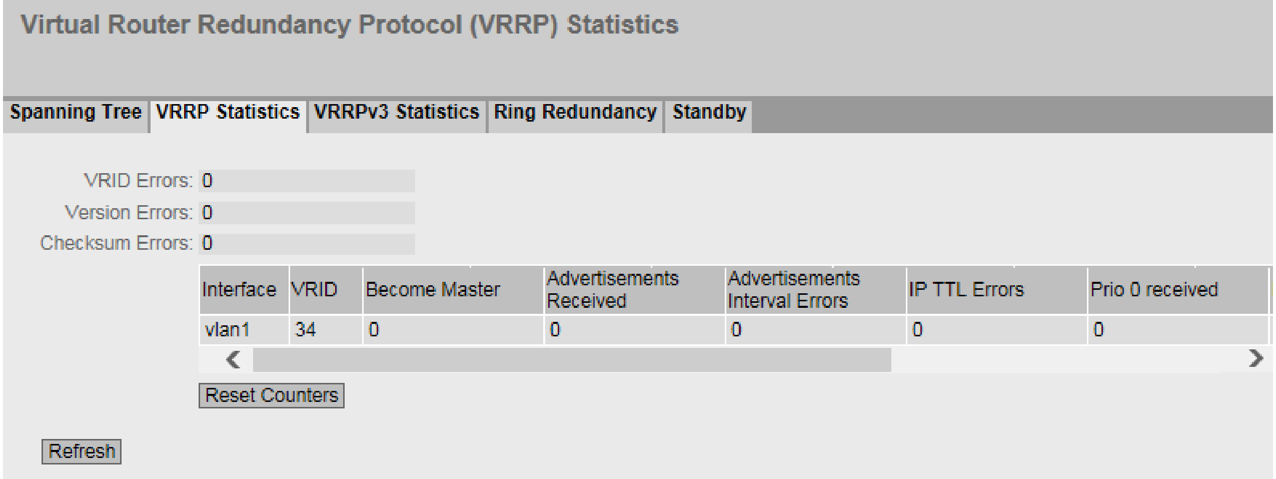
  Typical values for path costs with rapid spanning tree:
  - 10,000 Mbps = 2,000
  - 1000 Mbps = 20,000
  - 100 Mbps = 200,000
  - 10 Mbps = 2,000,000.

- **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 or Rapid Spanning Tree device at this port.
- **P.t.P. Type**
  Shows the type of 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 VRRP statistics

Introduction

This page shows the statistics of the VRRP protocol and all configured virtual routers.



Virtual Router Redundancy Protocol (VRRP) Statistics

VRID Errors: 0
Version Errors: 0
Checksum Errors: 0

Interface	VRID	Become Master	Advertisements Received	Advertisements Interval Errors	IP TTL Errors	Prio 0 received
vlan1	34	0	0	0	0	0

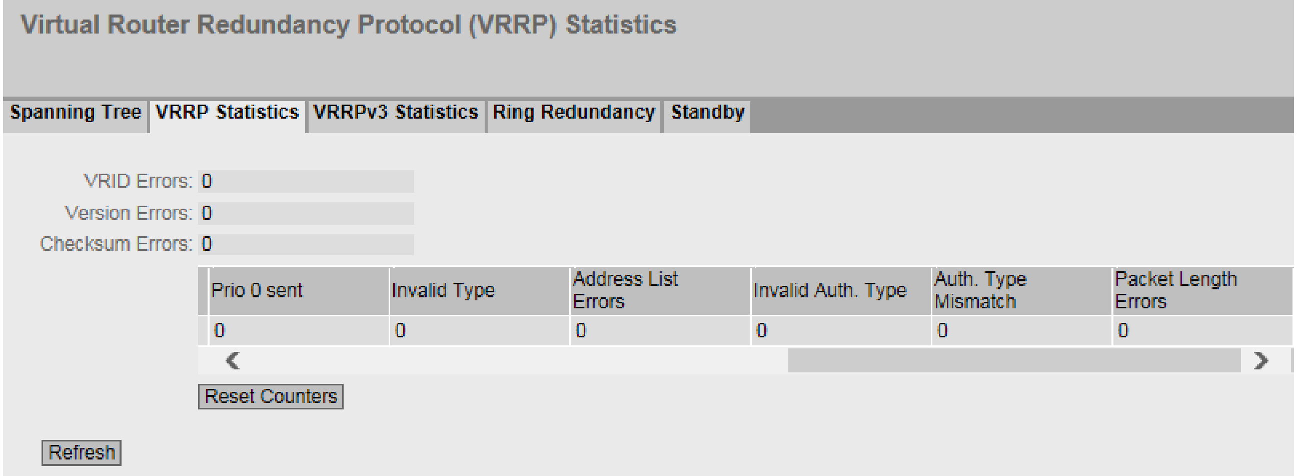
Description of the displayed values

The following fields are displayed:

- **VRID Errors**
  Shows how many VRRP packets containing an unsupported VRID were received.
- **Version Errors**
  Shows how many VRRP packets containing an invalid version number were received.
- **Checksum Errors**
  Shows how many VRRP packets containing an invalid checksum were received.

The table has the following columns:

- **Interface**
  Interface to which the settings relate.
- **VRID**
  Shows the ID of the virtual router.
  Valid values are 1 to 255.
- **Become Master**
  Shows how often this virtual router changed to the "Master" status.
- **Advertisements Received**
  Shows how often a VRRP packet was received that contained a bad address list.
- **Advertisement Interval Errors**
  Shows how many bad VRRP packets were received whose interval does not match the value set locally.
- **IP TTL Errors**
  Shows how many bad VRRP packets were received whose TTL (Time to live) value in the IP header is incorrect.
- **Prio 0 received**
  Shows how many VRRP packets with priority 0 were received. VRRP packets with priority 0 are sent when a master router is shut down. These packets allow a fast handover to the relevant backup router.
- **Prio 0 sent**
  Shows how many VRRP packets with priority 0 were sent. Packets with priority 0 are sent when a master router is shut down. These packets allow a fast handover to the relevant backup router.



Virtual Router Redundancy Protocol (VRRP) Statistics

VRID Errors: 0
Version Errors: 0
Checksum Errors: 0

Prio 0 sent	Invalid Type	Address List Errors	Invalid Auth. Type	Auth. Type Mismatch	Packet Length Errors
0	0	0	0	0	0

- **Invalid Type**
  Shows how many bad VRRP packets were received whose authentication type was not type 0. Type 0 means "no authentication".
- **Address List Errors**

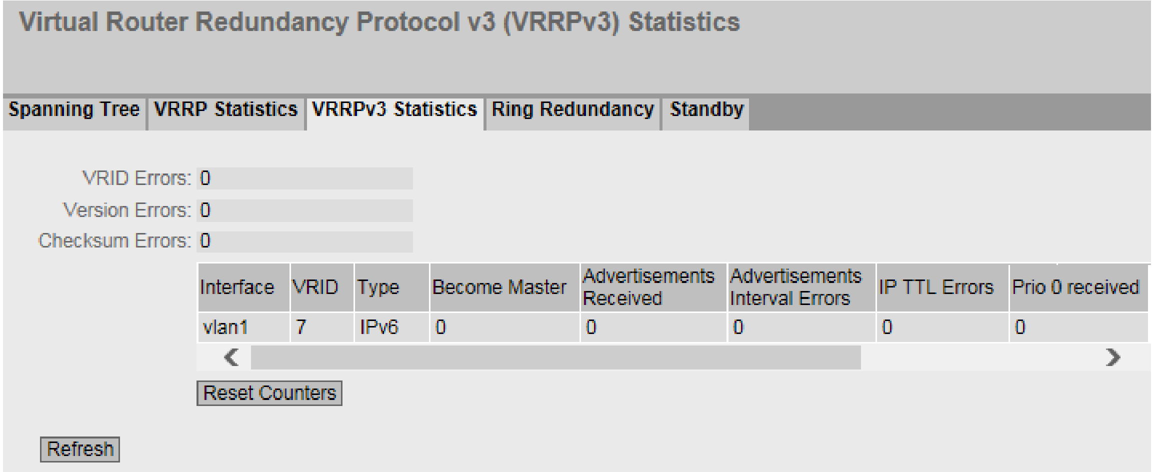
  Shows how many bad VRRP packets were received whose address list does not match the locally configured list.

- **Invalid Auth. Type**
  Shows how many bad VRRP packets were received whose authentication type does not match.
- **Auth. Type Mismatch**
  Shows that different authentication types are set.
- **Packet Length Errors**
  Shows how many bad VRRP packets were received whose length is not correct.

5.3.7.3 VRRP Statistics

Introduction

This page shows the statistics of the VRRPv3 protocol and all configured virtual routers.



Virtual Router Redundancy Protocol v3 (VRRPv3) Statistics

VRID Errors: 0
Version Errors: 0
Checksum Errors: 0

Interface	VRID	Type	Become Master	Advertisements Received	Advertisements Interval Errors	IP TTL Errors	Prio 0 received
vlan1	7	IPv6	0	0	0	0	0

Description of the displayed values

The following fields are displayed:

- **VRID Errors**

  Shows how many VRRPv3 packets containing an unsupported VRID were received.
- **Version Errors**

  Shows how many VRRPv3 packets containing an invalid version number were received.
- **Checksum Errors**

  Shows how many VRRPv3 packets containing an invalid checksum were received.

The table has the following columns:

- **Interfaces**

  Interface to which the settings relate.
- **VRID**

  Shows the ID of the virtual router. Valid values are 1 ... 255.

- **Type**

  Shows the version of the IP protocol.

- **Become Master**

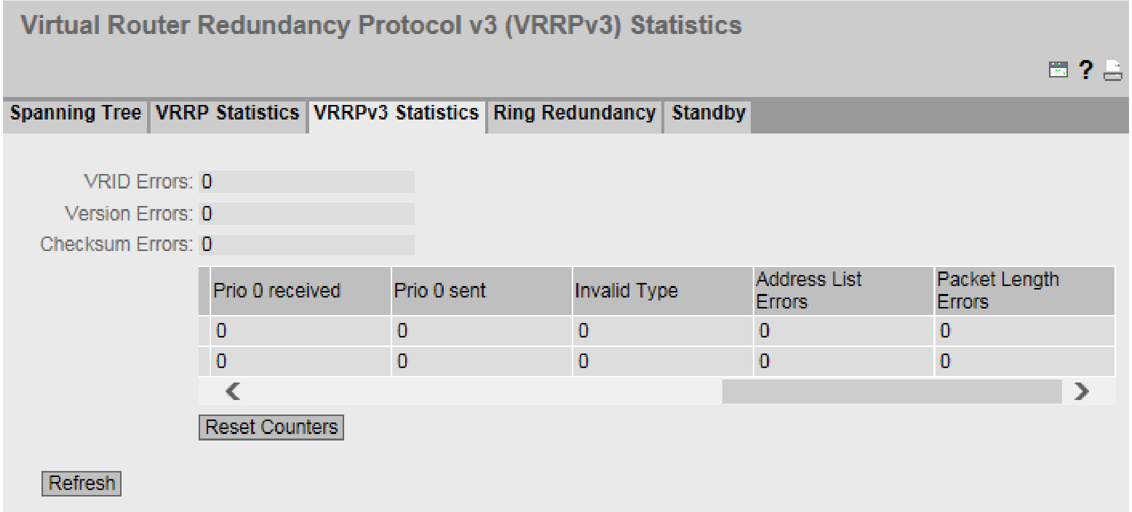
  Shows how often this virtual router changed to the "Master" status.

- **Advertisements Received**

  Shows how many VRRPv3 packets were received.

- **Advertisement Interval Errors**

  Shows how many bad VRRPv3 packets were received whose interval does not match the value set locally.



Virtual Router Redundancy Protocol v3 (VRRPv3) Statistics

VRID Errors: 0
Version Errors: 0
Checksum Errors: 0

Prio 0 received	Prio 0 sent	Invalid Type	Address List Errors	Packet Length Errors
0	0	0	0	0
0	0	0	0	0

- **IP TTL Errors**

  Shows how many bad VRRPv3 packets were received whose TTL (Time to live) value in the IP header is incorrect.

- **Prio 0 received**

  Shows how many VRRPv3 packets with priority 0 were received. VRRPv3 packets with priority 0 are sent when a master router is shut down. These packets allow a fast handover to the relevant backup router.

- **Prio 0 sent**

  Shows how many VRRPv3 packets with priority 0 were sent. Packets with priority 0 are sent when a master router is shut down. These packets allow a fast handover to the relevant backup router.

- **Invalid Type**

  Shows how many bad VRRPv3 packets were received whose value in the "Type" field of the IP header is invalid.

- **Address List Errors**

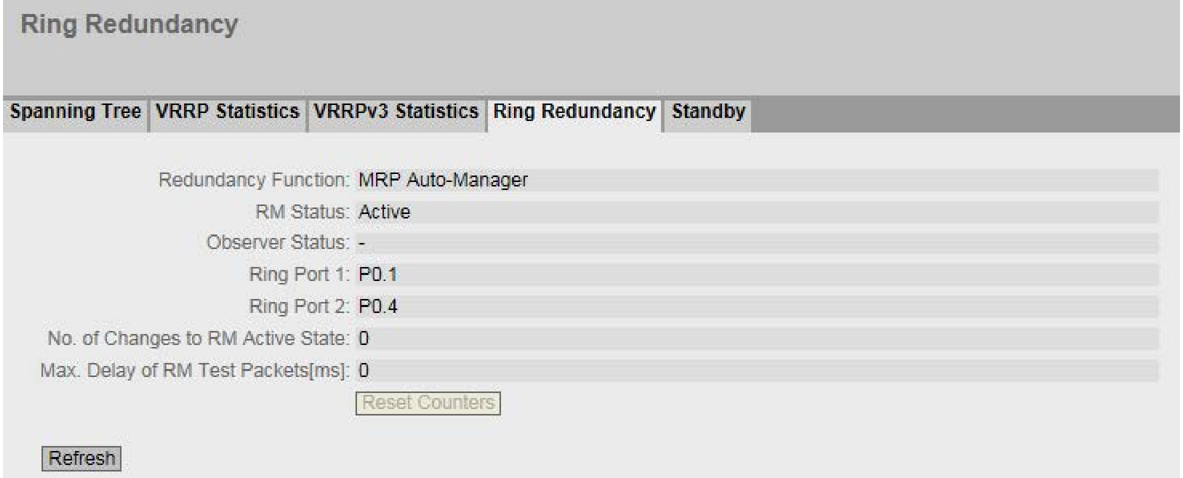
  Shows how many bad VRRPv3 packets were received whose address list does not match the locally configured list.
- **Packet Length Errors**

  Shows how many bad VRRPv3 packets were received whose length is not correct.

5.3.7.4 Ring redundancy

Information on ring redundancy

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



Redundancy Function: MRP Auto-Manager
RM Status: Active
Observer Status: -
Ring Port 1: P0.1
Ring Port 2: P0.4
No. of Changes to RM Active State: 0
Max. Delay of RM Test Packets[ms]: 0

Description of the displayed values

The table has the following columns:

- **Redundancy Function**

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

  – No Ring Redundancy (off)
  The IE switch works 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 (RM function 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.
  - If media redundancy in ring topologies is completely disabled, ring ports configured last are displayed and the text "Ring Redundancy disabled" is displayed.

- **Observer Status**

  Shows the current status of the observer.

- **Ring Port 1 and Ring Port 2**

  The "Ring Port 1"and "Ring Port 2" columns show the ports being used as ring ports.

- **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.

- Click the "Reset Counters" button to reset the counters on this page.

5.3.7.5 Standby

Information on standby redundancy

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

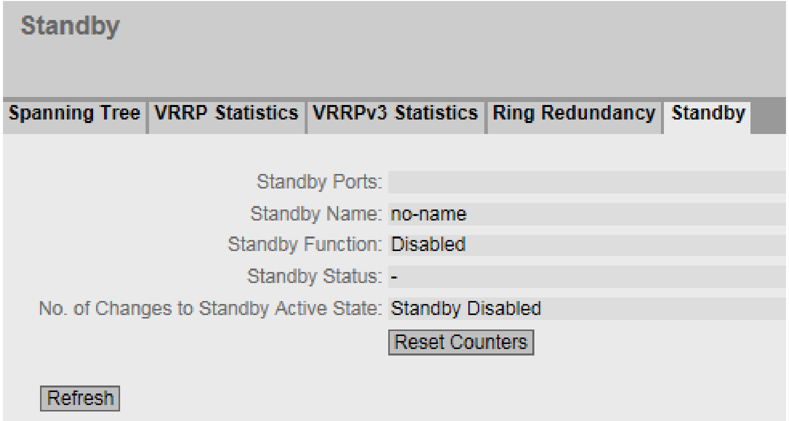
Note

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:



Standby Ports:
Standby Name: no-name
Standby Function: Disabled
Standby Status: -
No. of Changes to Standby Active State: Standby Disabled

Description of the displayed values

The table has the following columns:

- **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:
    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:
    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 display box "Standby Status" 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.

  Click the "Reset Counters" button to reset the counters on this page.

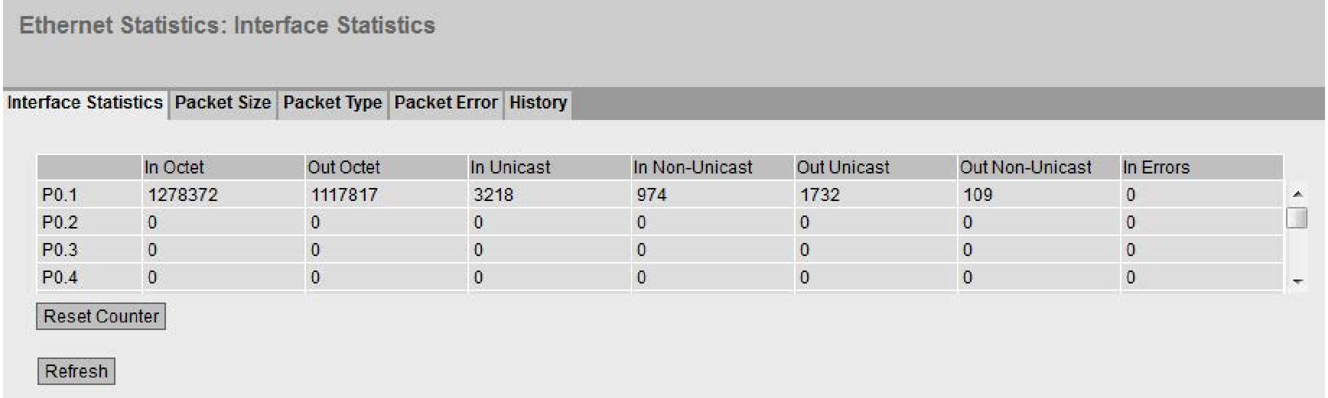
  Following each restart on the device, the counters are automatically reset.

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).



Ethernet Statistics: Interface Statistics

	In Octet	Out Octet	In Unicast	In Non-Unicast	Out Unicast	Out Non-Unicast	In Errors
P0.1	1278372	1117817	3218	974	1732	109	0
P0.2	0	0	0	0	0	0	0
P0.3	0	0	0	0	0	0	0
P0.4	0	0	0	0	0	0	0

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.

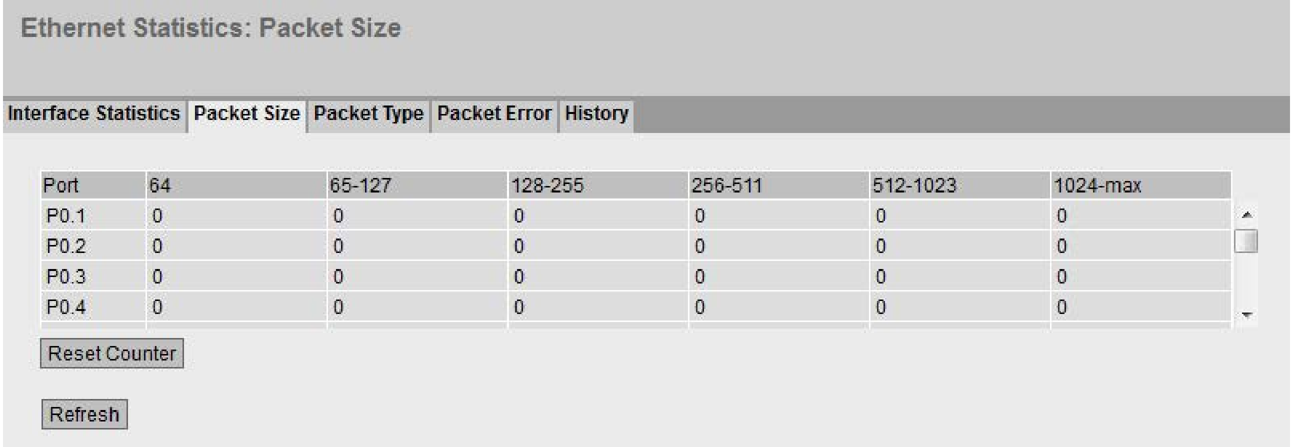
5.3.8.2 Packet Size

Frames sorted by length

This page displays how many frames of which size 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.



Port	64	65-127	128-255	256-511	512-1023	1024-max
P0.1	0	0	0	0	0	0
P0.2	0	0	0	0	0	0
P0.3	0	0	0	0	0	0
P0.4	0	0	0	0	0	0

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 size, 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.

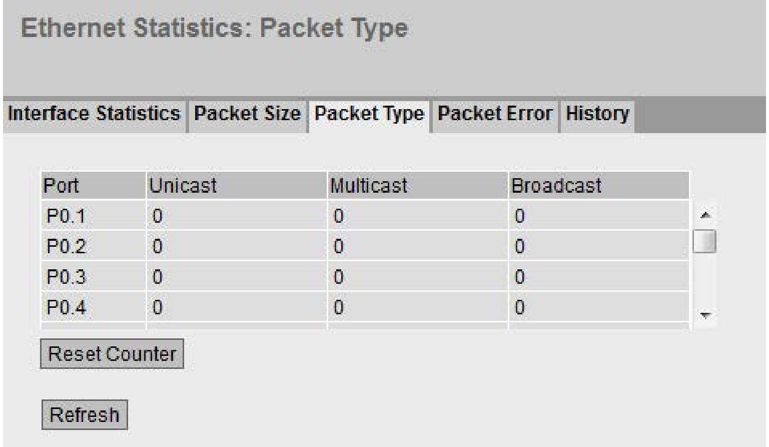
5.3.8.3 Frame Type

Received frames sorted by 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.



Ethernet Statistics: Packet Type

Port	Unicast	Multicast	Broadcast
P0.1	0	0	0
P0.2	0	0	0
P0.3	0	0	0
P0.4	0	0	0

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.

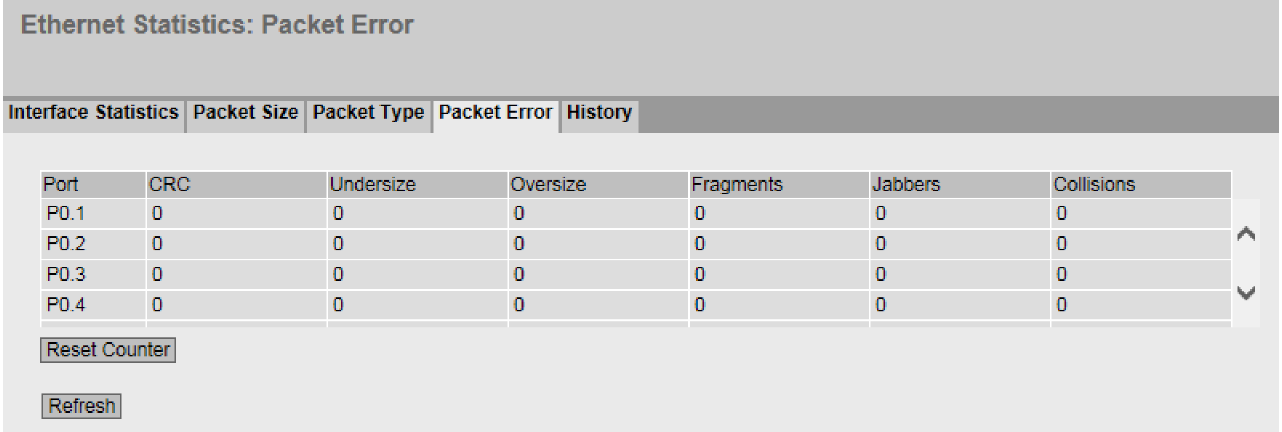
5.3.8.4 Packet Error

Bad received 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.



Ethernet Statistics: Packet Error

Port	CRC	Undersize	Oversize	Fragments	Jabbers	Collisions
P0.1	0	0	0	0	0	0
P0.2	0	0	0	0	0	0
P0.3	0	0	0	0	0	0
P0.4	0	0	0	0	0	0

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

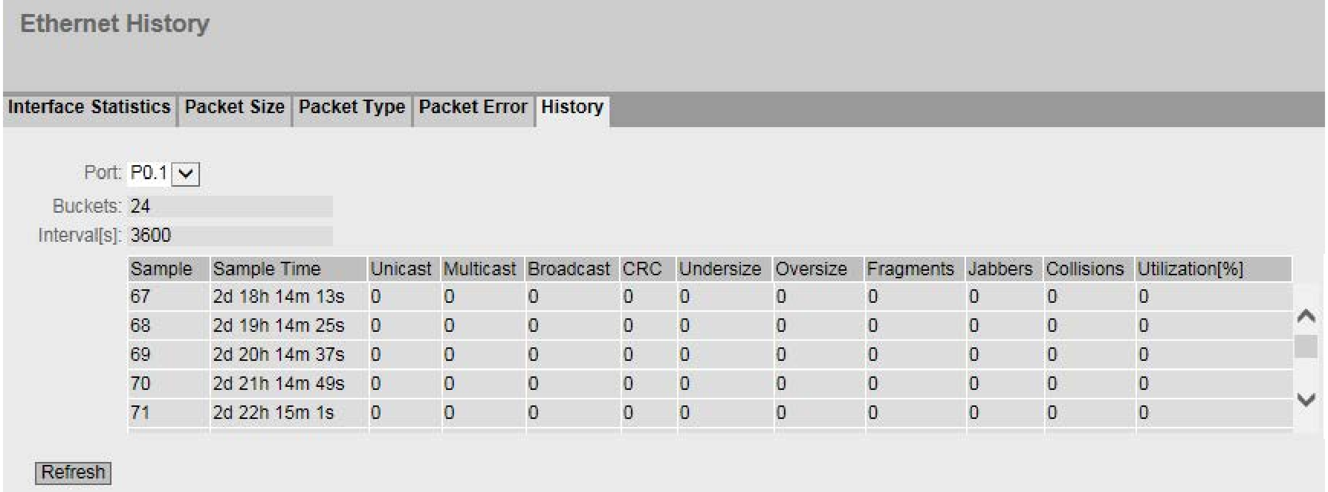
Click "Reset Counters" to reset all counters. The counters are reset by a restart.

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.



Port: P0.1
Buckets: 24
Interval[s]: 3600

Sample	Sample Time	Unicast	Multicast	Broadcast	CRC	Undersize	Oversize	Fragments	Jabbers	Collisions	Utilization[%]
67	2d 18h 14m 13s	0	0	0	0	0	0	0	0	0	0
68	2d 19h 14m 25s	0	0	0	0	0	0	0	0	0	0
69	2d 20h 14m 37s	0	0	0	0	0	0	0	0	0	0
70	2d 21h 14m 49s	0	0	0	0	0	0	0	0	0	0
71	2d 22h 15m 1s	0	0	0	0	0	0	0	0	0	0

Image 5-2 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.

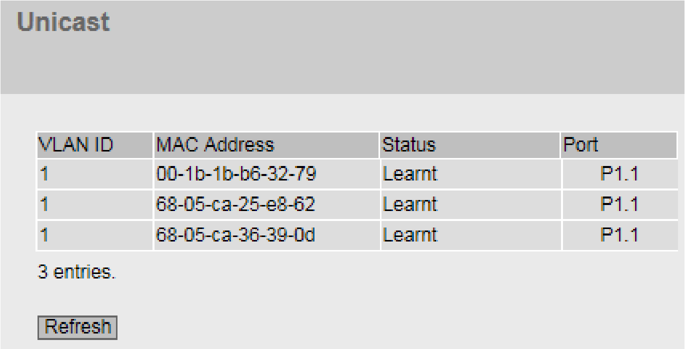
- **Utilization [%]**

  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.



Unicast

VLAN ID	MAC Address	Status	Port
1	00-1b-1b-b6-32-79	Learnt	P1.1
1	68-05-ca-25-e8-62	Learnt	P1.1
1	68-05-ca-36-39-0d	Learnt	P1.1

3 entries.

Description of the displayed values

This table contains 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.
  - Other
    The specified address is learnt indirectly through private VLAN.
- **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.

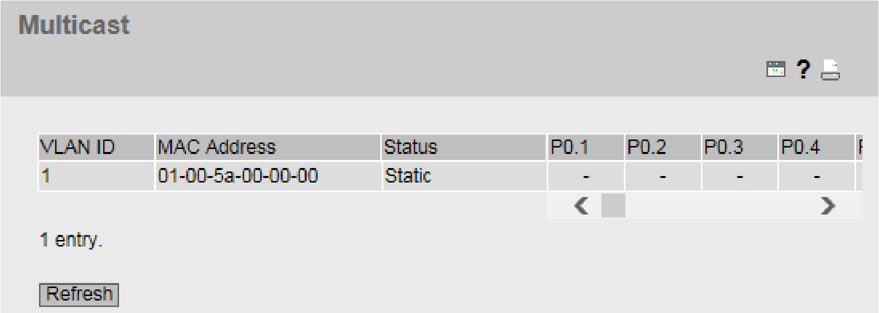
5.3.10 Multicast

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).

Note

The device does not learn any reserved multicast addresses, see also RFC 5771.



VLAN ID	MAC Address	Status	P0.1	P0.2	P0.3	P0.4
1	01-00-5a-00-00-00	Static	-	-	-	-

1 entry.

Description of the displayed values

This table contains 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 must be deleted by the user.

  – IGMP
  The destination port for this address was obtained by IGMP configuration.

  – MLD
  The destination port for this address was determined by MLD configuration.

  – 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

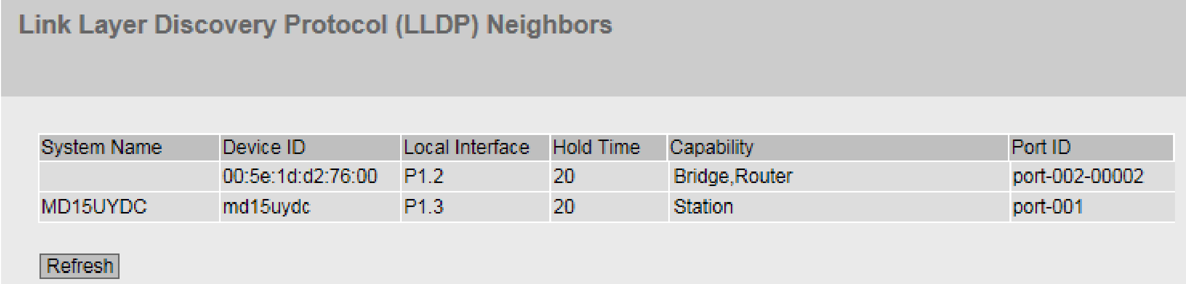
    (Registered) Member of the multicast group, registration was by a GMRP frame.
  - I
    (IGMP/MLD) Member of the multicast group, registration was by an IGMP/MLD frame.
  - –
    Not a member of the multicast group. No multicast frames with the defined multicast MAC address are sent via this port.
  - F
    (Forbidden) Not a member of the multicast group. Moreover, this address may not be an address learned dynamically with GMRP or IGMP/MLD.

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".



Link Layer Discovery Protocol (LLDP) Neighbors

System Name	Device ID	Local Interface	Hold Time	Capability	Port ID
	00:5e:1d:d2:76:00	P1.2	20	Bridge,Router	port-002-00002
MD15UYDC	md15uydc	P1.3	20	Station	port-001

Image 5-3 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 in the MIB 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**

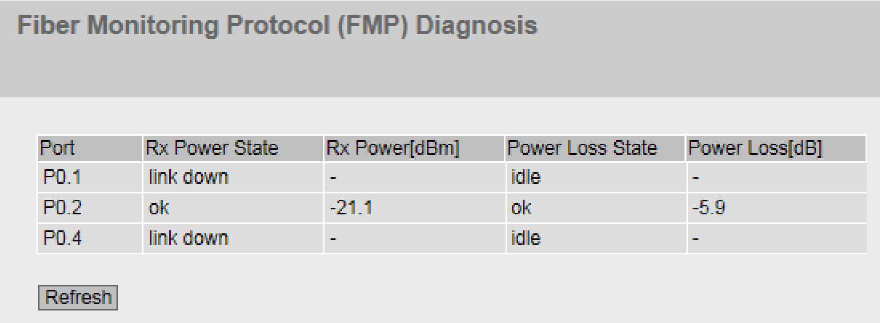
  Port of the device with which the IE switch is connected.

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".



Fiber Monitoring Protocol (FMP) Diagnosis

Port	Rx Power State	Rx Power[dBm]	Power Loss State	Power Loss[dB]
P0.1	link down	-	idle	-
P0.2	ok	-21.1	ok	-5.9
P0.4	link down	-	idle	-

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.

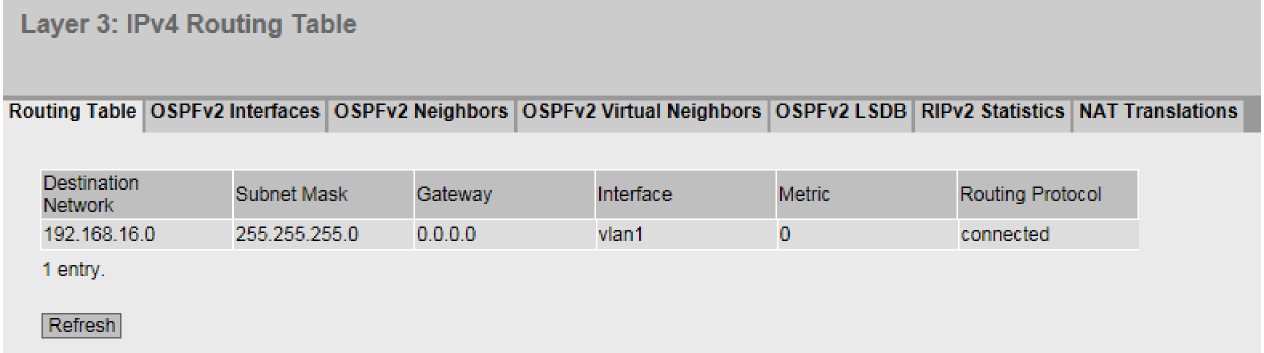
If there is no connection (link down), fiber monitoring is disabled or the partner port does not support fiber monitoring, "-" is displayed.

5.3.13 IPv4 routing

5.3.13.1 Routing Table

Introduction

This page shows the routes currently being used.



Destination Network	Subnet Mask	Gateway	Interface	Metric	Routing Protocol
192.168.16.0	255.255.255.0	0.0.0.0	vlan1	0	connected

1 entry.

Description of the displayed values

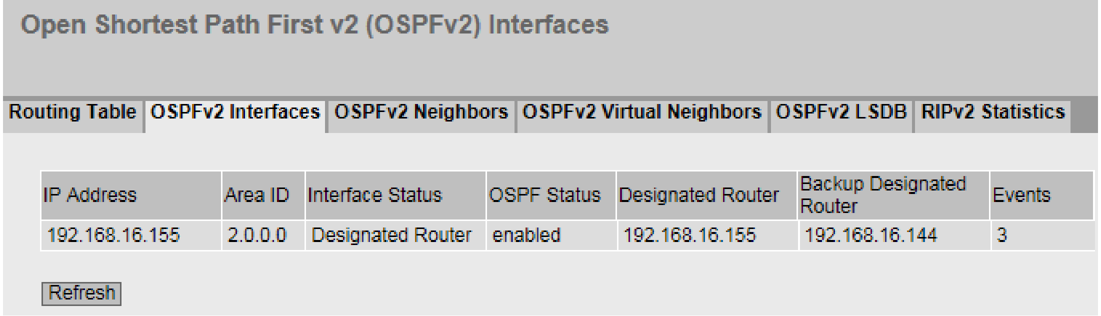
The table has the following columns:

- **Destination Network**
  Shows the destination address of this route.
- **Subnet Mask**
  Shows the subnet mask of this route.
- **Gateway**
  Shows the gateway for this route.
- **Interface**
  Shows the interface for this route.
- **Metric**
  Shows the metric of the route. The higher value, the longer packets require to their destination.
- **Routing Protocol**
  Shows the routing protocol from which the entry in the routing table originates. The following entries are possible:
  - Connected: Connected routes
  - Static: Static routes
  - RIP: Routes via RIP
  - OSPF: Routes via OSPF
  - Other: Other routes

5.3.13.2 OSPFv2 Interfaces

Overview

This page shows the configuration of the OSPF interface.



Open Shortest Path First v2 (OSPFv2) Interfaces

IP Address	Area ID	Interface Status	OSPF Status	Designated Router	Backup Designated Router	Events
192.168.16.155	2.0.0.0	Designated Router	enabled	192.168.16.155	192.168.16.144	3

Description of the displayed values

The table has the following columns:

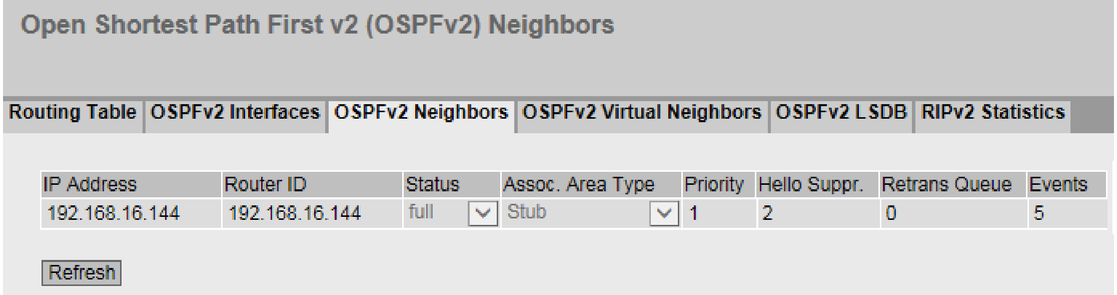
- **IP address**
  Shows the IPv4 address of the OSPF interface
- **Area ID**
  Shows the area ID to which the OSPF interface belongs.
- **Interface Status**
  Shows the status of the WLAN interface:
  - Down
    The interface is not available.
  - Loop back
    Loop back interface
  - Waiting
    Starting up and negotiating the interface.
  - Point to Point
    Point-to-point link
  - Designated Router
    The router is a designated router and generates network LSAs.
  - Backup D. Router
    The router is the backup router for the designated router.
  - Other D. Router
    The Interface has started up. The router is neither a designated nor a designated backup router.
- **OSPF Status**
  Shows the status of OSPF.
  - Enabled: OSPF is enabled on the interface.
  - Disabled: OSPF is disabled on the interface.

- **Designated Router**
  Shows the IPv4 address of the designated router for this OSPF interface.
- **Backup Designated Router**
  Shows the IPv4 address of the designated backup router for this OSPF interface.
- **Events**
  Shows the number of status changes of OSPF.

5.3.13.3 OSPFv2 Neighbors

Overview

This page shows the dynamically detected neighbor routers in the relevant networks.



Open Shortest Path First v2 (OSPFv2) Neighbors

IP Address	Router ID	Status	Assoc. Area Type	Priority	Hello Suppr.	Retrans Queue	Events
192.168.16.144	192.168.16.144	full	Stub	1	2	0	5

Description of the displayed values

The table has the following columns:

- **IP Address**
  Shows the IPv4 address of the neighbor router in this network.
- **Router ID**
  Shows the ID of the neighbor router. The two addresses can match.
- **Status**
  Shows the status of the neighbor router. The status can adopt the following values:
  - unknown
    Status of the neighbor router is unknown.
  - down
    The neighbor router cannot be reached.
  - attempt and init
    Brief status during initialization
  - two-way
    Two-way receipt of Hello packets. Specification of the designated router and the designated backup router.

- exchangestart, exchange and loading
  Status during exchange of the LSAs
- full
  The database is complete and synchronized within the area. The routes can now be detected.

Note

Normal status

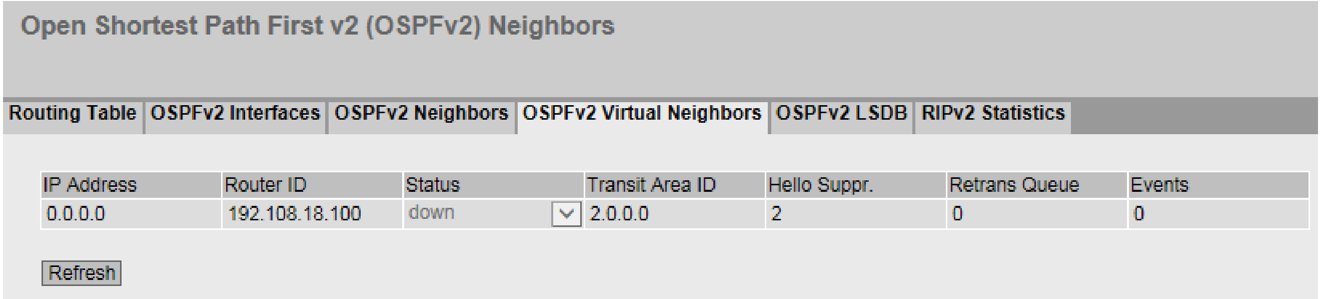
If the partner router is a designated router or a designated backup router, the status is "full". Otherwise the status is "two-way".

- **Assoc. Area Type**
  Shows the area type via which the neighbor-neighbor relation is maintained. The following area types exist:
  - Standard
  - Stub
  - NSSA
  - Backbone
- **Priority**
  Shows the priority of the neighbor router. This is only significant when selecting the designated router on a network. For virtual neighbor routers, this information is irrelevant.
- **Hello suppr**
  Shows the suppressed Hello packets to the neighbor router. This field normally displays "no".
- **Hello Queue**
  Shows the length of the queue with Hello packets still to be transmitted.
- **Events**
  Shows the number of status changes.

5.3.13.4 OSPFv2 Virtual Neighbors

Overview

This page shows the configured virtual neighbors.



Open Shortest Path First v2 (OSPFv2) Neighbors

IP Address	Router ID	Status	Transit Area ID	Hello Suppr.	Retrans Queue	Events
0.0.0.0	192.108.18.100	down	2.0.0.0	2	0	0

Description of the displayed values

The table has the following columns:

- **IP Address**
  Shows the IPv4 address of the virtual neighbor router in this network.
- **Router ID**
  Shows the router ID of the virtual neighbor router.
- **Status**
  Shows the status of the neighbor router. The status can adopt the following values:
  - unknown
    Status of the neighbor router is unknown.
  - down
    The neighbor router cannot be reached.
  - attempt and init
    Brief status during initialization
  - two-way
    Two-way receipt of Hello packets. Specification of the designated router and the designated backup router.
  - exchangestart, exchange and loading
    Status during exchange of the LSAs
  - full
    The database is complete and synchronized within the area. The routes can now be detected.

  Note

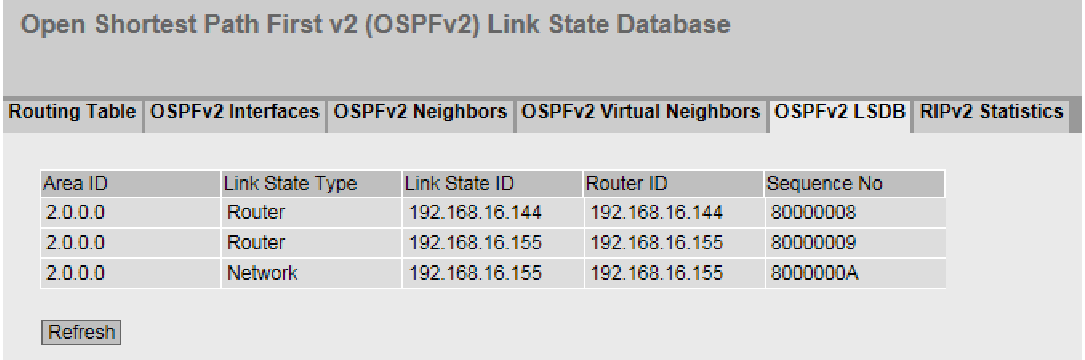
  Normal status

  If the partner router is a designated router or a designated backup router, the status is "full". Otherwise the status is "two-way".
- **Trans. Area ID**
  Shows the ID of the area via which the virtual neighborhood relation exists.
- **Hello Suppr.**
  Shows whether there are suppressed Hello packets to the virtual neighbor router.
  - no: There are no suppressed Hello packets (default)
  - yes: There are suppressed Hello packets.
- **Hello Queue**
  Shows the length of the queue with Hello packets still to be transmitted.
- **Events**
  Shows the number of status changes.

5.3.13.5 OSPFv2 LSDB

Overview

The link state database is the central database for managing all links within an area. It consists of the link state advertisements (LSAs). The most important data of these LSAs is shown on the this WBM page.



Area ID	Link State Type	Link State ID	Router ID	Sequence No
2.0.0.0	Router	192.168.16.144	192.168.16.144	80000008
2.0.0.0	Router	192.168.16.155	192.168.16.155	80000009
2.0.0.0	Network	192.168.16.155	192.168.16.155	8000000A

Description of the displayed boxes

The table has the following columns:

- **Area ID**
  Shows the ID of the area to which the LSA belongs. If the LSA is an external connection, '-' is displayed.
- **Link State Type**
  Shows the LSA type. The following values are possible:
  - Unknown
    LSA type is unknown.
  - Router
    The router LSA (Type 1) is sent by the OSPF router within an area. The LSA contains information about the status of all router interfaces.
  - Network
    The network LSA (Type 2) is sent by the designated router within an area. The LSA contains a list of routers connected to the network.
  - NSSA External
    The NSSA external LSA (Type 7) is sent by the NSSA-ASBR within an NSSA. The NSSA-ASBR receives LSAs of Type 5 and converts the information to LSAs of Type 7. The NSSA router can forward these LSAs within an NSSA.
  - Summary
    The summary LSA (Type 3) is sent by the ABR within an area. The LSA contains information about routes to other networks.

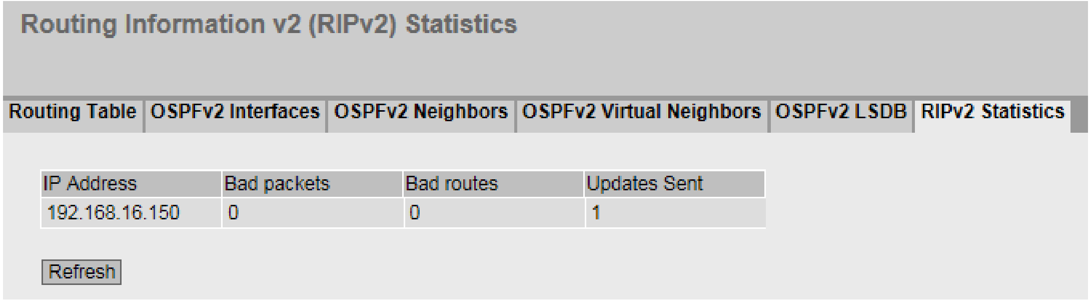
  - AS Summary
    The AS summary LSA (Type 4) is sent by the area border router within an area. The LSA contains information about routes to other autonomous systems.
  - AS External
    The AS external LSA (Type 5) is sent by the AS border router within an autonomous system. The LSA contains information about routes from one network to another.
- **Link State ID**
  Shows the ID of the LSA.
- **Router ID**
  Shows the ID of the router that sent this LSA.
- **Sequence Number**
  Shows the sequence number of the LSA. Each time an LSA is renewed, this sequence number is incremented by one.

5.3.13.6 RIPv2 Statistics

Overview

This page shows the statistics of the RIP interface.

Description of the displayed values



Routing Information v2 (RIPv2) Statistics

IP Address	Bad packets	Bad routes	Updates Sent
192.168.16.150	0	0	1

Image 5-4 RIPv2 Statistics information

The table has the following columns:

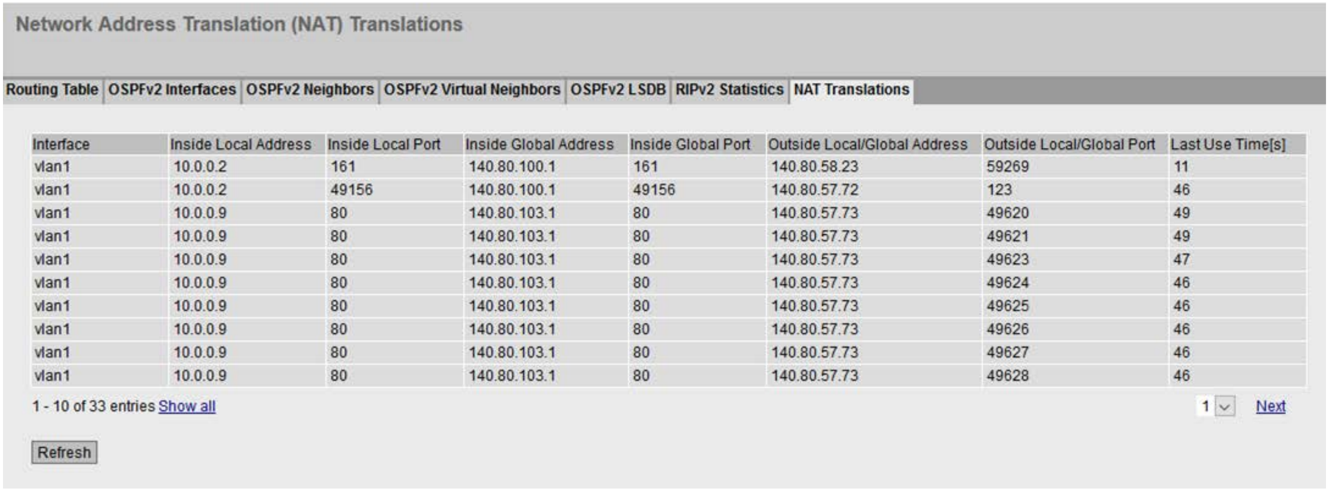
- **IP Address**
  Shows the IPv4 address of the RIPv2 interface
- **Bad packets**
  Number of received RIP packets that were deleted and therefore ignored.
- **Bad Routes**
  Number of routes of valid RIP packets that could not be taken into consideration.
- **Updates Sent**
  Shows how often the router has sent its routing table to its neighbor routers.

5.3.13.7 NAT Translations

Overview

This page displays the active NAT connections.

Description of the displayed values



Interface	Inside Local Address	Inside Local Port	Inside Global Address	Inside Global Port	Outside Local/Global Address	Outside Local/Global Port	Last Use Time[s]
vlan1	10.0.0.2	161	140.80.100.1	161	140.80.58.23	59269	11
vlan1	10.0.0.2	49156	140.80.100.1	49156	140.80.57.72	123	46
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49620	49
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49621	49
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49623	47
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49624	46
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49625	46
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49626	46
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49627	46
vlan1	10.0.0.9	80	140.80.103.1	80	140.80.57.73	49628	46

1 - 10 of 33 entries Show all

The table has the following columns:

- **Interface**

  Shows the IP interface.

- **Inside Local Address**

  Shows the actual address of the device that should be reachable from external.

- **Inside Local Port**

  Shows the port that is assigned to the Inside Local Address.

- **Inside Global Address**

  Shows the address at which the device can be reached from external.

- **Inside Global Port**

  Shows the port that is assigned to the Inside Global Address.

- **Outside Local/Global Address**

  Shows the address of the communications partner.

- **Outside Local/Global Port**

  Displays the port of the external communications partner.

- **Last Use Time [s]**

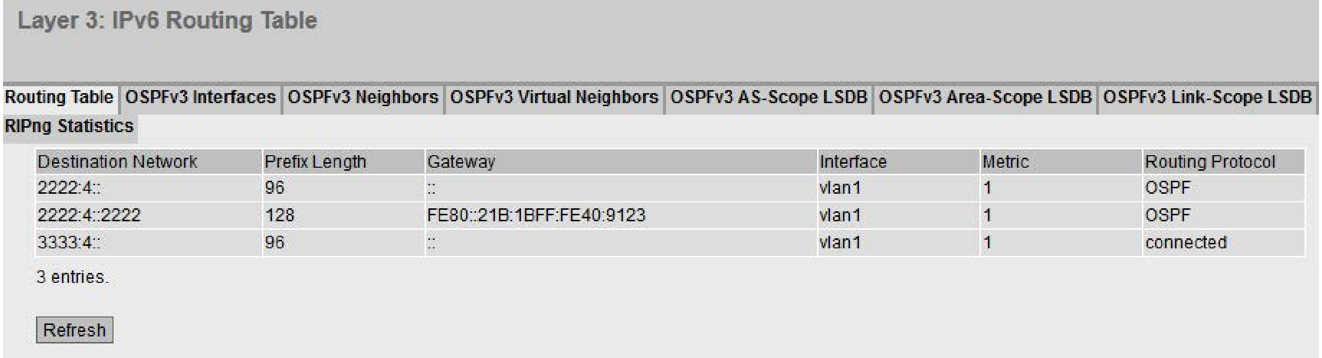
  Shows the time at which the last packet was transferred.

5.3.14 IPv6 routing

5.3.14.1 IPv6 Routing Table

Introduction

This page shows the IPv6 routes currently being used.



Destination Network	Prefix Length	Gateway	Interface	Metric	Routing Protocol
2222:4::	96	::	vlan1	1	OSPF
2222:4::2222	128	FE80::21B:1BFF:FE40:9123	vlan1	1	OSPF
3333:4::	96	::	vlan1	1	connected

3 entries.

Description of the displayed values

The table has the following columns:

- **Destination Network**

  Shows the destination address of this route.

- **Prefix Length**

  Shows the prefix length of this route.

- **Gateway**

  Shows the gateway for this route.

- **Interface**

  Shows the interface for this route.

- **Metric**

  Shows the metric of the route. The higher value, the longer packets require to their destination.

- **Routing Protocol**

  Shows the routing protocol from which the entry in the routing table originates. The following entries are possible:

  – connected: Connected routes

  – Static: Static routes

  – RIPng: Routes via RIPng

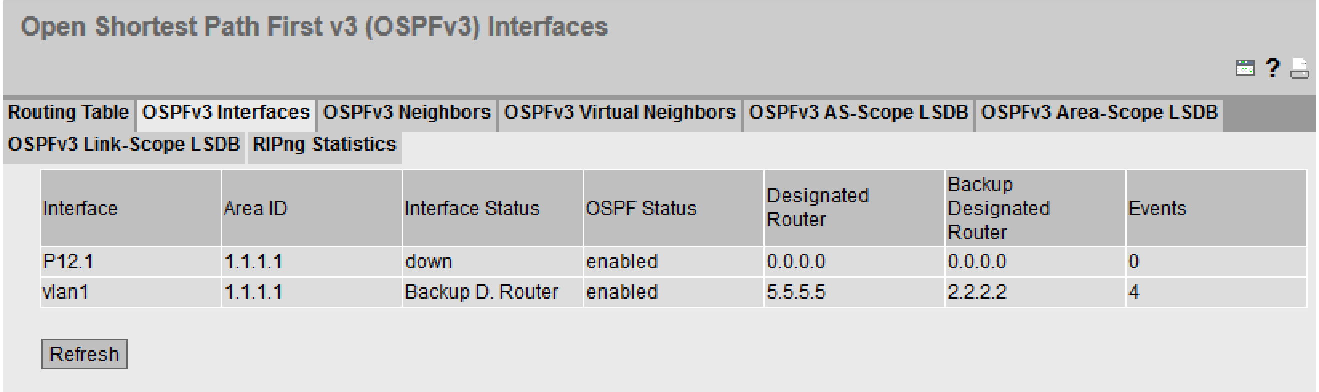
  – OSPFv3: Routes via OSPFv3

  – other: Other routes

5.3.14.2 OSPFv3 Interfaces

Overview

This page shows the configuration of the OSPFv3 interface.



Open Shortest Path First v3 (OSPFv3) Interfaces

Interface	Area ID	Interface Status	OSPF Status	Designated Router	Backup Designated Router	Events
P12.1	1.1.1.1	down	enabled	0.0.0.0	0.0.0.0	0
vlan1	1.1.1.1	Backup D. Router	enabled	5.5.5.5	2.2.2.2	4

Description of the displayed values

The table has the following columns:

- **Interface**

  Shows the interface to which the settings relate.

- **Area ID**

  Shows the Area ID to which the OSPF interface belongs.

- **Interface Status**

  Shows the status of the interface.

  – Down

    The interface is not available.

  – Loop back

    Loop back interface

  – Waiting

    Startup and negotiation of the interface.

  – Point to Point

    Point-to-point connection

  – Designated Router

    The router is a designated router and generates network LSAs.

  – Backup D. Router

    The router is the backup router for the designated router.

  – S D. Router

    The Interface has started up. The router is neither a designated nor a designated backup router.

- **OSPF Status**

  Shows the status of OSPF.

  – Enabled: OSPF is enabled on the interface.

  – Disabled: OSPF is disabled on the interface.

- **Designated Router**
  Shows the IPv6 address of the designated router for this OSPFv3 interface.

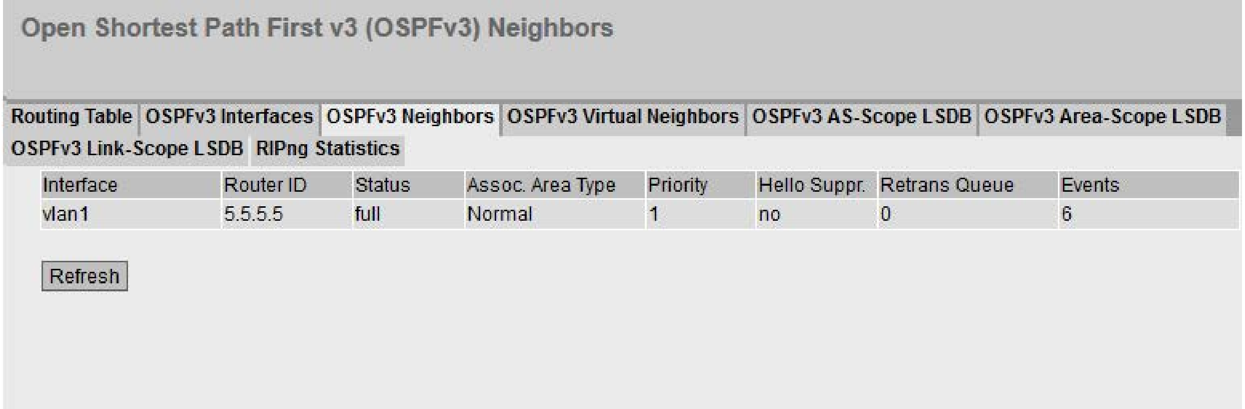
- **Backup Designated Router**
  Shows the IPv6 address of the designated backup router for this OSPFv3 interface.

- **Events**
  Shows the number of status changes of OSPFv3.

5.3.14.3 OSPFv3 Neighbors

Overview

This page shows the dynamically detected neighbor routers in the relevant networks.



Open Shortest Path First v3 (OSPFv3) Neighbors

Interface	Router ID	Status	Assoc. Area Type	Priority	Hello Suppr.	Retrans Queue	Events
vlan1	5.5.5.5	full	Normal	1	no	0	6

Description of the displayed values

The table has the following columns:

- **Interface**

  Displays the OSPFv3 interface via which the neighbor router can be reached.

- **Router ID**

  Shows the ID of the neighbor router.

- **Status**

  Shows the status of the neighbor router. The status can adopt the following values:

  – unknown
  Status of the neighbor router is unknown.

  – down
  The neighbor router cannot be reached.

  – attempt und init
  Short-lived status during initialization

  – two-way
  Two-way receipt of Hello packets. Specification of the designated router and the designated backup router.

- exchangestart, exchange und loading
  Status during exchange of the LSAs
- full
  The database is complete and synchronized within the area. The routes can now be detected.

Note

Normal status

If the partner router is a designated router or a designated backup router, the status is "full". Otherwise the status is "two-way".

- **Assoc. Area Type**

  Shows the area type via which the neighbor-neighbor relation is maintained. The following area types exist:

  - Standard
  - Stub
  - NSSA
  - Backbone

- **Priority**

  Shows the priority of the neighbor router. This is only significant when selecting the designated router on a network. For virtual neighbor routers, this information is irrelevant.

- **Hello suppr**

  Shows the suppressed Hello packets to the neighbor router. This field normally displays "no".

- **Hello Queue**

  Shows the length of the queue with Hello packets still to be transmitted.

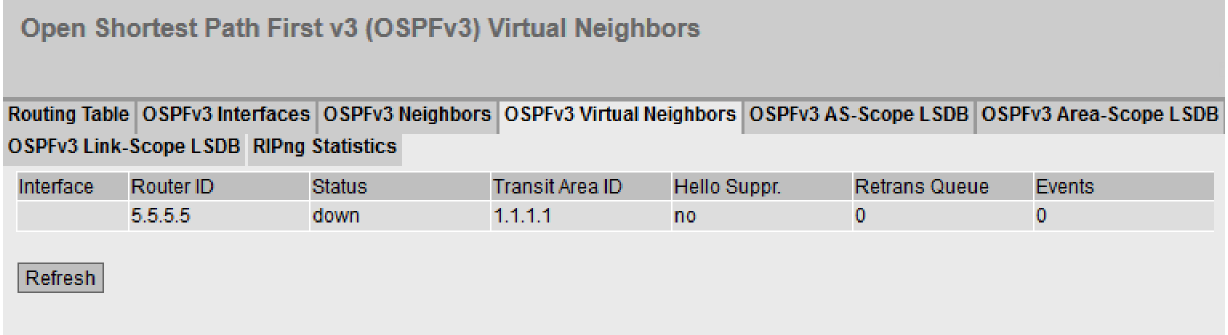
- **Events**

  Shows the number of status changes.

5.3.14.4 OSPFv3 Virtual Neighbors

Overview

This page shows the configured virtual neighbors.



Open Shortest Path First v3 (OSPFv3) Virtual Neighbors

Interface	Router ID	Status	Transit Area ID	Hello Suppr.	Retrans Queue	Events
	5.5.5.5	down	1.1.1.1	no	0	0

Description of the displayed values

The table has the following columns:

- **Interface**

  Displays the OSPFv3 interface via which the neighbor router can be reached.

- **Router ID**

  Shows the ID of the virtual neighbor router.

- **Status**

  Shows the status of the virtual neighbor router. The status can adopt the following values:

  – unknown
  Status of the neighbor router is unknown.

  – down
  The neighbor router cannot be reached.

  – attempt und init
  Short-lived status during initialization

  – two-way
  Two-way receipt of Hello packets. Specification of the designated router and the designated backup router.

  – exchangestart, exchange und loading
  Status during exchange of the LSAs

– full
The database is complete and synchronized within the area. The routes can now be detected.

Note

Normal status

If the partner router is a designated router or a designated backup router, the status is "full". Otherwise the status is "two-way".

- **Trans. Area ID**
  Shows the ID of the area via which the virtual neighborhood relation exists.
- **Hello suppr**

  Shows the suppressed Hello packets to the neighbor router. This field normally displays "no".
- **Hello Queue**

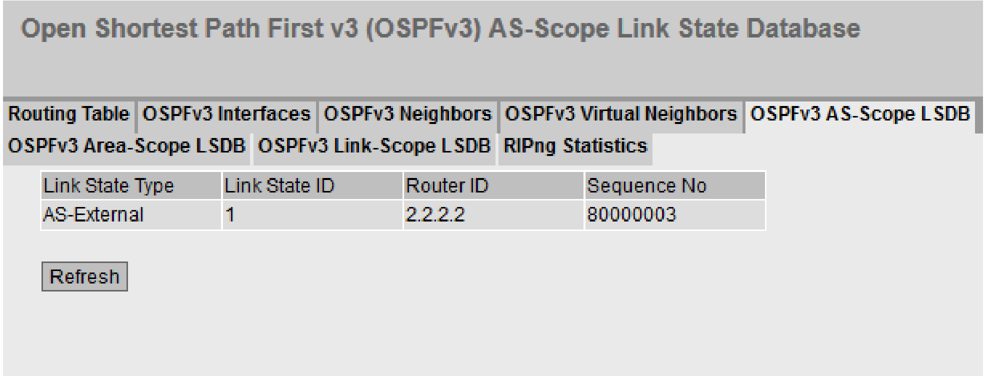
  Shows the length of the queue with Hello packets still to be transmitted.
- **Events**

  Shows the number of status changes.

5.3.14.5 OSPFv3 AS-Scope LSDB

Overview

The AS-Scope LSDB consists of AS external LSAs. The most important data of these LSAs is shown on this page.



Open Shortest Path First v3 (OSPFv3) AS-Scope Link State Database

Link State Type	Link State ID	Router ID	Sequence No
AS-External	1	2.2.2.2	80000003

Description of the displayed values

The table has the following columns:

- **Link State Type**
  – AS External
  The AS external LSA (Type 0x4005) is sent by the AS border router within an

autonomous system. The LSA contains information about routes from one network to another.

- **Link State ID**

  Shows the ID of the LSA.

- **Router ID**

  Shows the ID of the router that sent this LSA.

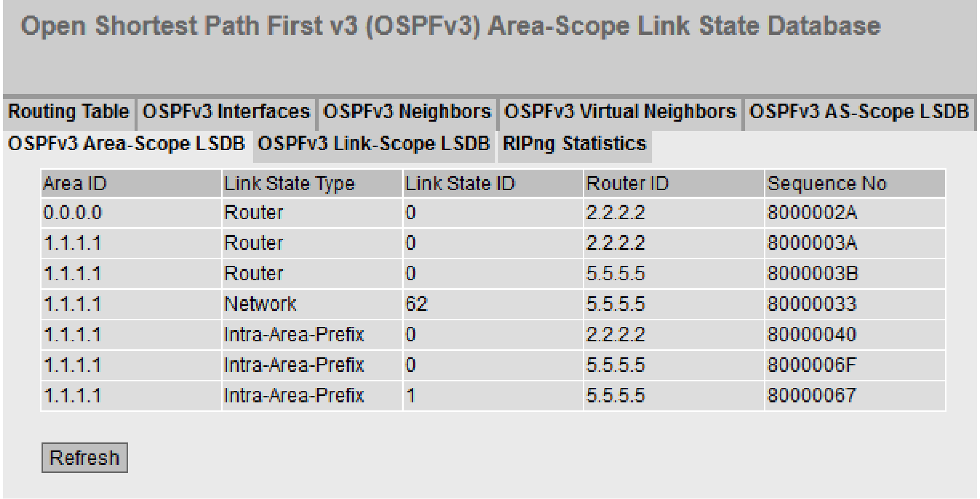
- **Sequence Number**

  Shows the sequence number of the LSA. Each time an LSA is renewed, this sequence number is incremented by one.

5.3.14.6 OSPFv3 Area-Scope LSDB

Overview

The Area-Scope LSDB is the central database for managing all links within an area. The most important data of the LSAs is shown on this page.



Area ID	Link State Type	Link State ID	Router ID	Sequence No
0.0.0.0	Router	0	2.2.2.2	8000002A
1.1.1.1	Router	0	2.2.2.2	8000003A
1.1.1.1	Router	0	5.5.5.5	8000003B
1.1.1.1	Network	62	5.5.5.5	80000033
1.1.1.1	Intra-Area-Prefix	0	2.2.2.2	80000040
1.1.1.1	Intra-Area-Prefix	0	5.5.5.5	8000006F
1.1.1.1	Intra-Area-Prefix	1	5.5.5.5	80000067

Description of the displayed values

The table has the following columns:

- **Area ID**
  Shows the ID of the area to which the LSA belongs. If the LSA is an external connection, '-' is displayed.

- **Link State Type**

  Shows the LSA type. The following values are possible:

  – Router
    The router LSA (Type 0x2001) is sent by the OSPF router within an area. The LSA

contains information about the status of all router interfaces. However, no longer contains address information. This is contained in the new LSA type 0x2009.

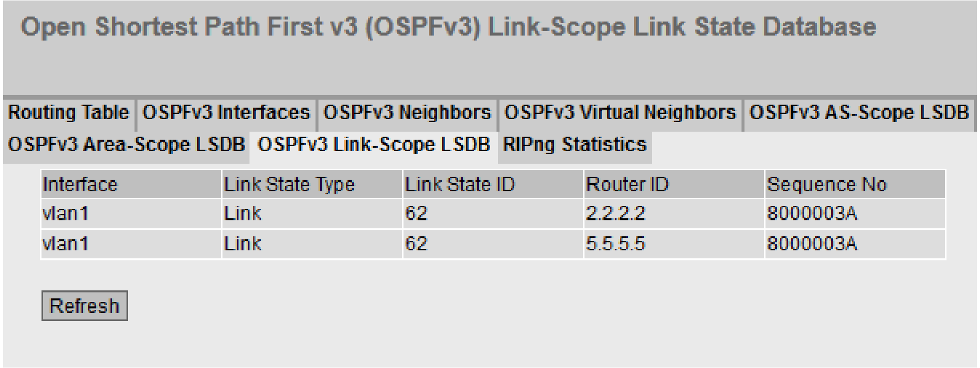
- Network
  The network LSA (Type 0x2002) is sent by the designated router within an area. The LSA contains a list of routers connected to the network. However, no longer contains address information. This is contained in the new LSA type 2009.
- Inter-Area Prefix
  the inter-area prefix LSA (Type 0x2003) is sent by the ABR within an area. The LSA contains information about routes to other networks.
- Inter-Area Router
  The inter-area router LSA (Type 0x2004) is sent by the area border router within an area. The LSA contains information about routes to other autonomous systems.
- Type 7
  The Type 7 LSA (Type 0x2007) is sent by the NSSA-ASBR within an NSSA. The NSSA-ASBR receives LSAs of Type 0x4005 and converts the information to LSAs of Type 0x2007. The NSSA router can forward these LSAs within an NSSA.
- Intra-Area Prefix
  The intra-area prefix LSA (Type 0x2009) is only sent within an area. It contains the IPv6 prefixes connected to the router or network.

- **Link State ID**
  Shows the ID of the LSA.
- **Router ID**
  Shows the ID of the router that sent this LSA.
- **Sequence Number**
  Shows the sequence number of the LSA. Each time an LSA is renewed, this sequence number is incremented by one.

5.3.14.7 OSPFv3 Link-Scope LSDB

Overview

The link scope LSDB consists of the link LSAs. The most important data of these LSAs is shown on this page.



Open Shortest Path First v3 (OSPFv3) Link-Scope Link State Database

Interface	Link State Type	Link State ID	Router ID	Sequence No
vlan1	Link	62	2.2.2.2	8000003A
vlan1	Link	62	5.5.5.5	8000003A

Description of the displayed values

The table has the following columns:

- **Interface**

  Shows the OSPFv3 interface to which the link LSA belongs.
- **Link State Type**
  - Link

    The link LSA (Type 0x2009) is sent by the router to every router linked to it. It contains the link local address of the router and a list with IPv6 prefixes configured on the link.
- **Link State ID**

  Shows the ID of the LSA.
- **Router ID**

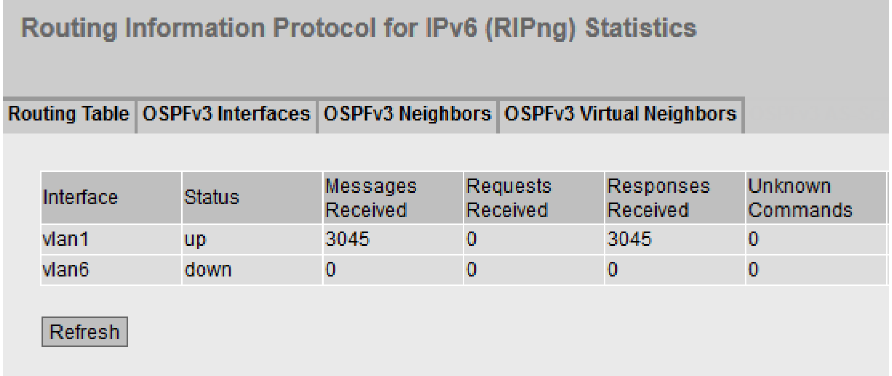
  Shows the ID of the router that sent this LSA.
- **Sequence Number**

  Shows the sequence number of the LSA. Each time an LSA is renewed, this sequence number is incremented by one.

5.3.14.8 RIPng Statistics

Overview

This page shows the statistics of the RIPng interfaces.



Routing Information Protocol for IPv6 (RIPng) Statistics

Interface	Status	Messages Received	Requests Received	Responses Received	Unknown Commands
vlan1	up	3045	0	3045	0
vlan6	down	0	0	0	0

Image 5-5 RIPng statistics - Part 1

Description of the displayed values

The table has the following columns:

- **Interface**

  Shows the RIPng interface.
- **Status**

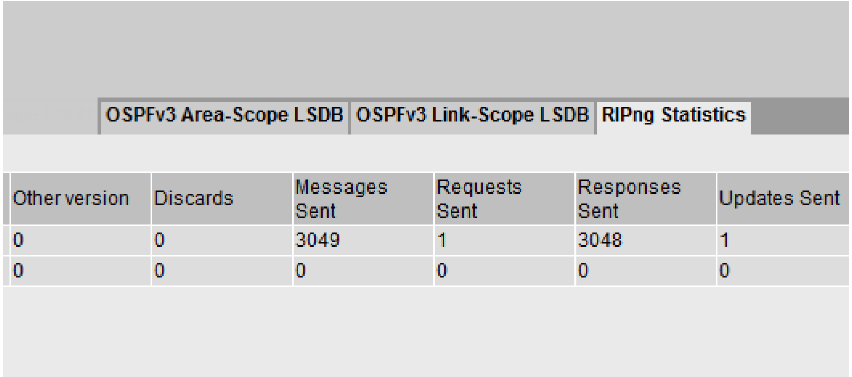
  Shows the status of the RIPng interface.
  - up
  - down
- **Messages Received**

  Shows how often the router has received messages.
- **Requests Received**

  Shows how often the router has received requests.
- **Responses Received**

  Shows how often the router has received responses.
- **Unknown Commands**

  Shows how many RIPng packets were received whose value in the "Commands" field of the RIPng header is unknown. Known values are 1 for requests and 2 for responses.



Other version	Discards	Messages Sent	Requests Sent	Responses Sent	Updates Sent
0	0	3049	1	3048	1
0	0	0	0	0	0

Image 5-6 RIPng statistics - Part 2

- **Other version**

  Shows how many RIPng packets were received whose value in the "Version" field is not 1.
- **Discards**

  Shows how often the router has discarded RIPng packets.
- **Messages Sent**

  Shows how often the router has sent messages.
- **Requests Sent**

  Shows how often the router has sent requests.

- **Responses Sent**

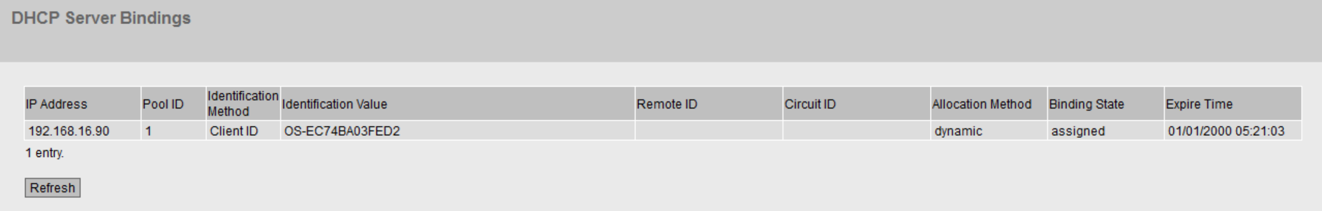
  Shows how often the router has sent responses.

- **Updates Sent**

  Shows how often the router has sent its routing table to its neighbor routers.

5.3.15 DHCP Server

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



DHCP Server Bindings

IP Address	Pool ID	Identification Method	Identification Value	Remote ID	Circuit ID	Allocation Method	Binding State	Expire Time
192.168.16.90	1	Client ID	OS-EC74BA03FED2			dynamic	assigned	01/01/2000 05:21:03

1 entry.

Description

- **IP Address**

  Shows the IPv4 address assigned to the device.

- **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 device 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.

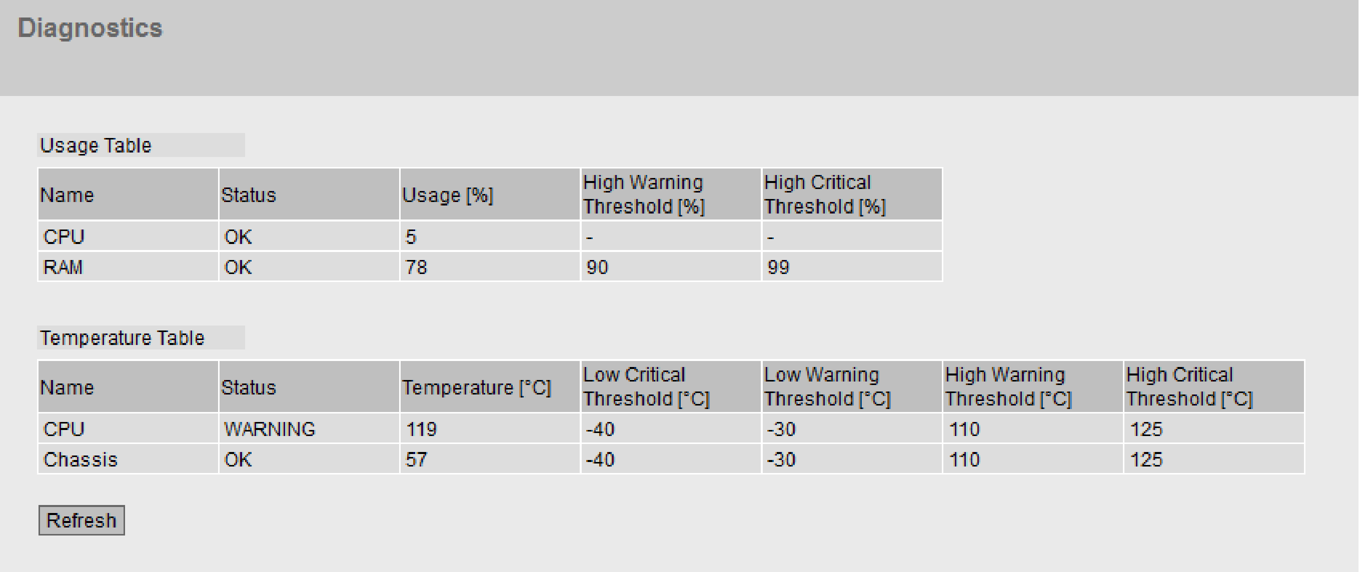
5.3.16 Diagnostics

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

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

The threshold values are preset by the device and cannot be modified.

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



Diagnostics

Usage Table

Name	Status	Usage [%]	High Warning Threshold [%]	High Critical Threshold [%]
CPU	OK	5	-	-
RAM	OK	78	90	99

Temperature Table

Name	Status	Temperature [°C]	Low Critical Threshold [°C]	Low Warning Threshold [°C]	High Warning Threshold [°C]	High Critical Threshold [°C]
CPU	WARNING	119	-40	-30	110	125
Chassis	OK	57	-40	-30	110	125

Description

The Usage Table contains the following columns:

- **Name**

  Shows the name of the module.

- **Status**

  Depending on the relationship between the threshold values and the current temperature the following statuses 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. The "Power [%] box shows "-".

  – INITIAL

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

- **Power [%]**

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

- **High Warning Threshold [%]**

  If the value exceeds this value, the status changes to "WARNING". You can configure that you are informed by a message.
- **High Critical Threshold [%]**

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

The Temperature Table contains the following columns:

- **Name**

  Shows the name of the module.

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

  With modular devices, the port is also specified.
- **Status**

  Depending on the relationship between the threshold values and the current temperature the following statuses 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)**

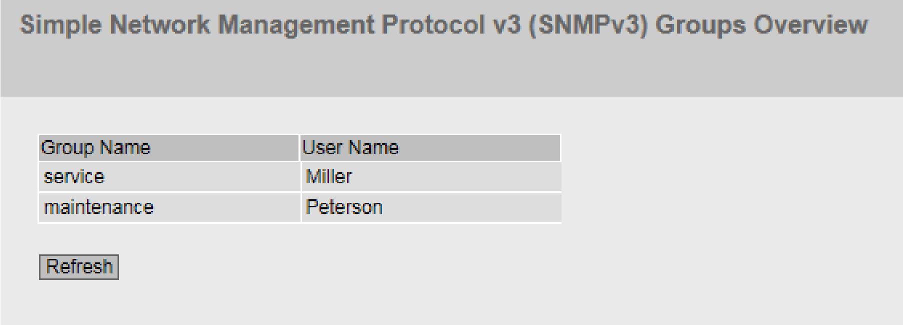
  If the value exceeds this value, the status changes to "WARNING". You can configure that you are informed by a message.

- **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.

5.3.17 SNMP

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



Simple Network Management Protocol v3 (SNMPv3) Groups Overview

Group Name	User Name
service	Miller
maintenance	Peterson

Description

The table has the following columns:

- **Group Name**

  Shows the group name.

- **User Name**

  Shows the user that is assigned to the group.

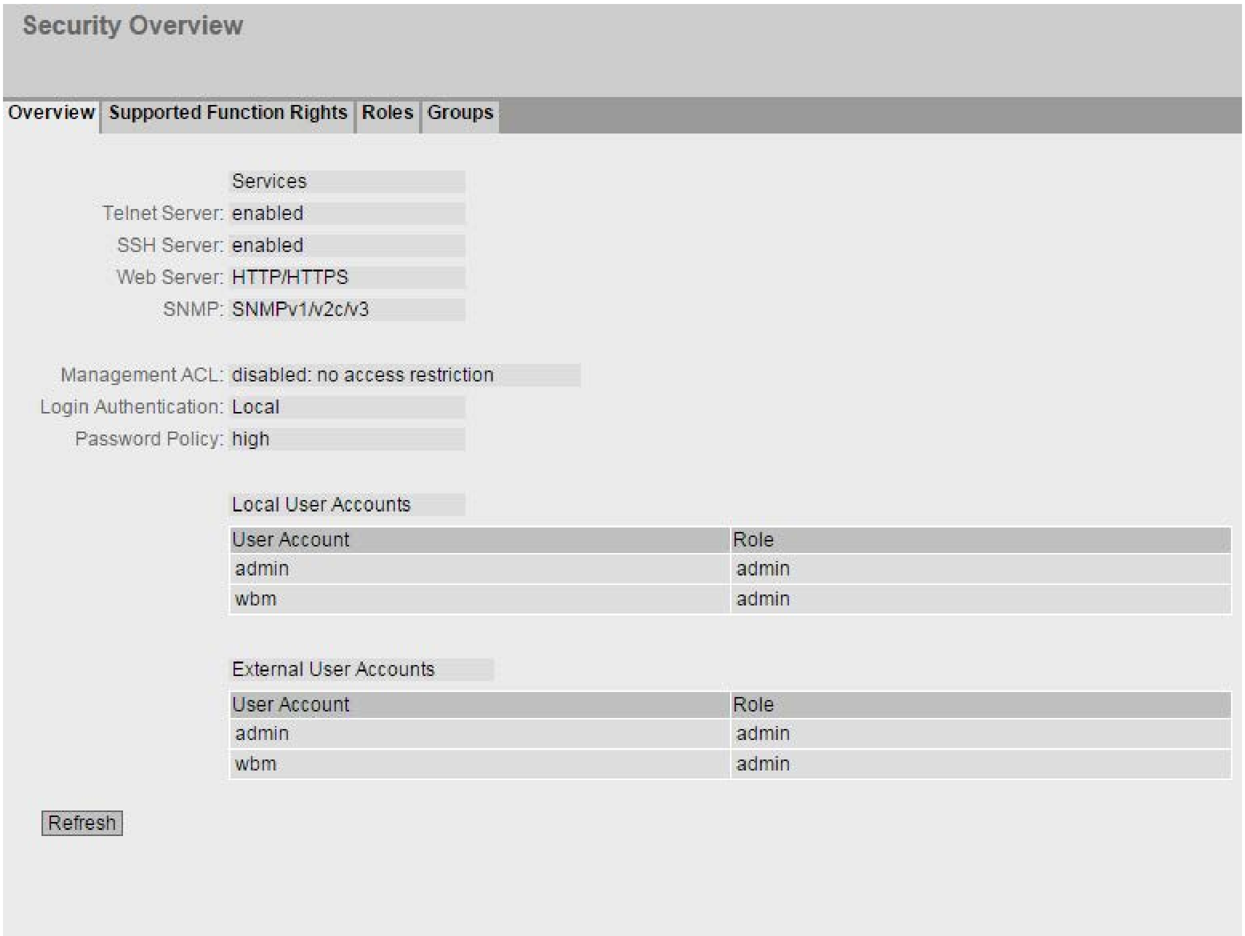
5.3.18 Security

5.3.18.1 Overview

Note

The values displayed depend on the rights of the logged-on user.

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



Security Overview

Services

Telnet Server: enabled
SSH Server: enabled
Web Server: HTTP/HTTPS
SNMP: SNMPv1/v2c/v3

Management ACL: disabled: no access restriction
Login Authentication: Local
Password Policy: high

Local User Accounts

User Account	Role
admin	admin
wbm	admin

External User Accounts

User Account	Role
admin	admin
wbm	admin

Description

Services

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 now only possible with HTTPS.

- **SNMP**

  You can configure 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 > Management ACL".

  – Enabled: Restricted access only: Access is restricted using an Access Control List (ACL).

  – Disabled: No access restriction: Management ACL is not enabled.

  – Enabled: No access restriction: Management ACL is enabled, but access is not restricted using an Access Control List (ACL).

- **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.

- **Password Policy**

  Shows which password policy is currently being used.

Local and external user accounts

You configure local user accounts and roles in "Security > User Accounts"

When you create a local user account an external user account is generated automatically.

Local user accounts involve users each with a password for logging in on the device.

In the table "External User Accounts" a user is linked to a role. In this example the user "Observer" is linked to the "user" role. The user is defined on a RADIUS server. The roll is defined locally on the device. When a RADIUS server authenticates a user, the corresponding group however is unknown or does not exist, the device checks whether or not there is an entry for the user in the table "External User Accounts". If an entry exists, the user is logged in with the rights of the associated role. If the corresponding group is known on the device, both tables are evaluated. The user is assigned the role with the higher rights.

Note

The table "External User Accounts" is only evaluated if you have set "SiemensVSA" in the RADIUS Authorization Mode".

With CLI you can access external user accounts.

The table "Local User Accounts" has the following columns:

- User Account

  Shows the name of the local user.

- Role

  Shows the role of the user. You can obtain more information on the function rights of the role in "Information > Security > Roles".

The table "External User Accounts" has the following columns:

- User Account

  Shows the name of the user on the RADIUS server.

- Role

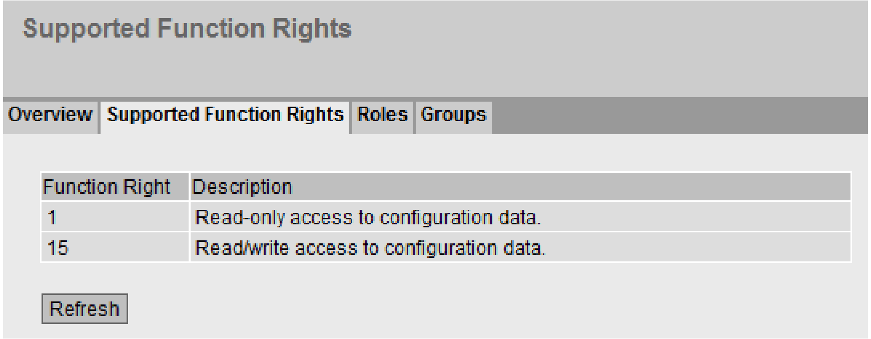
  Shows the role assigned to the user on the device. You can obtain more information on this in "Information > Security > Roles".

5.3.18.2 Supported Function Rights

Note

The values displayed depend on the role of the logged-on user.

The page shows the function rights available locally on the device.



Supported Function Rights

Function Right	Description
1	Read-only access to configuration data.
15	Read/write access to configuration data.

Description of the displayed values

- Function Right

  Shows the number of the function right. Different rights relating to the device parameters are assigned to the numbers.

- Description

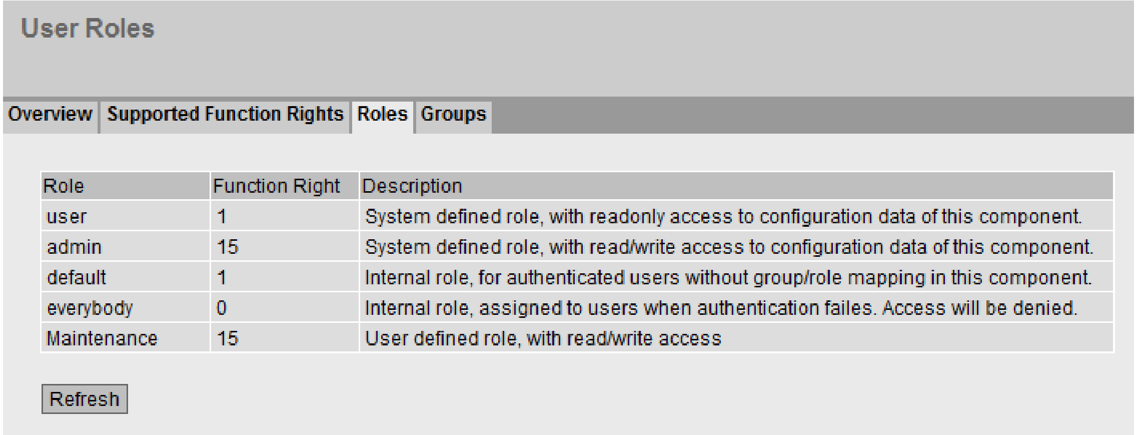
  Shows the description of the function right.

5.3.18.3 Roles

Note

The values displayed depend on the role of the logged-on user.

The page shows the roles valid locally on the device.



Role	Function Right	Description
user	1	System defined role, with readonly access to configuration data of this component.
admin	15	System defined role, with read/write access to configuration data of this component.
default	1	Internal role, for authenticated users without group/role mapping in this component.
everybody	0	Internal role, assigned to users when authentication failes. Access will be denied.
Maintenance	15	User defined role, with read/write access

Description of the displayed values

This table contains the following columns:

- **Role**

  Shows the name of the role.

- **Function Right**

  Shows the function right of the role:

  – 1

  Users with this role can read device parameters but cannot change them.

  – 15

  Users with this role can both read and change device parameters.

  – 0

  This is a role that the device assigns internally when a user could not be authenticated. The user is denied access to the device.

- **Description**

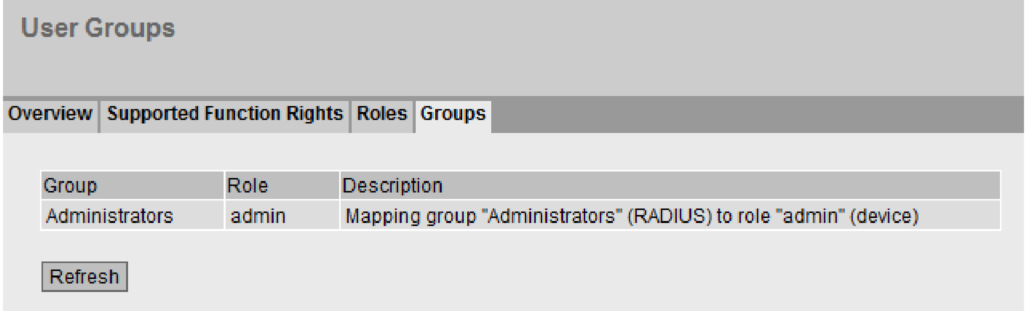
  Shows a description of the role.

5.3.18.4 Groups

Note

The values displayed depend on the role of the logged-on user.

This page shows which group is linked to which role. The group is defined on a RADIUS server. The roll is defined locally on the device.



Group	Role	Description
Administrators	admin	Mapping group "Administrators" (RADIUS) to role "admin" (device)

Description of the displayed values

The table has the following columns:

- **Group**

  Shows the name of the group. The name matches the group on the RADIUS server.

- **Role**

  Shows the name of the role. Users who are authenticated with the linked group on the RADIUS server receive the rights of this role locally on the device.

- **Description**

  Shows a a description for the link.

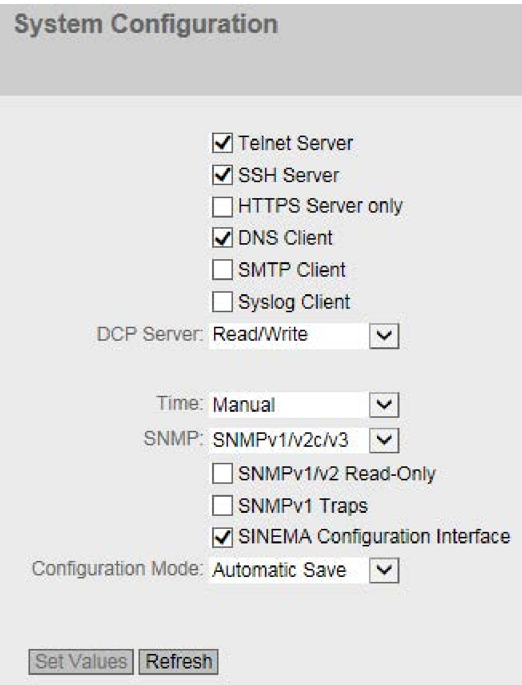
5.4 The "System" menu

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.



System Configuration

☑ Telnet Server
☑ SSH Server
□ HTTPS Server only
☑ DNS Client
□ SMTP Client
□ Syslog Client
DCP Server: Read/Write
Time: Manual
SNMP: SNMPv1/v2c/v3
□ SNMPv1/v2 Read-Only
□ SNMPv1 Traps
☑ SINEMA Configuration Interface
Configuration Mode: Automatic Save

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 device via HTTPS.
- **DNS Client**

  Enable or disable depending on whether the IE switch should operate as a DNS client. You can configure other settings in "System > DNS".

- **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 Setting**
  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".
  - PTP Client(SCALANCE XR528-6M and XR552-12M only)
    The system time is set via a PTP. You can configure other settings in "System > System Time > PTP 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.

- **SNMPv1 Traps**
  Enable or disable the sending of 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 via the TIA Portal.
- **NFC**(only for SCALANCE XM-400)
  Activate or deactivate the "NFC" (Near Field Communication) function.

  You will find further information on NFC in the "SCALANCE XM400" 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 when you restart the device, the configuration is automatically saved.

  – 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 "Write startup config" button is displayed when you set trial mode. The display area also shows the message "Trial Mode Active – Press "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

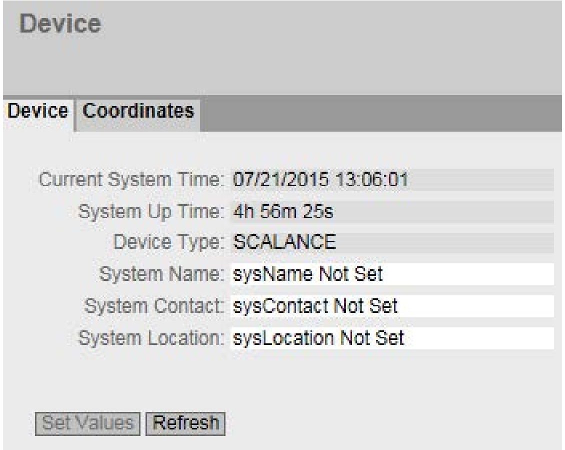
1. To use the required function, select the corresponding check box.
2. Select the options you require from the drop-down lists.
3. Click the "Set Values" button.

5.4.2 General

5.4.2.1 Device

General device information

This page contains the general device information.



Current System Time: 07/21/2015 13:06:01
System Up Time: 4h 56m 25s
Device Type: SCALANCE
System Name: sysName Not Set
System Contact: sysContact Not Set
System Location: sysLocation Not Set

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

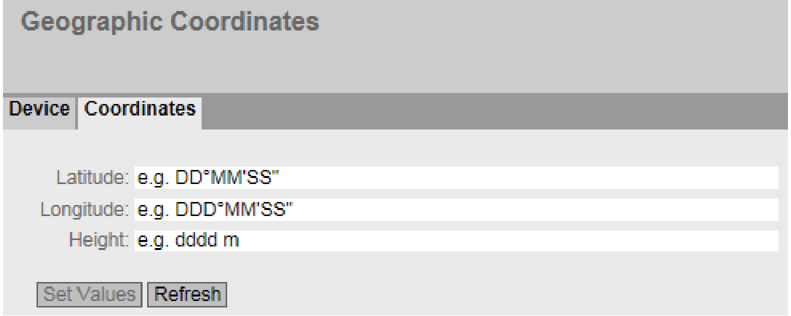
Information on geographic coordinates

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.



Geographic Coordinates

Latitude: e.g. DD°MM'SS"
Longitude: e.g. DDD°MM'SS"
Height: e.g. dddd m

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

Here, you specify the IP configuration for the device.

With devices with more than one IP interface, this call references the "Subnets > Configuration" menu item in the "Layer 3" menu and the configuration of the TIA interface there.

5.4.4 DNS

On this page, you can configure up to 3 DNS servers. If there is more than one server, the order in the table specifies the order in which the servers are queried. The top server is queried first.

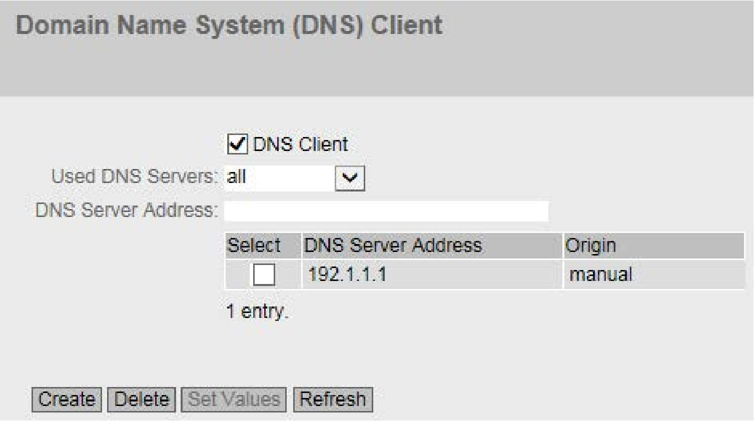
The DNS () server (Domain Name System) assigns a domain name to an IP address so that a device can be uniquely identified.

If this function is enabled, the IE switch can communicate with a DNS server as a DNS client. You have the option of entering names in IP address boxes.

Note

The DNS client function can only be used if there is a DNS server in the network.

Description



Domain Name System (DNS) Client

☑ DNS Client

Used DNS Servers: all

DNS Server Address:

Select	DNS Server Address	Origin
□	192.1.1.1	manual

1 entry.

Image 5-7 DNS client

The page contains the following boxes:

- **DNS Client**

  Enable or disable depending on whether the IE switch should operate as a DNS client.

- **Used DNS Servers**

  Here you specify which DNS server the device uses:

  – learned only

    The device uses only the DNS servers assigned by DHCP.

  – Manual only

    The device uses only the manually configured DNS servers. The DNS servers must be connected to the Internet. A maximum of three DNS servers can be configured.

  – All

    The device uses all available DNS servers.

- **DNS Server Address**

  Enter the IP address of the DNS server.

This table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **DNS Server Address**

  Shows the IP address of the DNS server.

- **Origin**

  This shows whether the DNS server was configured manually or was assigned by DHCP.

Procedure

Activating DNS

1. Enable the "DNS-Client" check box.
2. Click the "Set Values" button.

Creating a DNS server

1. In the "DNS Server Address" box, enter the IP address of the DNS server.
2. Click the "Create" button.

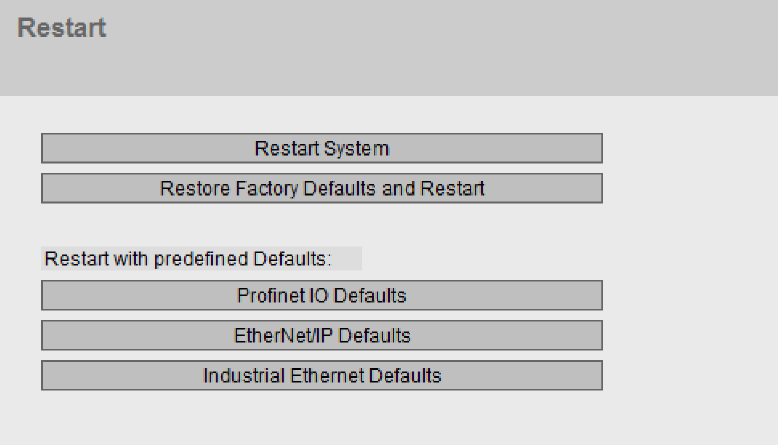
Filtering DNS servers

1. In the "Used DNS Servers" drop-down list, select which DNS servers are to be used.
2. Click the "Set Values" button.

5.4.5 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 settings.


Restart
Restart System
Restore Factory Defaults and Restart
Restart with predefined Defaults:
Profinet IO Defaults
EtherNet/IP Defaults
Industrial Ethernet Defaults

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.
- 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 "Trial" mode, configuration modifications must be saved manually before a restart. 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 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 use case. In contrast to resetting to the factory defaults. 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 and therefore the failure of the data traffic.

Which settings were set specially for the 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.

5.4.6 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, roles, groups and function rights. 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.
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 sheets 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.

File type	Description
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.
WBMFav	WBM favorite pages This file contains the favorites that you created in the WBM.. You can download this file and upload it in other devices.

5.4.6.1 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 devices. 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 mode

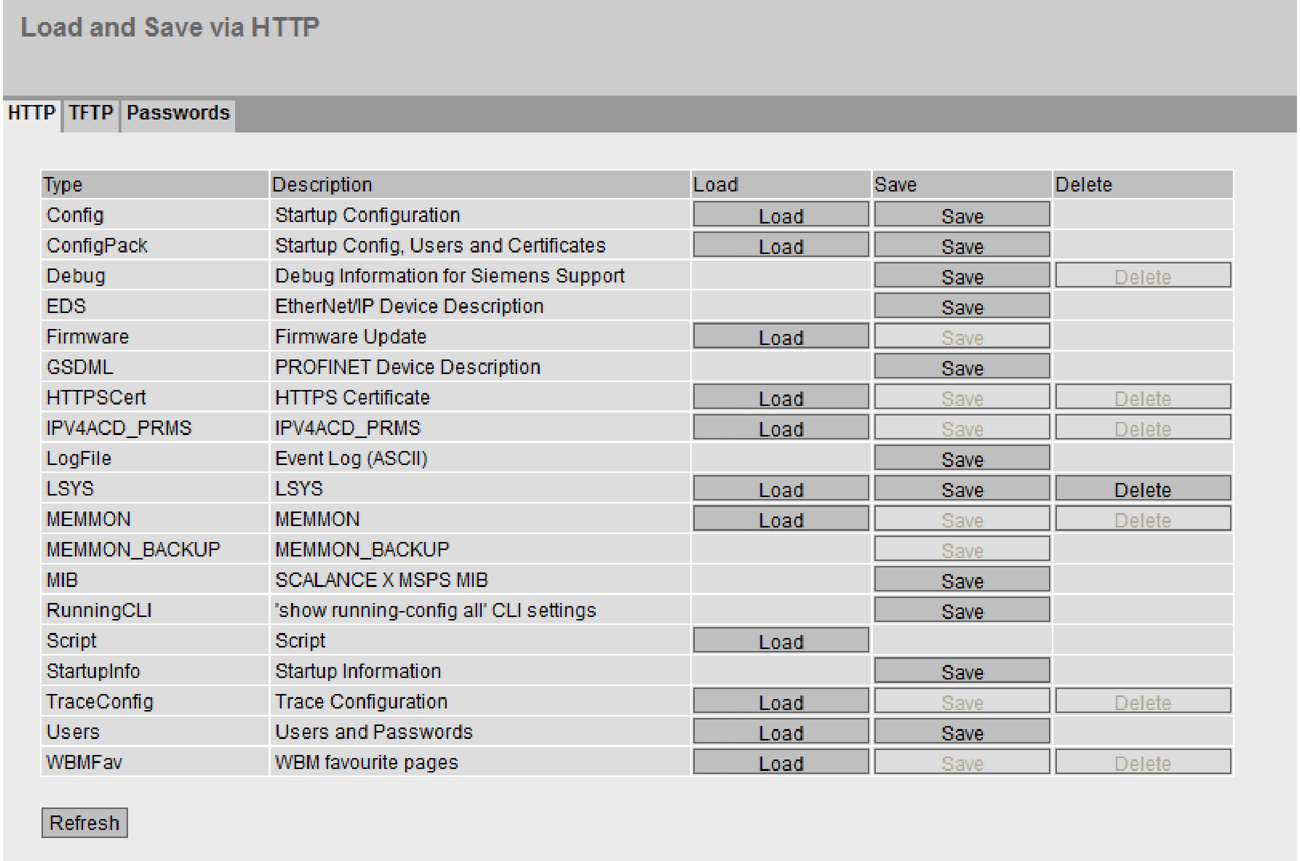
In Automatic Save mode, the data is saved automatically before the configuration files (ConfigPack and Config) are transferred.
In Trial mode, although the changes are adopted, they are not saved in the configuration files (ConfigPack and Config). Use the "Write Startup Config" button on the "System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



Load and Save via HTTP

Type	Description	Load	Save	Delete
Config	Startup Configuration	Load	Save	
ConfigPack	Startup Config, Users and Certificates	Load	Save	
Debug	Debug Information for Siemens Support		Save	Delete
EDS	EtherNet/IP Device Description		Save	
Firmware	Firmware Update	Load	Save	
GSDML	PROFINET Device Description		Save	
HTTPSCert	HTTPS Certificate	Load	Save	Delete
IPV4ACD_PRMS	IPV4ACD_PRMS	Load	Save	Delete
LogFile	Event Log (ASCII)		Save	
LSYS	LSYS	Load	Save	Delete
MEMMON	MEMMON	Load	Save	Delete
MEMMON_BACKUP	MEMMON_BACKUP		Save	
MIB	SCALANCE X MSPS MIB		Save	
RunningCLI	'show running-config all' CLI settings		Save	
Script	Script	Load		
StartupInfo	Startup Information		Save	
TraceConfig	Trace Configuration	Load	Save	Delete
Users	Users and Passwords	Load	Save	
WBMFav	WBM favourite pages	Load	Save	Delete

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 by 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 by 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 by 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 devices are to receive the same configuration and the IP addresses are assigned using DHCP, the effort for configuration 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 edit the files, you can no longer upload them to the IE switch.

5.4.6.2 TFTP

Loading and saving data via a TFTP server

On this page, you can configure the TFTP server and the file names. The WBM also 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 mode

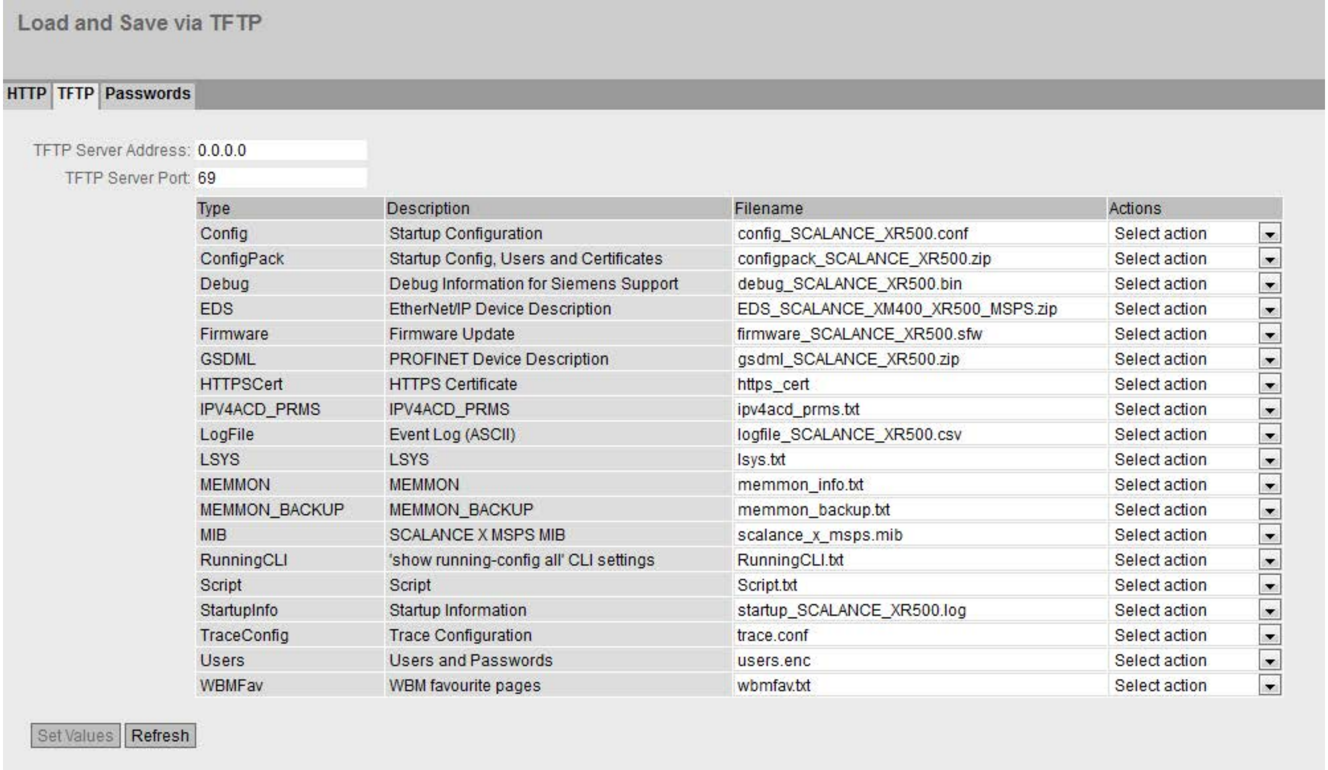
In Automatic Save mode, the data is saved automatically before the configuration files (ConfigPack and Config) are transferred.
In Trial mode, although the changes are adopted, they are not saved in the configuration files (ConfigPack and Config). Use the "Write Startup Config" button on the "System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



TFTP Server Address: 0.0.0.0

TFTP Server Port: 69

Type	Description	Filename	Actions
Config	Startup Configuration	config_SCALANCE_XR500.conf	Select action
ConfigPack	Startup Config, Users and Certificates	configpack_SCALANCE_XR500.zip	Select action
Debug	Debug Information for Siemens Support	debug_SCALANCE_XR500.bin	Select action
EDS	EtherNet/IP Device Description	EDS_SCALANCE_XM400_XR500_MSPS.zip	Select action
Firmware	Firmware Update	firmware_SCALANCE_XR500.sfw	Select action
GSDML	PROFINET Device Description	gsdml_SCALANCE_XR500.zip	Select action
HTTPSCert	HTTPS Certificate	https_cert	Select action
IPV4ACD_PRMS	IPV4ACD_PRMS	ipv4acd_prms.txt	Select action
LogFile	Event Log (ASCII)	logfile_SCALANCE_XR500.csv	Select action
LSYS	LSYS	lsys.txt	Select action
MEMMON	MEMMON	memmon_info.txt	Select action
MEMMON_BACKUP	MEMMON_BACKUP	memmon_backup.txt	Select action
MIB	SCALANCE X MSPS MIB	scalance_x_msps.mib	Select action
RunningCLI	'show running-config all' CLI settings	RunningCLI.txt	Select action
Script	Script	Script.txt	Select action
StartupInfo	Startup Information	startup_SCALANCE_XR500.log	Select action
TraceConfig	Trace Configuration	trace.conf	Select action
Users	Users and Passwords	users.enc	Select action
WBMFav	WBM favourite pages	wbmfav.txt	Select action

Description of the displayed boxes

The page contains the following boxes:

- **TFTP Server Address**
  Here, enter the IP address or the FQDN (Fully Qualified Domain Name) 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 or the FQDN 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 actions.
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 devices are to receive the same configuration and the IP addresses are assigned using DHCP, the effort for configuration can be reduced by saving and reading in the configuration data.

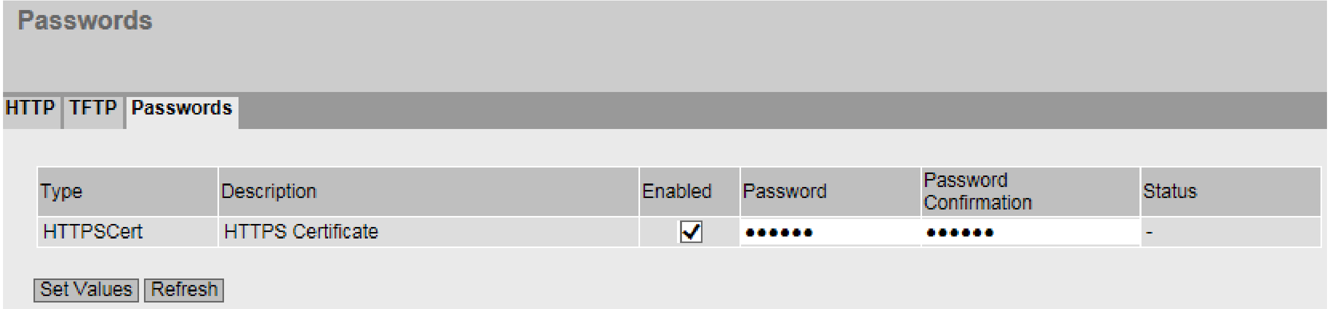
Follow the steps below to reuse configuration data:

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 that the configuration data is coded when it is saved. This means that you cannot edit the files with a text editor.

5.4.6.3 Passwords

There are files to which access is password protected. To load the file on the device, enter the password specified for the file on the WBM page.



Passwords

Type	Description	Enabled	Password	Password Confirmation	Status
HTTPSCert	HTTPS Certificate	☑	••••••	••••••	-

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 password 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 certificate.
  - Invalid
    the "Enabled" check box is selected but the password does not match the certificate or no certificate has been loaded yet.
  - '-'
    The password cannot be evaluated or is not yet being used. The "Enabled" check box is not selected.

Procedure

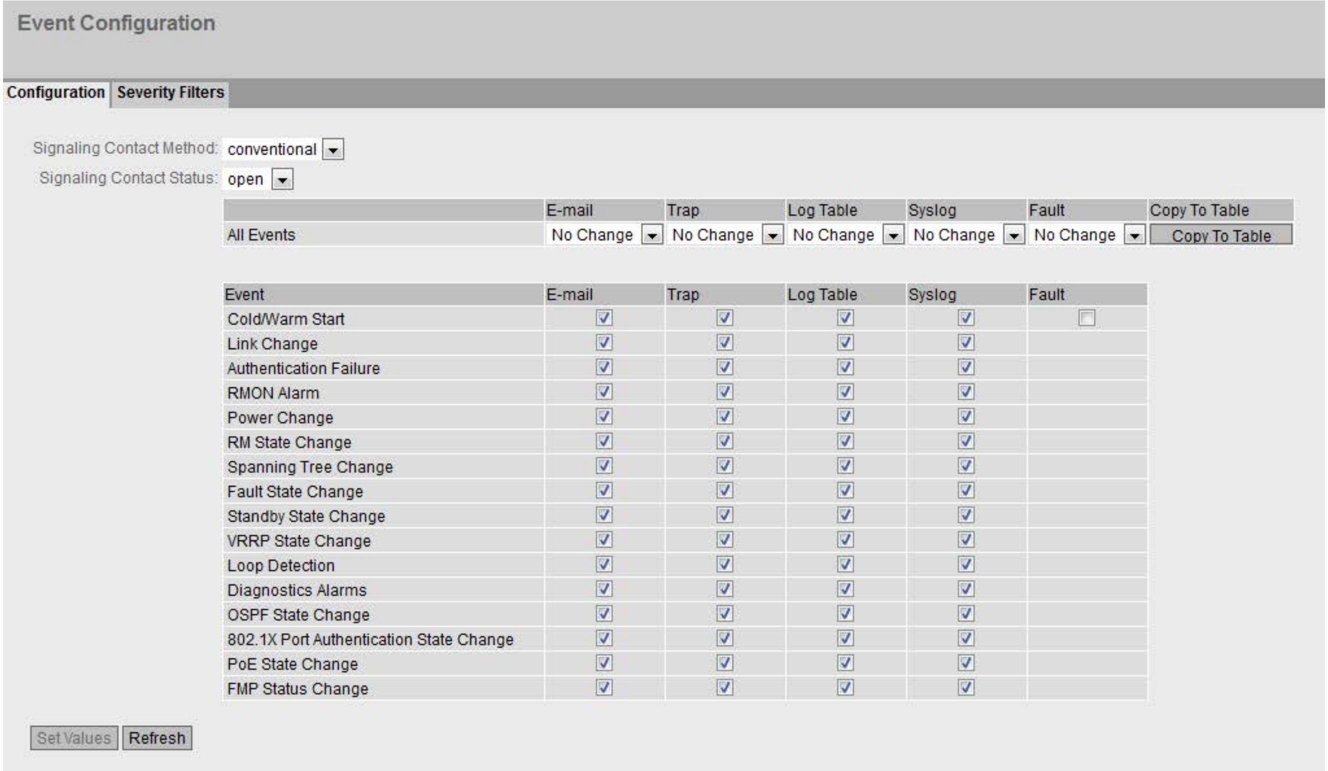
1. Enter the password in "Password".
2. To confirm the password, enter the password again in "Password Confirmation".
3. Select the "Enabled" option.
4. Click the "Set Values" button.

5.4.7 Events

5.4.7.1 Configuration

Selecting system events

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



Signaling Contact Method: conventional

Signaling Contact Status: open

	E-mail	Trap	Log Table	Syslog	Fault	Copy To Table
All Events	No Change	No Change	No Change	No Change	No Change	Copy To Table

Event	E-mail	Trap	Log Table	Syslog	Fault
Cold/Warm Start	☑	☑	☑	☑	☐
Link Change	☑	☑	☑	☑	
Authentication Failure	☑	☑	☑	☑	
RMON Alarm	☑	☑	☑	☑	
Power Change	☑	☑	☑	☑	
RM State Change	☑	☑	☑	☑	
Spanning Tree Change	☑	☑	☑	☑	
Fault State Change	☑	☑	☑	☑	
Standby State Change	☑	☑	☑	☑	
VRRP State Change	☑	☑	☑	☑	
Loop Detection	☑	☑	☑	☑	
Diagnostics Alarms	☑	☑	☑	☑	
OSPF State Change	☑	☑	☑	☑	
802.1X Port Authentication State Change	☑	☑	☑	☑	
PoE State Change	☑	☑	☑	☑	
FMP Status Change	☑	☑	☑	☑	

Description of the displayed boxes

The page contains the following boxes:

- **"Signaling Contact Method" drop-down list**
  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" drop-down list**
  Select the status of the signaling contact from the drop-down list. The following states are possible:
  - Closed
    Signaling contact is closed.
  - Open
    Signaling contact is opened.

The table has the following columns:

- **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
- **Event**
  The column contains the following values:
  - Cold/Warm Start
    The device was turned on or restarted by the user.
  - 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 STP or RSTP or MSTP topology has changed.
  - Fault State Change
    The fault status has changed. The fault status 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).
- VRRP State Change (only when routing via VRRP)
  The status of the virtual router has changed
- Loop Detection

  A loop was detected in the network segment.
- Diagnostic interrupts

  A diagnostics value has fallen below or exceeded a certain limit.
- OSPF State Change

  The status of OSPF has changed.
- 802.1X Port Authentication State Change
  This event occurs with 802.1X authentications.
- PoE State Change
  The status of PoE has changed.
- FMP Status Change
  The value of the received power or the power loss has exceeded or fallen below a certain limit.

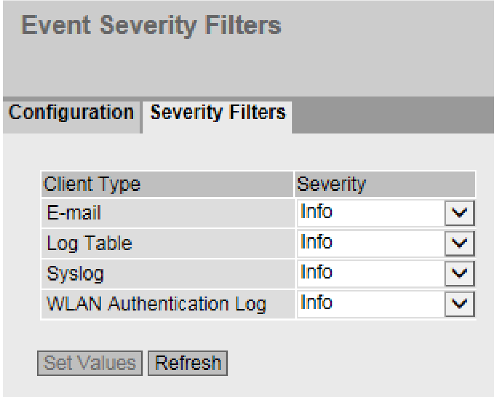
Steps in configuration

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.

5.4.7.2 Severity Filters

Setting the Severity Filters

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



Event Severity Filters

Client Type	Severity
E-mail	Info
Log Table	Info
Syslog	Info
WLAN Authentication Log	Info

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**

  Entry of system events in the Syslog file
- **WLAN Authentication Log**

  Entering system events in the WLAN authentication log

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:

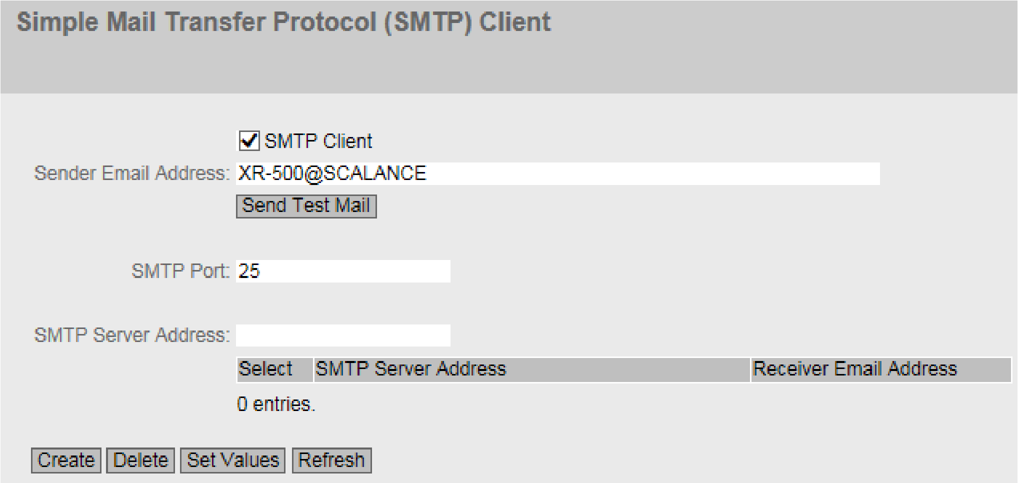
1. Select the required values from the drop-down lists of the second table column after the client types.
2. Click the "Set Values" button.

5.4.8 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.



Simple Mail Transfer Protocol (SMTP) Client

☑ SMTP Client

Sender Email Address: XR-500@SCALANCE

SMTP Port: 25

SMTP Server Address:

Select	SMTP Server Address	Receiver Email Address

0 entries.

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 or the FQDN (Fully Qualified Domain Name) 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 or the FQDN (Fully Qualified Domain Name) 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 IP address of the SMTP server or the FQDN in the "SMTP Server Address" input box.
3. Click the "Create" button. A new entry is generated in the table.
4. In the Receiver Email Address input box. enter the e-mail address to which the device sends an e-mail if a fault occurs.
5. Click the "Set Values" button.

Note

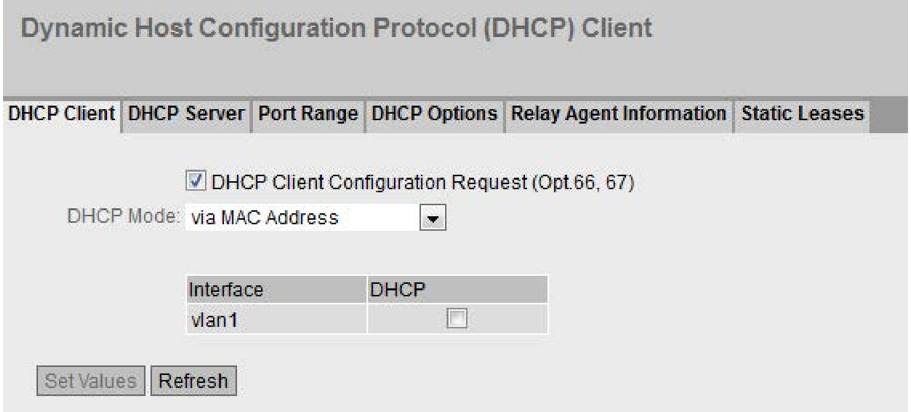
Depending on the properties and configuration of the SMTP server, it may be necessary to adapt the "Sender E-Mail Address” input box for the e-mails. Check with the administrator of the SMTP server.

5.4.9 DHCP

5.4.9.1 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.



Dynamic Host Configuration Protocol (DHCP) Client

☑ DHCP Client Configuration Request (Opt.66, 67)

DHCP Mode: via MAC Address

Interface	DHCP
vlan1	□

Description

The page contains the following boxes:

- **"DHCP Client Configuration Request (Opt. 66, 67)"**
  Enable 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

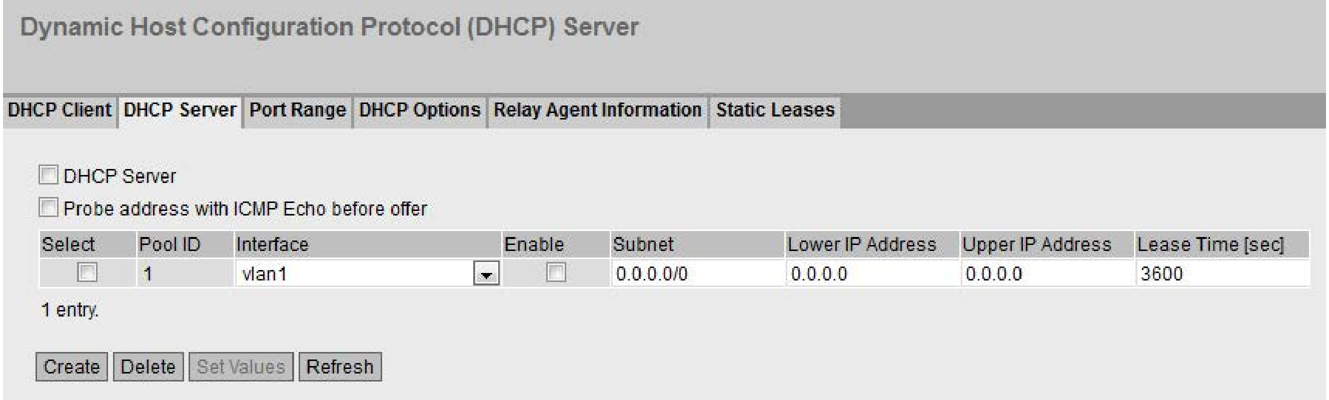
If a configuration file is downloaded, this can trigger a system restart. If the currently running configuration and the configuration in the downloaded configuration file differ, the system is restarted.

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

5.4.9.2 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".



□ DHCP Server
□ Probe address with ICMP Echo before offer

Select	Pool ID	Interface	Enable	Subnet	Lower IP Address	Upper IP Address	Lease Time [sec]
□	1	vlan1	□	0.0.0.0/0	0.0.0.0	0.0.0.0	3600

1 entry.

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.

  If you want to operate a DHCP server on the devices of a VRRP group, note the information in the section "Layer 3 (IPv4/IPv6) > VRRP/VRRPv3 > Router.

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

  When selected, the DHCP server checks whether or not the IP address has already been assigned. To do this the DHCP server sends ICMP echo messages (ping) to the 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.

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.

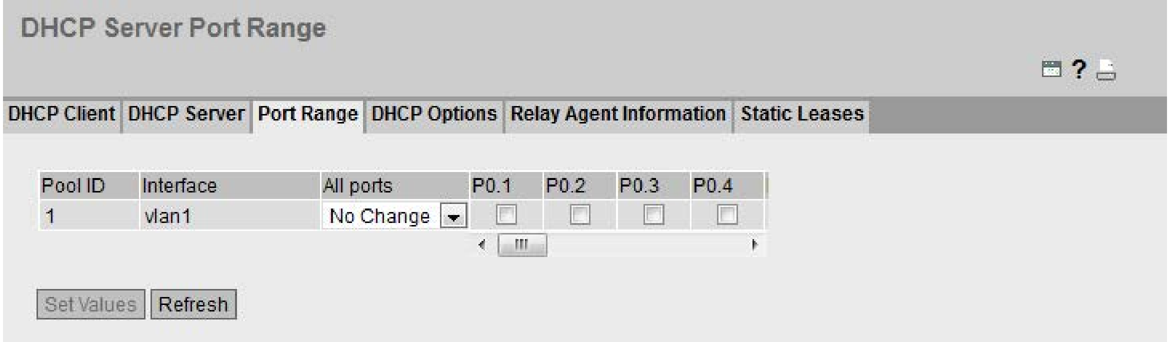
2. Click the "Delete" button.

   The entry is deleted.

5.4.9.3 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.



Pool ID	Interface	All ports	P0.1	P0.2	P0.3	P0.4
1	vlan1	No Change	□	□	□	□

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.

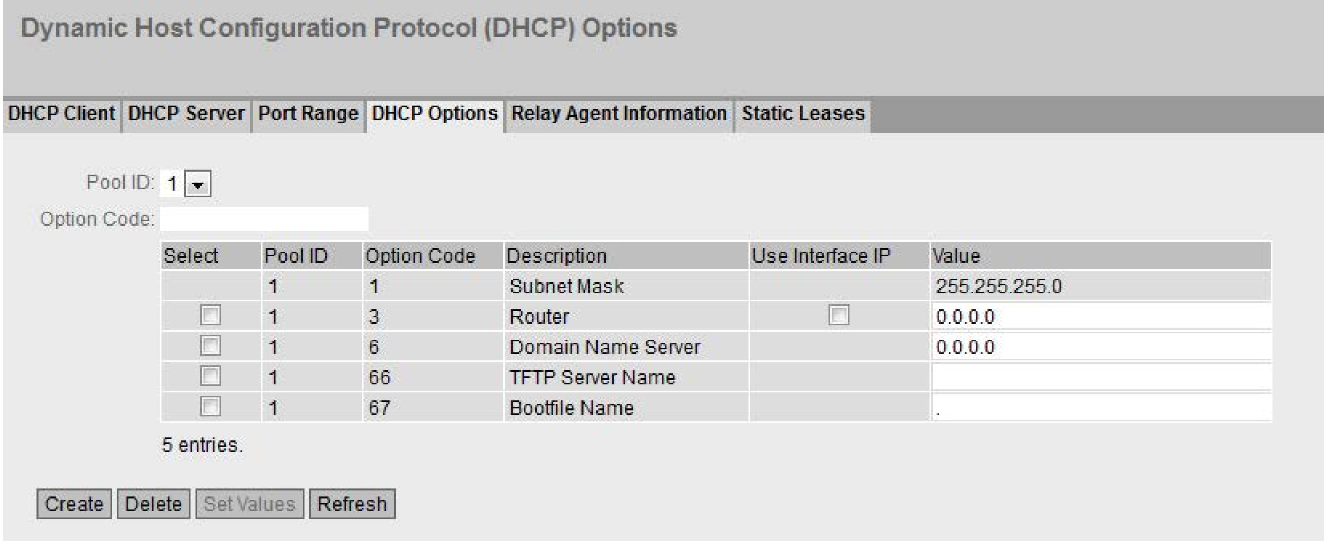
Configuring all ports

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

5.4.9.4 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.



Pool ID: 1

Option Code:

Select	Pool ID	Option Code	Description	Use Interface IP	Value
	1	1	Subnet Mask		255.255.255.0
□	1	3	Router	□	0.0.0.0
□	1	6	Domain Name Server		0.0.0.0
□	1	66	TFTP Server Name		
□	1	67	Bootfile Name		.

5 entries.

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 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 option 12 (host name)

    Enter the host name 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.

5.4.9.5 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.

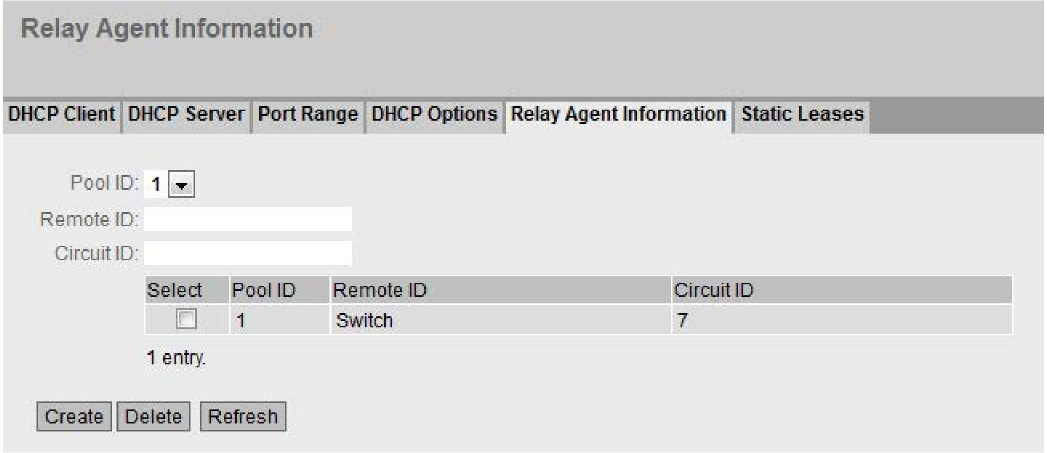
If you create such an entry for an address band, the ports of the address band only react to DHCP queries via a DHCP relay agent (option 82). You can create further address bands for the same VLAN IP interfaces so that ports react to different requests.

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.



Relay Agent Information

Pool ID: 1
Remote ID:
Circuit ID:

Select	Pool ID	Remote ID	Circuit ID
□	1	Switch	7

1 entry.

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

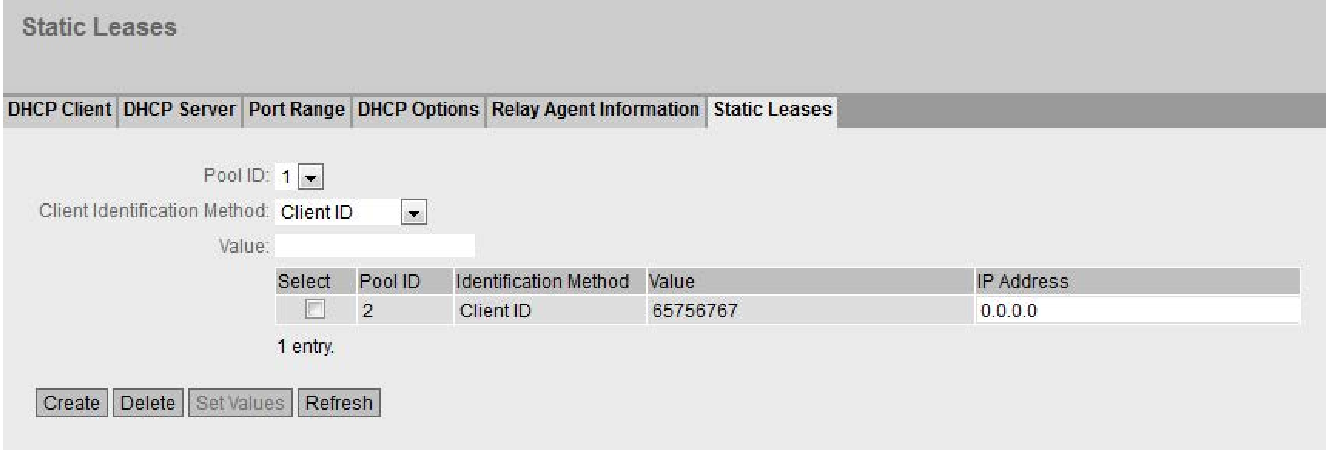
1. Enable the "Select" check box in the row to be deleted.

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

   The entry is deleted.

5.4.9.6 Static Leases

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



Pool ID: 1

Client Identification Method: Client ID

Value:

Select	Pool ID	Identification Method	Value	IP Address
☐	2	Client ID	65756767	0.0.0.0

1 entry.

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.

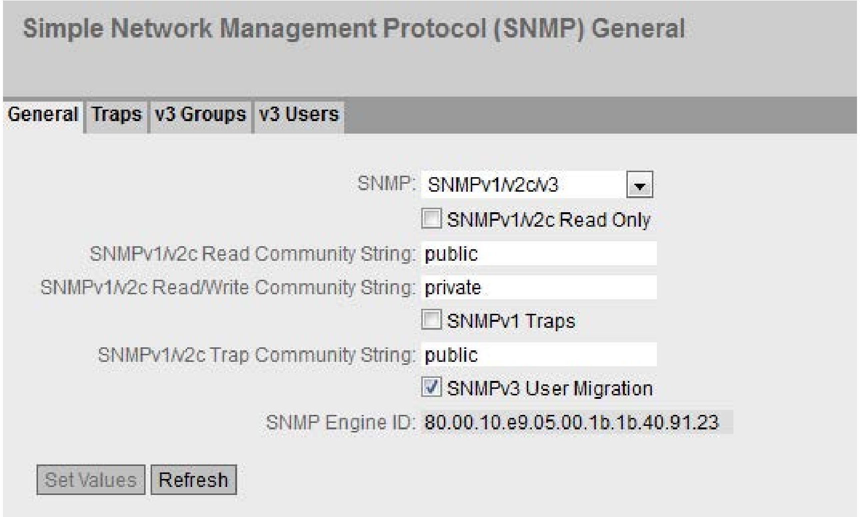
   The entry is deleted.

5.4.10 SNMP

5.4.10.1 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. Note the information in the section "Technical basics (Page 35)".



Simple Network Management Protocol (SNMP) General

SNMP: SNMPv1/v2c/v3

□ SNMPv1/v2c Read Only

SNMPv1/v2c Read Community String: public

SNMPv1/v2c Read/Write Community String: private

□ SNMPv1 Traps

SNMPv1/v2c Trap Community String: public

☑ SNMPv3 User Migration

SNMP Engine ID: 80.00.10.e9.05.00.1b.1b.40.91.23

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.
  – 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 SNMP traps (alarm frames). On the "Trap" tab, specify the IP addresses of the devices to which SNMP traps will be sent.
- **SNMPv1/v2c Trap Community String**
  Enter the community string for sending SNMPv1/v2 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.

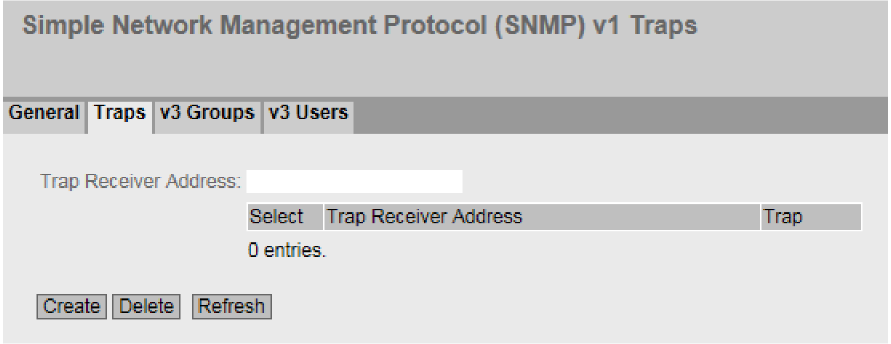
5.4.10.2 Traps

SNMP traps for alarm events

If an alarm event occurs, a 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 "Events" menu occur.

Note

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



Simple Network Management Protocol (SNMP) v1 Traps

Trap Receiver Address:

Select	Trap Receiver Address	Trap

0 entries.

Description

- **Trap Receiver Address**
  Enter the IP address or the FQDN name 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 or the FQDN names of the stations.
- **Trap**
  Enable or disable the sending of traps. Stations that are entered but not selected do not receive SNMP traps.

Procedure

Creating a trap entry

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

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

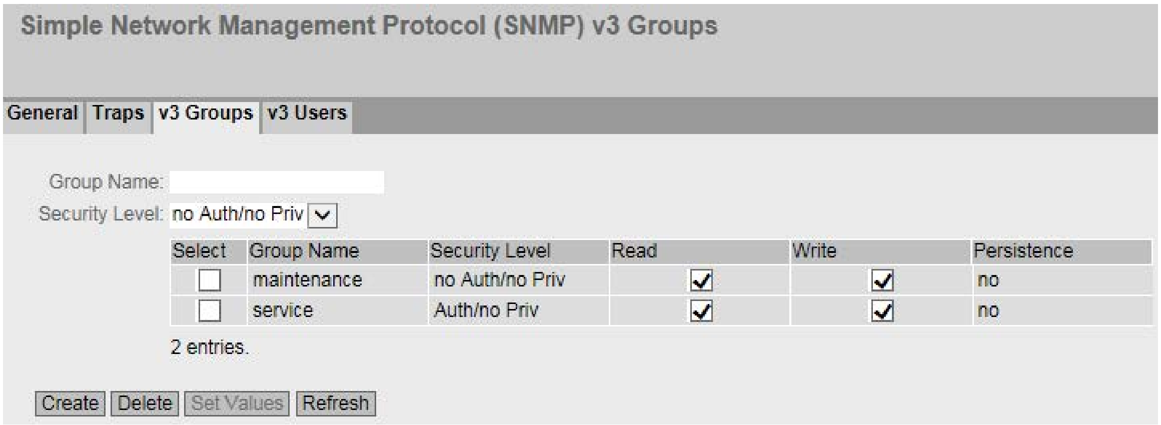
Deleting a trap entry

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

5.4.10.3 v3 Groups

Security settings and assigning permissions

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



Simple Network Management Protocol (SNMP) v3 Groups

Group Name:

Security Level: no Auth/no Priv

Select	Group Name	Security Level	Read	Write	Persistence
□	maintenance	no Auth/no Priv	☑	☑	no
□	service	Auth/no Priv	☑	☑	no

2 entries.

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. In the security levels, the following options:
  - 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 disappears again 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.

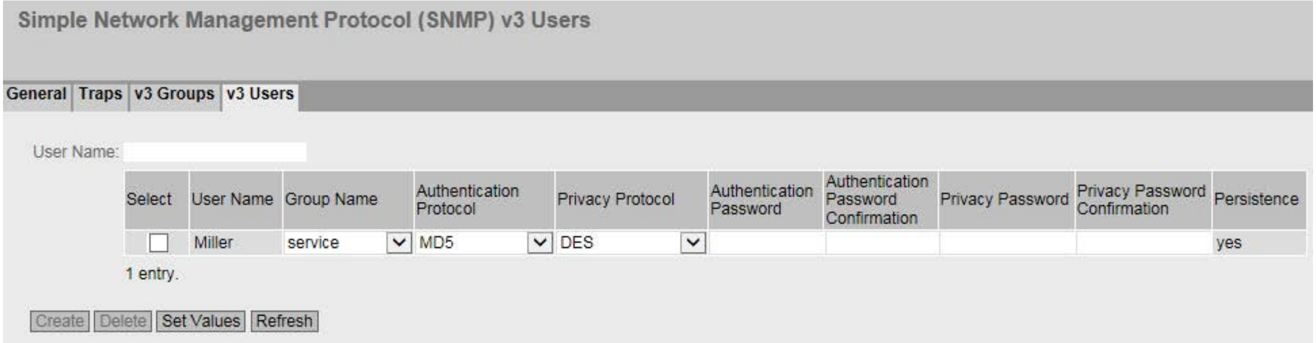
Deleting a group

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.

5.4.10.4 v3 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.



User Name:

Select	User Name	Group Name	Authentication Protocol	Privacy Protocol	Authentication Password	Authentication Password Confirmation	Privacy Password	Privacy Password Confirmation	Persistence
□	Miller	service	MD5	DES					yes

1 entry.

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 disappears again 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.

Note

If you click a different button prior to this step (for example the "Refresh" button), the delete action is canceled. The data of the selected rows is retained. The selections are removed. If you want to repeat the action, you will need to reselect the data records to be deleted.

5.4.11 System Time

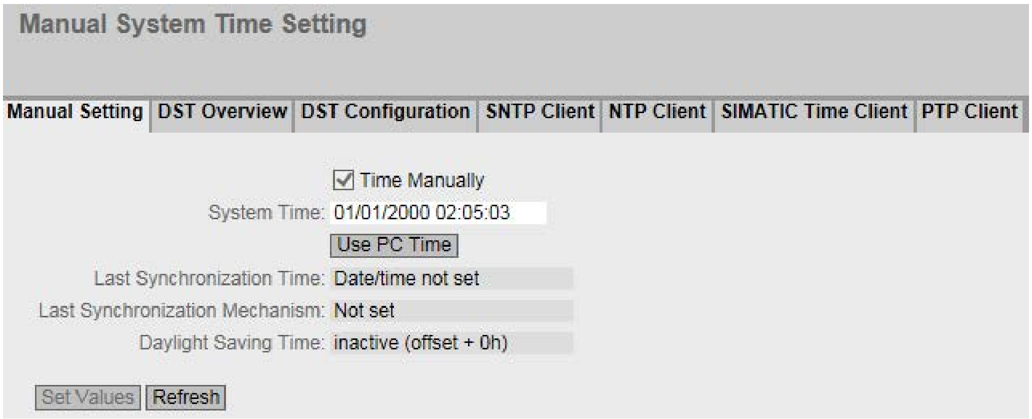
There are different methods that can be used to set the system time of the device. Only one method can be active at any one time.

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

5.4.11.1 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".



☑ Time Manually

System Time: 01/01/2000 02:05:03

Last Synchronization Time: Date/time not set

Last Synchronization Mechanism: Not set

Daylight Saving Time: inactive (offset + 0h)

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".
- **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
  - PTP
    Automatic time-of-day synchronization with PTP
- **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.

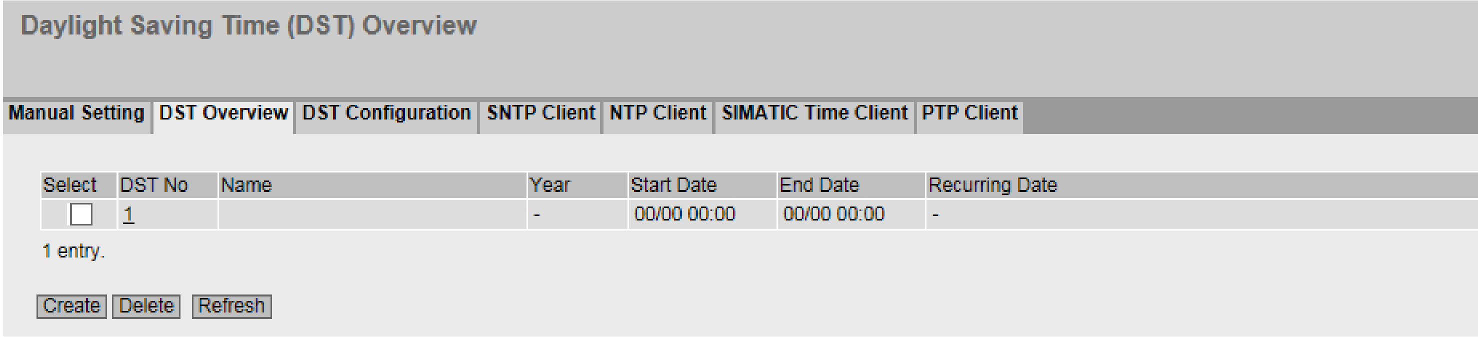
Procedure

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

5.4.11.2 DST Overview

Daylight saving time switchover

On this page, you can create new entries for the daylight saving time changeover. The table provides an overview of the existing entries.



Daylight Saving Time (DST) Overview

Select	DST No	Name	Year	Start Date	End Date	Recurring Date
□	1		-	00/00 00:00	00/00 00:00	-

1 entry.

Settings

The page contains the following boxes:

- **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.

- **Status**

  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.

5.4.11.3 DST Configuration

Configuring the daylight saving time switchover

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.

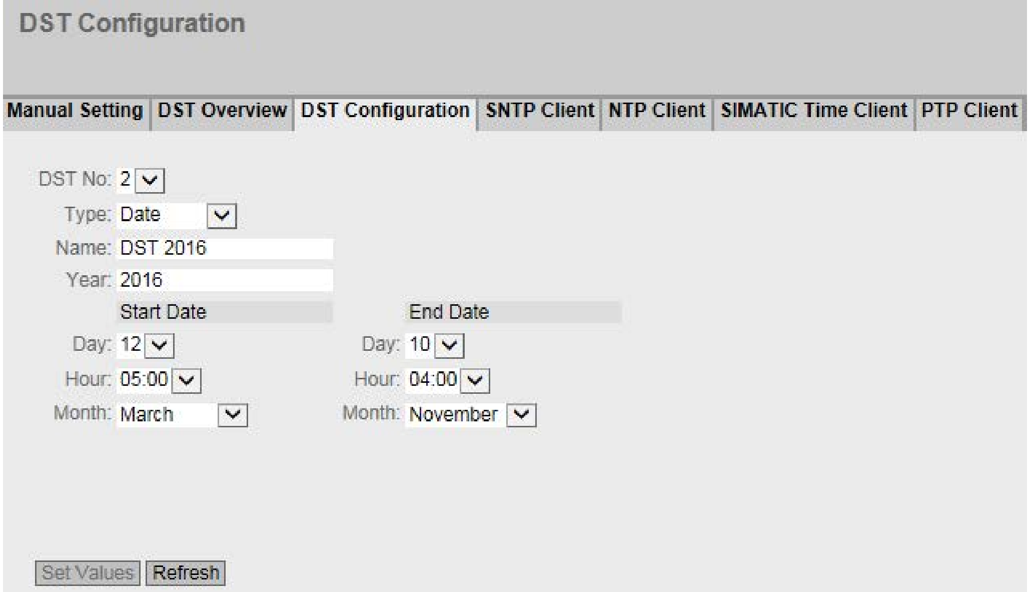
    This setting is suitable for regions in which the daylight saving time always begins or ends on a certain weekday.

- **Name**

  Enter a name for the entry.

  The name can be a maximum of 16 characters long.

Settings with "Date" selected



DST No: 2
Type: Date
Name: DST 2016
Year: 2016

	Start Date		End Date
Day:	12	Day:	10
Hour:	05:00	Hour:	04:00
Month:	March	Month:	November

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.

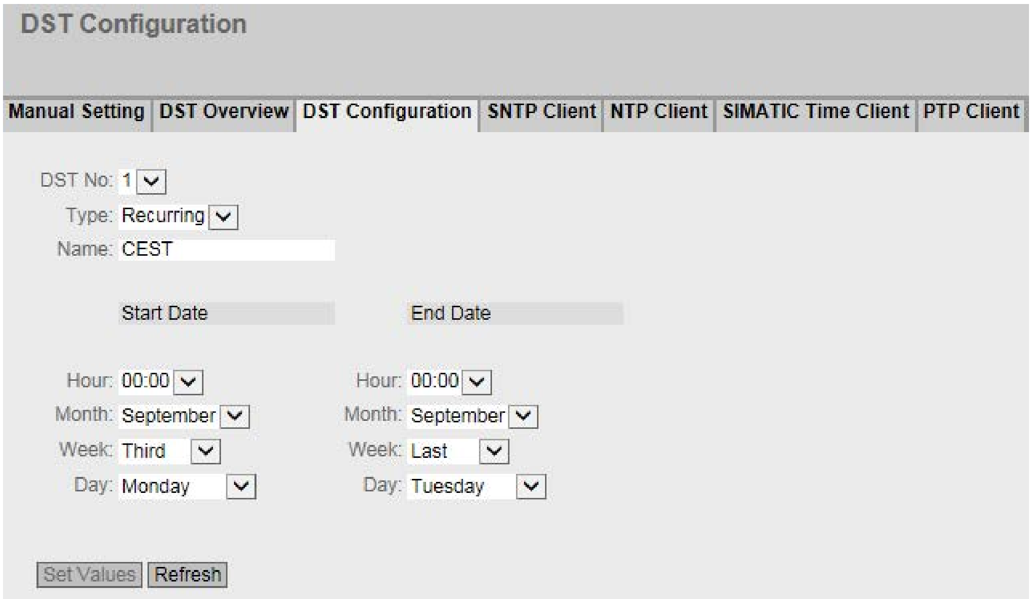
  – Hour

    Specify the hour.

  – Month

    Specify the month.

Settings with "Recurring" selected



DST No: 1

Type: Recurring

Name: CEST

	Start Date		End Date
Hour:	00:00	Hour:	00:00
Month:	September	Month:	September
Week:	Third	Week:	Last
Day:	Monday	Day:	Tuesday

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

- **Year**

  Enter the year 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.

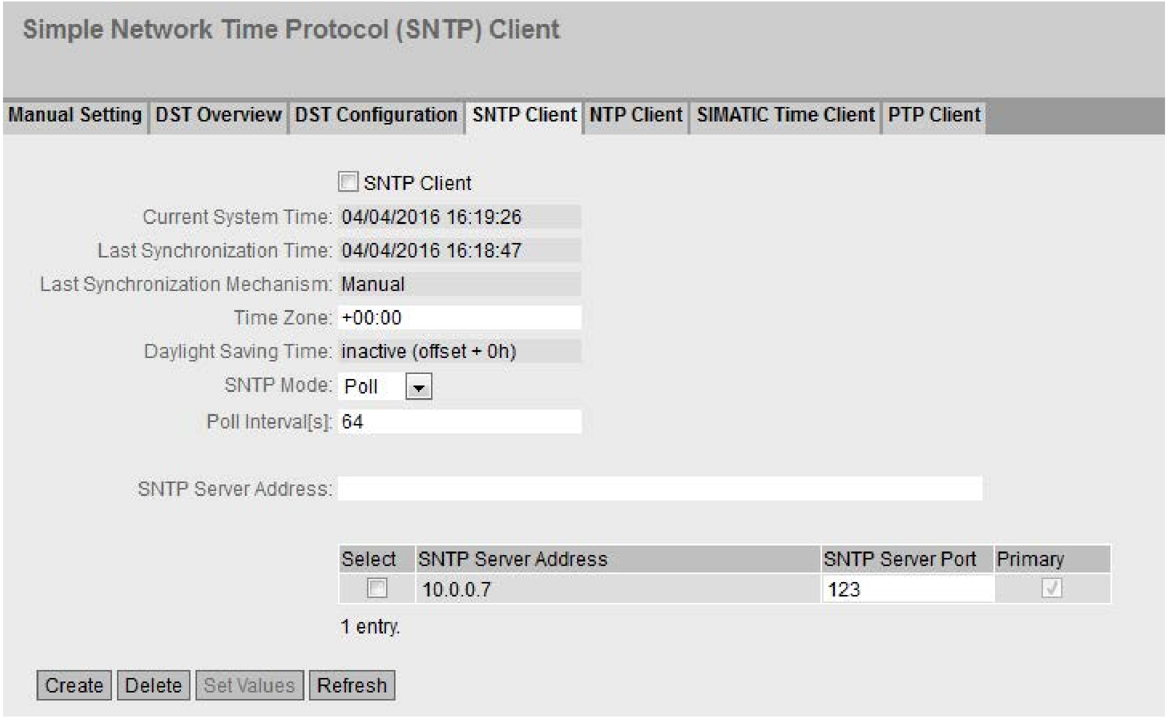
  – Day

    Specify the weekday.

5.4.11.4 SNTP Client

Time-of-day synchronization in the network

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



Simple Network Time Protocol (SNTP) Client

☐ SNTP Client

Current System Time:	04/04/2016 16:19:26
Last Synchronization Time:	04/04/2016 16:18:47
Last Synchronization Mechanism:	Manual
Time Zone:	+00:00
Daylight Saving Time:	inactive (offset + 0h)
SNTP Mode:	Poll
Poll Interval[s]:	64
SNTP Server Address:	

Select	SNTP Server Address	SNTP Server Port	Primary
☐	10.0.0.7	123	☑

1 entry.

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 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
  - PTP
    Automatic time-of-day synchronization with PTP
- **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:
  - Poll
    If you select this protocol type, 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.

    In this mode, IPv4 and IPv6 addresses are supported.
  - Listen
    With this type of synchronization, the device is passive and receives SNTP frames that deliver the time of day.

    In this mode, only IPv4 addresses are supported.
- **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.
- **SNTP Server Address**
  Enter the IP address or the FQDN (Fully Qualified Domain Name) 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
- **Primary**
  The check mark is set for the SNTP server that you create first. If several SNTP servers have been created, the primary server is queried first.

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. You configure the daylight saving time switchover on the pages "System > System Time > DST Overview" and "System > System Time > DST Configuration". You also need to take this into account when completing the "Time Zone" input box.

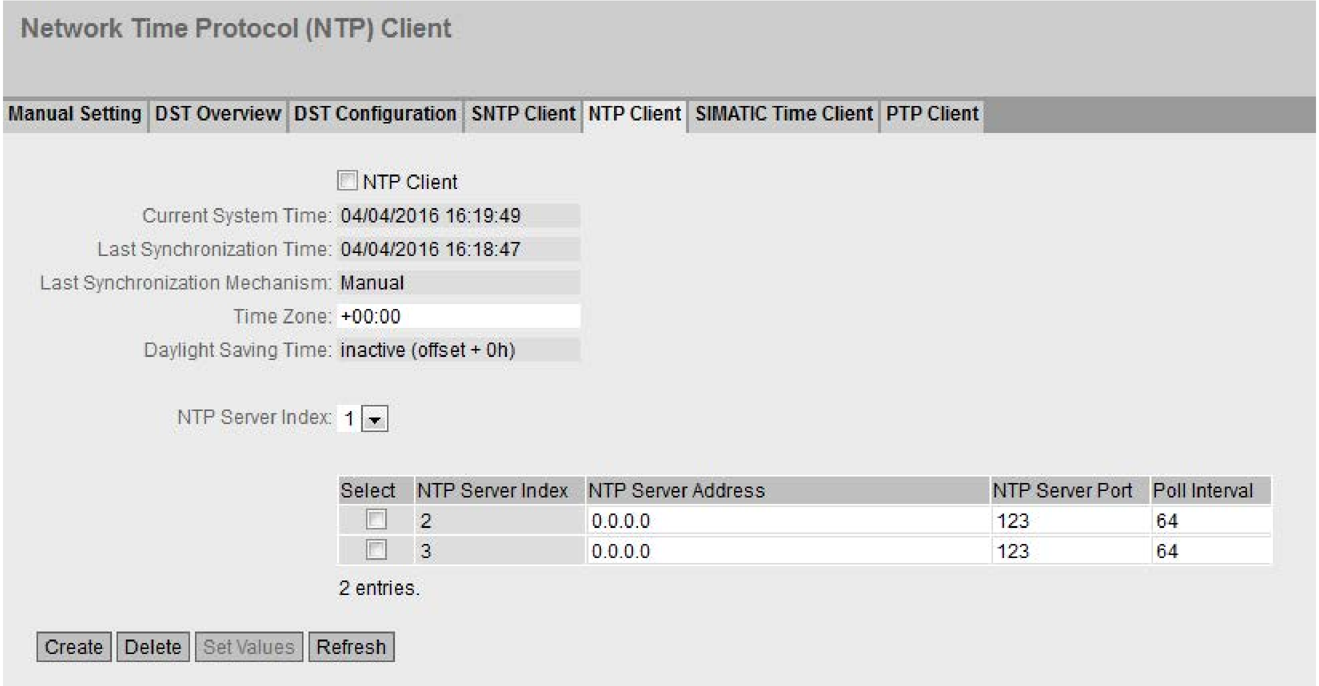
3. Select one of the following options from the "SNTP Mode" drop-down list:
   - Poll
     For this mode, you need to configure the following:
     - time zone difference (step 2)
     - query interval (step 4)
     -time server (step 4)
     - Port (step 7)
     - complete the configuration with step 8.
   - Listen
     For this mode, you need to configure the following:
     - time difference to the time sent by the server (step 2)
     - time server (step 5)
      - port (step 7)
      - complete the configuration with step 8.
4. In the "Poll Interval[s]" input box, enter the time in seconds after which a new time query is sent to the time server.
5. In the "SNTP Server Address" input box, enter the IP address or the FQDN of the SNTP server whose frames will be used to synchronize the time of day.
6. Click the "Create" button.

   A new row is inserted in the table for the SNTP server.
7. In the "SNTP Server Port" column, enter the port via which the SNTP server is available. The port can only be modified if the IPv4 address or the FQDN name of the SNTP server is entered.
8. Click the "Set Values" button to transfer your changes to the device.

5.4.11.5 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.



Network Time Protocol (NTP) Client

□ NTP Client

Current System Time: 04/04/2016 16:19:49

Last Synchronization Time: 04/04/2016 16:18:47

Last Synchronization Mechanism: Manual

Time Zone: +00:00

Daylight Saving Time: inactive (offset + 0h)

NTP Server Index: 1

Select	NTP Server Index	NTP Server Address	NTP Server Port	Poll Interval
□	2	0.0.0.0	123	64
□	3	0.0.0.0	123	64

2 entries.

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
  - PTP
    Automatic time-of-day synchronization with PTP
- **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 Index**
  Select the index of the NTP server. The server with the lowest index is queried first.
- **NTP Server Address**
  Enter the IP address or the FQDN (Fully Qualified Domain Name) 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.

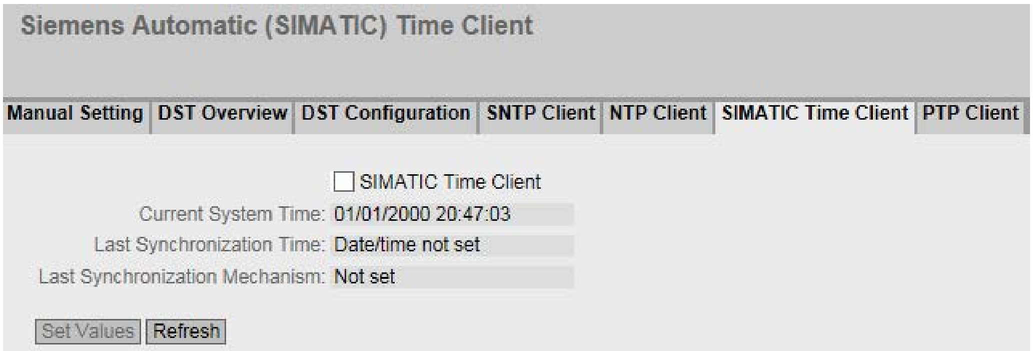
Procedure

1. Click the "NTP Client" check box to enable the automatic time setting using NTP.
2. 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, the Central European Summer Time), because the SNTP server always sends the UTC time. This time is then recalculated as the local time based on the specified time zone. You configure the daylight saving time switchover on the pages "System > System Time > DST Overview" and "System > System Time > DST Configuration". You also need to take this into account when completing the "Time Zone" input box.
3. Select the "NTP Server Index".
4. Click the "Create" button.

   A new row is inserted in the table for the SNTP server.
5. In the "SNTP Server Address" input box, enter the IP address or the FQDN of the SNTP server whose frames will be used to synchronize the time of day.
6. In the "NTP Server Port" column, enter the port via which the NTP server is available. The port can only be modified if the IPv4 address or the FQDN name of the NTP server is entered.
7. In the "Poll Interval" column, enter the time in seconds after which a new time query is sent to the time server.
8. Click the "Set Values" button.

5.4.11.6 SIMATIC time client

Time setting via SIMATIC time client



Siemens Automatic (SIMATIC) Time Client

□ SIMATIC Time Client

Current System Time: 01/01/2000 20:47:03

Last Synchronization Time: Date/time not set

Last Synchronization Mechanism: Not set

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
  - PTP
    Automatic time-of-day synchronization with PTP

Procedure

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

5.4.11.7 PTP Client

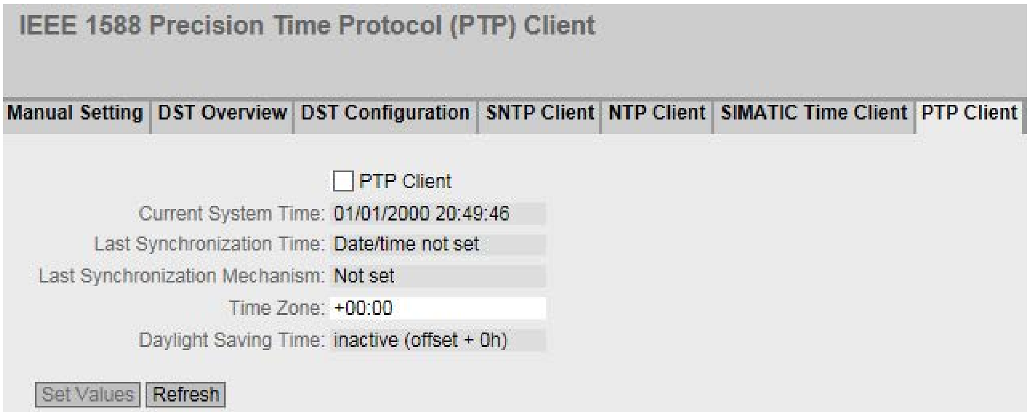
The following devices support time-of-day synchronization using PTP:

- SCALANCE XR528-6M
- SCALANCE XR552-12M

5.4.11.8 PTP Client

Automatic time-of-day setting with PTP

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



IEEE 1588 Precision Time Protocol (PTP) Client

□ PTP Client

Current System Time:	01/01/2000 20:49:46
Last Synchronization Time:	Date/time not set
Last Synchronization Mechanism:	Not set
Time Zone:	+00:00
Daylight Saving Time:	inactive (offset + 0h)

Description

The page contains the following boxes:

- **PTP Client**
  Select this check box to enable automatic time-of-day synchronization with PTP.
- **Current System Time**
  Shows the current date and current normal time obtained due to time synchronization in the network. 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
  - PTP
    Automatic time-of-day synchronization with PTP
- **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.

Procedure

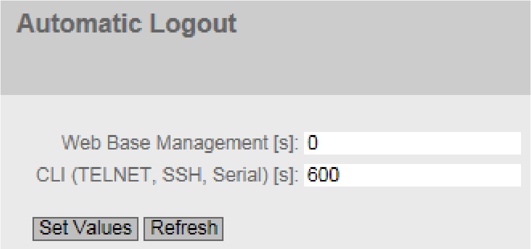
1. Click the "PTP Client" check box to enable the automatic time setting using PTP.
2. Specify the a time zone, if applicable.
3. Click the "Set Values" button.

5.4.12 Automatic logout

Setting the automatic logout

On this page, set the times after which there is an automatic logout from WBM or the CLI following user in activity.

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



Automatic Logout

Web Base Management [s]: 0

CLI (TELNET, SSH, Serial) [s]: 600

Configuration

1. Enter a value of 60-3600 seconds in the "Web Base 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.

5.4.13 Configuration of the SELECT/SET button

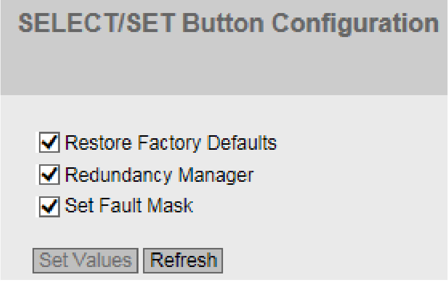
Description of the SELECT/SET button

The "SELECT/SET" button is used for the following:

- Changing the display mode,
- Resetting to factory defaults,
- Defining the fault mask and the LED display.

You will find a detailed description of the individual functions available with the buttons in the device operating instructions.

On this page, the functionality of the SELECT/SET button can be restricted or fully disabled.


SELECT/SET Button Configuration

☑ Restore Factory Defaults
☑ Redundancy Manager
☑ Set Fault Mask

Description of the displayed boxes

The following functions are possible:

- **Restore Factory Defaults**
  Enable or disable the "Restore Factory Defaults" function with the Select/set 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 needs to be reconfigured if this occurs. An inserted PLUG is also deleted and returned to the status as shipped.

- **Redundancy Manager**

  Enables/disables the redundancy manager function.

- **Set Fault Mask**
  Enable or disable the function "Define fault mask via the LED display" with the SELECT/SET button.

Steps in configuration

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

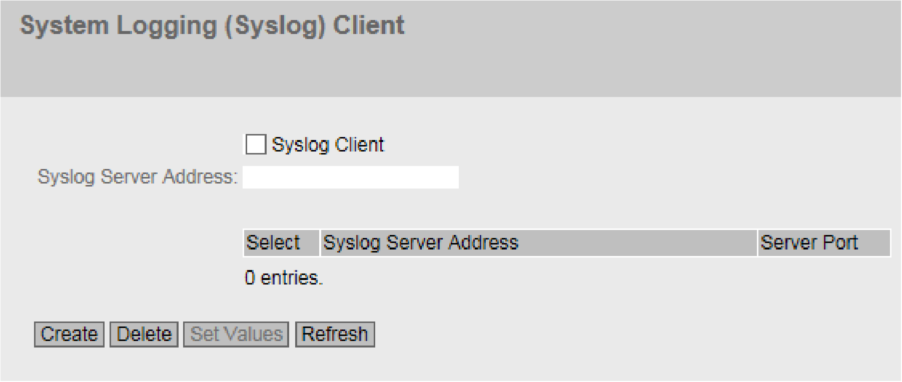
5.4.14 Syslog Client

System event agent

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 or the FQDN (Fully Qualified Domain Name) of the Syslog server is entered in the device.



System Logging (Syslog) Client

□ Syslog Client

Syslog Server Address:

Select	Syslog Server Address	Server Port

0 entries.

Description

The page contains the following boxes:

- **Syslog Client**
  Enable or disable the Syslog function.
- **Syslog Server Address**
  Enter the IP address or the FQDN (Fully Qualified Domain Name) 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 or the FQDN (Fully Qualified Domain Name) 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 or the FQDN 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

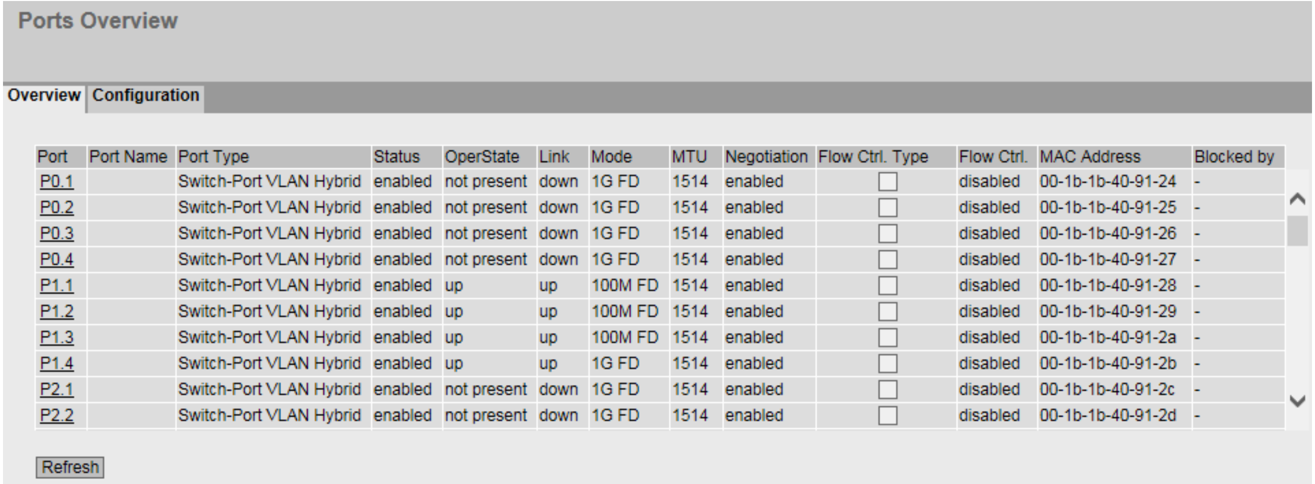
1. Select the check box in the row to be deleted.
2. Click the "Delete" button. All selected entries are deleted and the display is refreshed.

5.4.15 Ports

5.4.15.1 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.



Ports Overview

Port	Port Name	Port Type	Status	OperState	Link	Mode	MTU	Negotiation	Flow Ctrl. Type	Flow Ctrl.	MAC Address	Blocked by
P0.1		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-24	-
P0.2		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-25	-
P0.3		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-26	-
P0.4		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-27	-
P1.1		Switch-Port VLAN Hybrid	enabled	up	up	100M FD	1514	enabled	□	disabled	00-1b-1b-40-91-28	-
P1.2		Switch-Port VLAN Hybrid	enabled	up	up	100M FD	1514	enabled	□	disabled	00-1b-1b-40-91-29	-
P1.3		Switch-Port VLAN Hybrid	enabled	up	up	100M FD	1514	enabled	□	disabled	00-1b-1b-40-91-2a	-
P1.4		Switch-Port VLAN Hybrid	enabled	up	up	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-2b	-
P2.1		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-2c	-
P2.2		Switch-Port VLAN Hybrid	enabled	not present	down	1G FD	1514	enabled	□	disabled	00-1b-1b-40-91-2d	-

Description of the displayed boxes

The table has the following columns:

- **Port**
  Shows the configurable ports. The entry is a link. If you click on the link, 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** (only with routing)
  Shows the type of the port. The following types are possible:
  – Router port
  – Switch Port VLAN Hybrid
  – Switch-Port VLAN Trunk
  – Switch Port VLAN Host
  – Switch-Port PVLAN Promiscuous

- **Combo Port Media Type**

  This column contains a value only with combo ports.

  Shows the mode of the combo port:

  – auto

  – rj45

  – sfp

- **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 signal is being received.

  – down
    The link is down, for example because the connected device is turned off.

- **Curr. transfer mode**
  Shows the transfer parameters of the port.

- **MTU (Maximum Transmission Unit)**
  Shows the packet size.

- **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.

- **Blocked by**

  Shows why the port is in the "blocked" status:

  - -

    The analysis of the port status Is not supported.

  - forwarding

    The port is not blocked.

  - ring-redundancy

    The port belongs to a redundancy manager. When the redundancy manager is in the "Passive status, one of the ring ports is in the "blocking" status.

  - spanning-tree

    The port has the status "Discarding" in the spanning tree. The port is part of a spanning tree, however it is located on a redundant path and is deactivated for data traffic.

  - loop detection

    A loop was detected and as the reaction to a loop, the status "disable" was configured for the port.

  - down-in-bundle

    The port is part of a link aggregation and was deactivated by LACP.

  - la-loop-detection

    The port is part of a link aggregation. A loop was detected and as the reaction to a loop, the status "disable" was configured for the link aggregation.

  - la-spanning-tree

    The port is part of a link aggregation. Thelink aggregation was switched to the status "Discarding" by the spanning tree.

  - admin-down

    The status "disabled" is configured for the port, see "System > Ports > Configuration".

  - link down

    The status "enabled" is configured for the port but there is no connection, see "System > Ports > Configuration".

  - power-down

    The status “Link down" is configured for the port, see "System > Ports > Configuration".

  - standby

    Standby redundancy is enabled on the device. The port is a standby port with the status "Passive".

Deviating display of the transmission parameters with combo ports

In the connection status "down", the displayed transmission parameters do not match the actual values of the combo port. In the connection status "up", the correct values are displayed.

Initial situation

A pluggable transceiver is plugged into the combo port with the following settings:

- Combo Port Media Type: auto
- Status: enabled
- Link: down

Display of the transmission parameters

With 100 Mbps pluggable transceivers

- Actual response: Mode: 1G HD
- Expected response: Mode: 100M FD

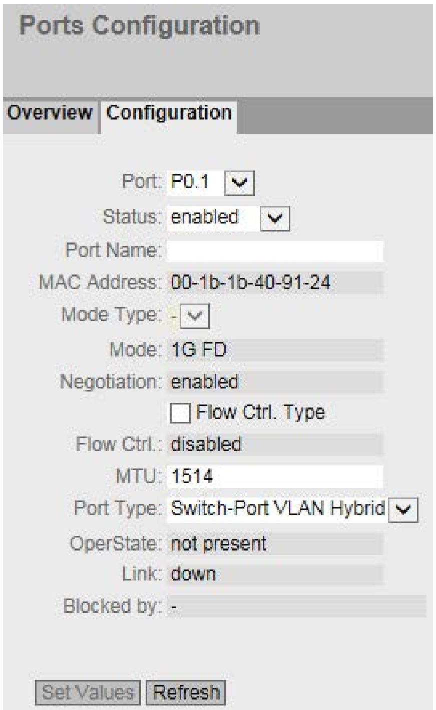
With 1 Gbps pluggable transceivers

- Actual response: Mode: 1G HD
- Expected response: Mode: 1G FD

5.4.15.2 Configuration

Configuring ports

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



Ports Configuration

Port: P0.1
Status: enabled
Port Name:
MAC Address: 00-1b-1b-40-91-24
Mode Type: -
Mode: 1G FD
Negotiation: enabled
□ Flow Ctrl. Type
Flow Ctrl.: disabled
MTU: 1514
Port Type: Switch-Port VLAN Hybrid
OperState: not present
Link: down
Blocked by: -

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.
- **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 end device. This must also be in the "Autonegotiation" mode.

  Note

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

  Note

  "Mode Type" with combo ports

  To be able to set the "Mode Type" of a combo port, change the "Combo Port Media Type" to "rj45".

  If "auto" is set for the "Combo Port Media Type" and the RJ-45 port is used, you cannot set the "Mode Type".

- **"Mode**
  Shows the transmission speed and the transfer mode of the port. The transmission speed can be 10 Mbps, 100 Mbps, 1000 Mbps or 10 Gbps. 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.

  Note

  Turning flow control on/off with autonegotiation

  Flow control can only be enabled or disabled if the "autonegotiation" function is turned off. The function cannot enabled again afterwards.

- **Flow Ctrl. Type**
  Enable or disable flow control for the port.
- **Flow Ctrl.**
  Shows whether flow control is working on this port.
- **MTU**
  Enter the packet size.

- **Port Type**(only with routing)
  Select the type of port from the drop-down list.
  - Router port

    The port is a layer 3 interface. It does not support layer 2 functions.
  - 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.
  - Switch Port VLAN Host

    Host ports belong to a secondary PVLAN.

    Connect devices to host ports that are only intended to communicate with certain devices of the PVLAN.
  - Switch-Port PVLAN Promiscuous

    Promiscuous ports belong to a primary PVLAN.

    Connect devices to promiscuous ports that are intended to communicate with all devices of the PVLAN.
- **Combo Port Media Type**

  Specify the mode of the combo port:
  - auto

    If you select this mode, the SFP transceiver port has priority.

    As soon as an SFP transceiver is plugged in, an existing connection at the fixed RJ-45 port is terminated. If no SFC transceiver is plugged in, a connection can be established via the fixed RJ-45 port.
  - rj45

    If you select this mode, the fixed RJ-45 port is used regardless of the SFP transceiver port.

    If an SFP transceiver is plugged in, it is disabled and the power turned off.
  - sfp

    If you select this mode, the SFP transceiver port is used regardless of the built-in RJ-45 port.

    If an RJ-45 connection is established, it is terminated because the power of the RJ-45 port is turned off.

The factory setting for the combo ports is the auto mode.

Note

Automatic adaptation due to PROFINET configuration

When establishing a PROFINET connection, the setting of the combo port media type is adapted automatically:

- If a pluggable transceiver is configured, the combo port media type will be set to "sfp".
- If a the fixed RJ-45 is configured, the combo port media type will be set to "rj45".

So that the automatic adaptation can be made, the combo port media type must be set to "auto".

Configure the combo port media type accordingly using the WBM or CLI.

- **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.
- **Blocked by**

  Shows why the port is in the "blocked" status:
  - -

    The analysis of the port status Is not supported.
  - forwarding

    The port is not blocked.
  - ring-redundancy

    The port belongs to a redundancy manager. When the redundancy manager is in the "Passive status, one of the ring ports is in the "blocking" status.

– spanning-tree

  The port has the status "Discarding" in the spanning tree. The port is part of a spanning tree, however it is located on a redundant path and is deactivated for data traffic.

– loop detection

  A loop was detected and as the reaction to a loop, the status "disable" was configured for the port.

– down-in-bundle

  The port is part of a link aggregation and was deactivated by LACP.

– la-loop-detection

  The port is part of a link aggregation. A loop was detected and as the reaction to a loop, the status "disable" was configured for the link aggregation.

– la-spanning-tree

  The port is part of a link aggregation. Thelink aggregation was switched to the status "Discarding" by the spanning tree.

– admin-down

  The status "disabled" is configured for the port, see "System > Ports > Configuration".

– link down

  The status "enabled" is configured for the port but there is no connection, see "System > Ports > Configuration".

– power-down

  The status "Lin down" is configured for the port, see "System > Ports > Configuration".

– standby

  Standby redundancy is enabled on the device. The port is a standby port with the status "Passive".

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.

5.4.16 Fault Monitoring

5.4.16.1 Power Supply

Settings for monitoring the power supply

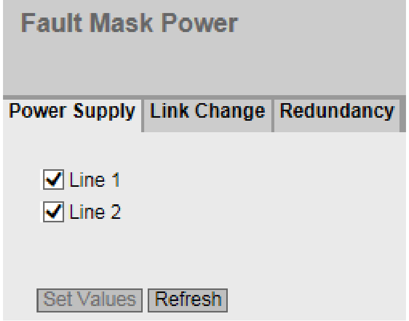
Configure whether or not the power supply should be monitored by the messaging system. Depending on the hardware variant there are one or two power connectors (Line 1 / Line 2). With a redundant power supply, configure the monitoring separately for each individual feed-in line.

A fault is then signaled by the message system when there is no power on one of the monitored lines (line 1 or line 2) or when the voltage is too low.

Note

You will find the permitted operating voltage limits in the compact 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.



Fault Mask Power

☑ Line 1
☑ Line 2

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.

5.4.16.2 Link Change

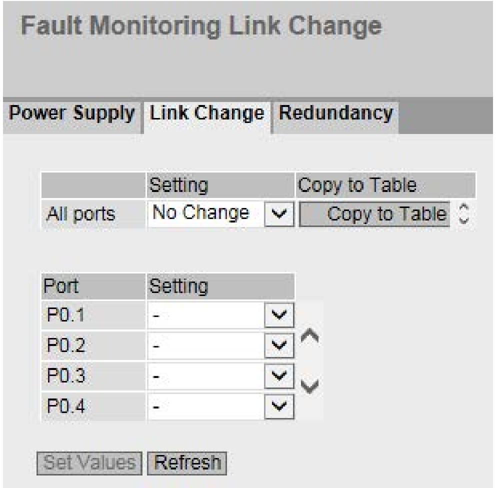
Configuration of fault monitoring of status changes on connections

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 and 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.



	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	-
P0.2	-
P0.3	-
P0.4	-

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 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.
- **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

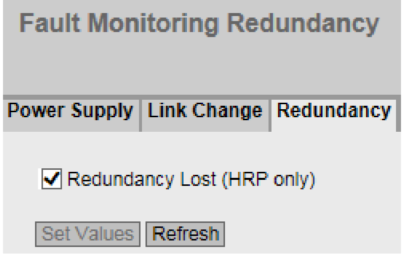
1. From the relevant drop-down list, select the options of the slots / ports whose connection status you want to monitor.
2. Click the "Set Values" button.

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.

5.4.16.3 Redundancy

On this page, you configure whether or not an error message is triggered if there is a status change on a network connection.



Fault Monitoring Redundancy

☑ Redundancy Lost (HRP only)

Setting

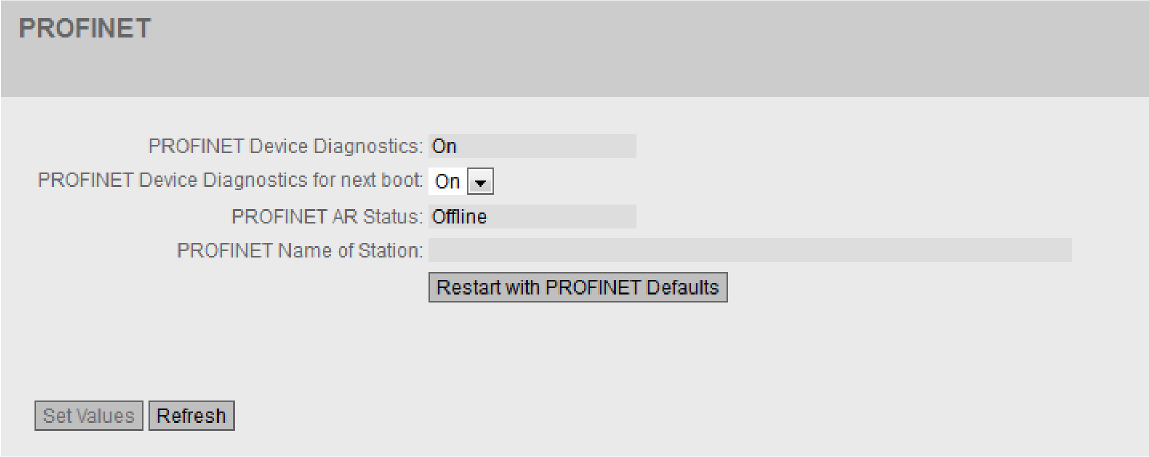
- **Redundancy loss (HRP only)**

  Enable or disable connection monitoring. If the redundancy of the connection is lost, an error is signaled.

5.4.17 PROFINET

Settings for PROFINET

On this page, you configure the mode of PROFINET.



PROFINET

PROFINET Device Diagnostics:	On
PROFINET Device Diagnostics for next boot:	On
PROFINET AR Status:	Offline
PROFINET Name of Station:	

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**

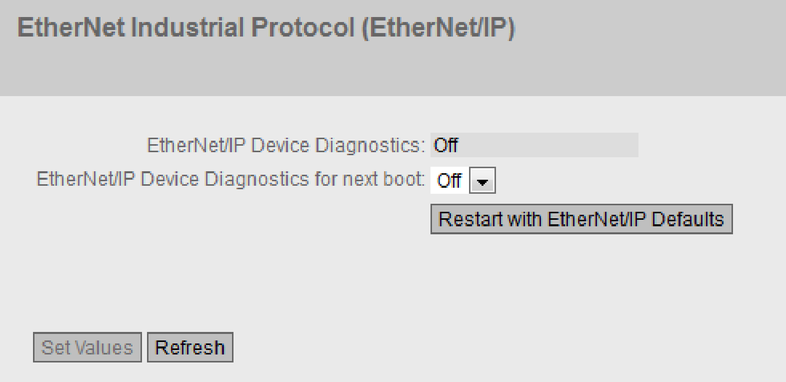
  Click this button to restore the default settings of the PROFINET profile and to restart the device. You must confirm the restart in a dialog box. The dialog box displays the settings specially made for operation with the PROFINET protocol.

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 and therefore the failure of the data traffic.

5.4.18 EtherNet/IP

EtherNet Industrial Protocol (EtherNet/IP)

On this page, you configure the mode of EtherNet/IP.



EtherNet Industrial Protocol (EtherNet/IP)

EtherNet/IP Device Diagnostics: Off

EtherNet/IP Device Diagnostics for next boot: Off

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 and therefore the failure of the data traffic.

5.4.19 PLUG

5.4.19.1 Configuration

NOTICE
Do not remove or insert a C-PLUG / KEY-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. If a valid KEY-PLUG was inserted in the device, the device changes to a defined error state following the restart.

Information about the configuration of the C-PLUG / KEY-PLUG

This page provides detailed information about the configuration stored on the C-PLUG or KEY-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.

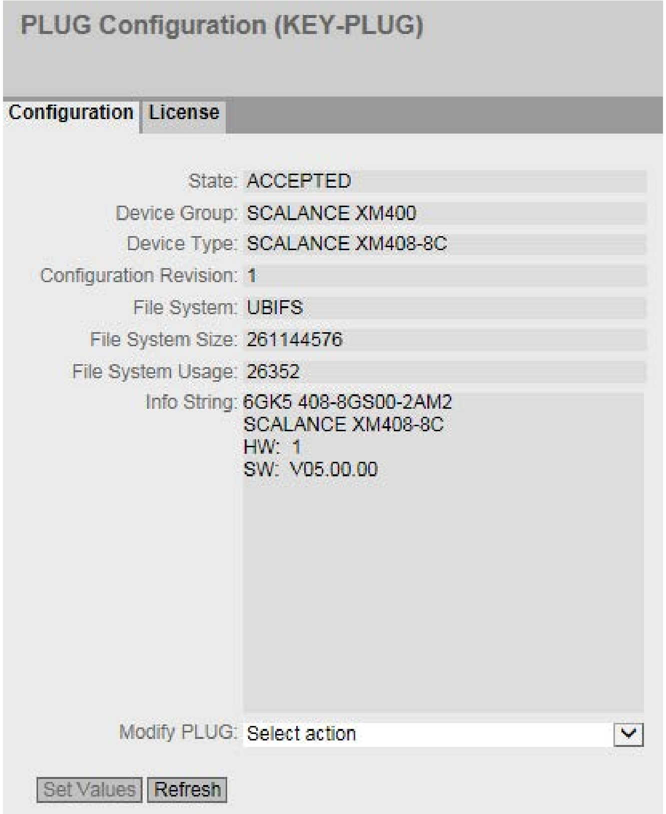
If you decide against executing the function after making your selection, click the "Refresh" button. As a result the data of this page is read from the device again and the selection is canceled.

Note

Incompatibility with previous versions with 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 "System > PLUG".



State: ACCEPTED
Device Group: SCALANCE XM400
Device Type: SCALANCE XM408-8C
Configuration Revision: 1
File System: UBIFS
File System Size: 261144576
File System Usage: 26352
Info String: 6GK5 408-8GS00-2AM2
SCALANCE XM408-8C
HW: 1
SW: V05.00.00
Modify PLUG: Select action

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
    There is no C-PLUG or KEY-PLUG 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.
  - MISSING
    There is no PLUG inserted. Functions are configured on the device for which a license is required.
- **Device Group**
  Shows the SIMATIC NET product line that used the C-PLUG or KEY-PLUG previously.
- **Device Type**
  Shows the device type within the product line that used the C-PLUG or KEY-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.

NOTICE

New file system UBI

As of firmware version 3.0, UBI is the standard file system for the C-PLUG or KEY-PLUG. If a C-PLUG with the previous file system IECP is detected in such a device, this C-PLUG will be formatted for the UBI file system and the data will be rewritten to the C-PLUG.

This change in the file system also occurs following a firmware update to V3.0. A downgrade to the previous version of the firmware then presents a problem. The firmware can neither read nor write the C-PLUG or KEY-PLUG and it is not even possible to "Erase PLUG to Factory Default".

- **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 or KEY-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.

5.4.19.2 License

NOTICE

Do not remove or insert a C-PLUG / KEY-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. If a valid KEY-PLUG was inserted in the device, the device changes to a defined error state following the restart.

If the device was configured at some time with a PLUG, the device can no longer be used without this PLUG. To be able to use the device again, reset the device to the factory settings.

Note

Incompatibility with previous versions with PLUG inserted

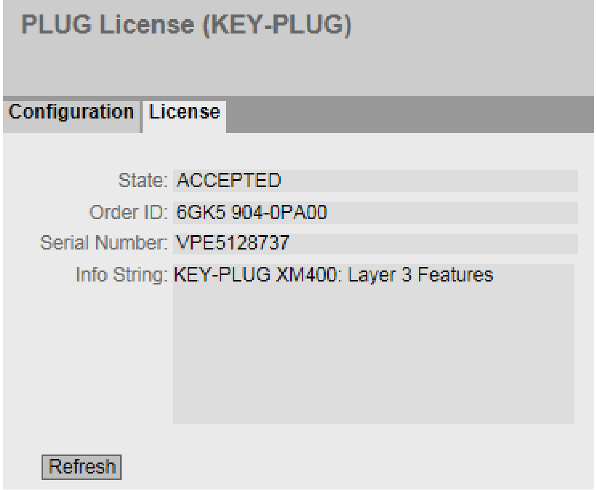
During the installation of a previous version, the configuration data can be lost. In this case, the device starts up with the factory settings after the firmware has been installed. In this situation, if a PLUG is inserted in the device, following the restart, this has the status "Not Accepted" since 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 "System > PLUG".

Information about the license of the KEY-PLUG

A C-PLUG can only store the configuration of a device. In addition to the configuration, a KEY-PLUG also contains a license that enables certain functions of your SIMATIC NET device.

This page provides detailed information about the license on the KEY-PLUG. In this example, the KEY-PLUG contains the data for enabling the layer 3 functions of the device.



State: ACCEPTED

Order ID: 6GK5 904-0PA00

Serial Number: VPE5128737

Info String: KEY-PLUG XM400: Layer 3 Features

Description of the displayed boxes

- **Status**
  Shows the status of the KEY-PLUG. The following are possible:
  – ACCEPTED
    The KEY-PLUG in the device contains a suitable and valid license.
  – NOT ACCEPTED
    The license of the inserted KEY-PLUG is not valid.
  – NOT PRESENT
    No KEY-PLUG is inserted in the device.
  – MISSING
    There is no KEY-PLUG or a C-PLUG with the status "FACTORY" inserted in the device. Functions are configured on the device for which a license is required.
  – WRONG
    The inserted KEY-PLUG is not suitable for the device.
  – UNKNOWN
    Unknown content of the KEY-PLUG.
  – DEFECTIVE
    The content of the KEY-PLUG contains errors.
- **Order ID**
  Shows the order number of the KEY-PLUG. The KEY-PLUG is available for various functional enhancements and for various target systems.
- **Serial Number**
  Shows the serial number of the KEY-PLUG.
- **Info String**
  Shows additional information about the device that used the KEY-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.

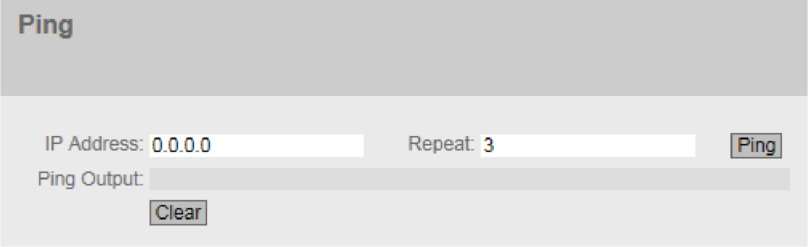
Note

When you save the configuration, the information about whether or not a KEY-PLUG was inserted in the device at the time is also saved. This configuration can then only work if a KEY-PLUG with the same order number / license is inserted.

5.4.20 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.



Ping

IP Address: 0.0.0.0

Repeat: 3

Description

The table has the following columns:

- **Dest. address**
  Enter the IPV4 address or the FQDN (Fully Qualified Domain Name) 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.

5.4.21 PoE

Note

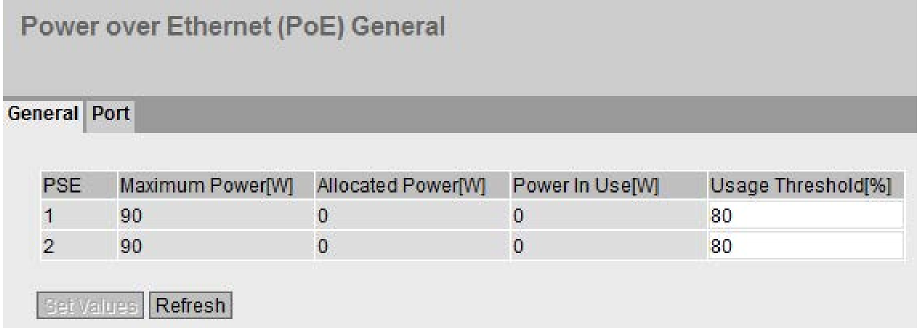
The "PoE" menu item is only displayed with devices that support PoE.

5.4.21.1 General

Settings for Power over Ethernet (PoE)

On this page, you see information about the power that the IE switch supplies with PoE.

The SCALANCE XR-500 represents a PSE (Power Sourcing Equipment). With the SCALANCE XM-400, each group of four ports with PoE capability is known as a PSE. The displayed values apply only to the corresponding PSE.



Power over Ethernet (PoE) General

PSE	Maximum Power[W]	Allocated Power[W]	Power In Use[W]	Usage Threshold[%]
1	90	0	0	80
2	90	0	0	80

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.

  The "Maximum Power" value can be set for a SCALANCE XM-400.
- **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.

Power over Ethernet with SCALANCE XM-400

With a SCALANCE XM-400, you can use the "Power over Ethernet" function via the port extender PE408PoE.

PoE power supply

The connection of the PoE power supply is external. You can connect 2 PoE power supplies with each PE408PoE port extender. Each PE408PoE therefore has 2 PSE units (Power Sourcing Equipment) each with 4 ports.

Numbering of the PSE units

To be able to differentiate between the PSE units in the configuration, they are numbered:

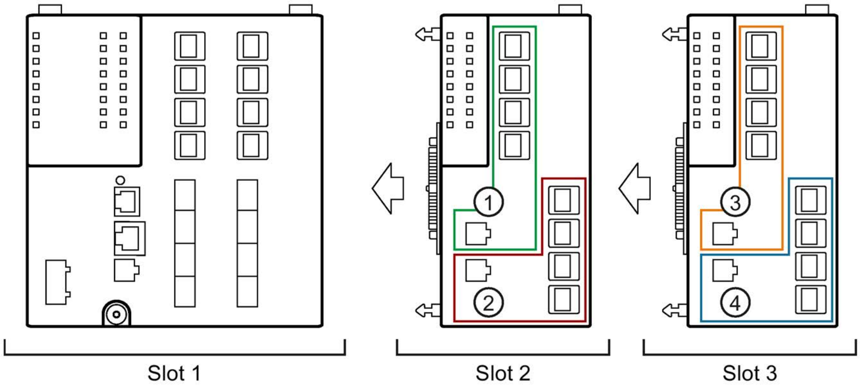


Image 5-8 SCALANCE XM-400 with 2 PE408PoE port extenders

If a PE408PoE is inserted in slot 2, its two PSE slots have indexes 1 and 2. If a PE408PoE is inserted in slot 3, its two PSE slots have indexes 3 and 4.

The numbering of the PSE units is decided by the slots. If there is a port extender without PoE in slot 2, and there is a PE408PoE in slot 3, the PSE units in slot 3 still have the indexes 3 and 4.

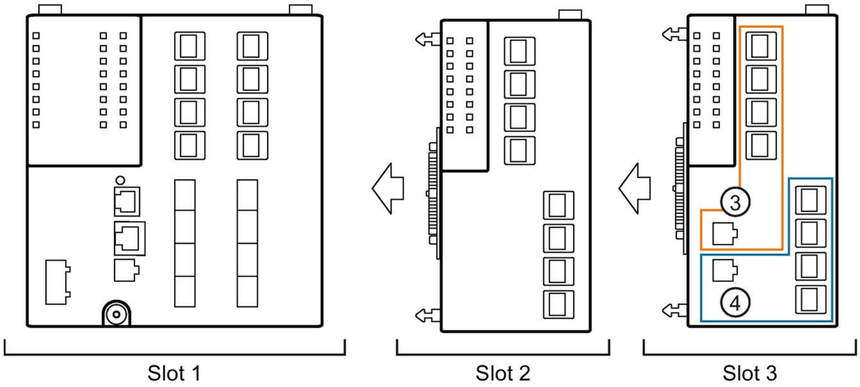


Image 5-9 SCALANCE XM-400 with 2 port extenders (1 port extender without PoE and 1 PE408PoE)

With a SCALANCE XM416-4C with which you can only connect one port extender, the indexes of the PSE units are 1 and 2.

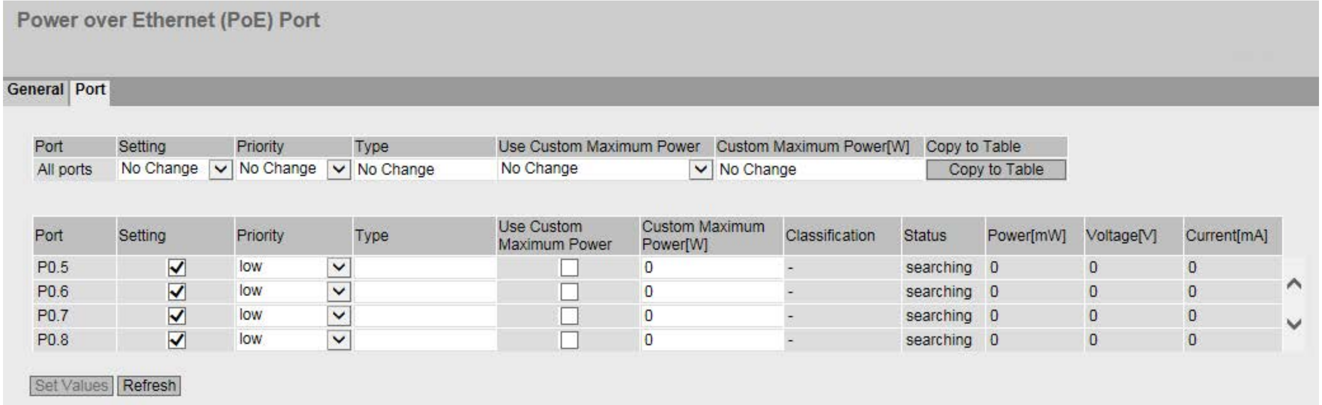
Power over Ethernet with SCALANCE XR528-6M and SCALANCE XR552-12M

With SCALANCE XR528-6M and SCALANCE XR552-12M only the module slots 1 to 3 can be fitted with PoE modules.

5.4.21.2 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.



Power over Ethernet (PoE) Port

Port	Setting	Priority	Type	Use Custom Maximum Power	Custom Maximum Power[W]	Copy to Table
All ports	No Change	No Change	No Change	No Change	No Change	Copy to Table

Port	Setting	Priority	Type	Use Custom Maximum Power	Custom Maximum Power[W]	Classification	Status	Power[mW]	Voltage[V]	Current[mA]
P0.5	☑	low		☐	0	-	searching	0	0	0
P0.6	☑	low		☐	0	-	searching	0	0	0
P0.7	☑	low		☐	0	-	searching	0	0	0
P0.8	☑	low		☐	0	-	searching	0	0	0

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 the required setting.

  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.

  If "No Change" is entered, 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 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 value used is exceeded, the device is turned off.

- **Classification (read-only)**

  The classification specifies the class of the device. From this you can recognize the maxim is um power 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 Power

    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.

5.4.22 Port Diagnostics

5.4.22.1 Cable Tester

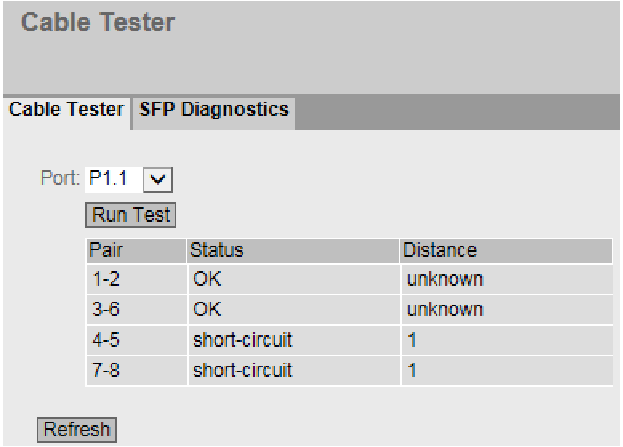
With this page, each individual Ethernet port can run independent fault diagnostics on the cable. This test is performed without needing to remove the cable, connect a cable tester and install a loopback module at the other end. Short-circuits and cable breaks can be localized to within a few meters.

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.



Port: P1.1

Pair	Status	Distance
1-2	OK	unknown
3-6	OK	unknown
4-5	short-circuit	1
7-8	short-circuit	1

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.

  1000 Mbps or gigabit Ethernet uses all 4 wire pairs.

  The wire pair assignment - pin assignment is as follows (DIN 50173):

  Pair 1 = pin 4-5

  Pair 2 = pin 1-2

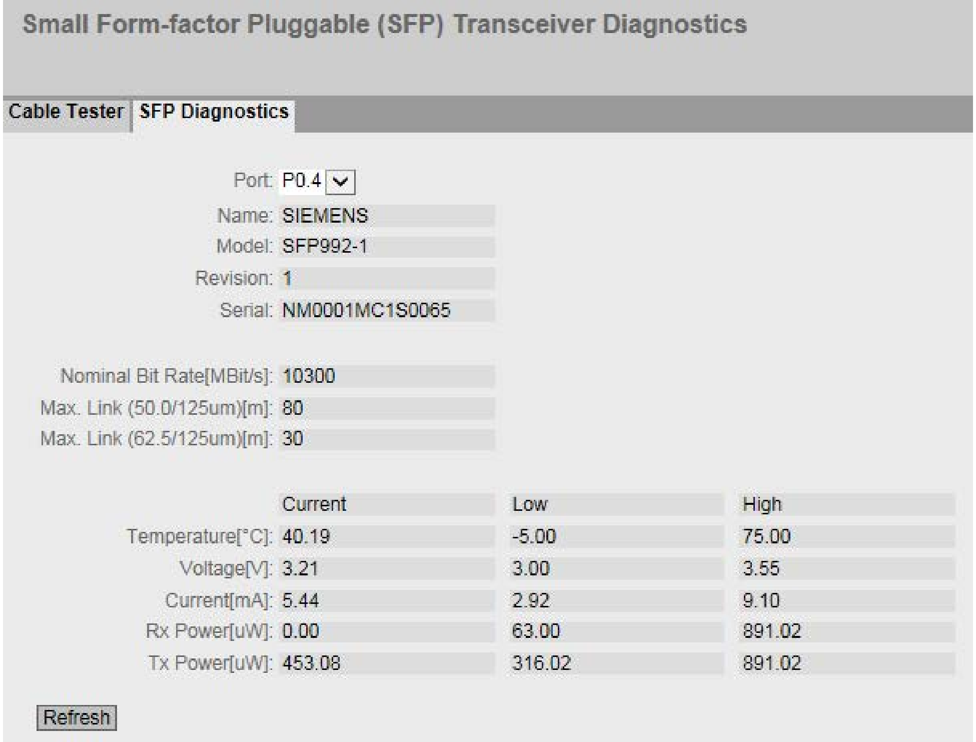
  Pair 3 = pin 3-6

  Pair 4 = pin 7-8

- **Status**
  Displays the status of the cable.
- **Distance [m]**
  Displays the distance to the cable end, cable break, or short-circuit.

5.4.22.2 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.



Small Form-factor Pluggable (SFP) Transceiver Diagnostics

Port: P0.4

Name:	SIEMENS
Model:	SFP992-1
Revision:	1
Serial:	NM0001MC1S0065
Nominal Bit Rate[MBit/s]:	10300
Max. Link (50.0/125um)[m]:	80
Max. Link (62.5/125um)[m]:	30

	Current	Low	High
Temperature[°C]:	40.19	-5.00	75.00
Voltage[V]:	3.21	3.00	3.55
Current[mA]:	5.44	2.92	9.10
Rx Power[uW]:	0.00	63.00	891.02
Tx Power[uW]:	453.08	316.02	891.02

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

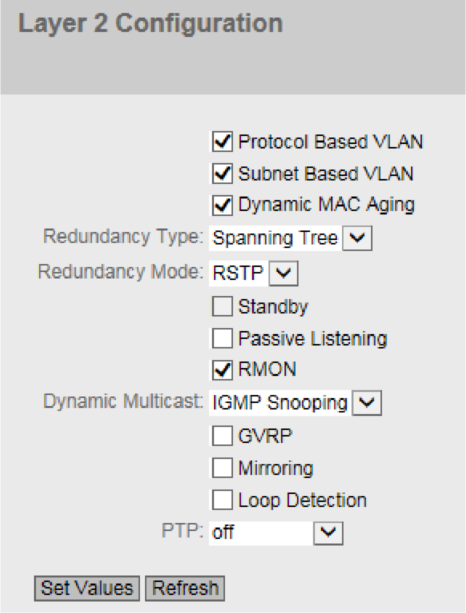
  Shows the highest value.

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.



Layer 2 Configuration

☑ Protocol Based VLAN
☑ Subnet Based VLAN
☑ Dynamic MAC Aging
Redundancy Type: Spanning Tree
Redundancy Mode: RSTP
☐ Standby
☐ Passive Listening
☑ RMON
Dynamic Multicast: IGMP Snooping
☐ GVRP
☐ Mirroring
☐ Loop Detection
PTP: off

Description of the displayed boxes

- **Protocol Based VLAN**

  Enable or disable protocol-based VLAN. Other settings in "Layer 2 > VLAN".

- **Subnet Based VLAN**

  Enable or disable subnet-based VLAN. Other settings in "Layer 2 > VLAN".

- **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.
  - **Ring with RSTP**

    If you select this option, the compatibility mode for spanning tree is set permanently to RSTP. In the "Redundancy Mode" drop-down list, you specify the redundancy mode of the ring redundancy.

    You can change the current setting in the "Ring Redundancy" and "Spanning Tree" menus.

    Note

    Restriction relating to ports with the "Ring with RSTP" option

    If you have enabled the "Ring with RSTP" option, the following ports must not be included in the spanning tree:
    - Ring ports
    - Standby ports
    - Standby coupling ports

- **Redundancy Mode**

  If you select "Ring" or "Ring with RSTP"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" 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

  The 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**
  Enabled Spanning Tree Protocol. Typical reconfiguration times with spanning tree are between 20 and 30 seconds. You can configure other settings in "Layer 2 > Spanning Tree".

– **RSTP**
  Enabled 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 (Rapid Spanning Tree Protocol), 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 Multiple Spanning Tree Protocol (MSTP). You can configure other settings in "Layer 2 > Spanning Tree".

If you select "Ring with RSTP" in the "Redundancy Type" drop-down list, the current redundancy modes of the Spanning tree and ring redundancy are displayed.

- **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.

- **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".
  - **MLD Snooping**
    Enables MLD. You can configure other settings in "Layer 2 > Multicast > MLD".
  - **IGMP and MLD Snooping**
    Enables IGMP and MDL.
  - **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"
- **PTP**

  The following setting is possible:

  – off

    The device does not process any PTP messages. PTP messages are, however, forwarded according to the rules of the switch.

  – transparent

    The device adopts the function of a transparent clock and forwards PTP messages to other nodes while at the same time making entries in the correction field of the PTP message.

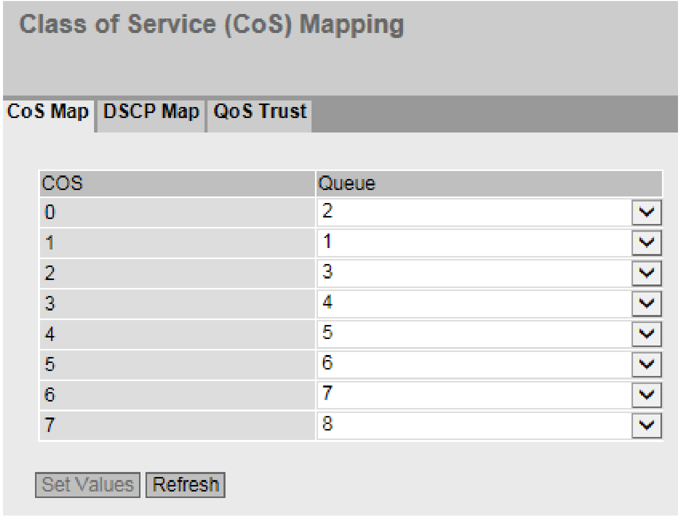
  You will find other settings in "Layer 2 > PTP"

5.5.2 QoS

5.5.2.1 CoS queue mapping

CoS queue

Here, CoS priorities are assigned to certain queues (Traffic Queues).



Class of Service (CoS) Mapping

COS	Queue
0	2
1	1
2	3
3	4
4	5
5	6
6	7
7	8

Description of the displayed boxes

The table has the following columns:

- **CoS**
  Shows the CoS priority of the incoming packets.
- **Queue**
  From the drop-down list, select the forwarding queue (send priority) that is assigned to the CoS priority.
  The higher the number of the queue, the higher the send priority.

  With queues 1 - 6 frames with a lower priority are occasionally processed even if there are frames with high priority in the queue.

  With queues 7 - 8 only frames with a high priority are processed as long as there are frames with high priority in the queue.

The service classes (CoS) are assigned to the queues as follows:

- CoS 0 → Queue 2
- CoS 1 → Queue 1
- CoS 2 → Queue 3
- CoS 3 → Queue 4
- CoS 4 → Queue 5
- CoS 5 → Queue 6
- CoS 6 → Queue 7
- CoS 7 → Queue 8

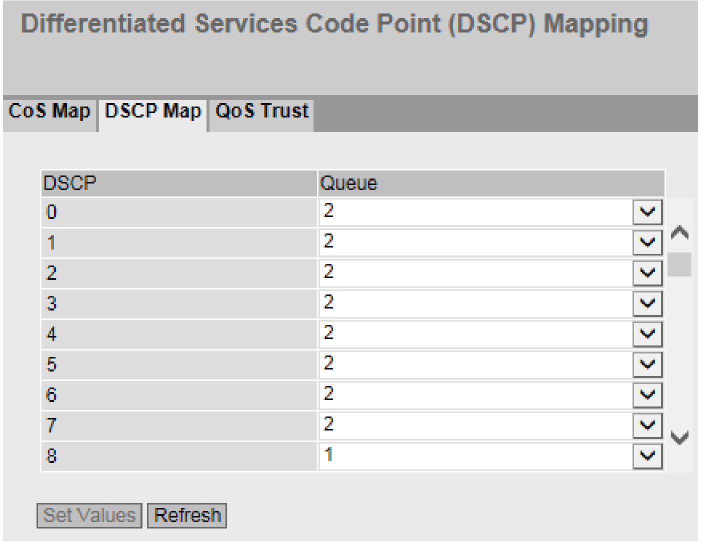
Steps in configuration

1. For each value in the "CoS" column, select the forwarding queue from the "Queue" drop-down list.
2. Click the "Set Values" button.

5.5.2.2 DSCP Mapping

DSCP Mapping

On this page, DSCP settings are assigned to various queues (Traffic Queues).



DSCP	Queue
0	2
1	2
2	2
3	2
4	2
5	2
6	2
7	2
8	1

Description of the displayed values

The table has the following columns:

- **DSCP**
  Shows the DSCP priority of the incoming packets.
- **Queue**
  From the drop-down list, select the forwarding queue (send priority) that is assigned to the DSCP value.
  The higher the queue number, the higher the send priority.

  With queues 1 - 6 frames with a lower priority are occasionally processed even if there are frames with high priority in the queue.

  With queues 7 - 8 only frames with a high priority are processed as long as there are frames with high priority in the queue.

The DSCP codes are assigned to the queues as follows:

- DSCP codes 0 - 7 → Queue 2
- DSCP codes 8 - 15 → Queue 1
- DSCP codes 16 - 23 → Queue 3
- DSCP codes 24 - 31 → Queue 4
- DSCP codes 32 - 39 → Queue 5
- DSCP codes 40 - 47 → Queue 6
- DSCP codes 48 - 55 → Queue 7
- DSCP codes 56 - 63 → Queue 8

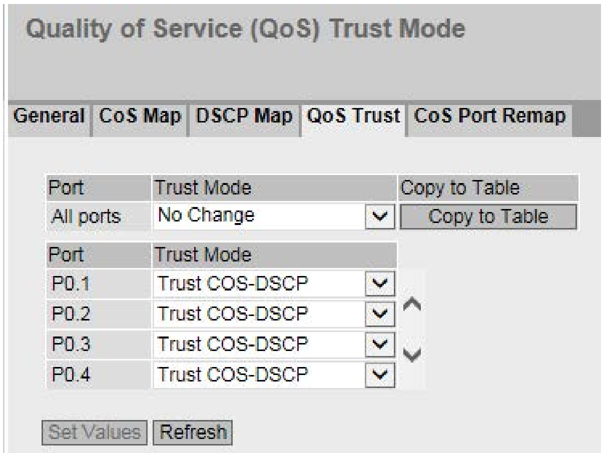
Steps in configuration

1. For each value in the "DSCP" column, select the forwarding queue from the "Queue" drop-down list.
2. Click the "Set Values" button.

5.5.2.3 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.



Quality of Service (QoS) Trust Mode

Port	Trust Mode	Copy to Table
All ports	No Change	Copy to Table

Port	Trust Mode
P0.1	Trust COS-DSCP
P0.2	Trust COS-DSCP
P0.3	Trust COS-DSCP
P0.4	Trust COS-DSCP

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, it 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.

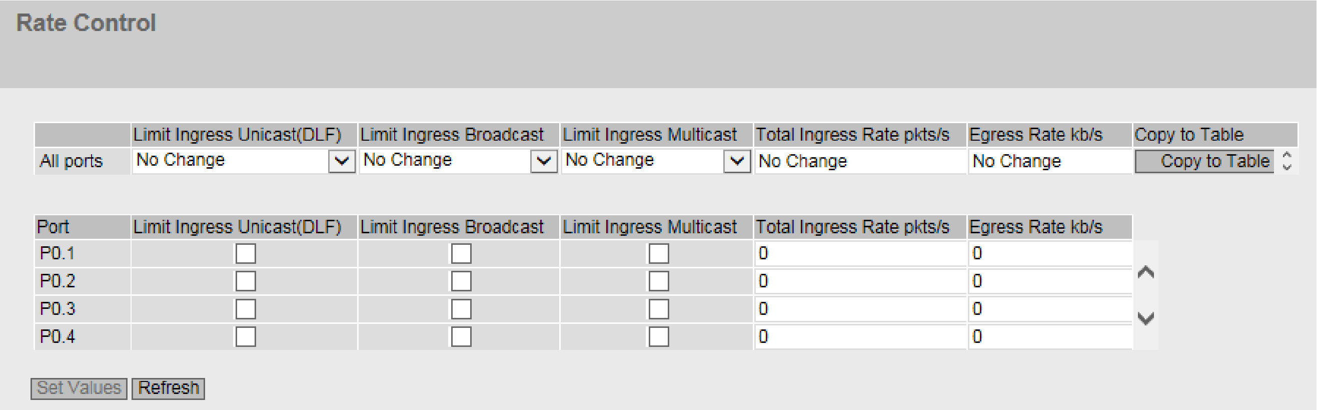
Steps in configuration

1. Select the required Trust Mode from the drop-down list.
2. Click the "Set Values" button.

5.5.3 Rate Control

Limiting the transfer rate of incoming and outgoing data

On this page, you configure the load limitation (maximum number of data packets per second) for the individual ports. You can specify the category of frame for which these limit values will apply.



Rate Control

	Limit Ingress Unicast(DLF)	Limit Ingress Broadcast	Limit Ingress Multicast	Total Ingress Rate pkts/s	Egress Rate kb/s	Copy to Table
All ports	No Change	No Change	No Change	No Change	No Change	Copy to Table

Port	Limit Ingress Unicast(DLF)	Limit Ingress Broadcast	Limit Ingress Multicast	Total Ingress Rate pkts/s	Egress Rate kb/s
P0.1	□	□	□	0	0
P0.2	□	□	□	0	0
P0.3	□	□	□	0	0
P0.4	□	□	□	0	0

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 [pkts/s]**
  Specify the maximum number of incoming packets processed by the device. If "No Change" is entered, the entry in the table remains unchanged.

- **Egress Rate kb/s**
  Specify the data rate for all outgoing frames. If "No Change" is entered, the entry in the table 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 slot and the port to which the other information relates. This field cannot be configured. 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 [pkts/s]**
  Specify the maximum number of incoming packets processed by the device.
- **Egress Rate kb/s**
  Specify the data rate for all outgoing frames.

Note

Rounding of the values, deviation from desired value

When you input the rate values, 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

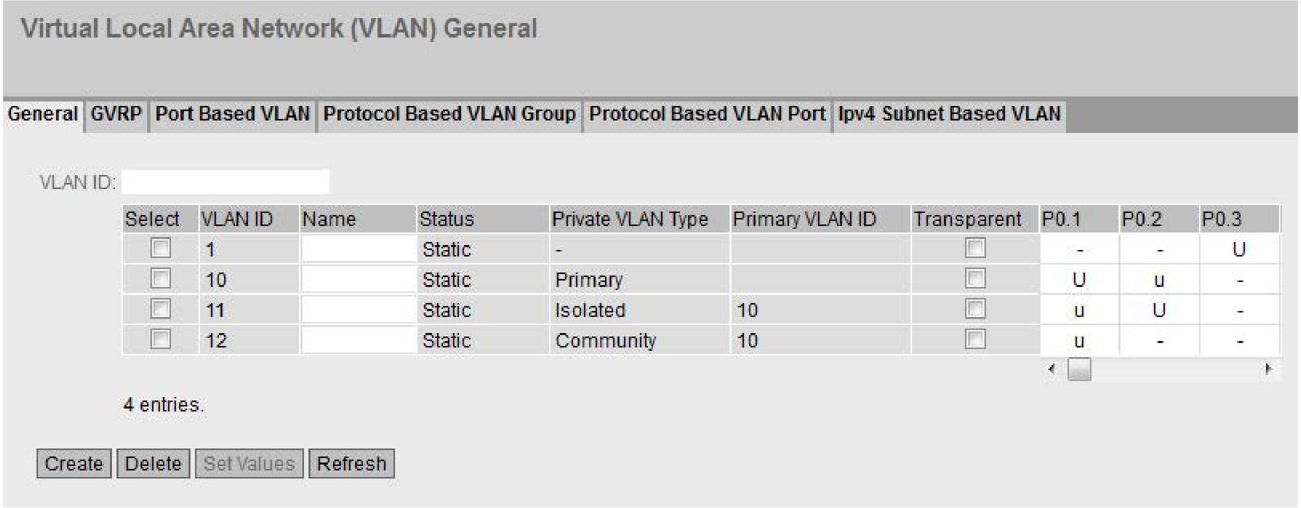
VLAN configuration page

On this page, you define the VLAN and specify the use of the ports.

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.



Select	VLAN ID	Name	Status	Private VLAN Type	Primary VLAN ID	Transparent	P0.1	P0.2	P0.3
□	1		Static	-		□	-	-	U
□	10		Static	Primary		□	U	u	-
□	11		Static	Isolated	10	□	u	U	-
□	12		Static	Community	10	□	u	-	-

4 entries.

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).
- With a trunk port, the VLAN assignment is dynamic. Static configurations can only be created if, in addition to the trunk port property, the port is also entered statically as a member in the VLANs involved. An example of a static configuration is the assignment of the multicast groups in certain VLANs.

Description of the displayed boxes

The page contains the following boxes:

- **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. Up to 257 VLANs can be defined.
- **Name**
  Enter a name for the VLAN. The name only provides information and has no effect on the configuration. The length is a maximum of 32 characters.
- **Status**
  Shows the status type of the entry in the internal port filter table. Here, static means that the address was entered as a static address by the user. The entry GVRP means that the configuration was registered by a GVRP frame. This is, however, only possible if GVRP was enabled for the device.
- **Private VLAN Type**
  Shows the type of the PVLAN.
- **Primary VLAN ID**
  , With secondary PVLANs shows the ID of the corresponding primary PVLAN.
- **Transparent**
  If you enable this check box, you switch a VLAN to the transparent mode. Ports that were assigned to this VLAN as members or untagged members now become transparent ports.

  This means the following:

  – The port VLAN ID of the transparent port is set to the ID of this VLAN.

  – Untagged frames that are received at these ports are forwarded to all other transparent ports once again without tag as long as they are not forwarded to a standard VLAN by a protocol or subnet rule.

  – Frames tagged with VLAN ID "0" and that are received at these ports are forwarded to all other transparent ports once again tagged with VLAN ID "0" as long as they are not forwarded to a standard VLAN by a protocol or subnet rule.

  – Frames tagged with the VLAN ID of the transparent VLAN and that are received at these ports are forwarded to all transparent ports once again tagged with the VLAN ID of the transparent VLAN.

  – Other frames are forwarded according to the normal VLAN rules and a transparent port behaves like an untagged member in this VLAN.

- All ports that were not members or untagged members in the relevant VLAN are automatically set to the "Forbidden" status.
- As long as a VLAN is configured as a transparent VLAN, the ports belonging to this VLAN cannot be modified.
- You can only configure one a transparent VLAN.

Note

If you disable the transparent mode for a VLAN again, the previously written port configuration is retained.

- **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 it is not possible for the VLAN to be registered dynamically at this port using GVRP. If a port in a VLAN has this option, it cannot become a member of this VLAN even if it is configured as a trunk port.
    You can configure further settings in "Layer 2 > VLAN > Port-based VLAN".
  - 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.
    You configure this function in the CLI (Command Line Interface) using the "`switchport mode trunk`" command.

Steps in configuration

1. Enter an ID in the "VLAN ID" input box.
2. Click the "Create" button. A new entry is generated in the table. As default, the boxes have "-" entered.
3. Enter a name for the VLAN under Name.
4. Switch the VLAN to the transparent or standard compliant mode.

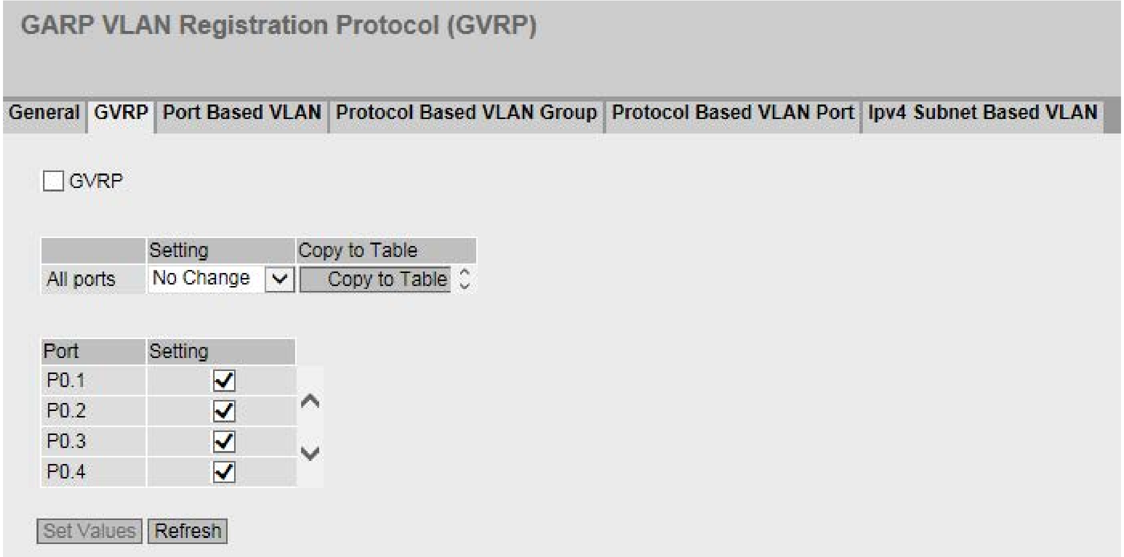
5. Specify the use of the port in the VLAN. If, for example you select M, the port is a member of the VLAN. The frame sent in this VLAN is forwarded with the corresponding VLAN tag.
6. Click the "Set Values" button.

5.5.4.2 GVRP

Configuration of GVRP functionality

Using GVRP frame, a different device can register at the port of the device for a specific VID. 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.



□ GVRP

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	☑
P0.2	☑
P0.3	☑
P0.4	☑

Description of the displayed boxes

The page contains the following box:

- **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.

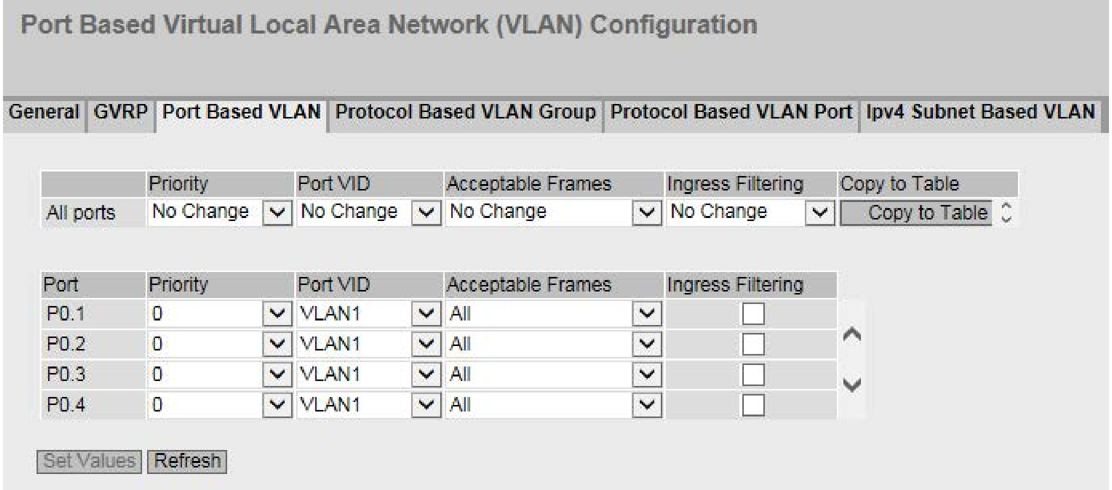
Steps in configuration

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.



Port Based Virtual Local Area Network (VLAN) Configuration

	Priority	Port VID	Acceptable Frames	Ingress Filtering	Copy to Table
All ports	No Change	No Change	No Change	No Change	Copy to Table

Port	Priority	Port VID	Acceptable Frames	Ingress Filtering
P0.1	0	VLAN1	All	☐
P0.2	0	VLAN1	All	☐
P0.3	0	VLAN1	All	☐
P0.4	0	VLAN1	All	☐

Description of the displayed boxes

Table 1 has the following columns:

- **Port**
  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 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.
- **Priority**
  From the drop-down list, select the priority given to untagged frames.

  The CoS priority (Class of Service) used in the VLAN tag. If a frame is received without a tag, it will be assigned this priority. This 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).
- **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.

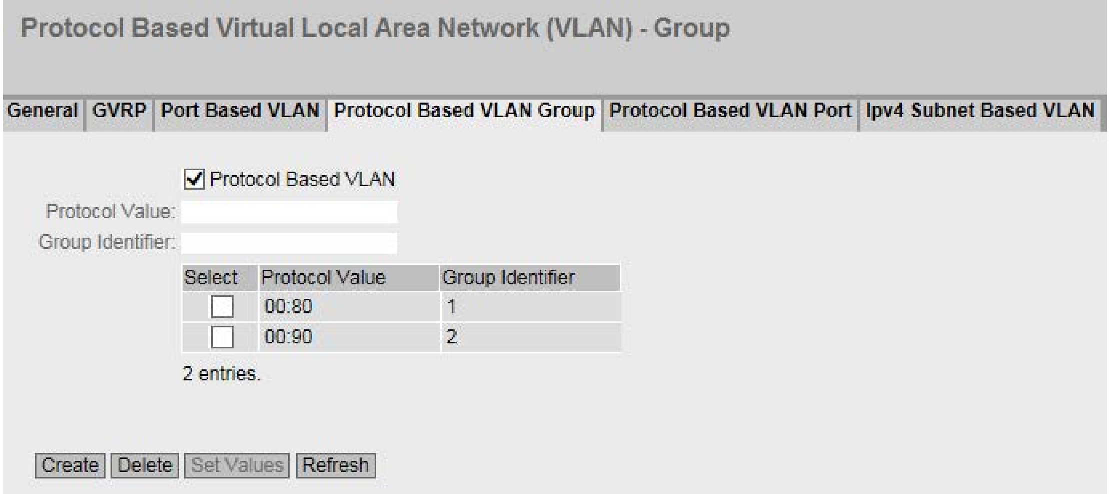
Steps in configuration

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.

5.5.4.4 Protocol-based VLAN group

Introduction

On this page, you specify groups and assign a protocol to them.


Protocol Based Virtual Local Area Network (VLAN) - Group

☑ Protocol Based VLAN

Protocol Value:

Group Identifier:

Select	Protocol Value	Group Identifier
□	00:80	1
□	00:90	2

2 entries.

Description of the displayed boxes

The page contains the following boxes:

- **Protocol-based VLAN**
  Enable or disable the protocol-based VLAN assignment.
- **Protocol Value**
  Enter the hexadecimal protocol value.
  A few examples are shown below:
  - PROFINET: 88:92
  - IP: 08:00
  - Novell: 81:37
  - netbios: f0:f0
  - appletalk: 80:9b
- **Group ID**
  Enter the ID of the group.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Protocol Value**
  Shows the protocol value.
- **Group Identifier**
  Shows the group ID.

Steps in configuration

Adding an entry

1. Enter the protocol value in the "Protocol Value" input box.
2. Enter the ID for the group in the Group Identifier input box.
3. Click the "Create" button. A new entry is generated in the table.
4. Click the "Set Values" button.

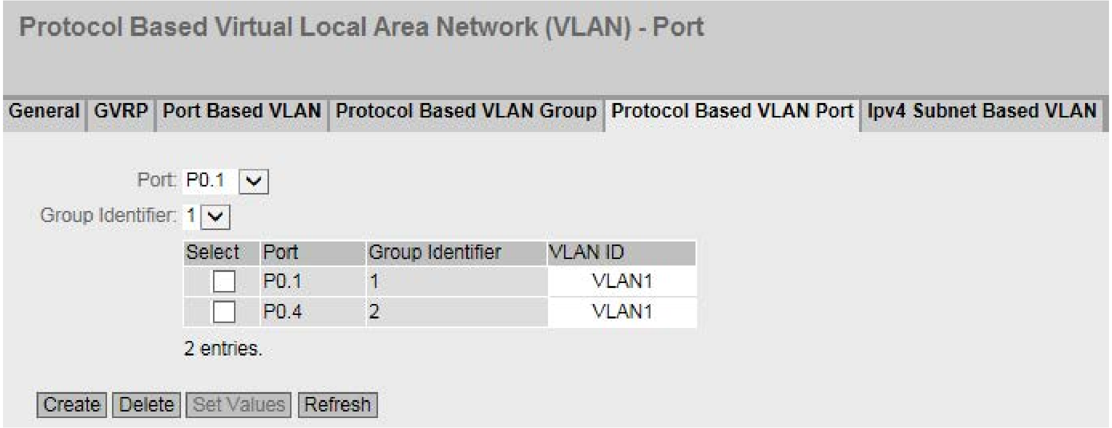
Deleting an entry

1. On the "Protocol-based VLAN port" tab, check that the protocol group is not used at any port.
2. Select the check box in the row to be deleted.
3. Click the "Delete" button.
4. Click the "Set Values" button.

5.5.4.5 Protocol-based VLAN port

Introduction

On this page, you specify which protocol and which VLAN is assigned to the individual port.



Protocol Based Virtual Local Area Network (VLAN) - Port

Port: P0.1

Group Identifier: 1

Select	Port	Group Identifier	VLAN ID
□	P0.1	1	VLAN1
□	P0.4	2	VLAN1

2 entries.

Description of the displayed boxes

The page contains the following boxes:

- **Port**
  Select the port in the drop-down list. All available ports and the link aggregations can be selected.
- **Group Identifier**
  Select the group ID in the drop-down list. You specify the ID the WBM page "Protocol Based VLAN Group".

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Port**
  All available ports and the link aggregations are displayed.
- **Group Identifier**
  Shows the group ID assigned to the port.
- **VLAN ID**
  From the drop-down list, select the VLAN ID you want to assign to the port.

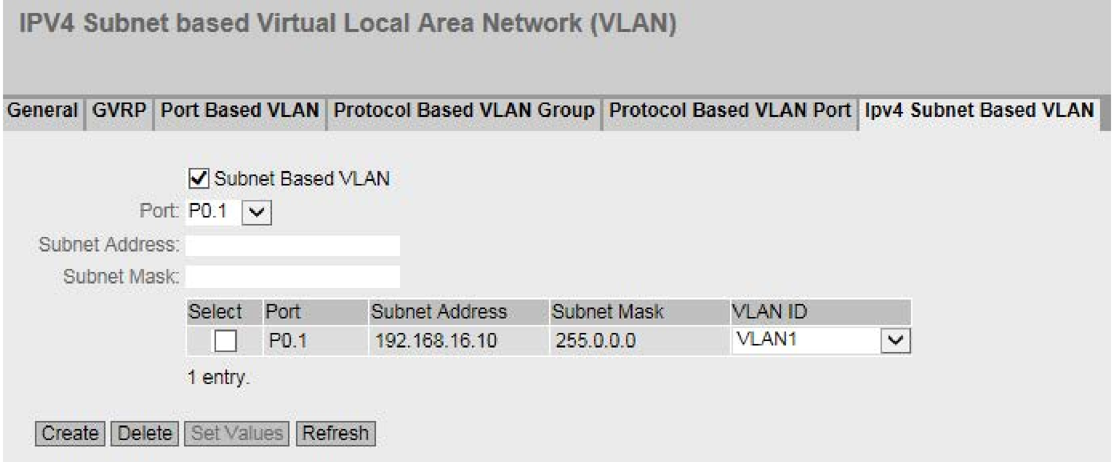
Steps in configuration

1. Select the port from the "Port" drop-down list.
2. Select the group ID from the "Group Identifier" drop-down list.
3. Click the "Create" button. A new entry is generated in the table.
4. Specify the VLAN ID in " VLAN ID".
5. Click the "Set Values" button.

5.5.4.6 IPv4 subnet-based VLAN

Introduction

On this page, you specify which VLAN ID is assigned to the subnet.



IPV4 Subnet based Virtual Local Area Network (VLAN)

☑ Subnet Based VLAN

Port: P0.1

Subnet Address:

Subnet Mask:

Select	Port	Subnet Address	Subnet Mask	VLAN ID
□	P0.1	192.168.16.10	255.0.0.0	VLAN1

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **Subnet-based VLAN**
  Enable or disable the IPv4 subnet-based VLAN assignment.
- **Port**
  Select the port in the drop-down list. All available ports and the link aggregations can be selected.
- **Subnet Address**

  Enter the IPv4 address of the subnet.
  Example: 192.168.10.0 for the network 192.168.10.x with nodes 192.168.10.1 to 192.168.10.254.
- **Subnet Mask**
  Enter the subnet mask.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Port**
  All available ports and the link aggregations are displayed.
- **Subnet Address**

  Shows the IPv4 address of the port.
- **Subnet Mask**

  Shows the subnet assigned to the port.
- **VLAN ID**
  Select the VLAN ID you want to assign to the port or the subnet.

Steps in configuration

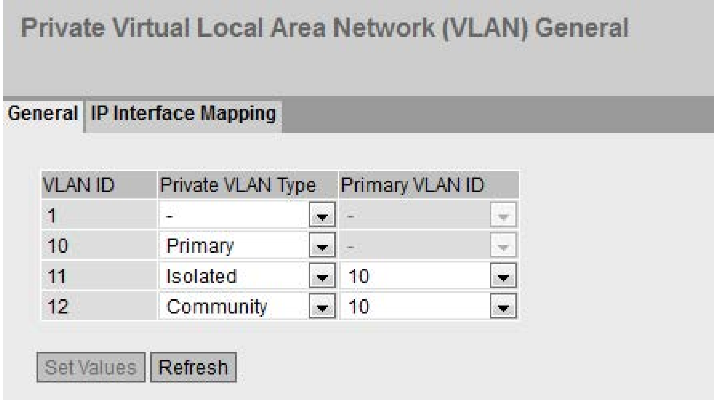
1. Select a port from the "Port" drop-down list.
2. In "Subnet", enter the subnet mask.
3. Click the "Create" button. A new entry is generated in the table.
4. Select the VLAN ID from the "VLAN ID" drop down list.
5. Click the "Set Values" button.

5.5.5 Private VLAN

5.5.5.1 General

Private VLAN configuration page

On this page you define the types of the PVLANs and assign secondary PVLANs to a primary PVLAN.



Private Virtual Local Area Network (VLAN) General

VLAN ID	Private VLAN Type	Primary VLAN ID
1	-	-
10	Primary	-
11	Isolated	10
12	Community	10

Description of the displayed boxes

The table has the following columns:

- **VLAN ID**
  Shows the VLAN ID.
- **Private VLAN Type**
  Specify the type of PVLAN:
  - Primary

    With this type, you define a primary PVLAN. In a PVLAN you can only define one primary PVLAN. The primary PVLAN uses the VLAN ID of the VLAN.
  - Isolated

    With this type, you define a secondary PVLAN. Only one end device can exist in this secondary PVLAN. The secondary PVLAN has a specific VLAN ID.
  - Community

    With this type, you define a secondary PVLAN. The devices in this secondary PVLAN can communicate with each other via layer 2. The secondary PVLAN has a specific VLAN ID.
- **Primary VLAN ID**
  For secondary PVLANs select the VLAN ID of the primary PVLAN.

Steps in configuration

1. Create the required VLANs on the page "Layer 2 > VLAN > General".

   Note

   All secondary PVLANs must be known on all IE switches of a PVLAN. Even if an IE switch has no host port in a secondary PVLAN, the secondary PVLAN must be known on the IE switch.

2. Change to the page "Layer 2 > Private VLAN > General". A line is created there for every VLAN.
3. On this page, you specify the "Private VLAN Type". For the secondary PVLANs specify the corresponding primary PVLAN.
4. Click the "Set Values" button.
5. For the required ports select the corresponding port type on the page "System > Ports > Configuration":
   – Switch-Port PVLAN Promiscuous
   – Switch Port VLAN Host
6. Specify the use of the ports on the page "Layer 2 > VLAN > General".
   – For promiscuous ports that are connected to other promiscuous ports, select the setting "M" in all PVLANs.
   – For promiscuous ports that are connected to an end device, select the setting "u" (lower case) in all PVLANs.

     In the primary PVLAN, the setting is automatically changed to "U" (upper case) after saving.
   – For host ports in the primary PVLAN and in its secondary PVLAN, select the setting "u" (lower case)

     In its secondary PVLAN, the setting is automatically changed to "U" (upper case) after saving.

   With incoming untagged frames, the port VLAN-ID of the VLAN is set by entering the port with the setting "U" (upper case).

5.5.5.2 IP Interface Mapping

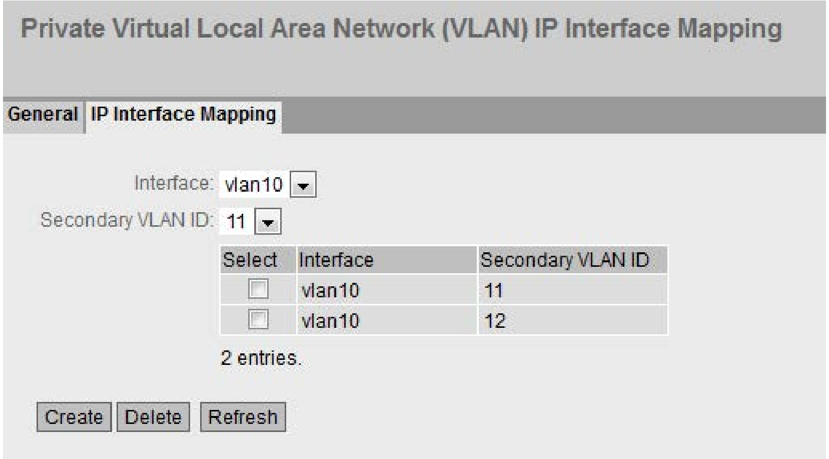
Private VLAN configuration page

On this page you specify from which secondary PVLANs the IP interface of the primary PVLAN will be reachable.

Configure the IP interface assignment for all functions for which an end device needs to communicate from the secondary PVLAN via the IP interface of the primary PVLAN.

Examples:

- An end device in the secondary PVLAN is configured as DHCP client. A local DHCP server is set up. Configure the IP interface assignment on the DHCP server.
- An end device in the secondary PVLAN is configured as DHCP client. A remote DHCP server is set up. A PVLAN switch is configured as DHCP relay agent. Configure the IP interface assignment on the DHCP relay agent.
- A PVLAN switch is configured as router. Configure the IP interface assignment on the router.



Private Virtual Local Area Network (VLAN) IP Interface Mapping

Interface: vlan10

Secondary VLAN ID: 11

Select	Interface	Secondary VLAN ID
□	vlan10	11
□	vlan10	12

2 entries.

Description of the displayed boxes

The page contains the following boxes:

- **Interface**
  Select a primary PVLAN with an IP interface.
- **Secondary VLAN ID**
  Select a secondary VLAN ID from which the IP interface of the primary PVLAN will be reachable.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Interface**
  Shows the IP interface.
- **Secondary VLAN-ID**
  Shows the secondary VLAN-ID of the secondary PVLAN from which the IP interface of the primary PVLAN is reachable.

Steps in configuration

1. Create an IP interface for a primary PVLAN.
2. Select a primary PVLAN with an IP interface.
3. Select a secondary VLAN ID.
4. Click the "Create" button.

5.5.6 Mirroring

5.5.6.1 General

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.

Mirroring in general

On this page, you can enable or disable the "Mirroring" function and make the basic settings.

Note

Mirroring a port does not work beyond switch core boundaries. Refer to the operating instructions of the device.

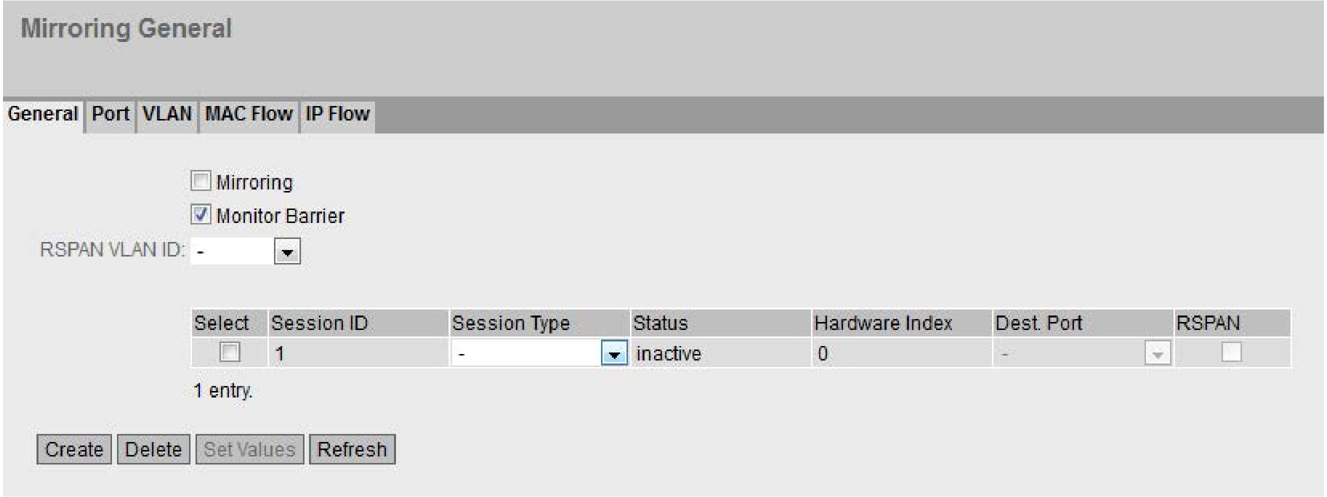
Note

You need to disable port mirroring if you want to connect a normal end device to the monitor port. This does not apply to the function extender BUS ANALYZER Agent XM-400.

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.

Settings



□ Mirroring

☑ Monitor Barrier

RSPAN VLAN ID: -

Select	Session ID	Session Type	Status	Hardware Index	Dest. Port	RSPAN
□	1	-	inactive	0	-	□

1 entry.

The page contains the following boxes:

- **Mirroring**

  Click this check box to enable or disable mirroring.

- **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 is 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 reconfigure 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".

Note

Function Extender BUS ANALYZER Agent XM-400

If the destination port is a port of the function extender BUS ANALYZER Agent XM-400 the monitor barrier option is always activated. It is activated regardless of whether the check box was disabled or enabled.

- **RSPAN VLAN-ID**

  Select a VLAN on which the data traffic of a mirroring session is transferred without disruption.

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.
- **Session Type**

  Select the required entry from the drop-down list:

  – -

    None

  – Port Based

    Port-based mirroring

  – VLAN

    VLAN-based mirroring

  – MAC ACL

    Mirroring of the MAC Access Control List

  – IP ACL

    Mirroring of the IP Access Control List

Note

If you have created a session of the type "VLAN" "MAC ACL" or "IP ACL", you cannot create any further sessions. You can create up to 7 sessions of the type "Port-based".

Note

If you change the "Session Type" of an existing session, all previous configurations of this session are lost.

- **Status**

  Shows whether or not mirroring is enabled.
- **Hardware Index**

  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. With several sessions, the corresponding frames are only visible in one session. They are only mirrored on the destination port with the lowest hardware index.

- **Dest. Port**

  From the drop-down list, select the destination port to which data will be mirrored in this session.

Note

Function Extender BUS ANALYZER Agent XM-400

If you connect a function extender BUS ANALYZER Agent XM-400 with a SCALANCE XM-400 basic device, you can select up to four ports of the function extender BUS ANALYZER Agent XM-400 as destination ports. Function extender BUS ANALYZER Agent XM-400 supports port-based, VLAN-based, MAC ACL-based and IP ACL-based mirroring.

- **RSPAN**

  Enable or disable RSPAN for a session.

Procedure

Creating a mirroring session

1. Activate mirroring.
2. Click the "Create" button to create a further entry in the table.

   The session ID is assigned automatically. Depending on the session type selected, you can create one or more mirroring sessions.
3. Select a "Session Type".
4. Click the "Set Values" button.
5. Select a destination port.
6. Click the "Set Values" button to save and activate the selected settings.
7. Change to the following tabs to make further detailed settings for the relevant 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.

Mirroring with RSPAN

1. Create a VLAN for the RSPAN data traffic on all devices involved.

Note

You can only create one RSPAN VLAN.

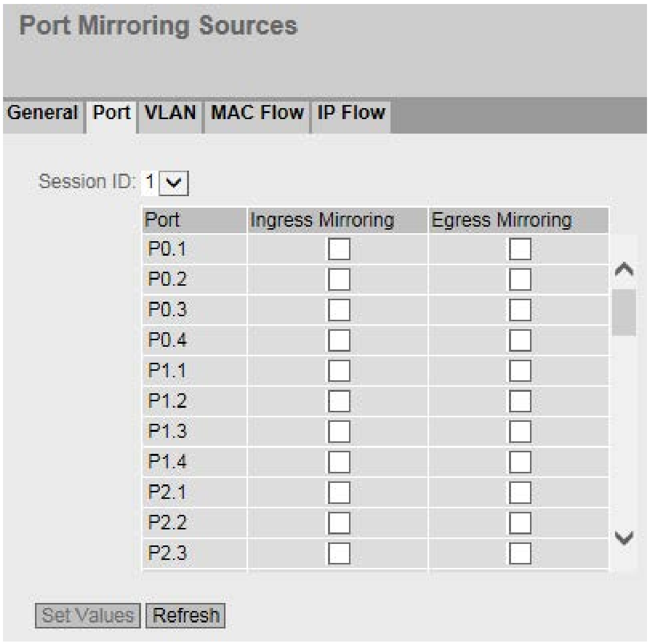
2. Create a mirroring session.
3. Select the "RSPAN VLAN ID".

4. Enable the check box in the "RSPAN" column.
5. Click the "Set Values" button to save the selected settings.

5.5.6.2 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.



Session ID: 1

Port	Ingress Mirroring	Egress Mirroring
P0.1	□	□
P0.2	□	□
P0.3	□	□
P0.4	□	□
P1.1	□	□
P1.2	□	□
P1.3	□	□
P1.4	□	□
P2.1	□	□
P2.2	□	□
P2.3	□	□

Description of the displayed boxes

The page contains the following drop down list:

- **Session ID**
  Select the session you want to monitor. Up to 7 parallel sessions are possible and their ports must not overlap.

The table 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.
- **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.

Steps in configuration

1. In the "Session ID" drop-down list, select the session you created earlier on the "General" tab.
2. 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.
3. Click the "Set Values" button.

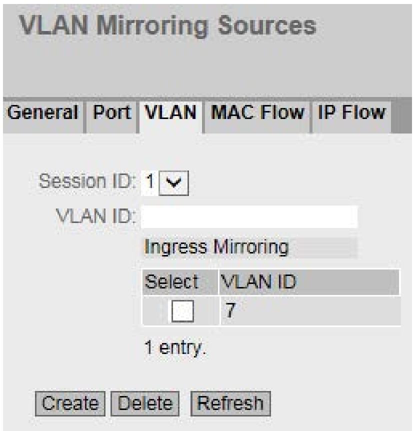
5.5.6.3 VLAN

VLAN sources of the port mirroring

You can only configure the settings on this page if you have already generated a session ID with the session type "VLAN" on the "General" tab.

On this page, you specify the VLAN whose incoming data traffic will be mirrored to the monitor port.

It can happen that data packets are visible on the monitor port that were not received in the defined VLAN. These data packets come from functions that are enabled on the device, e.g. SIMATIC time client. To avoid these data packets when VLAN mirroring, disable the relevant functions on the device before a recording.


VLAN Mirroring Sources

Session ID: 1

VLAN ID:

Ingress Mirroring

Select	VLAN ID
□	7

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **Session ID**

  Select the session you want to monitor. Only one session is possible.
- **VLAN ID**
  Enter the VLAN ID in the "VLAN ID" input box.
  Range of values: 1 ... 4094

The table "Ingress Mirroring " has the following columns:

- **Select**

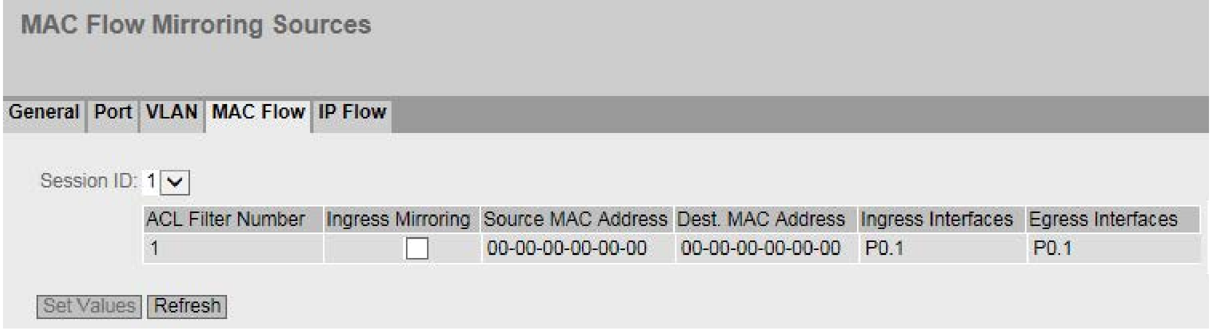
  Select the row you want to delete.
- **VLAN ID**
  Shows the VLAN ID for which the incoming frames are mirrored. The VLAN ID (a number between 1 and 4094) can only be assigned once when creating a new data record and can then no longer be changed. To make a change, the entire data record must be deleted and created again.

5.5.6.4 MAC Flow

ACL filter for port mirroring

You can only configure the settings on this page if you have already generated a session ID with the session type " "MAC ACL" on the "General" tab.

The ACL filter decides which data is available at the monitor port.



Session ID: 1

ACL Filter Number	Ingress Mirroring	Source MAC Address	Dest. MAC Address	Ingress Interfaces	Egress Interfaces
1	□	00-00-00-00-00-00	00-00-00-00-00-00	P0.1	P0.1

Description of the displayed boxes

- **Session ID**
  Select the session you want to monitor. Only one session is possible.
- **ACL Filter Number**
  Shows the number of the ACL filter.
- **Ingress Mirroring**
  Shows whether incoming packets are mirrored.

  Note

  Rules

  The selected rule only becomes active when you specify with which ACL rules the incoming packets will be filtered for at least one interface. You configure the settings in "Security > MAC ACL > Ingress Rules".

- **Source MAC**
  Shows the MAC address of the sender.

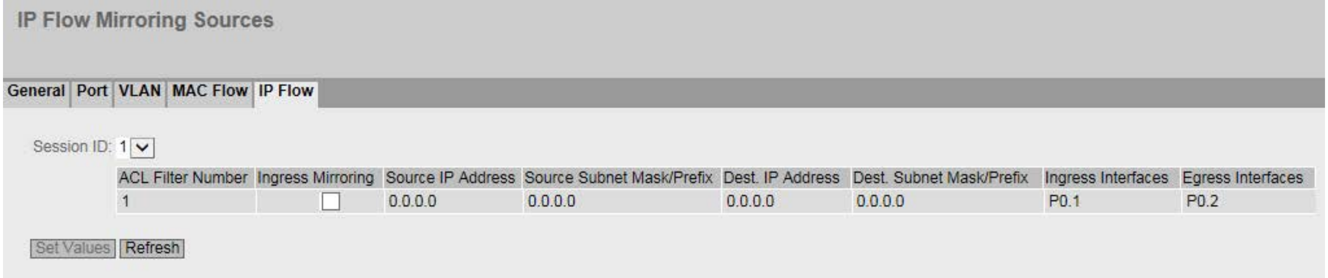
- **Dest. MAC**
  Shows the MAC address of the recipient.
- **Ingress Interfaces**
  Shows all interfaces to which this rule applies. The ACL filter decides which incoming data streams are mirrored on the monitor port (destination port).
- **Egress Interfaces**
  Shows all interfaces to which this rule applies.

5.5.6.5 IP Flow

ACL filter for port mirroring

You can only configure the settings on this page if you have already generated a session ID with the session type " "IP ACL" on the "General" tab.

The ACL filter decides which data is available at the monitor port.



IP Flow Mirroring Sources

Session ID: 1

ACL Filter Number	Ingress Mirroring	Source IP Address	Source Subnet Mask/Prefix	Dest. IP Address	Dest. Subnet Mask/Prefix	Ingress Interfaces	Egress Interfaces
1	□	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	P0.1	P0.2

Description of the displayed boxes

- **Session ID**
  Select the session you want to monitor. Only one session is possible.
- **ACL Filter Number**
  Shows the number of the ACL filter.
- **Ingress Mirroring**
  Shows whether incoming packets are mirrored.

  Note

  Rules

  The selected rule only becomes active when you specify with which ACL rules the incoming packets will be filtered for at least one interface. You configure the settings in "Security > IP ACL > Ingress Rules".

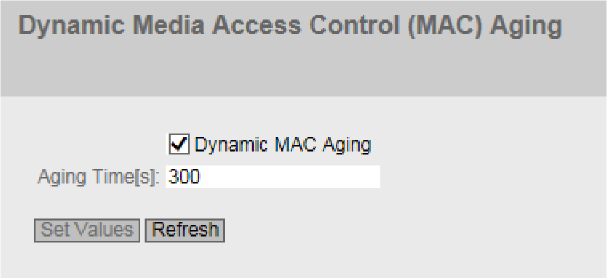
- **Source IP**
  Shows the IPv4 address of the destination device.
- **Source Subnet Mask**
  Shows the subnet mask of the sender.

- **Dest. IP**
  Shows the IPv4 address of the recipient.
- **Dest. Subnet Mask**
  Shows the subnet mask of the recipient.
- **Ingress Interfaces**
  Shows all interfaces to which this rule applies. The ACL filter decides which incoming data streams are mirrored on the monitor port (destination port).
- **Egress Interfaces**
  Shows all interfaces to which this rule applies. The ACL filter decides which outgoing data streams are mirrored on the monitor port (destination port).

5.5.7 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 (for example a programming device) is connected to a different switch port.
If the check box is not enabled, a device does not delete learnt addresses automatically.



Dynamic Media Access Control (MAC) Aging

☑ Dynamic MAC Aging

Aging Time[s]: 300

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. After this time, a learned address is deleted if the device does not receive any further frames from this sender address. The range of values is from 10 seconds to 630 seconds

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.

5.5.8 Ring redundancy

5.5.8.1 Ring

Rules for ring redundancy

Factory settings

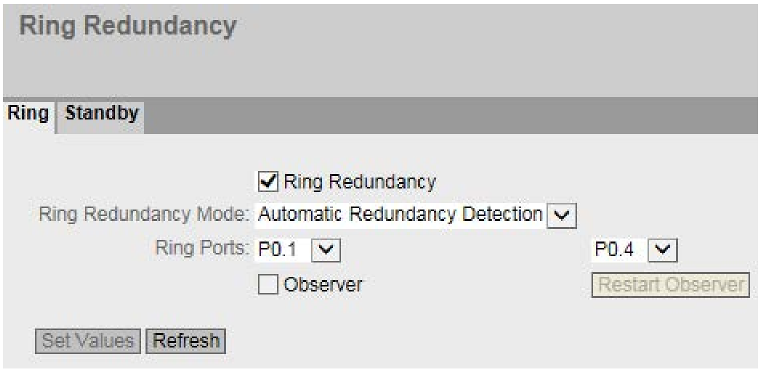
- The factory setting defines MSTP as the redundancy method.
- With SCALANCE XM-400, the factory setting defines ports P1.1 and P1.2 as ring ports.
- With SCALANCE XM-500, the factory setting defines ports P0.1 and P0.2 as ring ports.

Enabling redundancy

You can enable ring redundancy as follows:

- using the WBM
- using the CLI
- using the SELECT/SET button
- using a PROFINET configuration download

Configuration of ring redundancy



☑ Ring Redundancy

Ring Redundancy Mode: Automatic Redundancy Detection

Ring Ports: P0.1 P0.4

□ Observer

- **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 the "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

    The 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 menu is the "Isolated Port" in HRP.

- **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 menu 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.

Restoring factory settings

If you have restored the factory defaults, ring redundancy is disabled and the default ports are used as the ring ports. This can lead to circulating frames and failure of the data traffic if other settings were used in a previous configuration.

Changing over the status of the ring ports with the redundancy manager

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

You can change the ring ports without needing to open the ring.

To change the ring ports, follow the steps below:

1. Change to the page "Layer 2 > Spanning Tree > CIST Port".
2. Disable the ports in the spanning tree you want to configure as ring ports.
3. Change to the page "Layer 2 > Ring Redundancy > Ring".
4. Select the new ring ports.
5. Change the cable connections.

6. Change to the page "Layer 2 > Spanning Tree > CIST Port".
7. Enable the ports in the spanning tree that are no longer ring ports.

5.5.8.2 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

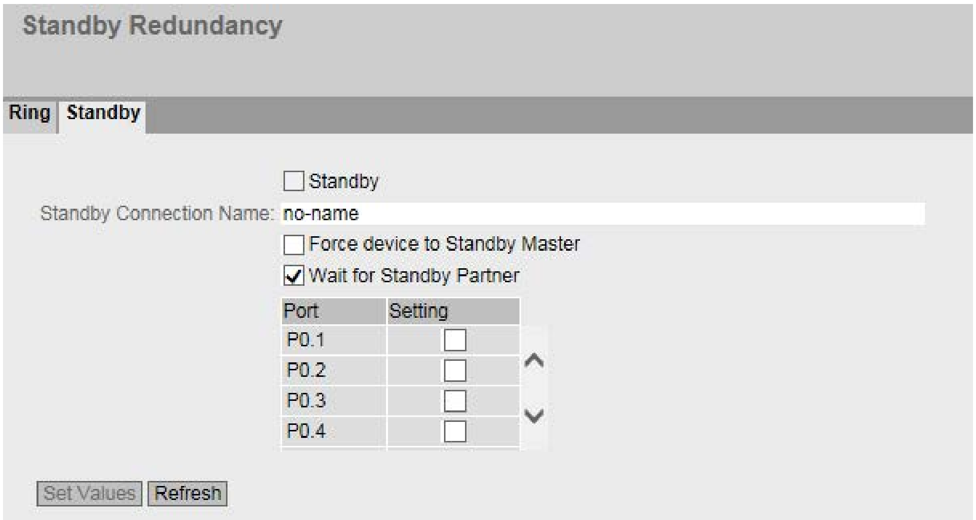
To be able to use the function, HRP must be activated.

The standby manager always requires an activated HRP client.

Note

Standby master coupling with an optical 100 Mbps connection

While the coupling partner of a standby master with an optical 100 Mbps connection starts up again, physically disconnect the connection between the standby master and its coupling partner.


Standby Redundancy

□ Standby

Standby Connection Name: no-name

□ Force device to Standby Master

☑ Wait for Standby Partner

Port	Setting
P0.1	□
P0.2	□
P0.3	□
P0.4	□

Description of the displayed boxes

- **Standby**
  Click the check box to enable or disable the function.

  Note

  If two devices are linked by the standby function, 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.

  Note

  Standby ports in the spanning tree

  Before you enable the port as the standby port, you need to disable the port in the spanning tree.

  1. Change to the page "Layer 2 > Spanning Tree > CIST Port".
  2. Disable the ports in the spanning tree you want to configure as standby ports.

  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 (link) of one of the standby ports 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.

- **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 the option "Force device to Standby Master" is enabled on both devices of a standby coupling, this can lead to circulating frames and therefore to failure of the data traffic. Enable the "Force device to Standby Master" option only on one device of a standby coupling.

- **Wait for Standby Partner**

  – Enabled

  A standby connection is enabled only after the standby master and the standby slave as well as their standby partners have established a connection. This ensures that the redundant connection is really available before communication via a standby connection is enabled.

  – Disabled

  A standby connection is enabled even if the standby master has not yet established a connection to the standby slave.

  This can lead to circulating frames and failure of the data traffic if another standby connection has already been enabled. Multiple standby connections can, for example, result due to configuration errors if different standby connection names were assigned to the standby master and standby slave.

5.5.9 Spanning tree

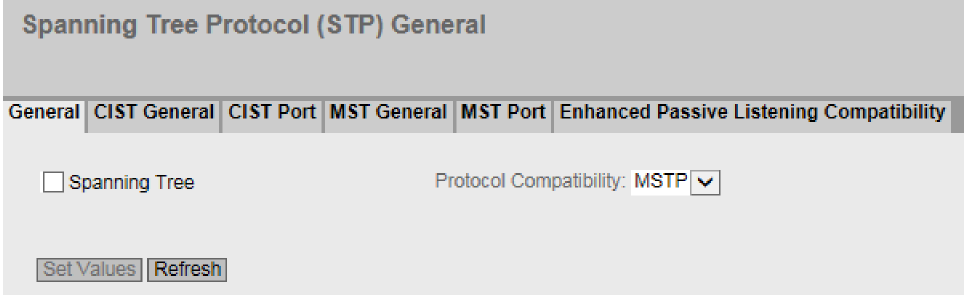
5.5.9.1 General

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.



Spanning Tree Protocol (STP) General

☐ Spanning Tree

Protocol Compatibility: MSTP

Description of the displayed boxes

The page contains the following boxes:

- **Spanning Tree**
  Enable or disable Spanning Tree.
- **Protocol Compatibility**
  Select the compatibility mode of MSTP. For example if you select RSTP, MSTP behaves like RSTP.

  The following settings are available:

  – STP

  – RSTP

  – MSTP

Steps in configuration

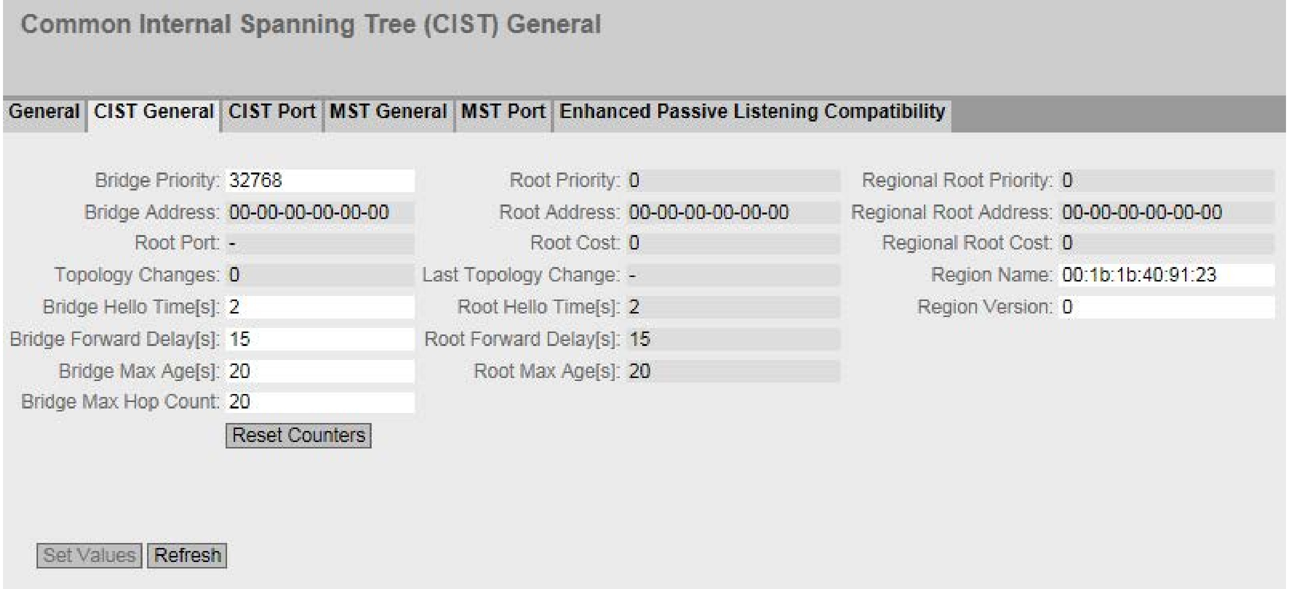
1. Select the "Spanning Tree" check box.
2. From the "Protocol Compatibility" drop-down list, select the type of compatibility.
3. Click the "Set Values" button.

5.5.9.2 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 received by an device. 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.



Common Internal Spanning Tree (CIST) General

Bridge Priority:	32768	Root Priority:	0	Regional Root Priority:	0
Bridge Address:	00-00-00-00-00-00	Root Address:	00-00-00-00-00-00	Regional Root Address:	00-00-00-00-00-00
Root Port:	-	Root Cost:	0	Regional Root Cost:	0
Topology Changes:	0	Last Topology Change:	-	Region Name:	00:1b:1b:40:91:23
Bridge Hello Time[s]:	2	Root Hello Time[s]:	2	Region Version:	0
Bridge Forward Delay[s]:	15	Root Forward Delay[s]:	15		
Bridge Max Age[s]:	20	Root Max Age[s]:	20		
Bridge Max Hop Count:	20				

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 with a range of values from 0 through 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: sec unit after the number
  - Minutes: min unit after the number
  - Hour: hr unit 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. The default for this parameter is 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 parameter. This ensures that operation is only started with the new topology after all the bridges have the required information. The default for this parameter is 15 seconds.
- **Bridge Max Age [s] / Root Max Age [s]**
  When the max age timer elapses the received BPDU is discarded to be accepted as valid by the switch. The default value is 20s.
- **Regional root priority**
  For a description, see Bridge Priority / Root Priority
- **Regional root address**
  The MAC address of the device.
- **Regional Root Costs**
  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.
- **Reset Counters**

  Click this button to reset the counters on this page.

- **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

Steps in configuration

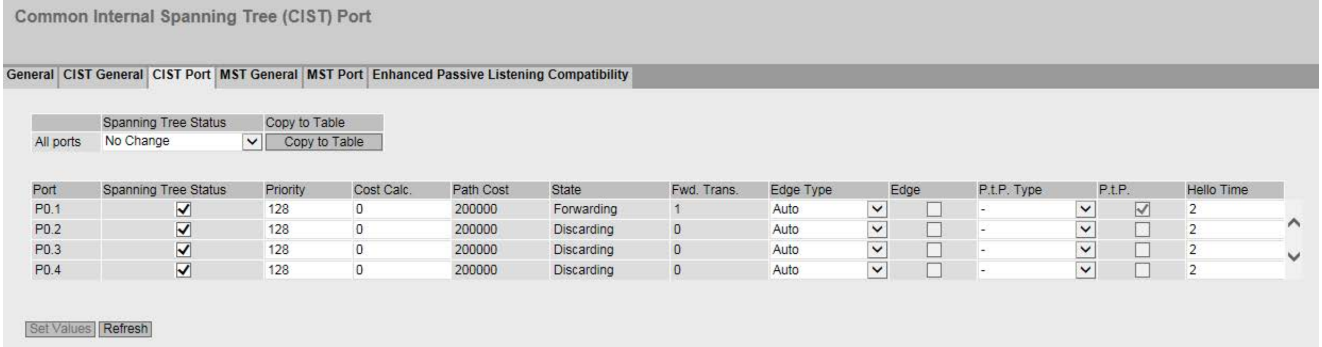
1. Enter the data required for the configuration in the input boxes.
2. Click the "Set Values" button.

5.5.9.3 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.



Common Internal Spanning Tree (CIST) Port

	Spanning Tree Status	Copy to Table
All ports	No Change	Copy to Table

Port	Spanning Tree Status	Priority	Cost Calc.	Path Cost	State	Fwd. Trans.	Edge Type	Edge	P.t.P. Type	P.t.P.	Hello Time
P0.1	☑	128	0	200000	Forwarding	1	Auto	□	-	☑	2
P0.2	☑	128	0	200000	Discarding	0	Auto	□	-	□	2
P0.3	☑	128	0	200000	Discarding	0	Auto	□	-	□	2
P0.4	☑	128	0	200000	Discarding	0	Auto	□	-	□	2

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 is possible for status:
  - 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 EdgePort".
  - 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 for switches.

- **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.

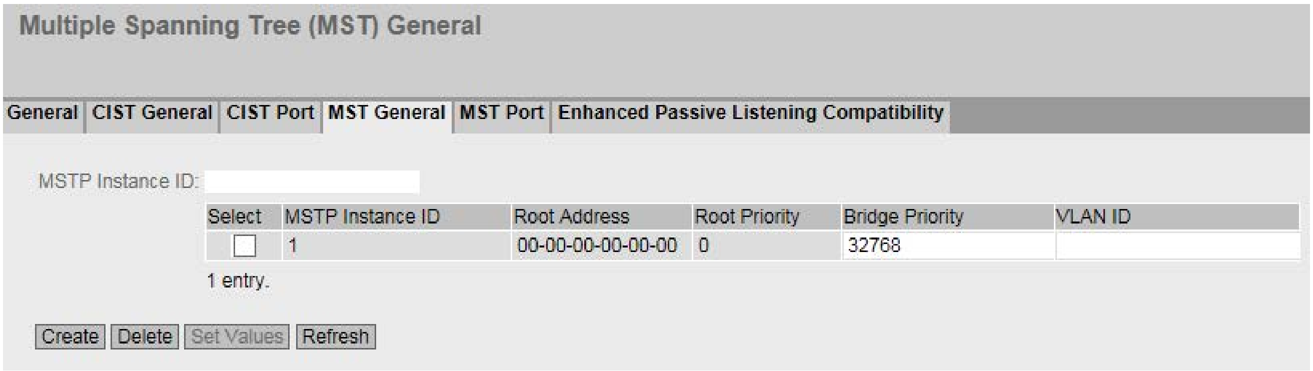
Steps in configuration

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.

5.5.9.4 MST General

Multiple Spanning Tree configuration

With MSTP, in addition to RSTP, several VLANs can be managed in a LAN with separate RSTP trees.


Multiple Spanning Tree (MST) General
General
CIST General
CIST Port
MST General
MST Port
Enhanced Passive Listening Compatibility
Create
Delete
Set Values
Refresh

MSTP Instance ID:

Select	MSTP Instance ID	Root Address	Root Priority	Bridge Priority	VLAN ID
□	1	00-00-00-00-00-00	0	32768	

1 entry.

Description

The page contains the following box:

- **MSTP Instance ID**
  Enter the number of the MSTP instance.
  Permitted values: 1 - 64
  You can define up to 16 MSTP instances.

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 identifier of the virtual LAN in the "VLAN ID" input box.
4. Enter the priority of the bridge in the "Bridge Priority" box.
5. Click the "Set Values" button.

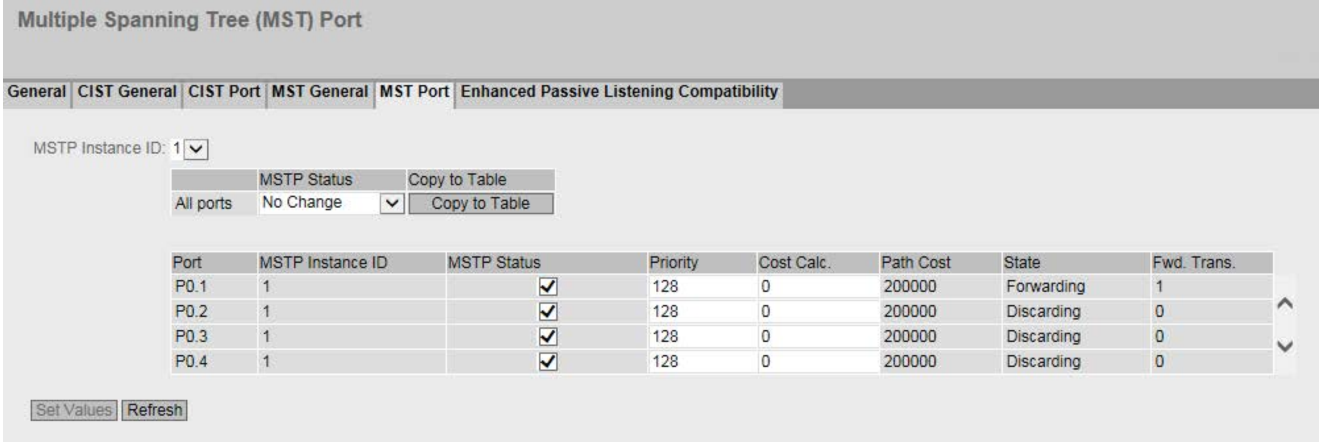
Deleting entries

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.

5.5.9.5 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.



Multiple Spanning Tree (MST) Port

MSTP Instance ID: 1

	MSTP Status	Copy to Table
All ports	No Change	Copy to Table

Port	MSTP Instance ID	MSTP Status	Priority	Cost Calc.	Path Cost	State	Fwd. Trans.
P0.1	1	☑	128	0	200000	Forwarding	1
P0.2	1	☑	128	0	200000	Discarding	0
P0.3	1	☑	128	0	200000	Discarding	0
P0.4	1	☑	128	0	200000	Discarding	0

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.
  The default is 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 is selected.
  If the value in the "Cost Calc." box is "0", the automatically calculated value is displayed. 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:
  - 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.

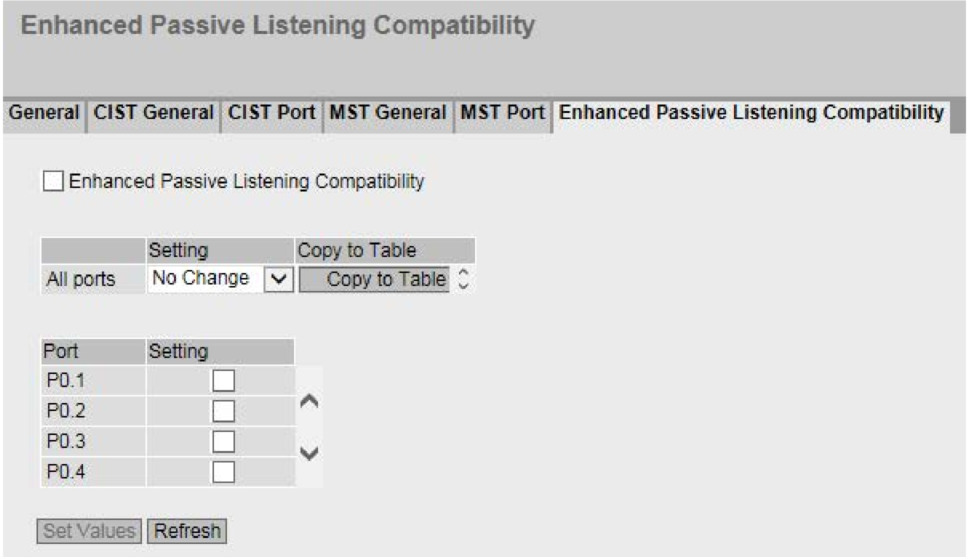
Steps in configuration

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.

5.5.9.6 Enhanced Passive Listening Compatibility

Enabling the function

On this page, you can enable passive listening compatibility.


Enhanced Passive Listening Compatibility
General
CIST General
CIST Port
MST General
MST Port
Enhanced Passive Listening Compatibility
Set Values
Refresh

□ Enhanced Passive Listening Compatibility

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	□
P0.2	□
P0.3	□
P0.4	□

Description of the displayed boxes

The page contains the following boxes:

- **Enhanced Passive Listening Compatibility**
  Enable or disable this function for the entire device.
- **Setting**
  - Enabled

    Enables the function for all ports of the device.
  - Disabled

    Disables the function for all ports of the device.
  - No Change

    No Change
- **Copy to Table**

  Writes the setting made in "Setting" to the following table

Port-specific table:
If the function is enabled for the entire device, enable or disable this function on individual ports.

- **Port**

  Displays the port of the device.
- **Setting**

  Enable or disable the function for this port.

Steps in configuration

Enable the function for the entire device

1. Enable or disable "Enhanced Passive Listening Compatibility"
2. Click the "Set Values" button.

For all ports of the device:

1. From the drop-down list, select whether the function should be enabled or disabled or adopted unchanged.
2. Click the "Copy to Table" button.
3. Click the "Set Values" button.

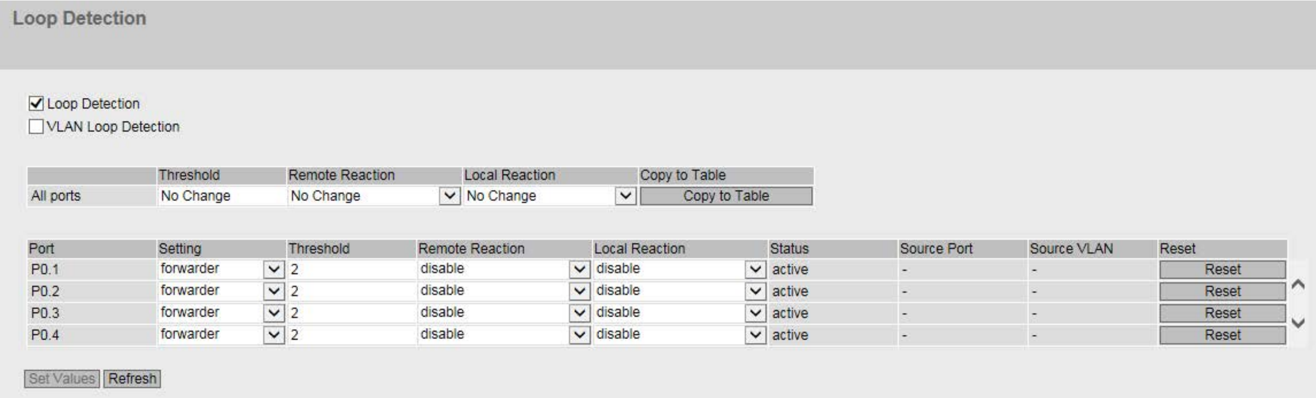
For individual ports of the device:

1. Click the check box after the required port in the port table to enable or disable the function.
2. Click the "Set Values" button.

5.5.10 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 "remote loop" involving other network components.



Loop Detection

☑ Loop Detection

□ VLAN Loop Detection

	Threshold	Remote Reaction	Local Reaction	Copy to Table
All ports	No Change	No Change	No Change	Copy to Table

Port	Setting	Threshold	Remote Reaction	Local Reaction	Status	Source Port	Source VLAN	Reset
P0.1	forwarder	2	disable	disable	active	-	-	Reset
P0.2	forwarder	2	disable	disable	active	-	-	Reset
P0.3	forwarder	2	disable	disable	active	-	-	Reset
P0.4	forwarder	2	disable	disable	active	-	-	Reset

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

- **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 Change: A loop has no effect on the port.
  – disabled: 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 Change: A loop has no effect on the port.
  – disabled: 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 this button "Reset 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 "Loop Detection”. The port status "Link down" is not changed by "Loop Detection".

Effects of configuration using STEP 7

The configuration of Spanning Tree can be changed if you configure "Loop Detection" using STEP 7.

If you enable "Loop Detection" on a port with STEP 7, Spanning Tree is automatically disabled on this port. If you disable "Loop Detection" for the port again with STEP 7 Spanning Tree is not automatically enabled. Enable Spanning Tree with the WBM or CLI.

5.5.11 Link aggregation

Bundling network connections for redundancy and higher bandwidth

Link aggregations according to IEEE 802.3ad allow several connections between neighboring devices to be bundled to achieve higher bandwidths and protection against failure.

Ports on both partner devices are included in link aggregations and the devices are then connected via these ports. To assign ports (in other words links) 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.

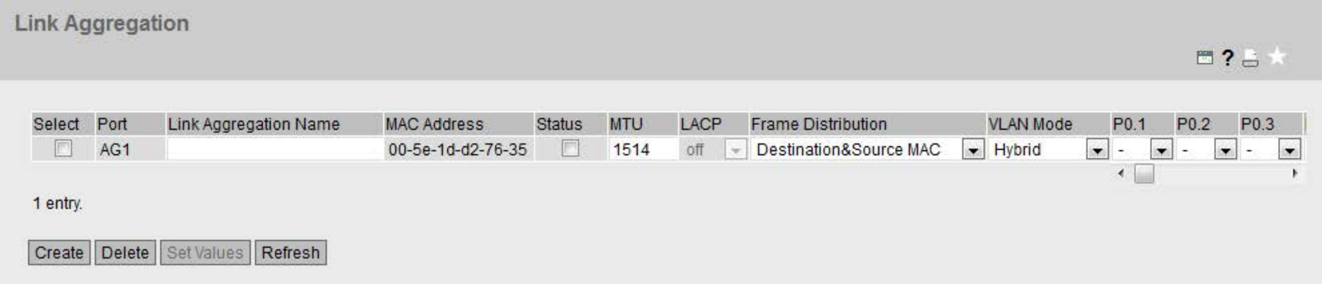
Note

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

The menu displays all the configured link aggregations.



Link Aggregation

Select	Port	Link Aggregation Name	MAC Address	Status	MTU	LACP	Frame Distribution	VLAN Mode	P0.1	P0.2	P0.3
□	AG1		00-5e-1d-d2-76-35	□	1514	off	Destination&Source MAC	Hybrid	-	-	-

1 entry.

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.
- **MTU**
  Specify the packet size.
- **LACP**
  - On
    Enables the sending of LACP frames.
  - Off
    Disables the sending of LACP frames.
- **Frame Distribution**
  Set the type of distribution of frames on the individual links of an aggregation.
  - Destination&Source MAC
    The distribution is based on a combination of the destination and source MAC address.
  - Destination&Source IP MAC
    The distribution is based on a combination of the destination and source IP and 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.
  - "" (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".

Note

If you add a configured port to a link aggregation, the port adopts the configuration of the link aggregation. If you take the port out of the link aggregation, the settings of the port are reset to the factory settings.

Steps in configuration

Basics prior to configuration

1. First, identify the ports you want to put together 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 an aggregation

1. Using the check box at the beginning of a row, select the link aggregation you want to delete.
2. Click the "Delete" button.

Changing an 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.

5.5.12 DCP forwarding

Applications

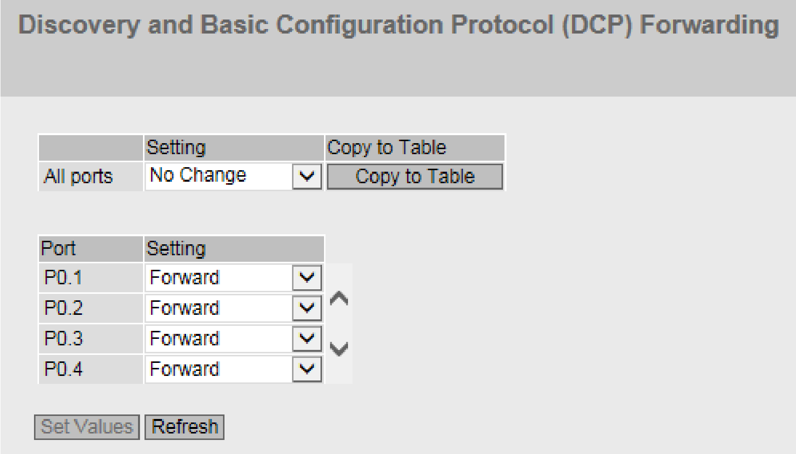
The DCP protocol is used by STEP 7 and the PST Tool for configuration and diagnostics. When shipped, DCP is enabled on all ports; in other words, DCP frames are forwarded at all ports. With this option, you can disable the sending of these frames for individual ports, for example to prevent individual parts of the network from being configured with the PST Tool or to divide the full network into smaller parts for configuration and diagnostics.

Note

PROFINET configuration

Since DCP is a PROFINET protocol, the configuration created here is only effective with the VLAN associated with the TIA interface.

All the ports of the device are displayed on this page. After each displayed port, there is a drop-down list for function selection.



Discovery and Basic Configuration Protocol (DCP) Forwarding

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	Forward
P0.2	Forward
P0.3	Forward
P0.4	Forward

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.

5.5.13 LLDP

Identifying the network topology

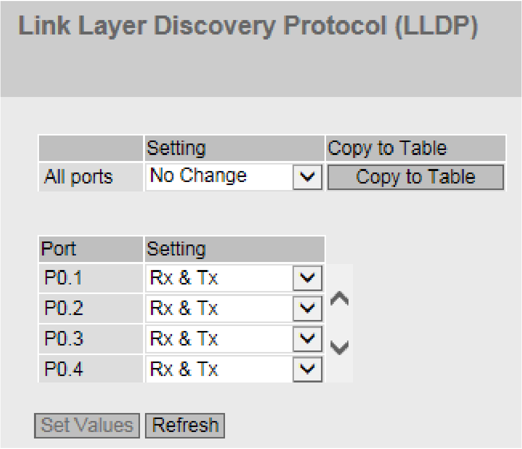
LLDP (Link Layer Discovery Protocol) is defined in the IEEE 802.AB standard.

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 in the MIB.

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.



Link Layer Discovery Protocol (LLDP)

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	Rx & Tx
P0.2	Rx & Tx
P0.3	Rx & Tx
P0.4	Rx & Tx

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 port.
- **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. From the drop-down list in the row of the port you want to configure, select the LLDP functionality.
2. Click the "Set Values" button.

5.5.14 Fiber Monitoring Protocol

Requirements

- To be able to use the fiber monitoring function, enable LLDP. The fiber monitoring information is appended to the LLDP packets.
- You can only use Fiber Monitoring with transceivers capable of diagnostics. Note the documentation of the devices.

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.

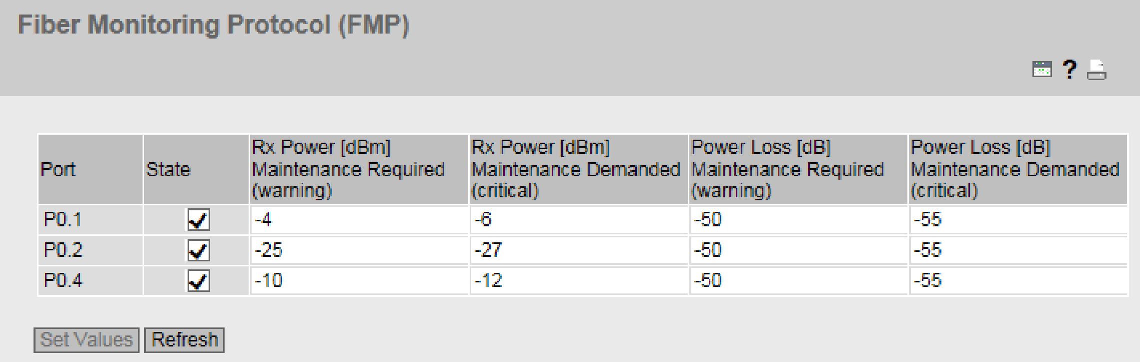
If fiber monitoring is enabled on the connection partner, the connection partner transfers the current value for the transmit power of the port to the device. The device compares the value it has received for the transmit power with the actually received power. The difference between the received power 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.



Fiber Monitoring Protocol (FMP)

Port	State	Rx Power [dBm] Maintenance Required (warning)	Rx Power [dBm] Maintenance Demanded (critical)	Power Loss [dB] Maintenance Required (warning)	Power Loss [dB] Maintenance Demanded (critical)
P0.1	☑	-4	-6	-50	-55
P0.2	☑	-25	-27	-50	-55
P0.4	☑	-10	-12	-50	-55

Description of the displayed boxes

In the first table you can specify the limit values for the measured received power and the calculated power loss to be monitored.

- **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 pluggable 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 pluggable 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.

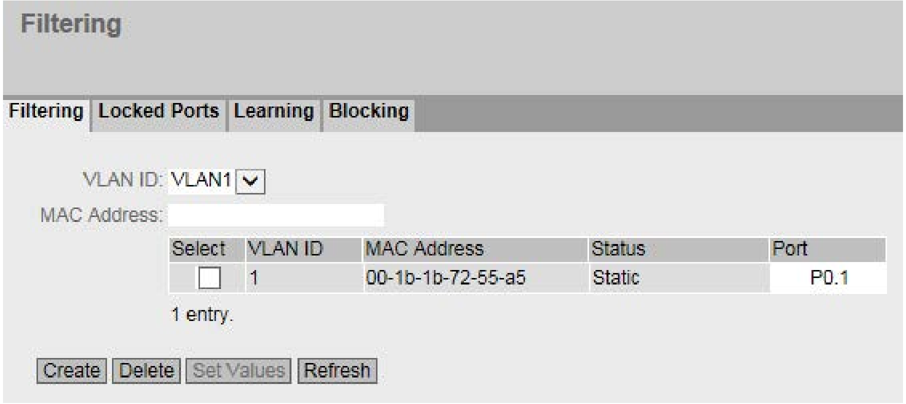
5.5.15 Unicast

5.5.15.1 Filtering

Address filtering

This table shows the unicast addresses entered statically by the user during parameter assignment.

On this page, you also define the static unicast filters.



VLAN ID: VLAN1

MAC Address:

Select	VLAN ID	MAC Address	Status	Port
□	1	00-1b-1b-72-55-a5	Static	P0.1

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **VLAN ID**
  Select the VLAN ID in 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**
  Shows the status of each address entry:
  - Static
    Configured by the user. Static addresses are stored permanently; in other words, they are not deleted when the Aging TimeAging Time expires or when the switch is restarted.
  - Invalid
    These values are not evaluated.
- **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. Select the relevant 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.

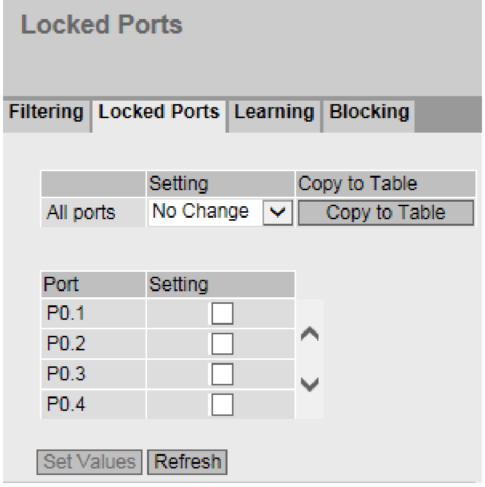
5.5.15.2 Locked ports

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").



Locked Ports

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	□
P0.2	□
P0.3	□
P0.4	□

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.

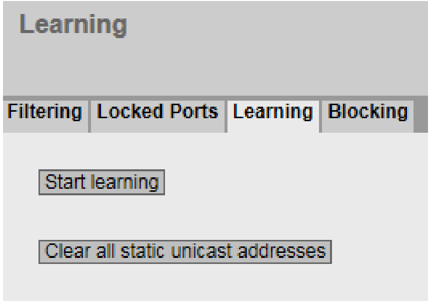
5.5.15.3 Learning

Starting/stopping learning

With the automatic learning function, all connected devices are automatically entered 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 really been learned. 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.

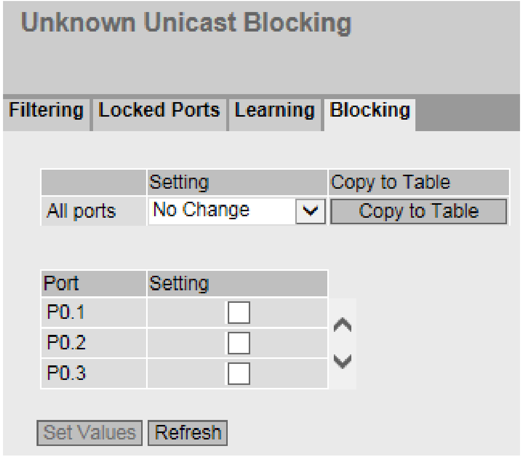
Note

Depending on the number of entries involved, deleting may take some time.

5.5.15.4 Unicast blocking

Blocking forwarding of unknown unicast frames

On this page, you can block the forwarding of unknown unicast frames for individual ports.



Unknown Unicast Blocking

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	□
P0.2	□
P0.3	□

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**
  All available ports are listed in this column. Unavailable ports are not displayed.
- **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.

5.5.16 Multicast

5.5.16.1 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

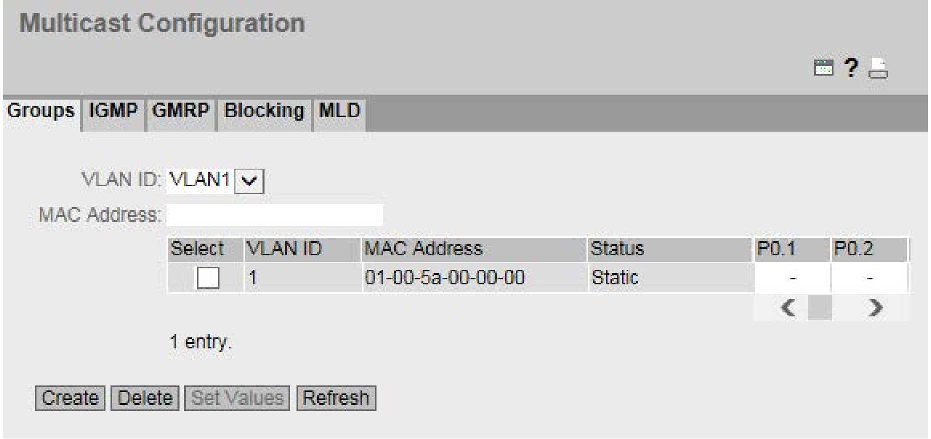
In contrast to unicast frames, multicast frames represent a higher load for the device. Generally, multicast frames are sent to all ports. There are three ways of reducing the load caused by multicast frames:

- Static entry of the addresses in the multicast filter table.
- Dynamic entry of the addresses by listening in on IGMP/MLD parameter assignment frames (IGMP/MLD 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 (static).

Configuring multicast addresses



VLAN ID: VLAN1

MAC Address:

Select	VLAN ID	MAC Address	Status	P0.1	P0.2
□	1	01-00-5a-00-00-00	Static	-	-

1 entry.

Description of the displayed boxes

The page contains 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 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 slot. Within a 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. Moreover, this address must not be an address learned dynamically with GMRP or IGMP/MLD.
  - –
    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. Select the required VLAN ID from the ""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.

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 completed and the layer 2 multicast addresses have been created.

Deleting an entry

1. Select the check box in the row to be deleted.
2. Click the "Delete" button.
   The row is deleted from the display and from the memory of the device.

5.5.16.2 IGMP

Function

IE switches support "IGMP snooping" and the IGMP querier function. If "IGMP snooping" is enabled, IGMP frames are evaluated and the multicast filter table is updated with this information. If "IGMP Querier is also enabled, IE switches also send 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

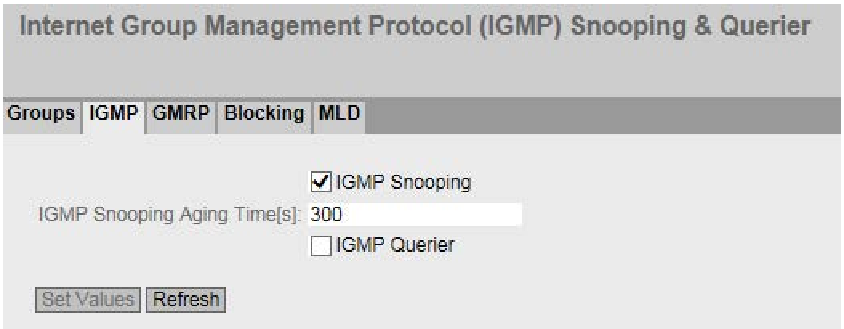
SCALANCE XR500 as IGMP querier

If a SCALANCE XR500 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


Internet Group Management Protocol (IGMP) Snooping & Querier
Groups
IGMP
GMRP
Blocking
MLD
Set Values
Refresh

☑ IGMP Snooping

IGMP Snooping Aging Time[s]: 300

□ IGMP Querier

The page contains the following boxes:

- IGMP Snooping
  Enable or disable IGMP (Internet Group Management Protocol). 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. Range of values: 130 - 1225 seconds
- IGMP Querier
  Enable or disable "IGMP Querier". The device sends IGMP queries.

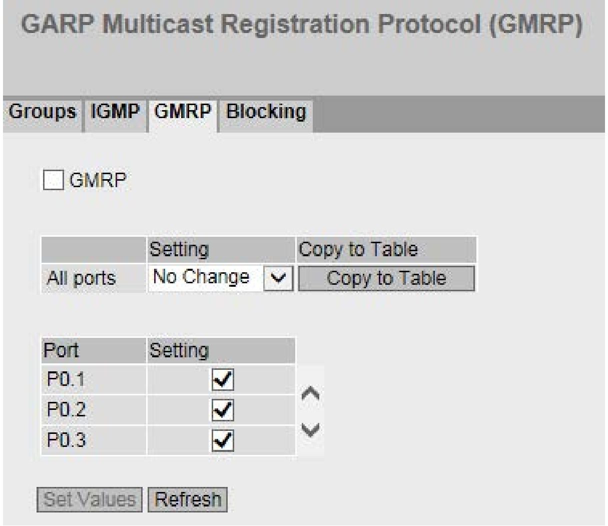
Steps in configuration

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.

5.5.16.3 GMRP

Activating GMRP

By selecting the check box, 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.



GARP Multicast Registration Protocol (GMRP)

☐ GMRP

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	☑
P0.2	☑
P0.3	☑

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 each individual 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.

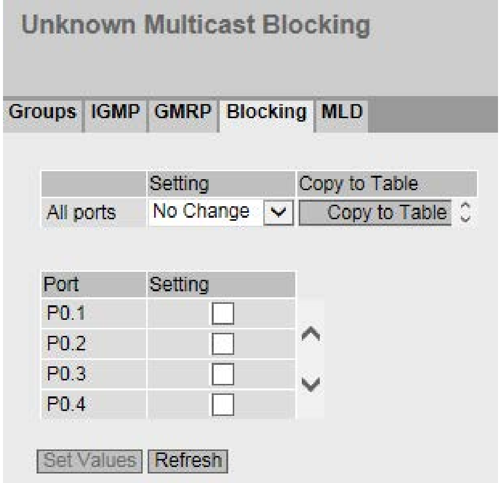
Enabling the sending of GMRP frames for all ports

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.

5.5.16.4 Multicast blocking

Disabling the forwarding of unknown multicast frames

On this page, you can block the forwarding of unknown multicast frames for individual ports.


Unknown Multicast Blocking

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	□
P0.2	□
P0.3	□
P0.4	□

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.

5.5.16.5 MLD (IPv6)

Mulitcast Listener Discovery

Devices support "MLD snooping" and the "MLD querier" function. If "MLD snooping" is enabled, MLD frames are evaluated and the multicast filter table is updated with this information. If "IGMP querier is also enabled, IE switches also send MLD queries that trigger responses from MLD-compliant nodes.

With MLD snooping, MLD frames are only forwarded to the intended multicast listeners instead of being flooded to all ports.

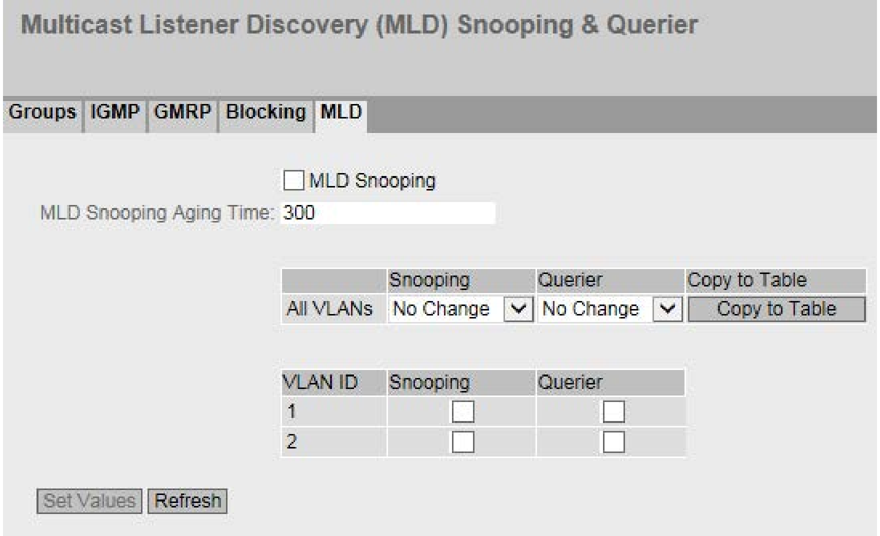
For MLD snooping to work, you need to enable the function globally and in the VLANs.

MLD Snooping Aging Time

On this page, you can configure the aging time for MLD configuration. When the time elapses, entries created by MLD are deleted from the address table if they are not updated by a new MLD packet.

This applies to all VLANS; a VLAN-specific configuration is not possible.

Description



Multicast Listener Discovery (MLD) Snooping & Querier

□ MLD Snooping

MLD Snooping Aging Time: 300

	Snooping	Querier	Copy to Table
All VLANs	No Change	No Change	Copy to Table

VLAN ID	Snooping	Querier
1	□	□
2	□	□

The page contains the following:

- **MLD Snooping**

  Enable or disable MLD on the device.

- **MLD Snooping Aging Time**

  Enter the time after which entries generated by MLD are deleted from the multicast filter table. Assuming that this is not updated by a new MLD packet.

  This applies to all VLANS; a VLAN-specific configuration is not possible

Table 1 has the following columns:

- **1st column**

  Shows that the settings are valid for all VLANs of table 2.

- **Snooping / Querier**

  Select the setting. You have the following setting options:

  – Enabled

    The function is enabled.

  – Disabled

    The function is disabled.

  – 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:

- **VLAN ID**

  Shows the VLAN to which the settings relate

- **Snooping**

  Enable or disable MLD for the required VLAN. When enabled, the MLD entries are included the multicast filter table and MLD packets are forwarded.

- **Querier**

  Enable or disable "Querier". The device sends MLD queries.

Steps in configuration

Enabling the sending of MLD frames for a VLAN

1. Select the "MLD Snooping" 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 MLD frames for all VLANs

1. Select the "MLD Snooping" check box.
2. Select the "enabled" entry in the "Snooping" and "Querier" drop-down lists.
3. Click the "Copy to table" button. The check box is enabled for all VLANs in table 2.
4. To apply the changes, click the "Set Values" button.

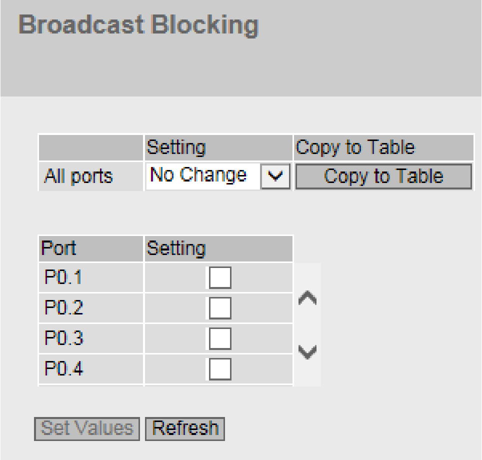
5.5.17 Broadcast

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.



Broadcast Blocking

	Setting	Copy to Table
All ports	No Change	Copy to Table

Port	Setting
P0.1	□
P0.2	□
P0.3	□
P0.4	□

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 and the link aggregations 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, 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.

5.5.18 PTP

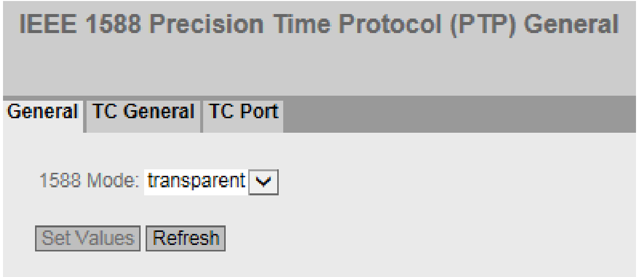
5.5.18.1 General

The following devices support time-of-day synchronization using PTP:

- SCALANCE XR528-6M
- SCALANCE XR552-12M

IEEE 1588 with SCALANCE devices

The IEEE 1588v2 standard defines mechanisms with which highly precise time of day synchronization of devices in a network can be achieved. SCALANCE devices with suitable hardware support time synchronization according to IEEE 1588v2. The functionality is disabled on these devices when they are shipped and following a "Reset to factory default". To be able to use PTP, enable this function and configure every port that is on the synchronization path as well as ports that are blocked due to redundancy mechanisms. PTP can also be used with redundancy mechanisms in the ring such as HRP, standby linking of rings, MRP and RSTP. The following sections describe the configuration options of Web Based Management.


IEEE 1588 Precision Time Protocol (PTP) General

1588 Mode: transparent

1588 Configuration

On this page, you specify how the device will process PTP messages.

1588 Mode
You can make the following settings:

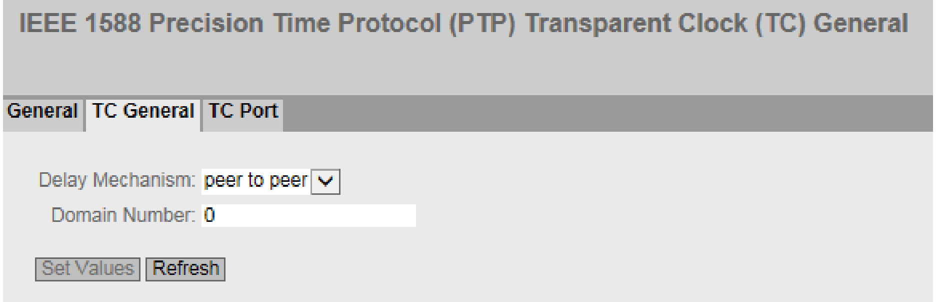
- **off**
  The device does not process any PTP messages. PTP messages are, however, forwarded according to the rules of the switch.
- **transparent**
  The device adopts the function of a transparent clock and forwards PTP messages to

other nodes while at the same time making entries in the correction field of the PTP message.

5.5.18.2 TC General

TC General

On this tab, you will find the general settings for PTP.



IEEE 1588 Precision Time Protocol (PTP) Transparent Clock (TC) General

Delay Mechanism: peer to peer

Domain Number: 0

1588 Transparent Clock Configuration

Delay Mechanism
Specify the delay mechanism the device will work with:

- end to end

  (Delay request response mechanism will be used)

  Note

  With end-to-end synchronization with more than 2 slaves, freak values > 100 ns can occur in the offset.

- peer to peer

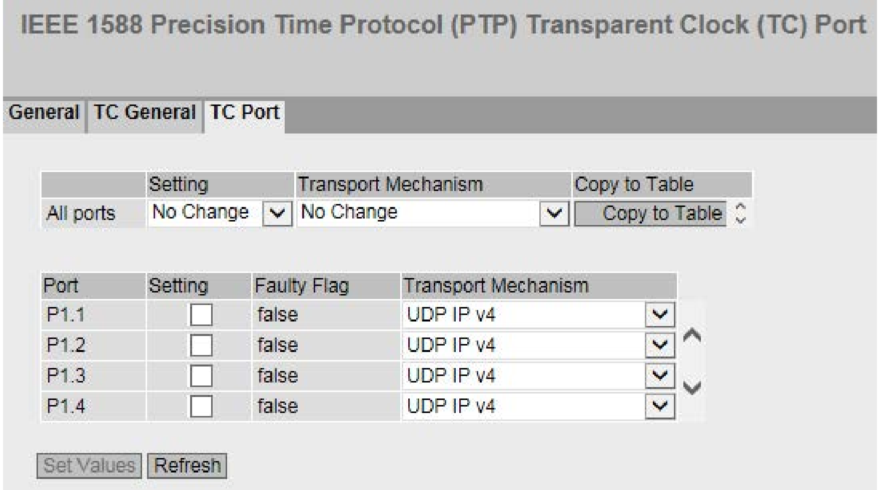
  (Peer delay mechanism will be used)

Domain Number
Enter the domain number for the device here. The device ignores PTP messages with a different domain number. A SCALANCE device can only be assigned to one synchronization domain.

5.5.18.3 TC Port

TC port

This tab contains the port settings for PTP.



IEEE 1588 Precision Time Protocol (PTP) Transparent Clock (TC) Port

	Setting	Transport Mechanism	Copy to Table
All ports	No Change	No Change	Copy to Table

Port	Setting	Faulty Flag	Transport Mechanism
P1.1	□	false	UDP IP v4
P1.2	□	false	UDP IP v4
P1.3	□	false	UDP IP v4
P1.4	□	false	UDP IP v4

1588 Transparent Clock Port Parameters

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.

- **Transport Mechanism**
  The following settings are possible:

  – Ethernet

  – UDP IPv4

  – No Change

    If "No Change" is selected, the entry in table 2 remains unchanged.

Table 2 shows detailed information about the individual ports:

- **Port**
  The port number. With modular devices, the slot number and port number are displayed separated by a dot.
- **Setting**

  The port status. The following entries are possible:

  – disabled
    The port is not involved in PTP.

  – enabled
    The port processes PTP messages.
- **Faulty Flag**
  The error status relating to PTP.

  – true

    An error occurred.

  – false
    No error has occurred on this port.
- **Transport mechanism**
  Choose how this port will handle PTP message data traffic. You can make different settings for the ports of a device, however, the relevant communications partner must support the selected transport mechanism. The following settings are possible:

  – Ethernet

  – UDP IPv4

5.5.19 RMON

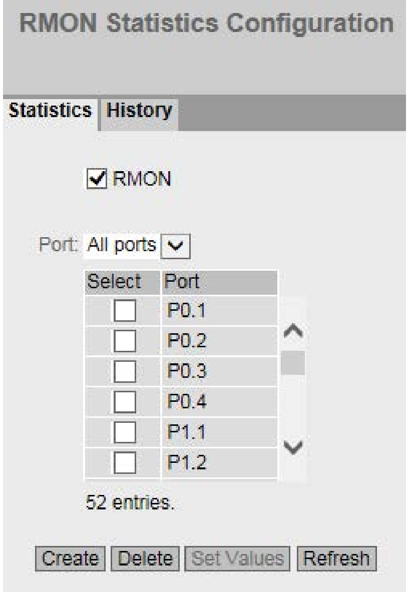
5.5.19.1 Statistics

Statistics

On this page you can specify the ports for which RMON statistics are displayed.

The RMON statistics are displayed on the "Information > Ethernet Statistics" page on the "Packet Size", "Telegrammtyp" and "Packet Error" tabs.

Settings



☑ RMON

Port: All ports

Select	Port
□	P0.1
□	P0.2
□	P0.3
□	P0.4
□	P1.1
□	P1.2

52 entries.

- **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 "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.

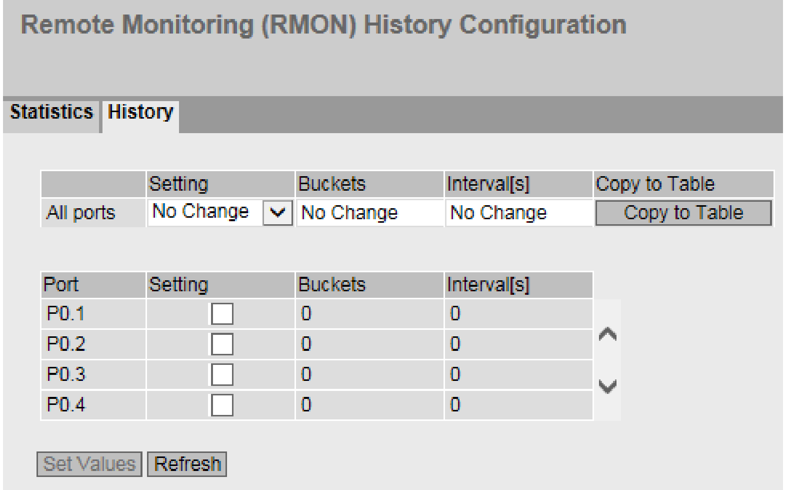
   No RMON statistics are displayed for the selected port.

5.5.19.2 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



Remote Monitoring (RMON) History Configuration

	Setting	Buckets	Interval[s]	Copy to Table
All ports	No Change	No Change	No Change	Copy to Table

Port	Setting	Buckets	Interval[s]
P0.1	□	0	0
P0.2	□	0	0
P0.3	□	0	0
P0.4	□	0	0

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.
- **Interval [s]**

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

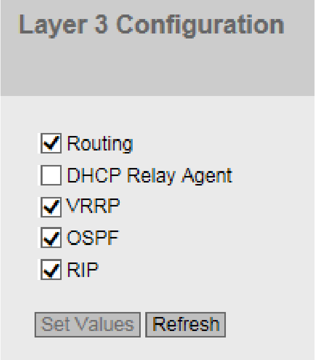
5.6 The "Layer 3 (IPv4)" menu

5.6.1 Configuration

Introduction

The page contains the overview of the layer 3 functions for IPv4 of the device. On this page, you enable or disable the required layer 3 function.

Die functions "Routing", "VRRP", "RIP" and "OSPF" are available only on layer 3.



Layer 3 Configuration

☑ Routing
□ DHCP Relay Agent
☑ VRRP
☑ OSPF
☑ RIP

Description of the displayed boxes

The page contains the following boxes:

- **Routing** (only available with devices with a layer 3 license)
  - Enabled

    IPv4 routing is enabled. You can only enable the routing function if DHCP is disabled on all configured interfaces.
  - Disabled

    IPv4 routing is disabled. If IPv6 routing is enabled, this is also disabled.
- **DHCP Relay Agent**
  Enable or disable the DHCP relay agent. You can configure other settings in "Layer 3 (IPv4)> DHCP Relay Agent".
- **VRRP** (only available with devices with a layer 3 license)
  Enable or disable routing using VRRP. To use VRRP, first enable the routing function. You can configure other settings in "Layer 3 (IPv4) > VRRP".
- **OSPF** (only available with devices with a layer 3 license)
  Enable or disable routing using OSPF. To use OSPF, first enable the "Routing" function. You can configure other settings in "Layer 3 (IPv4) > OSPF".
- **RIP** (only available with devices with a layer 3 license)
  Enable or disable routing using RIP. To use RIP , first enable the routing function. You can configure other settings in "Layer 3 (IPv4)> RIP".

Steps in configuration

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

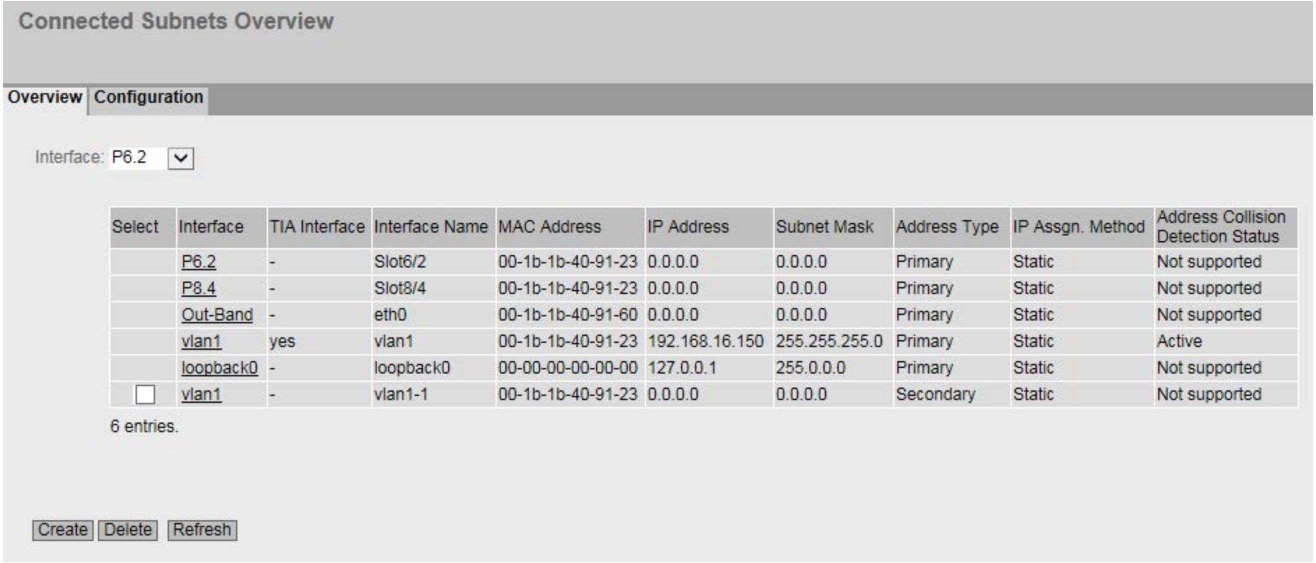
5.6.2 Subnets

5.6.2.1 Overview

Creating subnets

The page shows the subnets for the selected interface. If more than one subnet is available on an interface, in the first entry of this interface is of the address type "Primary".

All other subnets are created on this page. A subnet always relates to an interface. The interface is created on the "Configuration" tab.



Interface: P6.2

Select	Interface	TIA Interface	Interface Name	MAC Address	IP Address	Subnet Mask	Address Type	IP Assgn. Method	Address Collision Detection Status
	P6.2	-	Slot6/2	00-1b-1b-40-91-23	0.0.0.0	0.0.0.0	Primary	Static	Not supported
	P8.4	-	Slot8/4	00-1b-1b-40-91-23	0.0.0.0	0.0.0.0	Primary	Static	Not supported
	Out-Band	-	eth0	00-1b-1b-40-91-60	0.0.0.0	0.0.0.0	Primary	Static	Not supported
	vlan1	yes	vlan1	00-1b-1b-40-91-23	192.168.16.150	255.255.255.0	Primary	Static	Active
	loopback0	-	loopback0	00-00-00-00-00-00	127.0.0.1	255.0.0.0	Primary	Static	Not supported
☐	vlan1	-	vlan1-1	00-1b-1b-40-91-23	0.0.0.0	0.0.0.0	Secondary	Static	Not supported

6 entries.

Description of the displayed values

The page contains the following boxes:

- **Interface**
  Select the interface on which you want to configure another subnet.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Interface**
  Shows the interface.

- **TIA Interface**
  Shows the selected TIA interface.
- **Interface Name**
  Shows the name of the interface.
- **MAC Address**
  Shows the MAC address.
- **IP Address**
  Shows the IPv4 address of the subnet.
- **Subnet Mask**
  Shows the subnet mask.
- **Address Type**
  Displays the address type. The following values are possible:
  - Primary
    The first IPv4 address that was configured on an IPv4 interface.
  - Secondary
    All other IPv4 address that were configured on an IPv4 interface.
- **IP Assgn Method**
  Shows how the IPv4 address is assigned. The following values are possible:
  - Static
    The IPv4 address is static. You enter the settings in "IP Address" and "Subnet Mask".
  - Dynamic (DHCP)
    The device obtains a dynamic IPv4 address from a DHCPv4 server.
- **Address Collision Detection Status**

  If new IPv4 addresses become active in the network, the "Address Collision Detection" function checks whether this can result in address collisions. The allows IPv4 addresses that would be assigned twice to be detected.

  Note

  The function does not run a cyclic check.

  This column shows the current status of the function. The following values are possible:
  - Idle

    The interface is not enabled and does not have an IPv4 address.
  - Starting

    This status indicates the start-up phase. In this phase, the device initially sends a query as to whether the planned IPv4 address already exists. If the address is not yet been assigned, the device sends the message that it is using this IP address as of now.

– Conflict

  The interface is not enabled. The interface is attempting to use an IPv4 address address that has already been assigned.

– Defending

  The interface uses a unique IPv4 address. Another interface is attempting to use the same IPv4 address.

– Active

  The interface uses a unique IPv4 address. There are no collisions.

– Not supported

  The function for detection of address collisions is not supported.

– Disabled

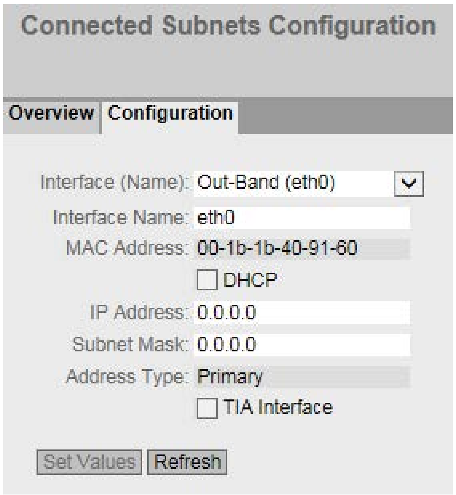
  The function for detection of address collisions is disabled.

Steps in configuration

1. Select the interface from the "Interface" drop-down list.
2. Click the "Create" button. A new row is inserted in the table.
3. Click the "Set Values" button. Configure the subnet on the "Configuration" tab.

5.6.2.2 Configuration

On this page, you configure the IPv4 interface.



Connected Subnets Configuration

Interface (Name): Out-Band (eth0)
Interface Name: eth0
MAC Address: 00-1b-1b-40-91-60
□ DHCP
IP Address: 0.0.0.0
Subnet Mask: 0.0.0.0
Address Type: Primary
□ TIA Interface

Description of the displayed values

The page contains the following boxes:

- **Interface (name)**
  Select the interface from the drop-down list.
- **Interface Name**
  Enter the name of the interface.
- **MAC Address**

  Displays the MAC address of the selected interface.
- **DHCP**

  Enable or disable the DHCP client for this IPv4 interface.

  Note

  If you want to operate the device as a router with several interfaces, disable DHCP on all interfaces.
- **IP Address**
  Enter the IPv4 address of the interface. The IPv4 addresses must not be used more than once.
- **Subnet Mask**
  Enter the subnet mask of the subnet you are creating. Subnets on different interfaces must not overlap.
- **Address Type**
  Shows the address type. The following values are possible:
  - Primary
    The first subnet of the interface.
  - Secondary
    All further subnets of the interface.
- **TIA Interface**
  Select whether or not this interface should become the TIA Interface.

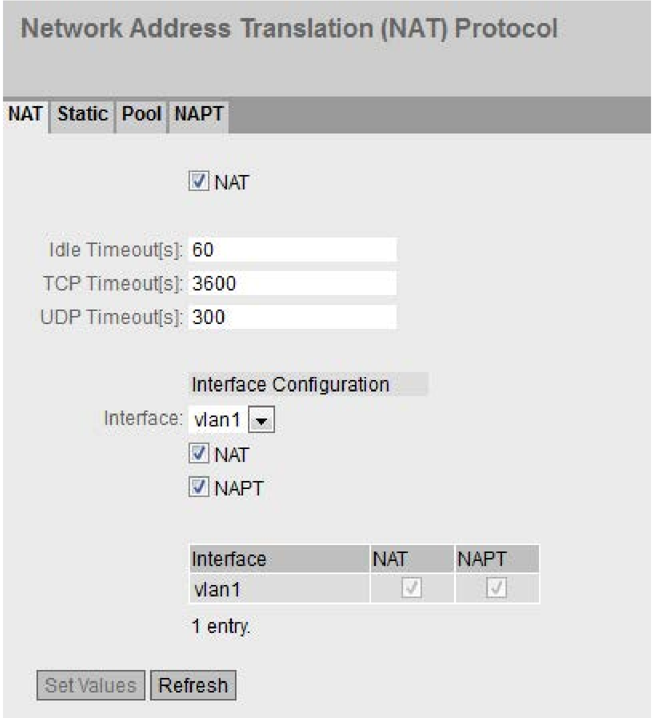
Steps in configuration

1. Select the interface from the "Interface (name)" drop-down list.
2. Enter a name for the Interface in "Interface Name".
3. Enter the IP address of the subnet in the "IP Address" column.
4. Enter the subnet mask belonging to the IPv4 address in the "Subnet Mask" column
5. Click the "Set Values" button.

5.6.3 NAT

5.6.3.1 NAT

On this WBM page, you specify the basic settings for NAT.



☑ NAT

Idle Timeout[s]: 60
TCP Timeout[s]: 3600
UDP Timeout[s]: 300

Interface Configuration

Interface: vlan1
☑ NAT
☑ NAPT

Interface	NAT	NAPT
vlan1	☑	☑

1 entry.

Description

The page contains the following boxes:

- **NAT**

  Enable or disable NAT/NAPT for the entire device. When enabled, the device operates as a NAT router.

- **Idle Timeout [s]**

  Enter the required time. The device checks cyclically after the set period has elapsed whether the aging time of TCP and UDP connections has elapsed. The connections whose aging time has elapsed since the last check are deleted from the table "NAT Translations".

- **TCP Timeout [s]**

  Enter the required aging time for TCP connections. TCP connections are stored until no data exchange has taken place for the set period. Depending on the cyclic check when the Idle Timeout has elapsed, the connections are deleted from the table "NAT translations".

- **UDP Timeout [s]**

  Enter the required aging time for UDP connections. UDP connections are stored until no data exchange has taken place for the set period. Depending on the cyclic check when the Idle Timeout has elapsed, the connections are deleted from the table "NAT translations".

- **Interface**

  Select an IP interface from the drop-down list on which you want to configure NAT.

  As soon as you have configured an interface as a NAT interface, all other configurations are considered starting from this interface. This means for this interface that all networks reachable via the interface itself count as "Outside". All other networks are "Inside".

  Note

  If you have configured several NAT interfaces on a device, this means that a network is "Outside" from the perspective of one NAT interface and "Inside" from the perspective of another NAT interface.

- **NAT**

  Enable or disable NAT for an IP interface.

  An entry is created automatically in the "Pool" tab. The device can be reached from the external network using the IP address of the IP interface.

  If you disable NAT for an IP interface and there are no configurations on the NAT interface, the entry is automatically deleted from the table.

- **NAPT**

  Enable or disable NAPT for an IP interface.

The table has the following columns:

- **Interface**

  Interface on which there is a NAT configuration.

- **NAT**

  Shows whether NAT is enabled or disabled for the selected IP interface.

  NAT is only enabled, when you have enabled NAT for the entire device.

- **NAPT**

  Shows whether NAPT is enabled or disabled for the selected IP interface.

  NAPT is only enabled, when you have enabled NAT for the entire device.

  If you do not create any further configurations for NAPT, the dynamic port translation is enabled automatically.

  As default, a device in the internal network cannot be reached from an external network. If the internal device wants to communicate in an external network, the inside local address and the IP address of the IP interface have a port added and the internal device is assigned as inside local and inside global address. Using this inside global address, the internal device can be reached from the external network until the timer of the connection elapses.

Procedure

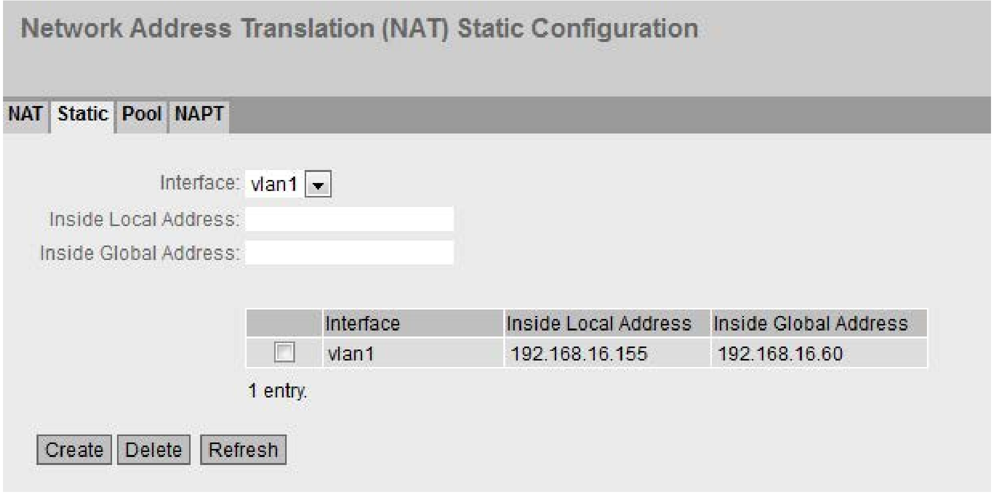
To configure NAT/NAPT proceed as follows:

1. Enter the required times.
2. Select the required IP interface.
3. Enable NAT/NAPT for the selected IP interface.
4. Click the "Set Values" button.
5. Make the settings you require for NAT/NAPT in the NAT/NAPT tabs.
6. Select the "NAT" check box on this tab.
7. Click the "Set Values" button.

5.6.3.2 Static

On this WBM page, you configure static 1:1 address translations.

You specify which inside global address the inside local address of a device will be converted to and vice versa. This variant allows connection establishment in both directions. The device in the internal network can be reached from the external network.



Network Address Translation (NAT) Static Configuration

Interface: vlan1

Inside Local Address:

Inside Global Address:

	Interface	Inside Local Address	Inside Global Address
□	vlan1	192.168.16.155	192.168.16.60

1 entry.

Description

The page contains the following boxes:

- **Interface**

  Select the a NAT interface from the drop-down list for which you want to create further NAT configurations.

- **Inside Local Address**

  Enter the actual address of the device that should be reachable from external.

- **Inside Global Address**

  Enter the address at which the device can be reached from external.

The table has the following columns:

- **1st column**

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

  NAT interface to which the setting relates.
- **Inside Local Address**

  Shows the actual address of the device that should be reachable from external.
- **Inside Global Address**

  Shows the address at which the device can be reached from external.

Procedure

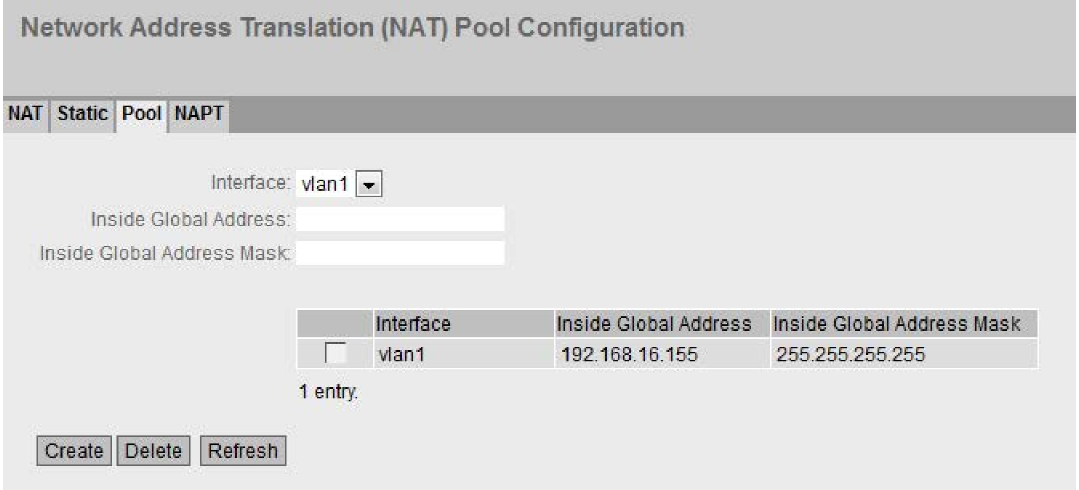
To create a 1:1 address translation, proceed as follows:

1. Select the a NAT interface from the "Interface" drop-down list:
2. In "Inside Local Address" enter the actual address of the device that should be reachable from external.
3. In "Inside Global Address" enter the address at which the device can be reached from external.

5.6.3.3 Pool

On this WBM page, you configure dynamic address translations.

As default, a device in the internal network cannot be reached from an external network. If the internal device wants to communicate in an external network, an inside global address is assigned to it dynamically. Using this inside global address, the internal device can be reached from the external network until the timer of the connection elapses.



Network Address Translation (NAT) Pool Configuration

Interface: vlan1
Inside Global Address:
Inside Global Address Mask:

	Interface	Inside Global Address	Inside Global Address Mask
□	vlan1	192.168.16.155	255.255.255.255

1 entry.

Description

The page contains the following boxes:

- **Interface**

  Select the a NAT interface from the drop-down list for which you want to create further NAT configurations.
- **Inside Global Address**

  Enter the start address for the dynamic assignment of addresses at which devices will be reachable from external.
- **Inside Local Address Mask**

  Enter the address mask of the external subnet.

The table has the following columns:

- **1st column**

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

  NAT interface to which the setting relates.
- **Inside Global Address**

  Shows the start address for the dynamic assignment of addresses at which devices will be reachable from external.
- **Inside Local Address Mask**

  Shows the address mask of the external subnet.

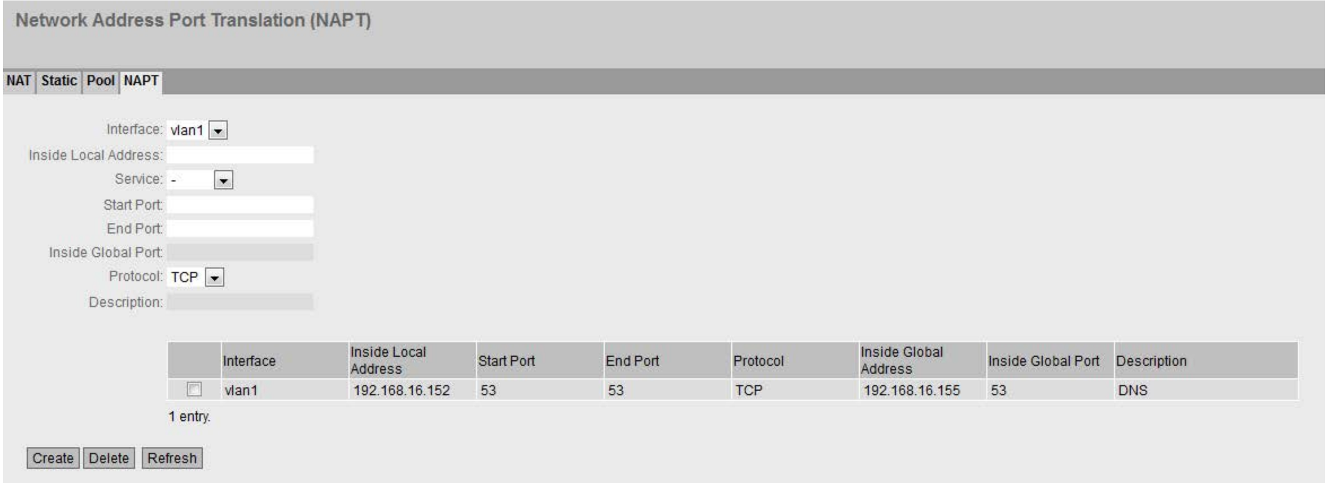
Procedure

To create a dynamic address translation, proceed as follows:

1. Select the a NAT interface from the "Interface" drop-down list:
2. In "Inside Global Address" enter the start address for the dynamic assignment of addresses at which devices will be reachable from external.
3. In "Inside Global Address Mask" enter the address mask of the external subnet.

5.6.3.4 NAPT

On this WBM page, you configure static port translations.



Network Address Port Translation (NAPT)

Interface: vlan1
Inside Local Address:
Service: -
Start Port:
End Port:
Inside Global Port:
Protocol: TCP
Description:

	Interface	Inside Local Address	Start Port	End Port	Protocol	Inside Global Address	Inside Global Port	Description
□	vlan1	192.168.16.152	53	53	TCP	192.168.16.155	53	DNS

1 entry.

Description

The page contains the following boxes:

- **Interface**

  Select the a NAT interface from the drop-down list for which you want to create further NAT configurations.

- **Inside Local Address**

  Enter the actual address of the device that should be reachable from external.

- **Service**

  Select the service for which the port translation is valid.

  When you select a service, the same port is entered in the Start Port and End Port boxes. If you change the start port, the end port is changed accordingly.

  if you select the entry "-", you can enter the start and end port freely.

- **Start Port**

  Enter an inside local port.

- **End Port**

  Depending on your selection in the "Service" drop down list, you can enter a inside local port or a port is displayed.

  If you enter different ports in the Start Port and End Port boxes, the same port range is entered in the Inside Global Port box. A port range can only be translated to the same port range.

  If you enter the same port in the Start Port and End Port boxes, you can enter any Inside Global Port.

- **Inside Global Port**

  Depending on your selection in the "Service" drop down list, you can enter a port or a port is displayed.

- **Protocol**

  Select the protocol for which the port translation is valid.

- **Description**

  Enter a description for the port translation.

The table has the following columns:

- **1st column**

  Select the check box in the row to be deleted.

- **Interface**

  NAT interface to which the setting relates.

- **Inside Local Address**

  Shows the actual address of the device that should be reachable from external.

- **Start Port**

  Shows the start port that will be assigned to the inside local address.

- **End Port**

  Shows the end port that will be assigned to the inside local address.

- **Protocol**

  Shows the protocol for which the port translation is valid.

- **Inside Global Address**

  Shows the address at which the device can be reached from external.

- **Inside Global Port**

  Shows the port that will be assigned to the Inside Global Address.

- **Description**

  Shows a a description for the port translation.

Procedure

To create a static port translation, proceed as follows:

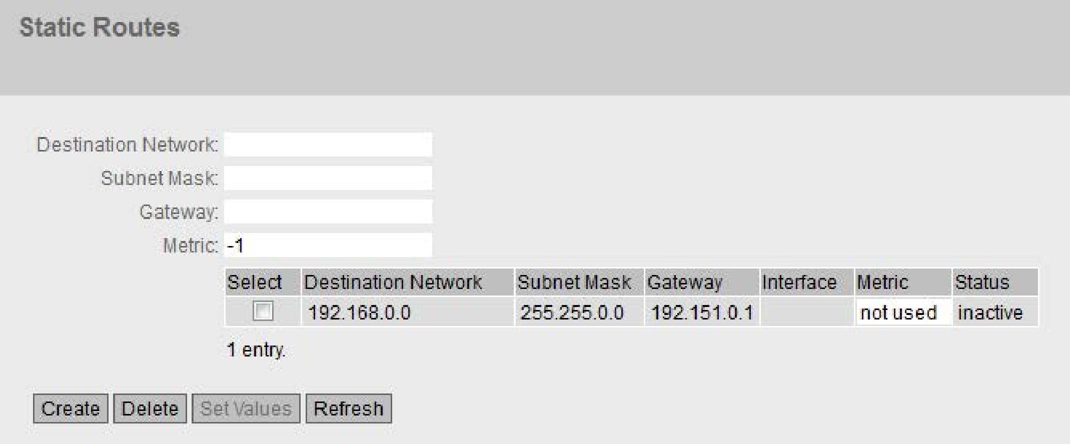
1. Select the a NAT interface from the "Interface" drop-down list:
2. In "Inside Local Address" enter the actual address of the device that should be reachable from external.
3. Select a service.
4. Depending on your selection in the "Service" drop-down list specify the start, end and inside global port.

5. Select a protocol.
6. Enter a description for the port translation.

5.6.4 Static Routes

Static route

On this page, you create the static IPv4 routes.



Destination Network:
Subnet Mask:
Gateway:
Metric: -1

Select	Destination Network	Subnet Mask	Gateway	Interface	Metric	Status
□	192.168.0.0	255.255.0.0	192.151.0.1		not used	inactive

1 entry.

Description of the displayed values

The page contains the following boxes:

- **Destination Network**
  Enter the network address of the destination that can be reached via this route.
- **Subnet Mask**
  Enter the corresponding subnet mask.
- **Gateway**
  Enter the IPv4 address of the gateway via which this network address is reachable.
- **Metric**
  Enter the metric for the route. The metric corresponds to the quality of a connection, based for example on speed or costs. If there are several equal routes, the route with the lowest metric value is used.
  As default -1 is set.

  Range of values: 1 - 254

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Destination Network**
  Shows the network address of the destination.

- **Subnet Mask**
  Shows the corresponding subnet mask.
- **Gateway**
  Shows the IPv4 address of the next gateway.
- **Interface**
  Shows the interface of the route.
- **Metric**
  Enter the metric for the route. When creating the route, "not used" is entered automatically. The metric corresponds to the quality of a connection, based for example on speed or costs. If there are several equal routes, the route with the lowest metric value is used.
  Range of values: 1 - 254
- **Status**
  Shows whether or not the route is active.

Steps in configuration

1. Enter the network address of the destination in the "Destination Network" input box.
2. Enter the corresponding subnet mask in the "Subnet Mask" input box.
3. Enter the gateway in the "Gateway" input box.
4. Enter the weighting of the route in "Metric".
5. Click the "Create" button. A new entry is generated in the table.
6. Click the "Set Values" button.

5.6.5 Route Maps

5.6.5.1 General

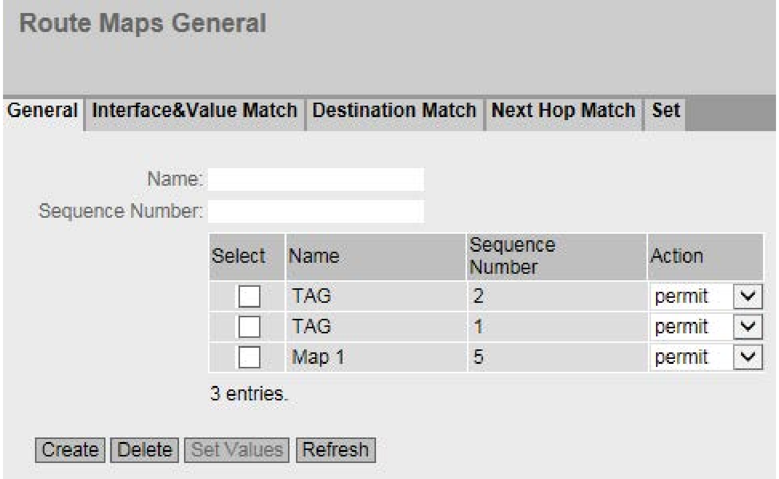
Route maps

With route maps, you control how routing information is further processed. You can filter routing information and specify whether the information is further processed, modified or discarded.

Route maps operate according to the following principle:

- Routing information is compared with the filters of the route maps.
- The comparison is continued until the filters of a route map match the properties of an item of information.
- The information is then processed according to the route map settings:
  - The routing information is discarded.
  - The properties of the routing information are changed.

Settings



Name:

Sequence Number:

Select	Name	Sequence Number	Action
□	TAG	2	permit
□	TAG	1	permit
□	Map 1	5	permit

3 entries.

Image 5-10 Route maps general

- **Name**

  Enter the name for the route map.
- **Sequence Number**

  Enter a number for the route map.

  You can create several route maps with the same name but with different sequence numbers. The sequence numbers then specify the order in which the route maps are processed.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Name**

  Shows the name of the route map.
- **Sequence Number**

  Shows the sequence number of the route map.
- **Action**

  Specify what happens to the routing information that matches the settings of the route map:

  – permit

    The routing information is further processed according to the settings you make in the "Set" tab.

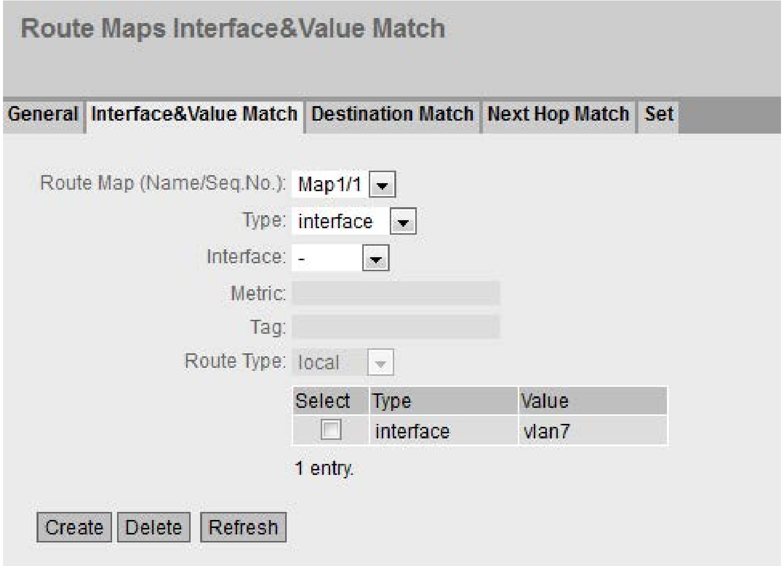
  – deny

    The routing information is discarded.

5.6.5.2 Interface & Value Match

On this page, you specify whether or not the routing information for a route map is filtered according to interfaces, metric or tags.

Settings



Route Map (Name/Seq.No.): Map1/1

Type: interface

Interface: -

Metric:

Tag:

Route Type: local

Select	Type	Value
□	interface	vlan7

1 entry.

Image 5-11 Filtering route maps and metric

- **Route Map (Name/Seq. No.)**

  Select a route map.

  The created route maps are available to you.

- **Type**

  Select the basis for the filtering:

  – Interface

  – Metric

  – Tag

  – Route Type

- **Interface**

  Select an interface.

  This box is active only if you have selected the "Interface" entry in the "Type" drop-down list.

- **Metric**

  Enter a value for the metric.

  This box is active only if you have selected the "Metric" entry in the "Type" drop-down list.

- **Tag**

  Enter a value for the tag.

  This box is active only if you have selected the entry "Tag in the "Type" drop-down list.
- Route Type

  Select the type of the route.

  - Local

    The routing information for the route map is filtered according to directly connected routes (local interfaces).
  - Remote

    The routing information for the route map is filtered according to learned or statically configured routes.

  This box is active only if you have selected the entry "Route Type in the "Type" drop-down list.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Type**

  Shows the selected type:

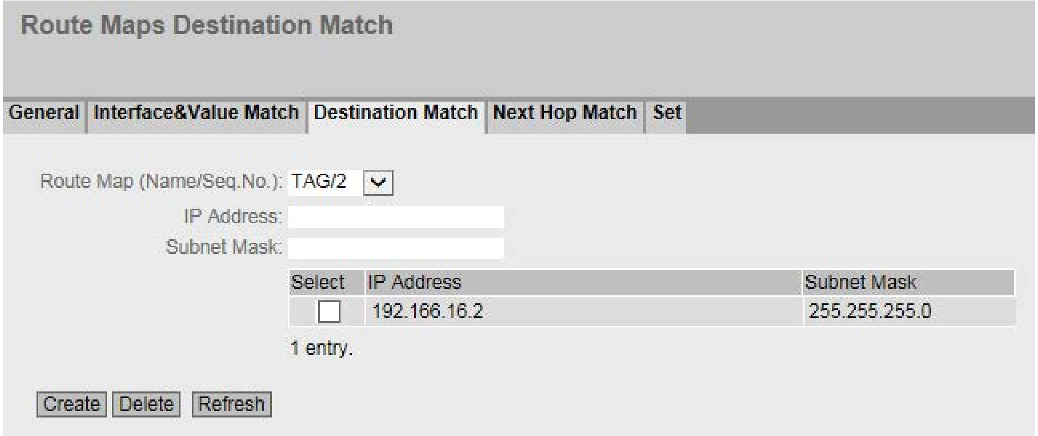
  - Interface
  - Metric
  - Tag
  - Route Type
- **Value**

  Shows the selected interface or the value of the metric or of the tag.

5.6.5.3 Destination Match

On this page, you specify whether or not the routing information for a route map is filtered based on the destination IPv4 address.

Settings


Route Maps Destination Match

Route Map (Name/Seq.No.): TAG/2

IP Address:

Subnet Mask:

Select	IP Address	Subnet Mask
□	192.166.16.2	255.255.255.0

1 entry.

Image 5-12 Route Maps Destination Match

- **Route Map (Name/Seq. No.)**

  Select a route map.
- **IP Address**

  Enter the IPv4 address of the destination on which the filtering is based.
- **Subnet Mask**

  Enter the subnet mask of the destination on which the filtering is based.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **IP Address**

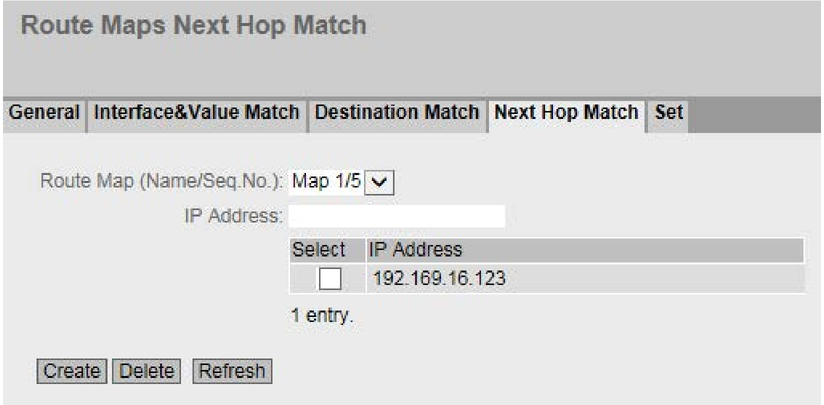
  Shows the IPv4 address of the destination.
- **Subnet Mask**

  Shows the subnet mask of the destination.

5.6.5.4 Next Hop Match

On this page, you specify whether or not the filtering for a route map will be based on the router to which the routing information is sent next.

Settings



Route Map (Name/Seq.No.): Map 1/5
IP Address:

Select	IP Address
□	192.169.16.123

1 entry.

Image 5-13 Route Maps Next Hop Match

- **Route Map (Name/Seq. No.)**

  Select a route map.

- **IP Address**

  Enter the IP address of the router to which the routing information will be sent next.

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **IP Address**

  Shows the IP address of the next router.

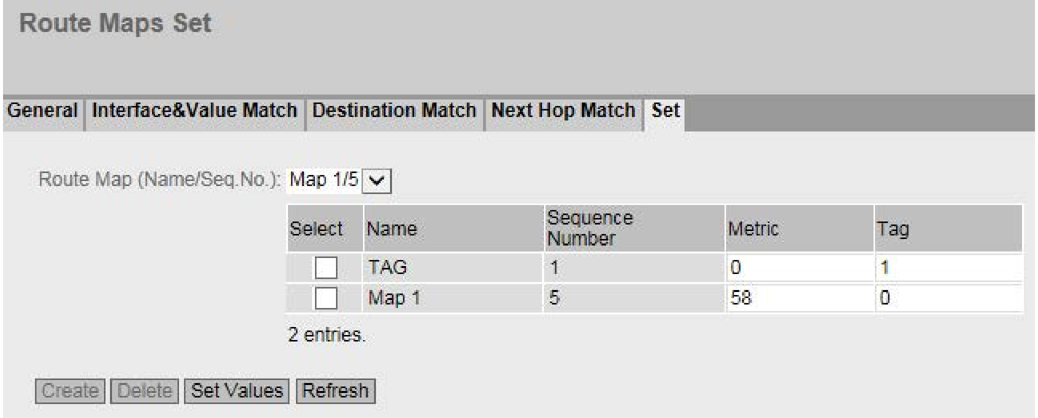
5.6.5.5 Create

On this page, you specify whether or not the routing information will be changed by a route map.

You can only change the information of a "Permit" route map.

If, for example, you have filtered based on a certain metric, you can change the value of the metric here. The routing information is then forwarded with the new value.

Settings



Route Maps Set

Route Map (Name/Seq.No.): Map 1/5

Select	Name	Sequence Number	Metric	Tag
□	TAG	1	0	1
□	Map 1	5	58	0

2 entries.

Image 5-14 Route maps set

- **Route Map (Name/Seq. No.)**

  Select a route map.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Name**

  Shows the name of the route map.
- **Sequence Number**

  Shows the sequence number of the route map.
- **Metric**

  Enter the new value for the metric with which the routing information will be forwarded.
- **Tag**

  Enter the new value for the tag with which the routing information will be forwarded.

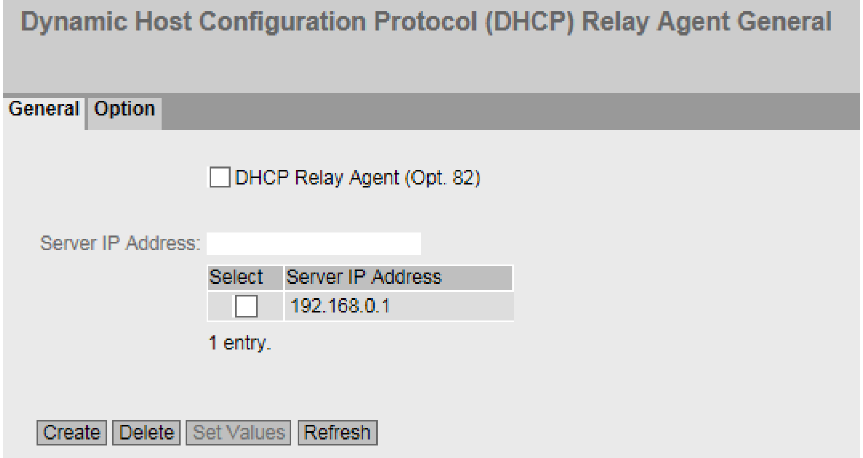
5.6.6 DHCP Relay Agent

5.6.6.1 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 server IPv4 addresses for the DHCP relay agent. If a DHCP server is unreachable, the device can switch to a different DHCP server.



Dynamic Host Configuration Protocol (DHCP) Relay Agent General

□ DHCP Relay Agent (Opt. 82)

Server IP Address:

Select	Server IP Address
□	192.168.0.1

1 entry.

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.

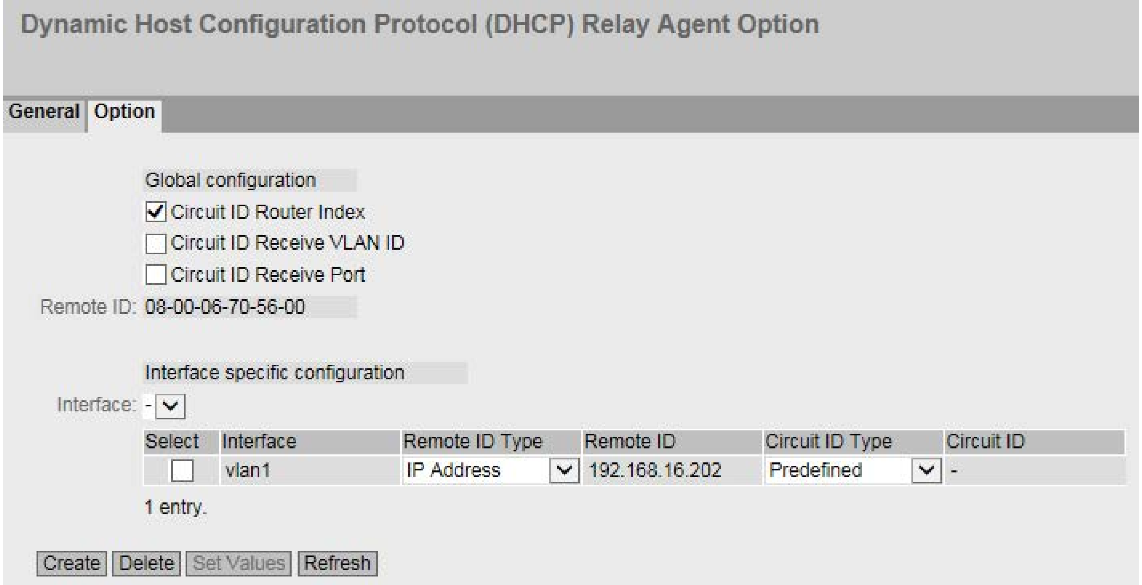
3. Select the "DHCP Relay Agent (Opt. 82)" check box.
4. Click the "Set Values" button.

5.6.6.2 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.



Dynamic Host Configuration Protocol (DHCP) Relay Agent Option

Global configuration

☑ Circuit ID Router Index
□ Circuit ID Receive VLAN ID
□ Circuit ID Receive Port

Remote ID: 08-00-06-70-56-00

Interface specific configuration

Interface: -

Select	Interface	Remote ID Type	Remote ID	Circuit ID Type	Circuit ID
□	vlan1	IP Address	192.168.16.202	Predefined	-

1 entry.

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 generated circuit ID of the has the router index added to it.

- **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 generated circuit ID has the receiving port added to it.

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".
  Range of values: 1- 188

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.

5.6.7 VRRP

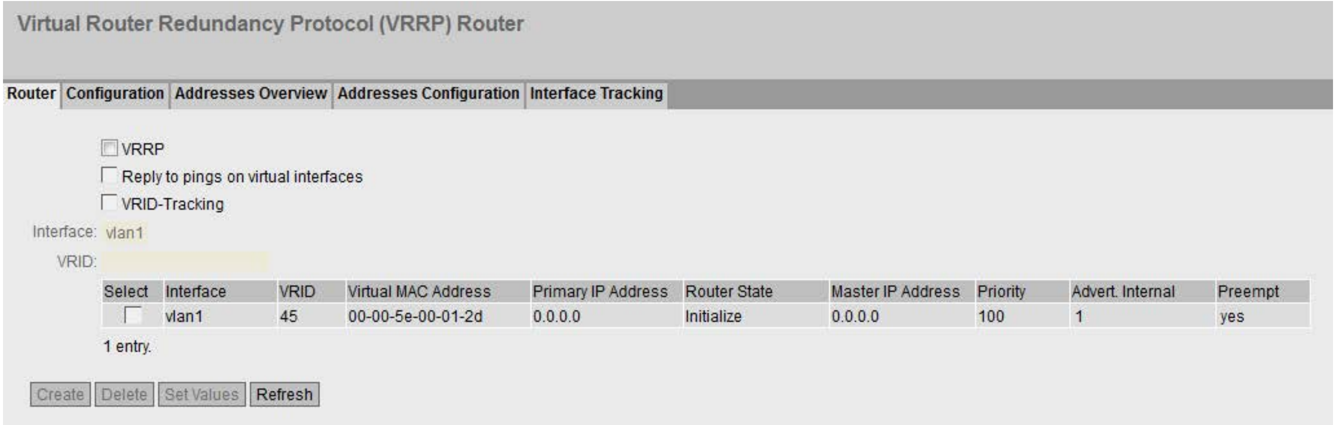
5.6.7.1 Router

Introduction

Using the "Create" button, you can create new virtual routers. A maximum of 52 Virtual routers can be configured. You can configure other parameters on the "Configuration" tab.

Note

- This function is available only with layer 3.
- Select the "VRRP" check box to configure VRRP.
- Simultaneous operation of VRRP and VRRPv3 is not possible.
- You can only use VRRP in conjunction with VLAN interfaces. Router ports are not supported.



□ VRRP
□ Reply to pings on virtual interfaces
□ VRID-Tracking

Interface: vlan1

VRID:

Select	Interface	VRID	Virtual MAC Address	Primary IP Address	Router State	Master IP Address	Priority	Advert. Internal	Preempt
□	vlan1	45	00-00-5e-00-01-2d	0.0.0.0	Initialize	0.0.0.0	100	1	yes

1 entry.

Description of the displayed values

The page contains the following boxes:

- **VRRP**
  Enable or disable routing using VRRP.
- **Reply to pings on virtual interfaces**
  When enabled, the virtual IP addresses also reply to the ping.
- **VRID-Tracking**

  Enable or disable VRID tracking.

  When enabled, all interfaces of a VRID are monitored. When the link of an interface changes from "up" to "down", the priority of all VRRP interfaces with the same VRID is reduced to the value "0".

  When the link of an interface changes back from "down" to "up", the original priority of the VRRP interfaces is restored.
- **Interface**
  Select the VLAN Interface that functions as the virtual router from the drop-down list.
- **VRID**
  Enter the ID of the virtual router in the input box. This ID defines the group of routers that form a virtual router (VR). In the group, this is the same. It can no longer be used for other groups.
  Valid values are 1.. 255.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Interface**
  Shows the Interface that functions as the virtual router.
- **VRID**
  Shows the ID of the virtual router.
- **Virtual MAC Address**
  Shows the virtual MAC address of the virtual router.

- **Primary IP Address**
  Shows the numerically lowest IPv4 address in this VLAN. The entry 0.0.0.0 means that the "Primary" address on this VLAN is used. Otherwise all IPv4 addresses configured on this VLAN in the "Layer 3 (IPv4) > Subnets" menu are valid values.
- **Router State**
  Shows the current status of the virtual router. Possible values are:
  - Master
    The router is the Master router and handles the routing functionality for all assigned IP addresses.
  - Backup
    The router is the backup router. If the master router fails, the backup router takes over the tasks of the master router.
  - Initialize
    The virtual router has just been turned on. It will soon change to the "Master" or "Backup" state.
- **Master IP Address**
  Shows the IPv4 address of the master router.
- **Priority**
  Shows the priority of the virtual router.
  Valid values are 1-255.

  If an IPv4 address is assigned to the VRRP router that is also actually configured on the local IPv4 interface, the value 255 is entered automatically. All other priorities can be distributed freely among the VRRP routers. The higher the priority, the earlier the VRRP router becomes "Master".
- **Advert. Interval**
  Shows the interval at which the master router sends VRRP packets.
- **Preempt**
  Shows the precedence of a router when changing roles between backup and master.
  - yes
    This router has precedence when changing roles.
  - no
    This router does not have precedence when changing roles.

VRRP and DHCP server

If you want to operate a DHCP server on the devices of a VRRP group, the DHCP server must be configured on the master router. Backup routers do not react to DHCP queries. Make sure that the master router is statically configured and that after a failure, becomes the master of the VRRP group again.

Steps in configuration

1. Select the "VRRP" check box.
2. Select the required interface.
3. Enter the ID of the virtual router in the "VRID" input box.

4. Click the "Create" button. A new row is inserted in the table.
5. Select the "Reply to pings on virtual interfaces" check box so that virtual addresses reply to pings as well.
6. Select the "VRID Tracking" check box to monitor the VRID.
7. Click the "Set Values" button. To configure the virtual router, click on the "Configuration" tab.

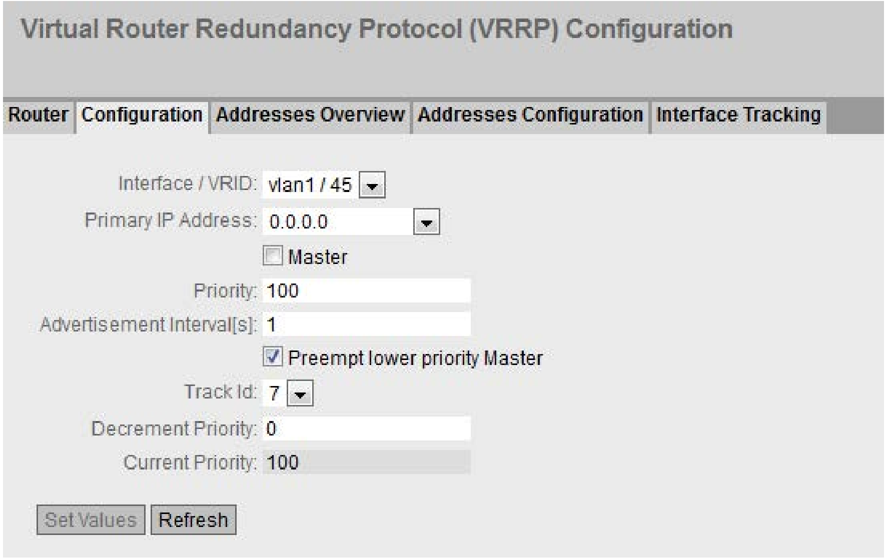
5.6.7.2 Configuration

Introduction

On this page, you configure the virtual router.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol (VRRP) Configuration

Interface / VRID: vlan1 / 45
Primary IP Address: 0.0.0.0
□ Master
Priority: 100
Advertisement Interval[s]: 1
☑ Preempt lower priority Master
Track Id: 7
Decrement Priority: 0
Current Priority: 100

Description of the displayed values

The page contains the following boxes:

- **Interface / VRID**
  Select the ID of the virtual router you are configuring from the drop-down list.

- **Primary IP Address**
  Select the numerically lowest IPv4 address from the drop-down list: If the router becomes master router, the router uses this IPv4 address.

  Note

  If you only configure one subnet on this VLAN, no entry is necessary. The entry is then 0.0.0.0.
  If you configure more than one subnet on the VLAN and you want a specific IPv4 address to be used as the source address for VRRP packets, select the IPv4 address from the drop-down list. Otherwise, the numerically lowest IPv4 address will be used.

- **Master**
  If this option is enabled, the numerically lowest IPv4 address is entered for "Associated IP Address". This means that the highest priority IPv4 address of the VRRP router is used as the virtual IPv4 address of the virtual master router. The option must be disabled for the backup routers in this group and the IP address of the router in "Associated IP address" must be used.
- **Priority**
  Enter the priority of this virtual router. Valid values are 1-255.

  If an IPv4 address is assigned to the VRRP router that is also actually configured on the local IPv4 interface, the value 255 is entered automatically. All other priorities can be distributed freely among the VRRP routers. The higher the priority, the earlier the VRRP router becomes "Master".
- **Advertisement Interval**
  Enter the interval in seconds after which a master router sends a VRRP packet again.
- **Preempt lower priority Master**
  Allow the precedence when changing roles between backup and master based on the selection process.
- **Track ID**
  Select a track ID.
- **Decrement Priority**
  Enter the value by which the priority of the VRRP interface will be reduced.
- **Current Priority**
  Shows the priority of the VRRP interface after the monitored interface has changed to the "down" status.

Steps in configuration

To configure a virtual router as the master router, follow the steps below:

1. Select the ID of the virtual router you want to configure from the "Interface / VRID" drop-down list.
2. Select the source address from the "Primary IP Address" drop-down list.
3. Select the "Master" check box.
4. From the "Priority" drop-down list, enter the priority of this virtual router.
5. Enter the interval in "Advertisement Interval".

6. Select the "Preempt lower priority Master" check box.
7. Select a track ID.
8. Value by which the priority of the VRRP interface will be reduced
9. Click the "Set Values" button.

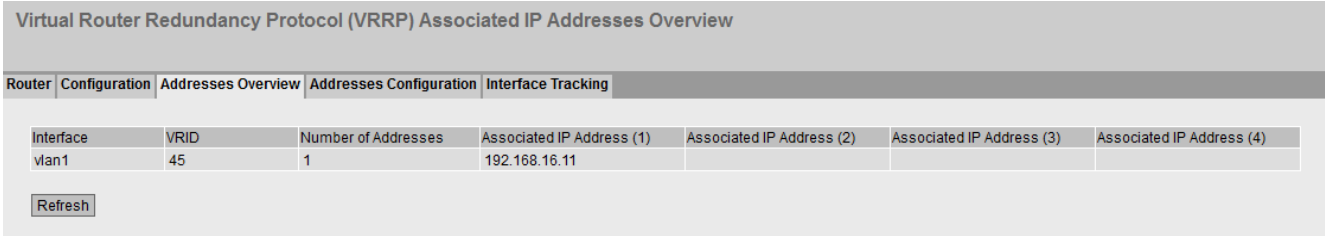
5.6.7.3 Address overview

Overview

This page shows which IPv4 addresses the virtual router monitors. Each virtual router can monitor a maximum of 10 IPv4 addresses.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol (VRRP) Associated IP Addresses Overview

Interface	VRID	Number of Addresses	Associated IP Address (1)	Associated IP Address (2)	Associated IP Address (3)	Associated IP Address (4)
vlan1	45	1	192.168.16.11			

Description of the displayed boxes:

The table has the following columns:

- **Interface**
  Shows the Interface that functions as the virtual router.
- **VRID**
  Shows the ID of this virtual router.
- **Number of addresses**
  Shows the number of IPv4 addresses.
- **Assigned IP address (1) ... Assigned IP address (10)**
  Shows the router IPv4 addresses monitored by this virtual router. If a router takes over the role of master, the routing function is taken over by this router for all these IPv4 addresses.

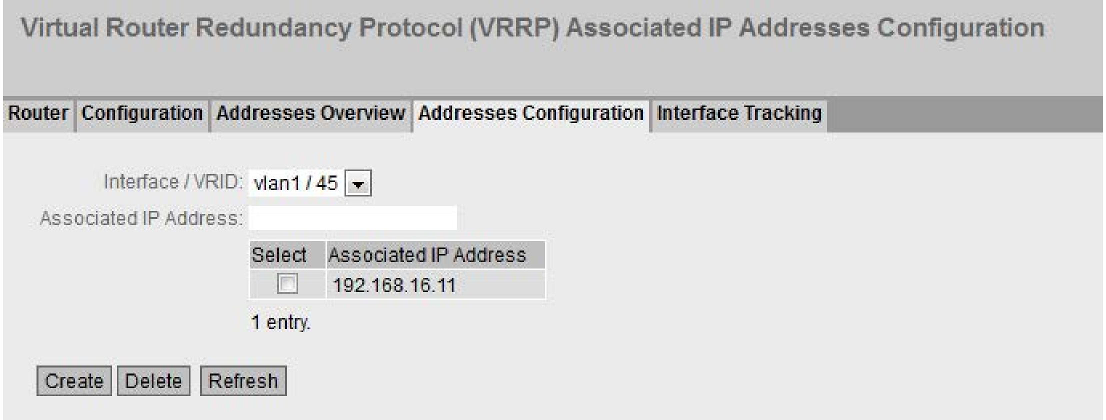
5.6.7.4 Address Configuration

Creating or changing the monitored IPv4 addresses

On this page, you can create, modify or delete the IPv4 addresses to be monitored. A maximum of 10 IPv4 addresses can be monitored by a virtual router.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol (VRRP) Associated IP Addresses Configuration

Interface / VRID: vlan1 / 45

Associated IP Address:

Select	Associated IP Address
□	192.168.16.11

1 entry.

Description of the displayed values

The page contains the following boxes:

- **Interface / VRID**
  Select the virtual router from the drop-down list.
- **Associated IP address**
  Enter the IPv4 address that the virtual router will monitor.
  A maximum of 10 IPv4 addresses are possible.

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Associated IP Address**
  Shows the IPv4 addresses that the virtual router monitors.

Steps in configuration

1. Select the ID of the virtual router from the "Interface / VRID" drop-down list.
2. Enter the IPv4 address that the virtual router will monitor.
3. Click the "Create" button. A new entry is generated in the table.

5.6.7.5 Interface Tracking

Introduction

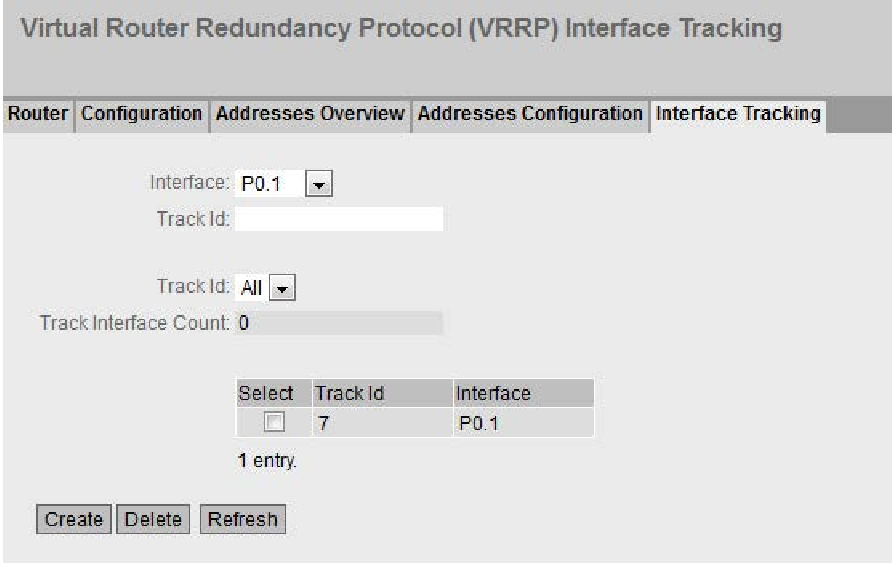
On this page, you configure the monitoring of interfaces.

When the link of a monitored interface changes from "up" to "down", the priority of the assigned VRRP interface is reduced. You configure the value by which the priority is reduced on the page "Layer 3 > VRRP/VRRPv3 > Configuration".

When the link of the interface changes back from "down" to "up", the original priority of the VRRP interface is restored.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol (VRRP) Interface Tracking

Interface: P0.1

Track Id:

Track Id: All

Track Interface Count: 0

Select	Track Id	Interface
☐	7	P0.1

1 entry.

Description of the displayed values

The page contains the following boxes:

- **Interface**

  From the drop-down list, select the interface to be monitored.

- **Track ID**

  Enter a track ID.

- **Track ID**

  Select a track ID.

- **Track Interface Count**

  Enter how many monitored interfaces need to change to the "down" status, before the priority is changed.

The table has the following columns:

- **Select**

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

  Shows the track ID.
- **Interface**

  Shows the interface that is being monitored.

Steps in configuration

1. Select the required interface from the "Interface" drop-down list.
2. In the "Track ID" box, enter the required ID.
3. Click the "Create" button.
4. Select an ID from the "Track-ID" drop-down list:
5. In the "Track Interface Count" enter the number of interfaces.
6. Click the "Set Values" button.
7. Link the monitoring to a VRRP interface in the "Configuration" tab.

5.6.8 VRRPv3

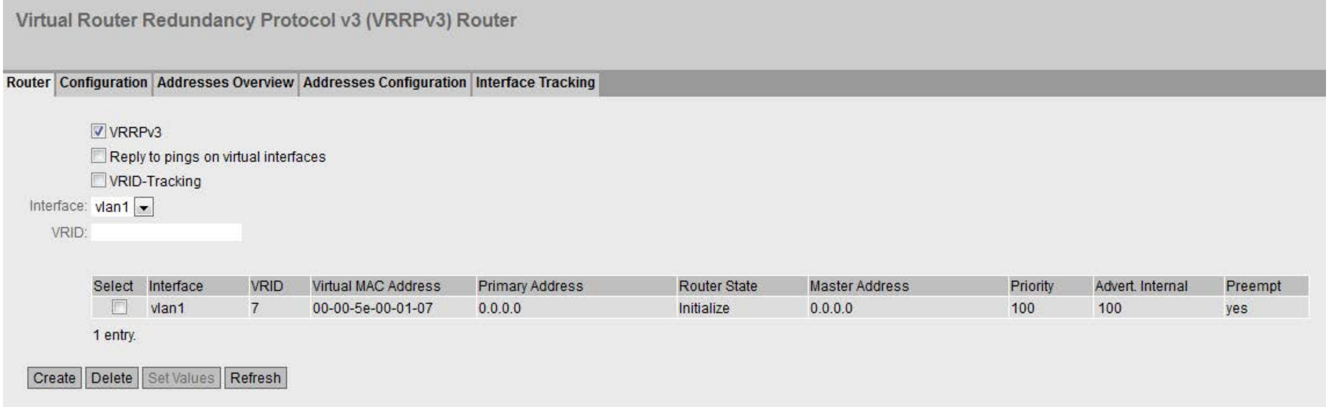
5.6.8.1 Router

Introduction

Using the "Create" button, you can create new virtual routers. A maximum of 52 Virtual routers can be configured. You can configure other parameters on the "Configuration" tab.

Note

- This function is available only with layer 3.
- Simultaneous operation of VRRP and VRRPv3 is not possible.
- Select the "VRRPv3" check box to configure VRRPv3.
- You can use VRRPv3 on VLAN interfaces. Router ports are not supported.



☑ VRRPv3

□ Reply to pings on virtual interfaces

□ VRID-Tracking

Interface: vlan1

VRID:

Select	Interface	VRID	Virtual MAC Address	Primary Address	Router State	Master Address	Priority	Advert. Internal	Preempt
□	vlan1	7	00-00-5e-00-01-07	0.0.0.0	Initialize	0.0.0.0	100	100	yes

1 entry.

Description

The page contains the following:

- **VRRPv3**

  Enable or disable routing using VRRPv3. Can only be enabled when "Layer 3 > Configuration" "IPv6 Routing" is enabled.

- **Reply to pings on virtual interfaces**

  When enabled, the virtual IPv4 addresses also reply to the ping.

- **VRID-Tracking**

  Enable or disable VRID tracking.

  When enabled, all interfaces of a VRID are monitored. When the link of an interface changes from "up" to "down", the priority of all VRRP interfaces with the same VRID is reduced to the value "0".

  When the link of an interface changes back from "down" to "up", the original priority of the VRRP interfaces is restored.

- **Interface**

  Select the required VLAN interface operating as virtual router.

- **VRID**

  Enter the ID of the virtual router. This ID defines the group of routers that form a virtual router (VR). In the group, this is the same. It can no longer be used for other groups. Valid values are 1.. 255.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Interface**

  Shows the Interface that functions as the virtual router.

- **VRID**

  Shows the ID of the virtual router.

- **Virtual MAC Address**

  Shows the virtual MAC address of the virtual router.

- **Primary IP Address**

  Shows the numerically lowest IPv4 address in this VLAN. The entry 0.0.0.0 means that the "Primary" address on this VLAN is used. Otherwise all IPv4 addresses configured on this VLAN in the "Layer 3 (IPv4) > Subnets" menu are valid values.

- **Router State**

  Shows the current status of the virtual router. Possible values are:

  – Master

    The router is the master router and handles the routing functionality for all assigned IPv4 addresses.

  – Backup

    The router is the backup router. If the master router fails, the backup router takes over the tasks of the master router.

  – Initialize

    The virtual router has just been turned on. It will soon change to the "Master" or "Backup" status.

- **Master IP Address**

  Shows the IPv4 address of the master router.

- **Priority**

  Shows the priority of the virtual router.
  Valid values are 1-254.
  If an IPv4 address is assigned to the VRRP router that is also actually configured on the local IPv4 interface, the value 255 is entered automatically. All other priorities can be distributed freely among the VRRP routers. The higher the priority, the earlier the VRRP router becomes "Master".

- **Advert. Internal**

  Shows the interval at which the master router sends VRRPv3 packets.

- **Preempt**

  Shows the precedence of a router when changing roles between backup and master.

  – yes

    This router has precedence when changing roles.

  – no

    This router does not have precedence when changing roles.

VRRP and DHCP server

If you want to operate a DHCP server on the devices of a VRRP group, the DHCP server must be configured on the master router. Backup routers do not react to DHCP queries. Make sure that the master router is statically configured and that after a failure, becomes the master of the VRRP group again.

Steps in configuration

1. Select the "VRRPv3" check box.
2. Select the required interface.
3. Enter the ID of the virtual router in the "VRID" input box.
4. Click the "Create" button. A new row is inserted in the table.
5. Select the "Reply to pings on virtual interfaces" check box so that virtual IPv4 addresses reply to pings as well.
6. Select the "VRID Tracking" check box to monitor the VRID.
7. Click the "Set Values" button. To configure the virtual router, click on the "Configuration" tab.

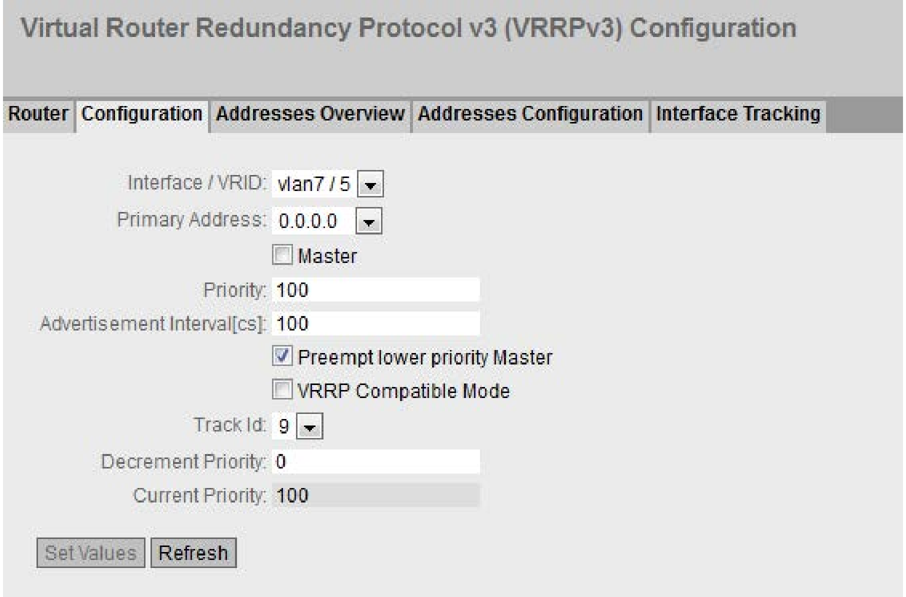
5.6.8.2 Configuration

Introduction

On this page, you configure the virtual router.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol v3 (VRRPv3) Configuration

Interface / VRID: vlan7 / 5
Primary Address: 0.0.0.0
□ Master
Priority: 100
Advertisement Interval[cs]: 100
☑ Preempt lower priority Master
□ VRRP Compatible Mode
Track Id: 9
Decrement Priority: 0
Current Priority: 100

Description

The page contains the following:

- **Interface / VRID**

  Select the ID of the virtual router to be configured.

- **Primary Address**

  Select the primary IPv4 address. If the router becomes master router, the router uses this IPv4 address.

  Note

  If you only configure one subnet on this VLAN, no entry is necessary. The entry is then 0.0.0.0.
  If you configure more than one subnet on the VLAN and you want a specific IPv4 address to be used as the source address for VRRP packets, select the IPv4 address. Otherwise, the numerically lowest IPv4 address will be used.

- **Master**

  If enabled, the numerically lowest IPv4 address is entered for "Associated IP Address". This means that the numerically lowest IPv4 address of the VRRP router is used as the virtual IP address of the virtual master router. The backup routers in this group must disable the option and use the IPv4 address of the router in "Associated IP address".

- **Priority**

  Enter the priority of this virtual router. Valid values are 1-254.
  If an IPv4 address is assigned to the VRRPv3 router that is also actually configured on the local IPv4 interface, the value 255 is entered automatically. All other priorities can be distributed freely among the VRRPv3 routers. The higher the priority, the earlier the VRRPv3 router becomes "Master".

- **Advertisement interval**

  Enter the interval in seconds after which a master router sends a VRRPv3 packet again.

- **Preempt lower priority Master**.

  Allow precedence when changing roles between backup and master based on the selection process.

- **VRRP Compatible Mode**

  When enabled, the VRRPv3 router also sends and receives VRRPv2 frames in addition to VRRPv3 frames for configured IPv4 addresses. Only necessary when not all VRRP routers support VRRPv3.

- **Track ID**
  Select a track ID.

- **Decrement Priority**
  Enter the value by which the priority of the VRRPv3 interface will be reduced.

- **Current Priority**
  Shows the priority of the VRRPv3 interface after the monitored interface has changed to the "down" status.

Steps in configuration

To configure a virtual router as the master router, follow the steps below:

1. Select the ID of the virtual router you want to configure from the "Interface / VRID" drop-down list.
2. Select the "Status" check box.
3. Select the source address from the "Primary Address" drop-down list.
4. From the "Priority" drop-down list, enter the priority of this virtual router.
5. Select the "Master" check box.
6. Enter the interval in "Advertisement Interval".
7. Select the "Preempt lower priority Master" check box.
8. Select the "VRRP Compatible Mode" check box.
9. Select a track ID.

10. Enter the value by which the priority of the VRRPv3 interface will be reduced

11. Click the "Set Values" button.

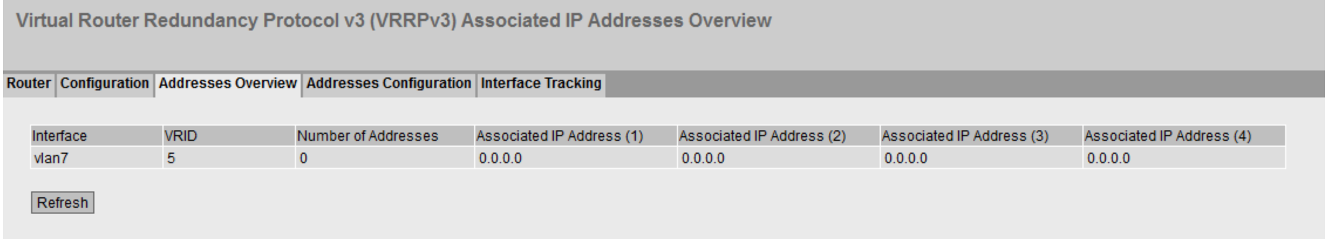
5.6.8.3 Addresses Overview

Overview

This page shows which IPv4 addresses the virtual router monitors. Each virtual router can monitor a maximum of 10 IPv4 addresses.

Note

This function is available only with layer 3.



Interface	VRID	Number of Addresses	Associated IP Address (1)	Associated IP Address (2)	Associated IP Address (3)	Associated IP Address (4)
vlan7	5	0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0

Description of the displayed values

The table has the following columns:

- **Interface**

  Shows the Interface that functions as the virtual router.

- **VRID**

  Shows the ID of this virtual router.

- **Number of Addresses**

  Shows the number of IPv4 addresses.

- **Associated IP Address (1) ...Associated IP Address (10)**

  Shows the router IPv4 addresses monitored by this virtual router. If a router takes over the role of master, the routing function is taken over by this router for all these IPv4 addresses.

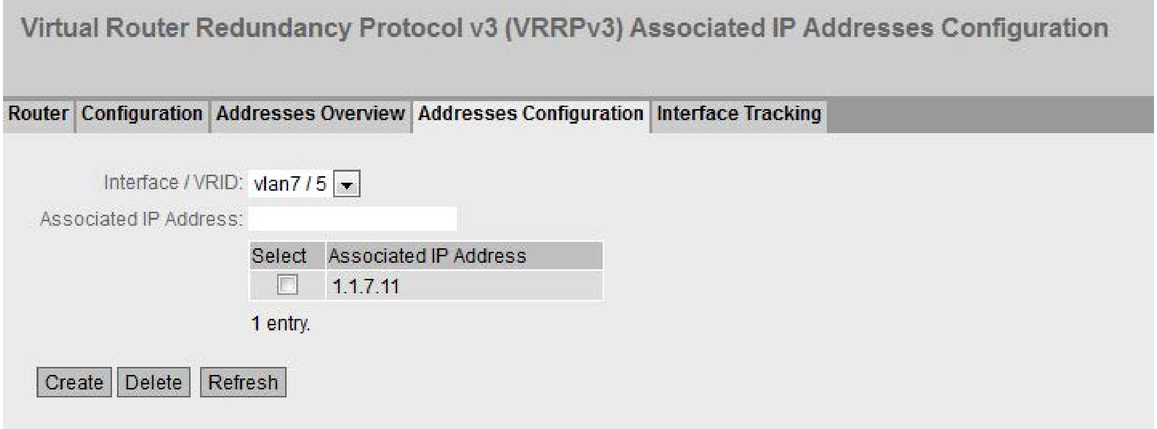
5.6.8.4 Addresses Configuration

Creating or changing the monitored IP addresses

On this page, you can create, modify or delete the IPv4 addresses to be monitored. A maximum of 10 IPv4 addresses can be monitored by a virtual router.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol v3 (VRRPv3) Associated IP Addresses Configuration

Interface / VRID: vlan7 / 5

Associated IP Address:

Select	Associated IP Address
□	1.1.7.11

1 entry.

Description

The page contains the following:

- **Interface / VRID**

  Select the ID of the virtual router.

- **Associated IP Address**

  Enter the IPv4 address that the virtual router will monitor.
  A maximum of 10 IPv4 addresses are possible.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted

- **Associated IP Address**

  Shows the IPv4 addresses that the virtual router monitors.

Steps in configuration

1. Select the ID of the virtual router.
2. Enter the IPv4 address that the virtual router will monitor.
3. Click the "Create" button. A new entry is generated in the table.

5.6.8.5 Interface Tracking

Introduction

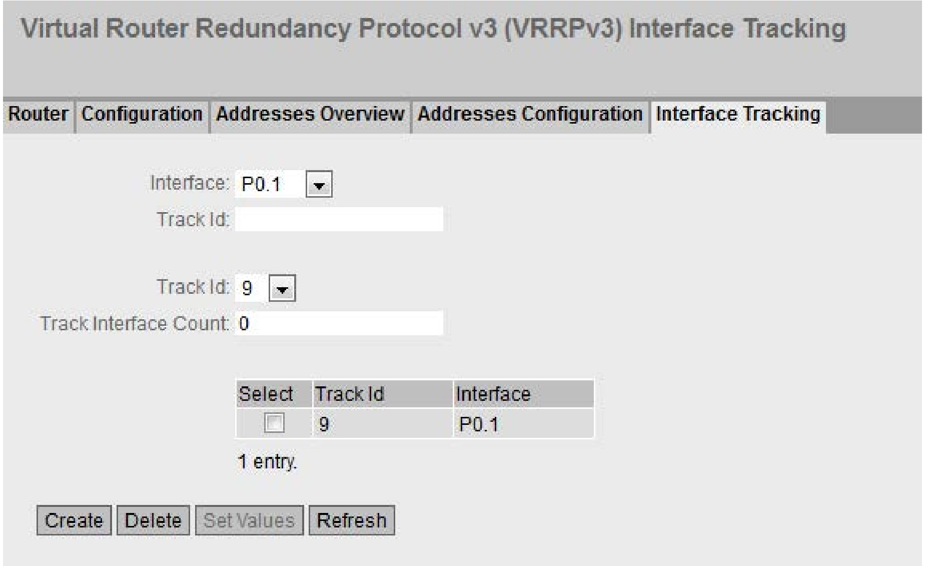
On this page, you configure the monitoring of interfaces.

When the link of a monitored interface changes from "up" to "down", the priority of the assigned VRRP interface is reduced. You configure the value by which the priority is reduced on the page "Layer 3 > VRRP/VRRPv3 > Configuration".

When the link of the interface changes back from "down" to "up", the original priority of the VRRP interface is restored.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol v3 (VRRPv3) Interface Tracking

Interface: P0.1

Track Id:

Track Id: 9

Track Interface Count: 0

Select	Track Id	Interface
□	9	P0.1

1 entry.

Description of the displayed values

The page contains the following boxes:

- **Interface**

  From the drop-down list, select the interface to be monitored.

- **Track ID**

  Enter a track ID.

- **Track ID**

  Select a track ID.

- **Track Interface Count**

  Enter how many monitored interfaces need to change to the "down" status, before the priority is changed.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Track ID**

  Shows the track ID.

- **Interface**

  Shows the interface that is being monitored.

Steps in configuration

1. Select the required interface from the "Interface" drop-down list.
2. In the "Track ID" box, enter the required ID.
3. Click the "Create" button.
4. Select an ID from the "Track-ID" drop-down list:
5. In the "Track Interface Count" enter the number of interfaces.
6. Click the "Set Values" button.
7. Link the monitoring to a VRRP interface in the "Configuration" tab.

5.6.9 OSPFv2

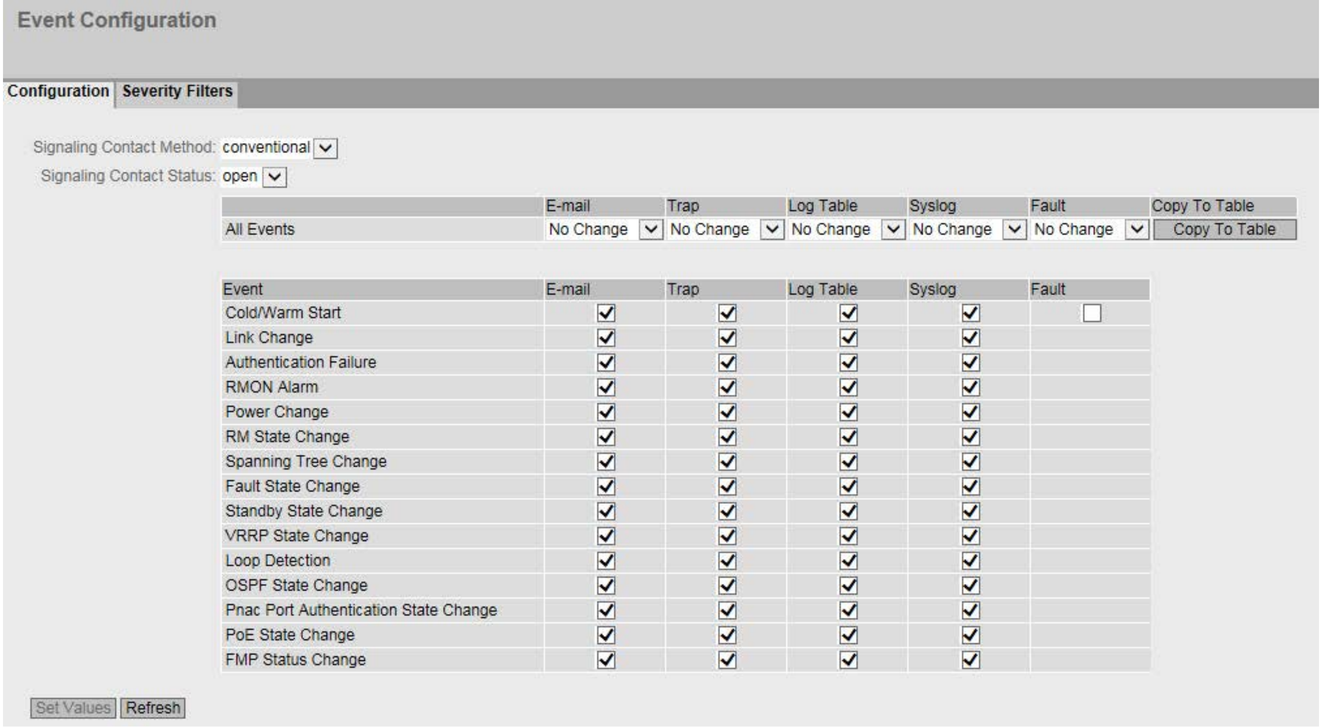
5.6.9.1 Configuration

Introduction

On this page, you configure the routing using OSPFv2..

Note

This function is available only with layer 3.



Event Configuration

Signaling Contact Method: conventional

Signaling Contact Status: open

	E-mail	Trap	Log Table	Syslog	Fault	Copy To Table
All Events	No Change	No Change	No Change	No Change	No Change	Copy To Table

Event	E-mail	Trap	Log Table	Syslog	Fault
Cold/Warm Start	☑	☑	☑	☑	☐
Link Change	☑	☑	☑	☑	
Authentication Failure	☑	☑	☑	☑	
RMON Alarm	☑	☑	☑	☑	
Power Change	☑	☑	☑	☑	
RM State Change	☑	☑	☑	☑	
Spanning Tree Change	☑	☑	☑	☑	
Fault State Change	☑	☑	☑	☑	
Standby State Change	☑	☑	☑	☑	
VRRP State Change	☑	☑	☑	☑	
Loop Detection	☑	☑	☑	☑	
OSPF State Change	☑	☑	☑	☑	
Pnac Port Authentication State Change	☑	☑	☑	☑	
PoE State Change	☑	☑	☑	☑	
FMP Status Change	☑	☑	☑	☑	

Description of the displayed values

The page contains the following boxes

- **OSPFv2**
  Enable or disable routing using OSPFv2.
- **Router ID**
  Enter the name of one of the OSPFv2 interfaces. The name is entered in the IP address format and does not need to match the local IP address. The router ID must be unique in the network.
- **OSPFv2-RFC1583 Compatibility**
  Enable the option if you still have old OSPFv2 routers in operation that are not compatible with RFC 2328.

- **Border Router**
  Shows the status of the OSPFv2 router. If the local system is an active member in at least 2 areas, this is an area border router.
- **AS Border Router**
  Specify whether the router is an AS border router. An AS border router intercedes between multiple autonomous systems, for example if you have an additional RIP network. An AS border router is also necessary to add and to distribute static routes.
- **New LSA Received**
  Shows the number of received LSAs.
  Updates and local LSAs are not counted.
- **New LSA Configured**
  Shows the number of different LSAs sent by this local system.
- **External LSA Maximum**
  To limit the number of entries of external LSAs in the database, enter the maximum number of external LSAs.
- **Exit Interval [s]**
  Enter the interval after which the OSPFv2 router once again attempts to come out of the overflow status. A 0 means that the OSPF router attempts to exit the overflow status only following a restart.
- **Inbound Filter**

  Select a route map that filters inbound routes.
- **Redistribute Routes (Default/Connected/Static)**
  Specify which known routes are distributed using OSPFv2. You can make different decisions for the route types Default, Connected and Static.

  Note

  The options can only be enabled on an AS border router. Enabling the Default and Static options, in particular, can cause problems if they are enabled at too many points in the network, for example, forwarding loops.
- **Route Map**

  Select a route map that filters which routes are forwarded using RIPv2.

Steps in configuration

1. Select the "OSPFv2" check box.
2. Enter the ID of the router in the "Router ID" input box.
3. Select the "AS Border Router" check box.
4. Click the "Set Values" button.

5.6.9.2 Areas

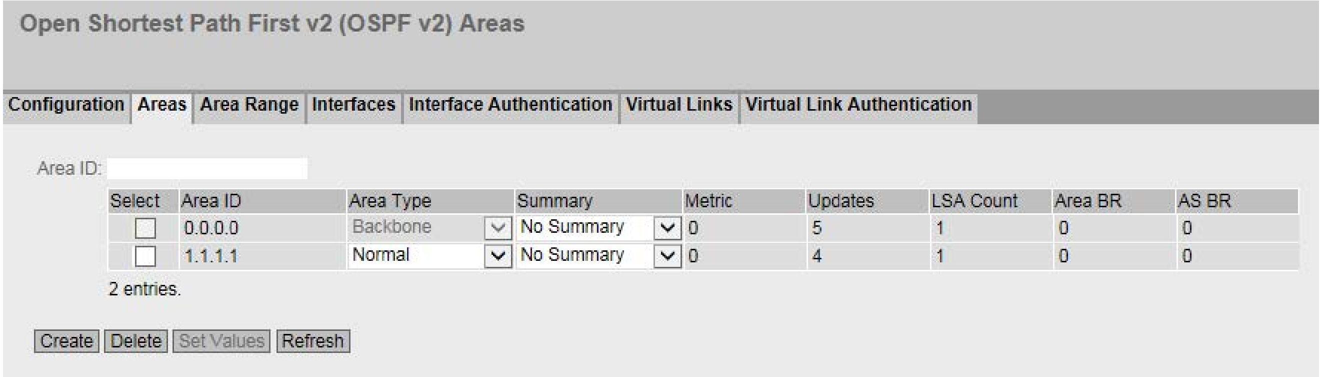
Overview

An Autonomous System can be divided into smaller areas.

On this page, you can view, create, modify or delete the areas of the router.

Note

This function is available only with layer 3.



Area ID:

Select	Area ID	Area Type	Summary	Metric	Updates	LSA Count	Area BR	AS BR
□	0.0.0.0	Backbone	No Summary	0	5	1	0	0
□	1.1.1.1	Normal	No Summary	0	4	1	0	0

2 entries.

Description of the displayed values

The page contains the following boxes:

- **Area ID**
  Enter the identifier of the area. The database is synchronized for all routers of an area.
  The area identifier must be unique in the network.
  The area identifier is a 32-bit number with the following format: x.x.x.x where x = 0 ... 255
  The area identifier 0.0.0.0 is reserved for the backbone area and cannot be deleted.

This table contains the following columns:

- **Select**

  Select the row you want to delete.

- **Area ID**
  Shows the identifier of the area.

- **Area Type**
  Select the area type in the drop-down list.
  - Standard
  - Stub
  - NSSA
  - Backbone
- **Summary**
  Specify whether summary LSAs are generated for this area.
  - Summary: Summary LSAs are generated and sent to the area.
  - No Summary: Summary LSAs are not generated and sent to the area.
- **Metric**

  Displays the costs for the OSPFv2 interface.
- **Updates**
  Shows the number of recalculations of the routing tables.
- **LSA Count**
  Shows the number of LSAs in the database.
- **Area BR**
  Shows the number of reachable area border routers (ABR) within this area.
- **AS BR**
  Shows the number of reachable autonomous system border routers (ASBR) in this area.

Steps in configuration

1. Enter the ID for the area in the "Area ID" input box.
2. Click the "Create" button. A new entry is generated in the table.
3. Select the type of area, for example Stub in the "Area Type" drop-down list.
4. Select the "Summary LSA" entry in the "Summary" drop-down list.
5. Click the "Set Values" button.

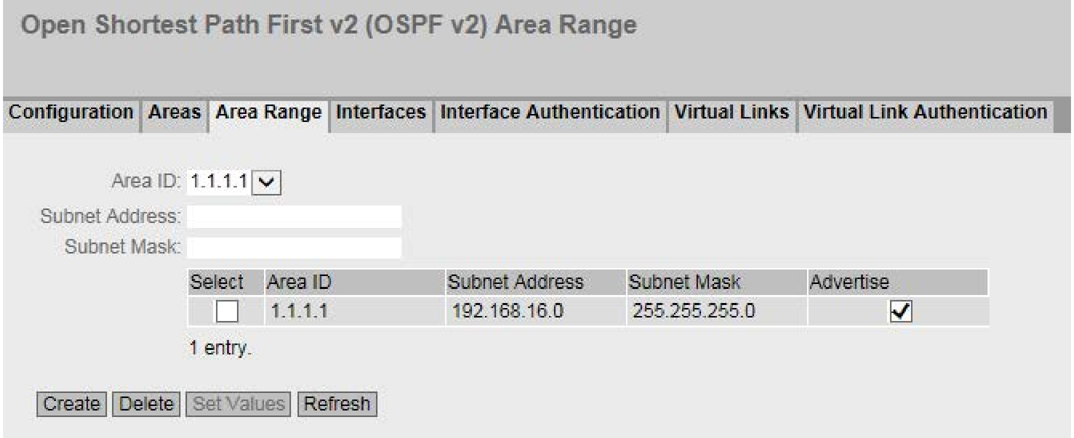
5.6.9.3 Area Range

Creating a new OSPFv2 area range

Using the "Create" button in the "OSPFv2 Area Range" menu, up to four networks can be grouped together under one area ID. The method is used only with area border routers. This means that an area border router only advertises one route for grouped areas to the outside.

Note

This function is available only with layer 3.



Area ID: 1.1.1.1

Subnet Address:

Subnet Mask:

Select	Area ID	Subnet Address	Subnet Mask	Advertise
☐	1.1.1.1	192.168.16.0	255.255.255.0	☑

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **Area ID**
  Select the ID of the area from the drop-down list. You specify the ID on the "Areas" tab.
- **Subnet Address**
  Enter the IPv4 address of the network that will be grouped.
- **Subnet mask**
  Enter the subnet mask of the network that will be grouped.

This table contains the following columns:

- **Select**

  Select the row you want to delete.
- **Area ID**
  Shows the ID of the area.
- **Subnet Address**
  Shows the IP address of the network that will be grouped.
- **Subnet Mask**
  Shows the subnet mask of the network that will be grouped.
- **Advertise**
  Enable this option to advertise the grouped network.

Steps in configuration

1. Select the ID of the area from the drop-down list.
2. Enter the IP address of the network that will be grouped.
3. Enter the subnet mask of the network that will be grouped.
4. Click the "Create" button. A new entry is generated in the table.
5. Enable the "Advertise" option to advertise the grouped network.
6. Click the "Set Values" button.

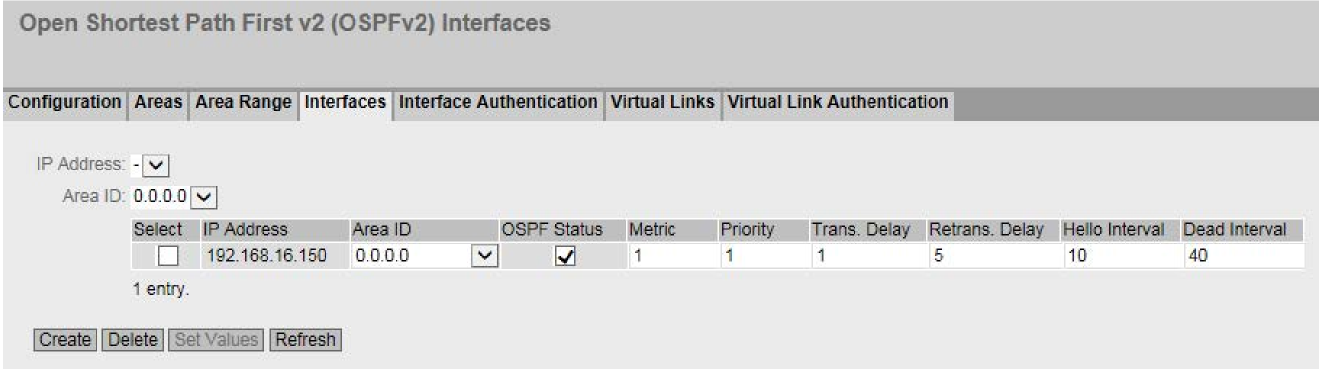
5.6.9.4 Interfaces

Overview

On this page, you can configure OSPFv2 interfaces.

Note

This function is available only with layer 3.



Open Shortest Path First v2 (OSPFv2) Interfaces

IP Address: -
Area ID: 0.0.0.0

Select	IP Address	Area ID	OSPF Status	Metric	Priority	Trans. Delay	Retrans. Delay	Hello Interval	Dead Interval
□	192.168.16.150	0.0.0.0	☑	1	1	1	5	10	40

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **IP Address**
  Select the IP address of the OSPF interface from the drop-down list.
- **Area ID**
  Select the ID of the area that is connected to the OSPFv2 interface from the drop-down list.

Note

For the secondary interface select the same Area ID as for the corresponding primary interface.
The information whether an address type is primary or secondary can be found in the "Address Type" column on the "Layer 3 (IPv4) > Subnets > Overview" page.

Select the ID of the area that is connected to the OSPFv2 interface from the drop-down list.
The table has the following columns:

- **Select**

  Select the row you want to delete.
- **IP address**
  Shows the IPv4 address of the OSPFv2 interface
- **Area ID**
  Select the ID of the area that is connected to the OSPFv2 interface from the drop-down list.

- **OSPF Status**
  Specify whether OSPFv2 is active on the Interface.
  – Enabled: OSPFv2 is enabled on the interface.
  – Disabled: OSPFv2 is disabled on the interface.
- **Metric**
  Enter the costs for the OSPFv2 interface.
- **Priority**
  Enter the router priority. The priority is only relevant for selecting the designated router or designated border router. This parameter can be selected differently on routers within the same subnet.
  Range of values: 0 to 255
  Default setting: 1
- **Trans. Delay**
  Enter the expected delay when sending a connection update.
  Range of values: 1 s to 3600 s
  Default: 1 s
- **Retrans. Delay**
  Enter the time after which an OSPFv2 packet is transferred again if no confirmation was received.
  Range of values: 1 s to 3600 s
  Default: 5 s
- **Hello Interval**
  Enter the interval between two Hello packets.
  Range of values: 1 s to 65,535 s
  Default: 10 s
- **Dead Interval**
  Enter the interval after which the neighbor router is marked as "failed" if no more Hello packets are received from it during this time.
  Default: 40 s

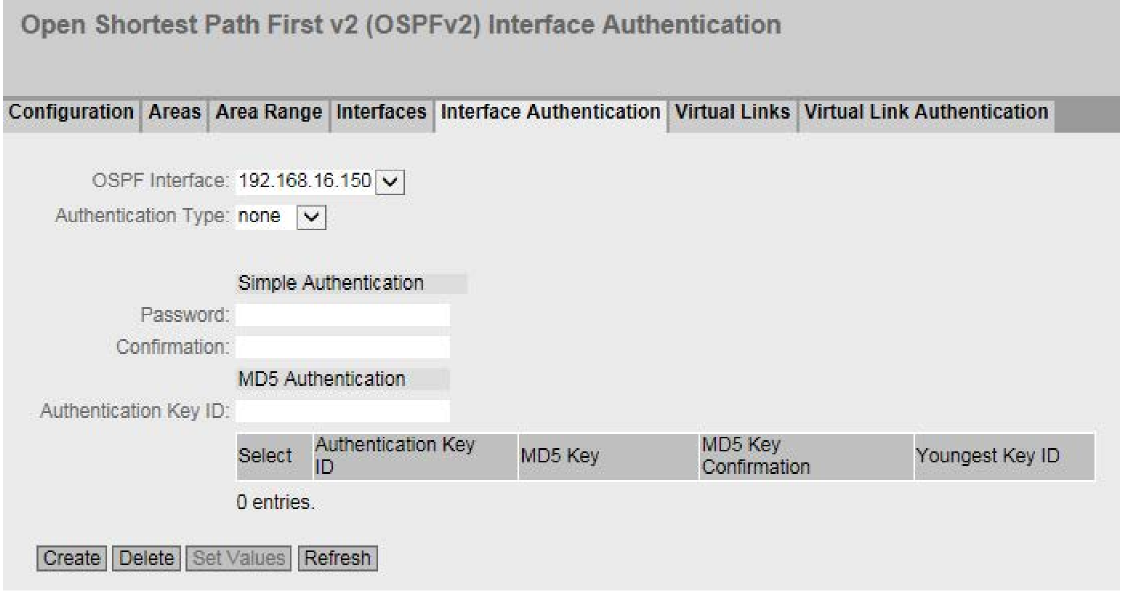
Steps in configuration

1. Select the IPv4 address of the OSPFv2 interface from the "IP Address" drop-down list.
2. Select the ID of the area with which the OSPFv2 interface is connected from the "Area ID" drop-down list.
3. Click the "Create" button. A new entry is generated in the table.
4. Select the check box beside "OSPF Status".
5. In "Transit Delay", "Retrans. Delay" and "Dead Interval"enter suitable values or use the default settings .
6. Click the "Set Values" button.

5.6.9.5 Interface Authentication

Configuring the interface authentication

On this page, you define the authentication of the interface.



Open Shortest Path First v2 (OSPFv2) Interface Authentication

OSPF Interface: 192.168.16.150

Authentication Type: none

Simple Authentication

Password:

Confirmation:

MD5 Authentication

Authentication Key ID:

Select	Authentication Key ID	MD5 Key	MD5 Key Confirmation	Youngest Key ID

0 entries.

Description of the displayed boxes

The page contains the following boxes:

- **OSPF interface**
  Select the OSPFv2 interface for which you want to configure authentication.
- **Authentication Type**

  Select the authentication method. You have the following options:

  – None

    No authentication

  – Simple

    Authentication using an unencrypted password

  – MD5

    Authentication using MD5

Section "Simple Authentication"

- **Password**

  Enter a password.

- **Confirmation**

  Confirm the entered password.

Section "MD5 Authentication"

- **Authentication Key ID**

  Enter the identifier of the MD5 authentication key.

  Enter the ID for MD5 authentication with which the password will be used as a key.

  Since the key ID is transferred with the protocol, the same key must be stored under the same key ID on all neighboring routers.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Authentication Key ID**

  Can only be edited if you set the MD5 authentication method. It is only possible to use several keys there.
- **MD5 Key**

  Enter the MD5 key.
- **MD5 Key Confirmation**

  Confirm the entered key.
- **Youngest Key ID**

  Shows whether or not the MD5 key is the latest key ID.

Steps in configuration

1. Select the OSPFv2 interface and the authentication method from the drop-down lists.
2. Enter the following data in the relevant input box:
   - Password
   - Confirmation of the password
   - Identifier of the MD5 authentication key
3. Click the "Create" button.

5.6.9.6 Virtual Links

Overview

Due to the protocol, each area border router must have access to the backbone area. If a router is not connected directly to the backbone area, a virtual link to it is created.

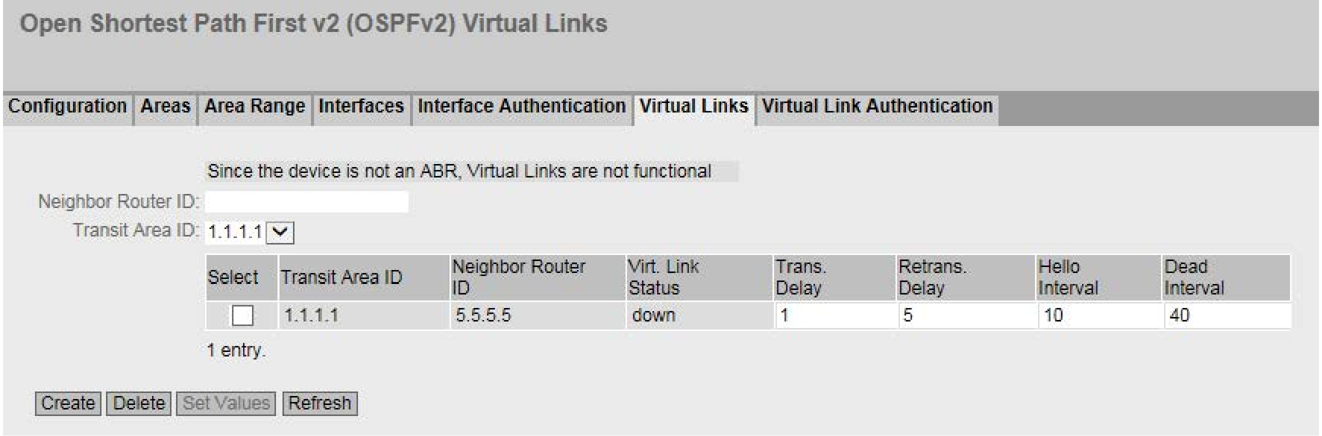
Note

This function is available only with layer 3.

Note

Note that when creating a virtual link both the transit area and the backbone area must already be configured.

A virtual link must be configured identically at both ends.



Open Shortest Path First v2 (OSPFv2) Virtual Links

Since the device is not an ABR, Virtual Links are not functional

Neighbor Router ID:

Transit Area ID: 1.1.1.1

Select	Transit Area ID	Neighbor Router ID	Virt. Link Status	Trans. Delay	Retrans. Delay	Hello Interval	Dead Interval
□	1.1.1.1	5.5.5.5	down	1	5	10	40

1 entry.

Description of the displayed boxes

The page contains the following note:

- **Since the device is not an ABR, Virtual Links are not functional**
  This is displayed when at least one virtual link entry is configured and the device is not an area border router.

The page contains the following boxes:

- **Neighbor Router ID**
  Enter the ID of the neighbor router at the other end of the virtual connection.
- **Transit Area ID**
  Select the ID of the area that connects both routers from the drop-down list.

This table contains the following columns:

- **Select**

  Select the row you want to delete.
- **Transit Area ID**
  Shows the ID via which the two routers are connected.
- **Neighbor Router ID**
  Shows the ID of the neighbor router at the other end of the virtual connection.
- **Virt. Link Status**
  Specify the status of the virtual link. The following states are possible:
  – down: The virtual link is inactive.
  – point-to-point: The virtual link is active.

- **Trans. Delay**
Enter the expected delay when sending a link update packet.
Range of values: 1 s to 3600 s
Default: 1 s
- **Retrans. Delay**
Enter the time after which a packet is transferred again if no confirmation was received.
Range of values: 1 s to 3600 s
Default: 5 s
- **Hello Interval**
Enter the interval between two Hello packets.
Range of values: 1 s to 65,535 s
Default: 10 s
- **Dead Interval**
Enter the interval after which the neighbor router counts as "failed" if no more Hello packets are received from it during this time.
Default setting: 40 s

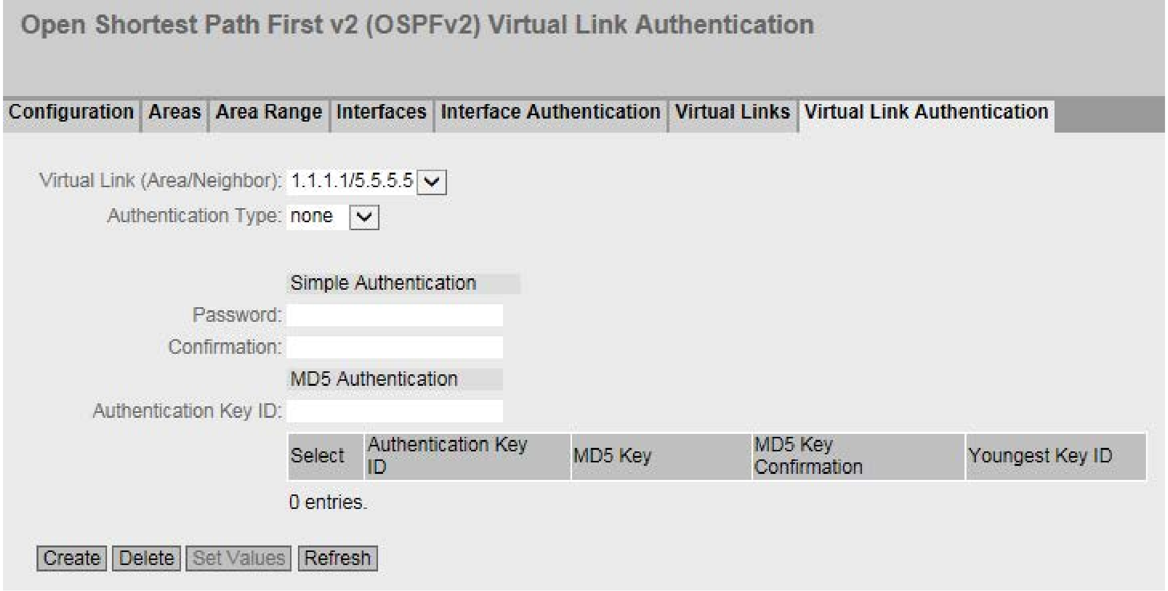
Steps in configuration

1. Enter the ID of the neighbor router at the other end of the virtual link in "Neighbor Router ID".
2. Select the area ID that connects the two routers from the "Transit Area ID" drop-down list.
3. Click the "Create" button. A new entry is generated in the table.
4. Enter the appropriate values in "Transit Delay", "Retrans. Delay" and "Dead Interval".
5. Click the "Set Values" button.

5.6.9.7 Virtual Link Authentication

Configuring the interface login

On this page, you define the authentication of the interface.



Open Shortest Path First v2 (OSPFv2) Virtual Link Authentication

Virtual Link (Area/Neighbor): 1.1.1.1/5.5.5.5

Authentication Type: none

Simple Authentication

Password:

Confirmation:

MD5 Authentication

Authentication Key ID:

Select	Authentication Key ID	MD5 Key	MD5 Key Confirmation	Youngest Key ID

0 entries.

Description of the displayed boxes

The page contains the following boxes:

- **Virtual Link (Area/Neighbor)**

  Select the virtual link for which you want to configure authentication.

- **Authentication Type**

  Select the authentication method. You have the following options:

  – None

    No authentication

  – Simple

    Authentication using an unencrypted password

  – MD5

    Authentication using MD5

Section "Simple Authentication"

- **Password**

  Enter a password.

- **Confirmation**

  Confirm the entered password.

Section "MD5 Authentication"

- **Authentication Key ID**

  Enter the identifier of the MD5 authentication key.

  Enter the ID for MD5 authentication with which the password will be used as a key.

  Since the key ID is transferred with the protocol, the same key must be stored under the same key ID on all neighboring routers.

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **Authentication Key ID**

  Can only be edited if you set the MD5 authentication method. It is only possible to use several keys there.

- **MD5 Key**

  Enter the MD5 key.

- **MD5 Key Confirmation**

  Confirm the entered key.

- **Youngest Key ID**

  Shows whether or not the MD5 key is the latest key ID.

Steps in configuration

Follow these steps:

1. Select the virtual connection and the authentication method from the drop-down lists.
2. Enter the following data in the relevant input box:
   - Password
   - Confirmation of the password
   - Identifier of the MD5 authentication key
3. Click the "Set Values" button.

5.6.10 RIPv2

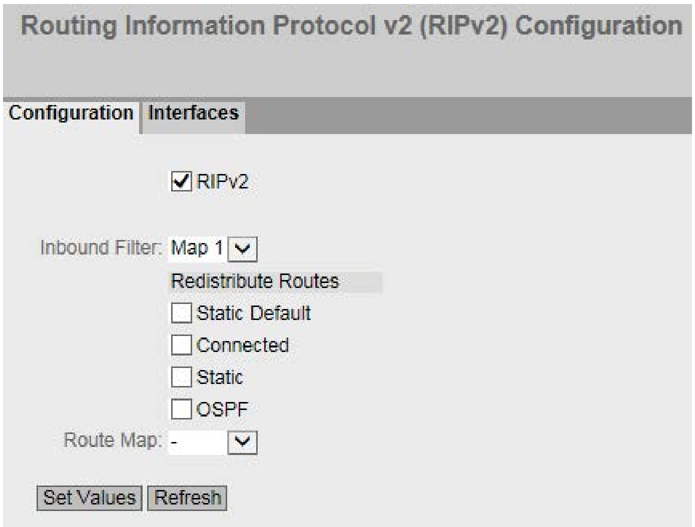
5.6.10.1 Configuration

On this page, you configure the routing using RIPv2.

Note

RIPv2 is available only on layer 3.

Settings



Routing Information Protocol v2 (RIPv2) Configuration

☑ RIPv2

Inbound Filter: Map 1

Redistribute Routes
□ Static Default
□ Connected
□ Static
□ OSPF

Route Map: -

Image 5-15 RIPv2 Configuration

- **RIPv2**

  Enable or disable routing using RIPv2.

- **Inbound Filter**

  Select a route map that filters inbound routes.

- **Redistribute Routes**

  Specify which known routes are distributed using RIPv2.

  The following types of route exist:

  – Static Default

  – Connected

  – Static

  – OSPF

- **Route Map**

  Select a route map that filters which routes are forwarded using RIPv2.

5.6.10.2 Interfaces

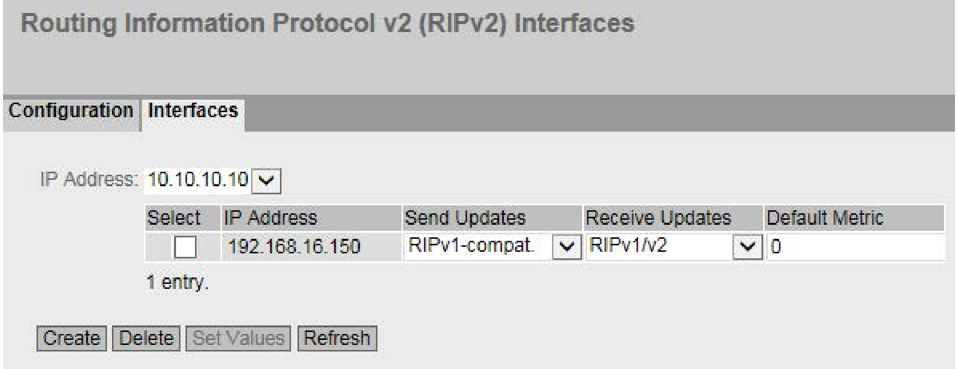
Overview

On this page, you can configure RIPv2 interfaces.

Note

RIPv2 is available only on layer 3.

Settings



Routing Information Protocol v2 (RIPv2) Interfaces

IP Address: 10.10.10.10

Select	IP Address	Send Updates	Receive Updates	Default Metric
□	192.168.16.150	RIPv1-compat.	RIPv1/v2	0

1 entry.

Image 5-16 RIPv2 interfaces

- **IP Address**

  Select the IPv4 address of the RIPv2 interface.

This table contains the following columns:

- **Select**

  Select the row you want to delete.
- **IP Address**

  Shows the IPv4 address of the RIPv2 interface

- **Send Updates**

  Select the way in which updates are sent:

  – no send

    No updates are sent.

  – RIPv1

    Updates for RIPv1 are sent.

  – RIPv1-compat.

    RIPv2 updates are sent as broadcasts according to the rules of RIPv1.

  – RIPv2

    Updates for RIPv2 are sent as multicasts.

  – RIPv1 demand/RIPv2 demand

    RIP packets are sent only as a response to an explicit query.

- **Receive Updates**

  Select the form in which received updates are accepted:

  – no receive

    No updates are received.

  – RIPv1

    Only updates of RIPv1 are received.

  – RIPv2

    Only updates of RIPv2 are received.

  – RIPv1/v2

    Updates of RIPv1 and RIPv2 are received.

- **Default Metric**

  Enter the costs for the RIPv2 interface.

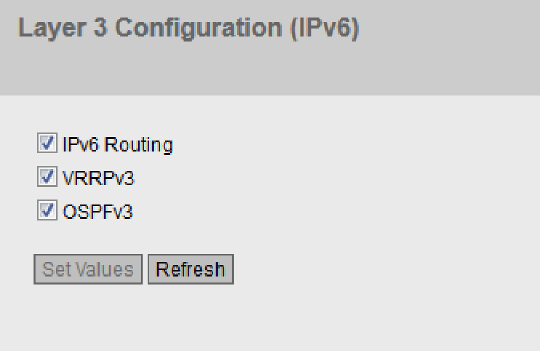
5.7 The "Layer 3 (IPv6)" menu

5.7.1 Configuration

Introduction

The page contains the overview of the layer 3 functions for IPv6. On this page, you enable or disable the required layer 3 function.

The functions "IPv6 Routing", "VRRPv3" and "OSPFv3" are only available with Layer 3 (IPv6).



Layer 3 Configuration (IPv6)

☑ IPv6 Routing

☑ VRRPv3

☑ OSPFv3

Description

The page contains the following:

- **IPv6 Routing** (only available with devices with a layer 3 license)
  - Enabled

    IPv6 routing is enabled. If IPv4 routing is not enabled on the device this is also enabled with this function.
  - Disabled

    IPv6 routing is disabled.
- **VRRPv3** (only available with devices with a layer 3 license)

  Enable or disable routing using VRRPv3. To use VRRPv3 , first enable the IPv6 routing function. You can configure other settings in "Layer 3 (IPv6)> VRRPv3".
- **OSPFv3** (only available with devices with a layer 3 license)

  Enable or disable routing using OSPFv3. To use OSPFv3 , first enable the IPv6 routing function. You can configure other settings in "Layer 3 (IPv6) > OSPFv3".

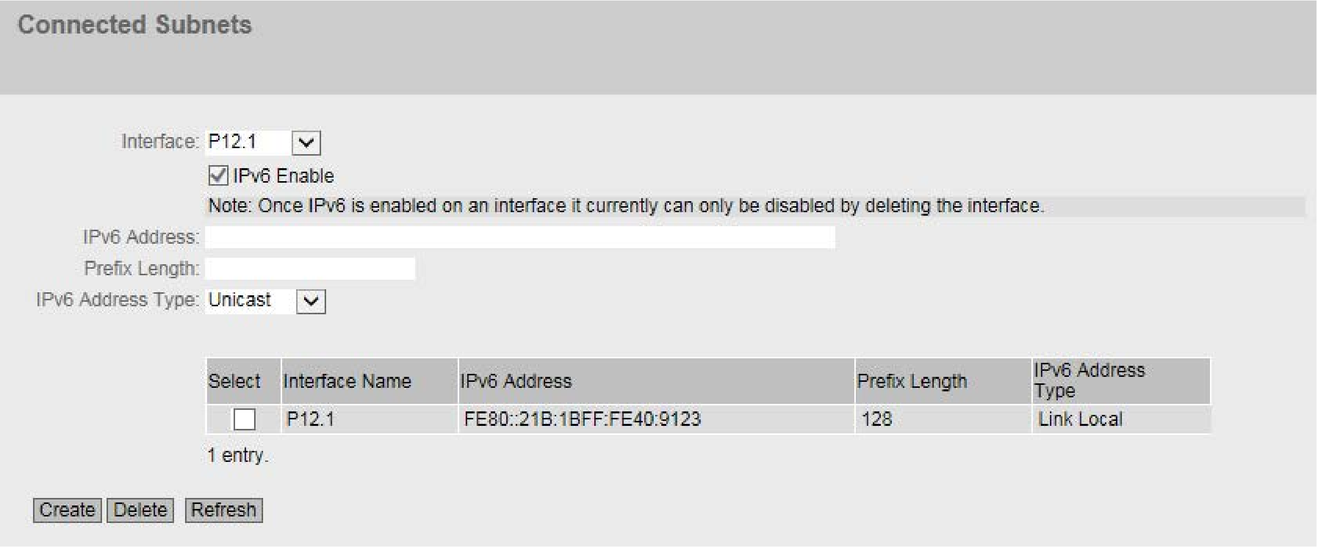
Steps in configuration

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

5.7.2 Subnets

Connected Subnets

On this page, you can enable IPv6 on the interface. The interface is also called an IPv6 interface. An IPv6 interface can have several IPv6 addresses.



Connected Subnets

Interface: P12.1

☑ IPv6 Enable

Note: Once IPv6 is enabled on an interface it currently can only be disabled by deleting the interface.

IPv6 Address:

Prefix Length:

IPv6 Address Type: Unicast

Select	Interface Name	IPv6 Address	Prefix Length	IPv6 Address Type
□	P12.1	FE80::21B:1BFF:FE40:9123	128	Link Local

1 entry.

Description

The page contains the following:

- **Interface**

  Select the IP interface on which IPv6 will be enabled.

- **IPv6 Enable**

  Enable or disable IPv6 on the interface.

  Note

  Disabling IPv6

  If IPv6 is enabled on an interface, you can only disable IPv6 by deleting interface.

- **IPv6 Address**

  Enter the IPv6 address. The entry depends on the selected address type.

- **Prefix Length**

  Enter the number of left-hand bits belonging to the prefix
- **IPv6 Address Type**

  Select the address type.
  - Unicast
  - Anycast
  - Link Local IPv6 address is only valid on the link

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.
- **Interface Name**

  Shows the name of the interface.
- **IPv6 Address**

  Shows the IP address of the subnet.
- **Prefix Length**

  Shows the prefix length.
- **IPv6 Address Type**

  Displays the address type. The following values are possible:
  - Unicast
  - Anycast
  - Link Local

Steps in configuration

Forming a link local address automatically

1. Select the required interface.
2. Enable IPv6.
3. Click the "Create" button. In the table an entry with the interface is created and the automatically formed IPv6 address is displayed.

Assigning link local address

1. Select the required interface.
2. Enable IPv6.
3. In "IPv6 Address" enter the link local address, e.g. FE80::21B:1BFF:FE40:9155
4. Enter "128" in "Prefix Length".
5. For "IPv6 Address Type" select the entry "Link Local".
6. Click the "Create" button. In the table an entry with the interface is created and the IPv6 address is displayed.

5.7.3 DHCPv6 client

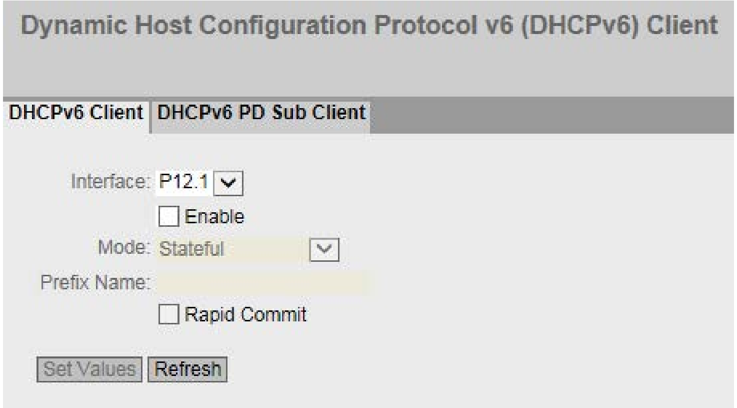
5.7.3.1 DHCPv6 client

On this page, you specify whether the DHCPv6 client receives not only the configuration settings but also the IPv6 address or supports the "prefix delegation" function.

Prefix delegation

The DHCPv6 server delegates the distribution of the IPv6 prefix to the DHCPv6 client. To do this an IPv6 interface must be configured on the DHCPv6 client as a PD client. Via the PD client, the DHCPv6 client obtains an IPv6 prefix from the DHCPv6 server and stores it under a prefix name. The IPv6 interfaces of the DHCPv6 client the should adopt the prefix are configured as so-called PD sub-clients.

You configure the PD sub-clients in "Layer 3 (IPv6)" > "DHCPv6 Client" > "DHCPv6 PD Sub Client".



Dynamic Host Configuration Protocol v6 (DHCPv6) Client

Interface: P12.1

□ Enable

Mode: Stateful

Prefix Name:

□ Rapid Commit

Description

The page contains the following:

- **Interface**

  Select the IP interface via which the DHCPv6 client functions.

- **Enable**

  Enable or disable the DHCPv6 client for the relevant interface.

- **Mode**

  Specify the procedure.

  - Status dependent Obtains the IPv6 address and the configuration file from the DHCPv6 server
  - Stateless: Obtains only the configuration file from the DHCPv6 server
  - Prefix Delegation: The DHCPv6 client takes over the distribution of the IPv6 prefix

- **Prefix Name**

  Enter the prefix name that will be further distributed by the DHCPv6 router. Can only be edited with the "Prefix Delegation" procedure. The DHCPv6 router stores IPv6 prefix of the DHCPv6 server under this name.

- **Rapid Commit**

  When enabled the procedure for the IPv6 address assignment is shortened. Instead of 4 DHCPv6 messages (SOLICIT, ADVERTISE , REQUEST, REPLY) only 2 DHCPv6 messages (SOLICIT, REPLY) are used. You will find further information on the messages in RFC 3315.

Steps in configuration

1. Select the interface
2. Enable the DHCPv6 client.
3. Select the mode.
4. Enter a name for the prefix. Only necessary if "Prefix Delegation" is set as the mode.
5. Click the "Create" button.
6. Click the "Set Values" button.

5.7.3.2 DHCPv6 PD Sub Client

On this page you specify which IPv6 interfaces of the DHCPv6 client will adopt the prefix. This achieved by assigning the prefix name followed by a prefix and the required prefix length to them as the IP address. Here, the first bits of the configured prefix are replaced by the values stored in the prefix name.

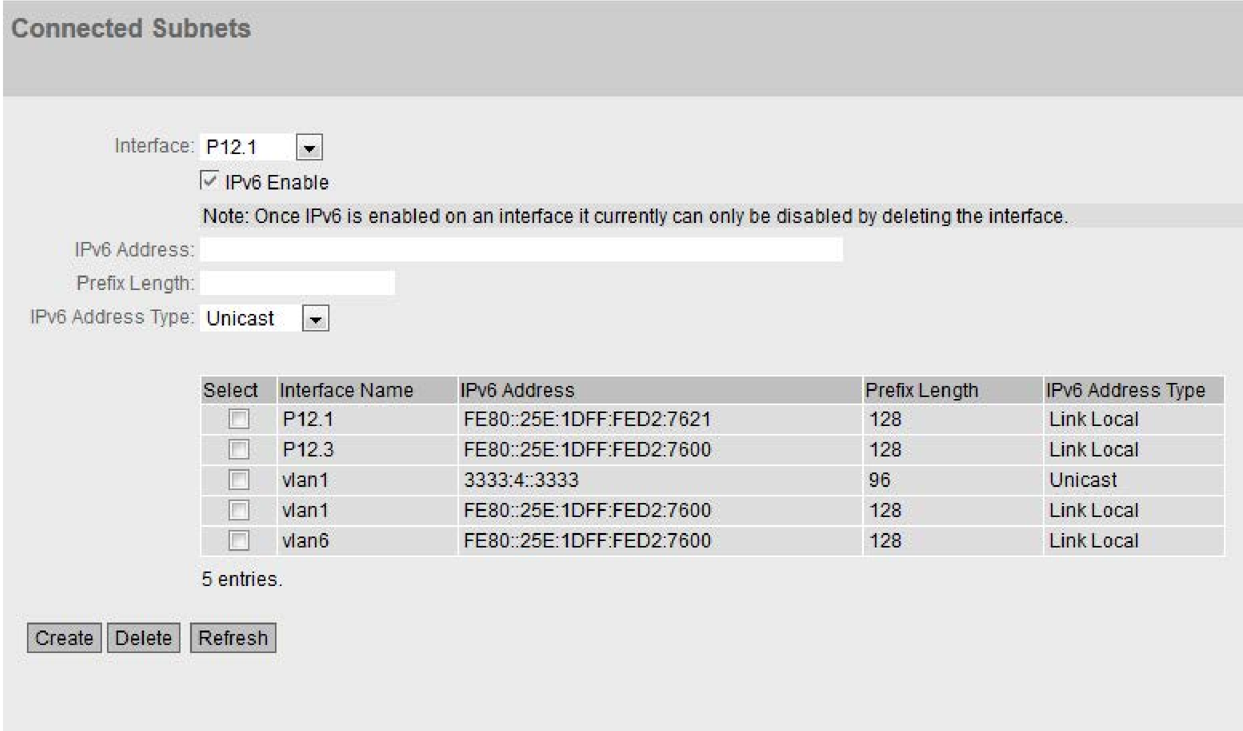
Example:

Under the prefix name "test", the following IPv6 prefix is stored: 2001:DB8:1234::/48

Prefix = 2002:AF9:5678::1

Prefix length = 64

This results in the following IPv6 address 2001:DB8:1234::1



Connected Subnets

Interface: P12.1

☑ IPv6 Enable

Note: Once IPv6 is enabled on an interface it currently can only be disabled by deleting the interface.

IPv6 Address:

Prefix Length:

IPv6 Address Type: Unicast

Select	Interface Name	IPv6 Address	Prefix Length	IPv6 Address Type
□	P12.1	FE80::25E:1DFF:FED2:7621	128	Link Local
□	P12.3	FE80::25E:1DFF:FED2:7600	128	Link Local
□	vlan1	3333:4::3333	96	Unicast
□	vlan1	FE80::25E:1DFF:FED2:7600	128	Link Local
□	vlan6	FE80::25E:1DFF:FED2:7600	128	Link Local

5 entries.

Description

The page contains the following:

- **Interface**

  Select the interface that functions as the PD sub client. Only IP interfaces can be selected

- **Prefix Name**

  Enter the prefix name that will be further distributed by the PD router. The PD router stores IPv6 prefix of the DHCPv6 server under this name.

- **Prefix**

  Specify the network identifier of the host.

- **Prefix Length**

  Enter the number of left-hand bits belonging to the prefix

This table contains the following columns

- **Select**

  Select the check box in the row to be deleted

- **Interface Name**

  Shows the name of the interface

- **Prefix Name**

  Shows the name of the prefix.

- **Prefix**

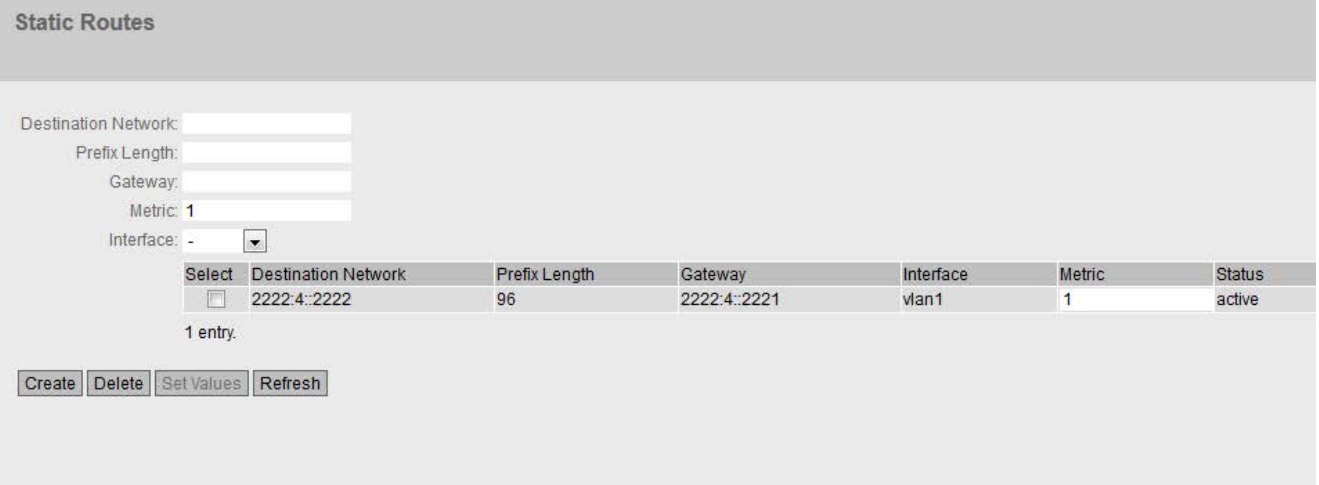
  Shows the prefix.
- **Prefix Length**

  Shows the prefix length.
- **Generated Address**

  Shows the IPv6 address formed from the prefix name, prefix and prefix length.

5.7.4 Static Routes

On this page, you configure static IPv6 routes.



Static Routes

Destination Network:
Prefix Length:
Gateway:
Metric: 1
Interface: -

Select	Destination Network	Prefix Length	Gateway	Interface	Metric	Status
□	2222:4::2222	96	2222:4::2221	vlan1	1	active

1 entry.

Description

The page contains the following:

- **Destination Network**

  Enter the network address of the destination that can be reached via this route.
- **Prefix Length**

  Enter the number of left-hand bits belonging to the prefix
- **Gateway**

  Enter the IPv4 address of the gateway via which this network address is reachable.

- **Metric**

  Enter the metric for the route. The metric corresponds to the quality of a connection, based for example on speed or costs. If there are several equal routes, the route with the lowest metric value is used.
  Range of values: 1 - 254

- **Interface**

  Specify the interface via which the network address of the destination is reached.

This table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Destination Network**

  Shows the network address of the destination.

- **Prefix Length**

  Shows the prefix length.

- **Gateway**

  Shows the IPv6 address of the next gateway.

- **Interface**

  Shows the Interface of the route.

- **Metric**

  Enter the metric for the route. When creating the route, "not used" is entered automatically. The metric corresponds to the quality of a connection, based for example on speed or costs. If there are several equal routes, the route with the lowest metric value is used.
  Range of values: 1 - 254

- **Status**

  Shows whether or not the route is active.

Steps in configuration

1. Enter the network address of the destination.
2. Enter the prefix length.
3. Enter the IPv6 address of the gateway.
4. Select the required interface.
5. Enter the metric of the route.
6. Click the "Create" button. A new entry is generated in the table.
7. Click the "Set Values" button.

5.7.5 Route maps

5.7.5.1 General

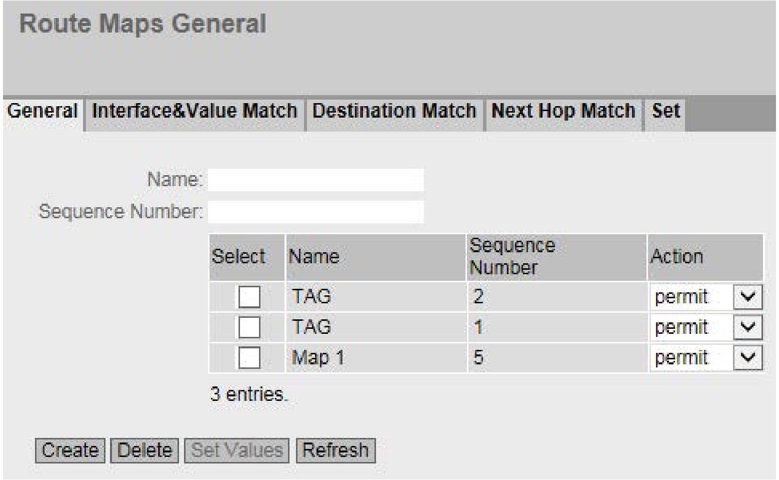
Route maps

With route maps, you control how routing information is further processed. You can filter routing information and specify whether the information is further processed, modified or discarded.

Route maps operate according to the following principle:

- Routing information is compared with the filters of the route maps.
- The comparison is continued until the filters of a route map match the properties of an item of information.
- The information is then processed according to the route map settings:
  - The routing information is discarded.
  - The properties of the routing information are changed.

Settings



Route Maps General

Name:

Sequence Number:

Select	Name	Sequence Number	Action
□	TAG	2	permit
□	TAG	1	permit
□	Map 1	5	permit

3 entries.

Image 5-17 Route maps general

- **Name**

  Enter the name for the route map.

- **Sequence Number**

  Enter a number for the route map.

  You can create several route maps with the same name but with different sequence numbers. The sequence numbers then specify the order in which the route maps are processed.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Name**

  Shows the name of the route map.
- **Sequence Number**

  Shows the sequence number of the route map.
- **Action**

  Specify what happens to the routing information that matches the settings of the route map:

  – permit

    The routing information is further processed according to the settings you make in the "Set" tab.

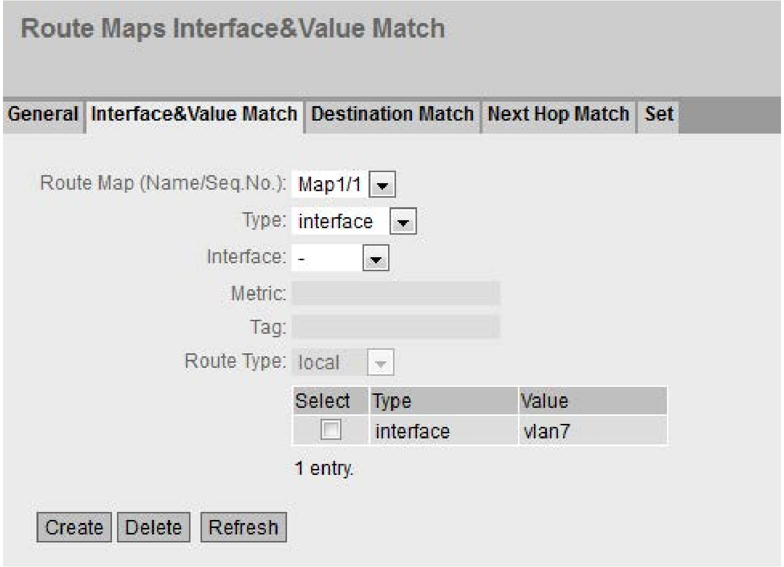
  – deny

    The routing information is discarded.

5.7.5.2 Interface & Value Match

On this page, you specify whether or not the routing information for a route map is filtered according to interfaces, metric or tags.

Settings



Route Maps Interface&Value Match

Route Map (Name/Seq.No.): Map1/1

Type: interface

Interface: -

Metric:

Tag:

Route Type: local

Select	Type	Value
□	interface	vlan7

1 entry.

Image 5-18 Filtering route maps and metric

- **Route Map (Name/Seq. No.)**

  Select a route map.

  The created route maps are available to you.

- **Type**

  Select the basis for the filtering:

  – Interface

  – Metric

  – Tag

  – Route Type

- **Interface**

  Select an interface.

  This box is active only if you have selected the "Interface" entry in the "Type" drop-down list.

- **Metric**

  Enter a value for the metric.

  This box is active only if you have selected the "Metric" entry in the "Type" drop-down list.

- **Tag**

  Enter a value for the tag.

  This box is active only if you have selected the entry "Tag in the "Type" drop-down list.

- Route Type

  Select the type of the route.

  – Local

    The routing information for the route map is filtered according to directly connected routes (local interfaces).

  – Remote

    The routing information for the route map is filtered according to learned or statically configured routes.

  This box is active only if you have selected the entry "Route Type in the "Type" drop-down list.

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **Type**

  Shows the selected type:

  – Interface

  – Metric

  – Tag

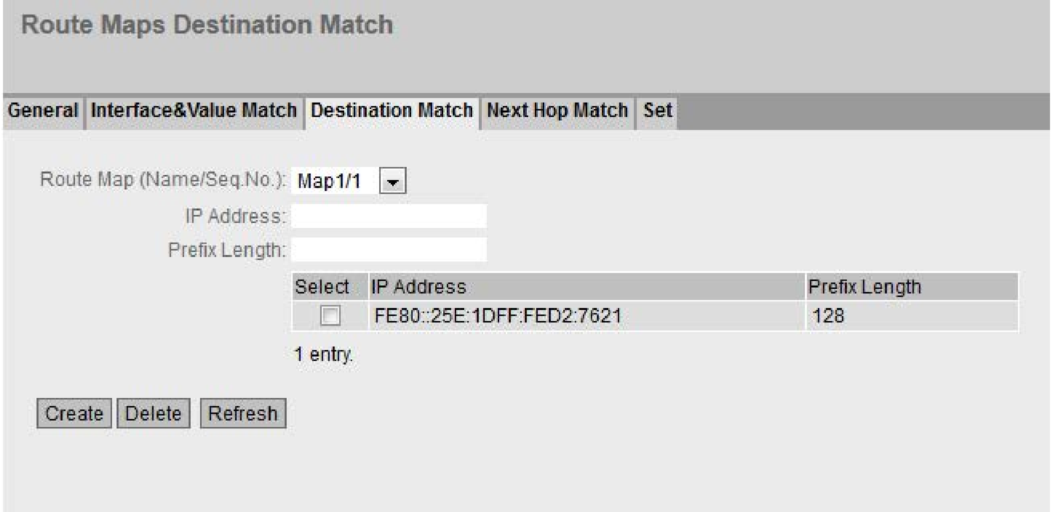
  – Route Type

- **Value**

  Shows the selected interface or the value of the metric or of the tag.

5.7.5.3 Destination Match

On this page, you specify whether or not the routing information for a route map is filtered based on the destination IP address.



Route Maps Destination Match

Route Map (Name/Seq.No.): Map1/1
IP Address:
Prefix Length:

Select	IP Address	Prefix Length
□	FE80::25E:1DFF:FED2:7621	128

1 entry.

Settings

- **Route Map (Name/Seq. No.)**

  Select a route map.

- **IP Address**

  Enter the IPv6 address of the destination on which the filtering is based.

- **Prefix Length**

  Enter the number of left-hand bits belonging to the prefix

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.
- **IP Address**

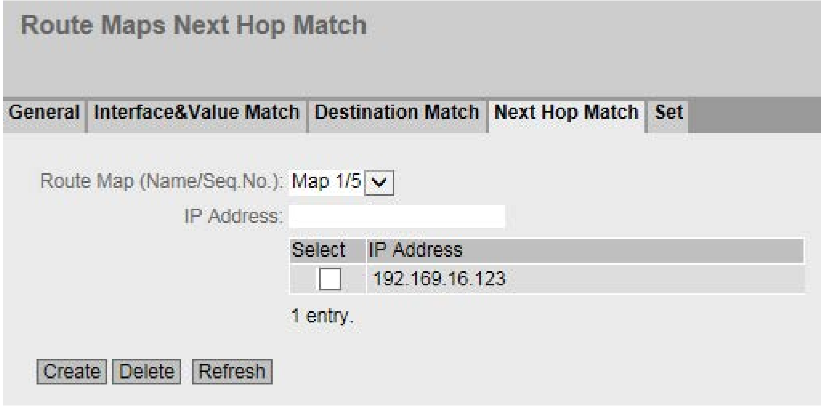
  Shows the IPv6 address of the destination.
- **Prefix Length**

  Shows the prefix length.

5.7.5.4 Next Hop Match

On this page, you specify whether or not the filtering for a route map will be based on the router to which the routing information is sent next.

Settings



Route Maps Next Hop Match

Route Map (Name/Seq.No.): Map 1/5

IP Address:

Select	IP Address
□	192.169.16.123

1 entry.

Image 5-19 Route Maps Next Hop Match

- **Route Map (Name/Seq. No.)**

  Select a route map.
- **IP Address**

  Enter the IP address of the router to which the routing information will be sent next.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **IP Address**

  Shows the IP address of the next router.

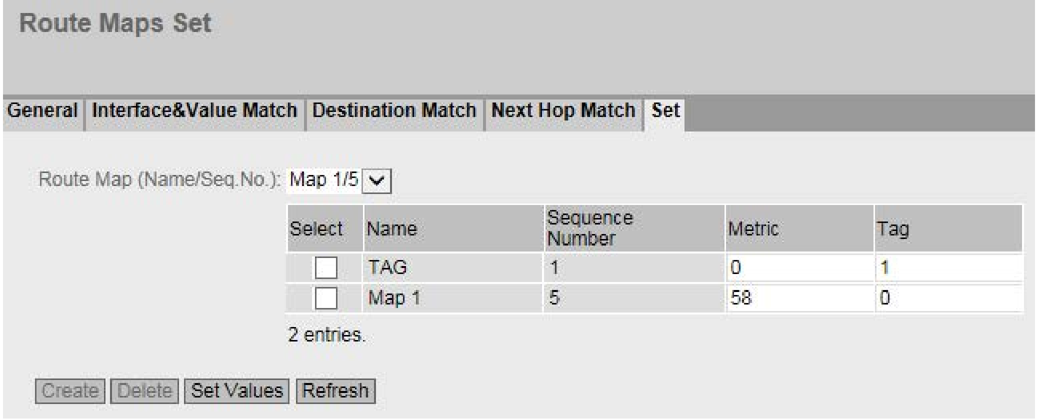
5.7.5.5 Set

On this page, you specify whether or not the routing information will be changed by a route map.

You can only change the information of a "Permit" route map.

If, for example, you have filtered based on a certain metric, you can change the value of the metric here. The routing information is then forwarded with the new value.

Settings



Route Maps Set

Route Map (Name/Seq.No.): Map 1/5

Select	Name	Sequence Number	Metric	Tag
□	TAG	1	0	1
□	Map 1	5	58	0

2 entries.

Image 5-20 Route maps set

- **Route Map (Name/Seq. No.)**

  Select a route map.

The table has the following columns:

- **Select**

  Select the row you want to delete.
- **Name**

  Shows the name of the route map.
- **Sequence Number**

  Shows the sequence number of the route map.
- **Metric**

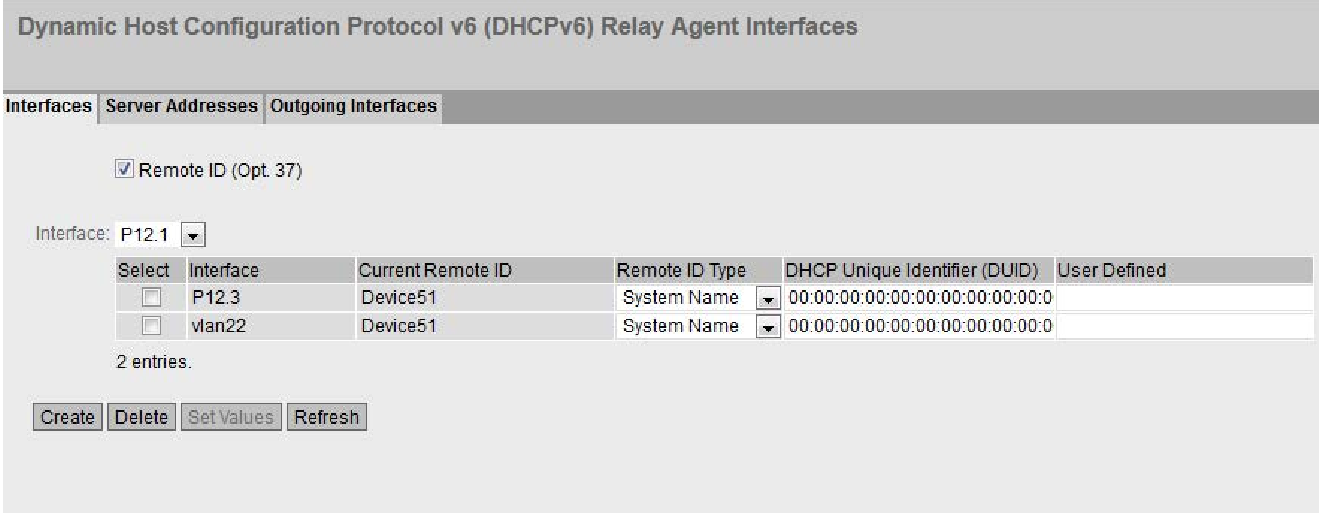
  Enter the new value for the metric with which the routing information will be forwarded.
- **Tag**

  Enter the new value for the tag with which the routing information will be forwarded.

5.7.6 DHCPv4 Relay Agent

5.7.6.1 Interfaces

A DHCPv6 relay agent forwards the DHCP queries of the DHCPv6 client to the DHCPv6 server. When forwarding the remote ID is inserted in the DHCP query. The remote ID is the identifier of the interface. With this, the DHCPv6 relay agent can send the reply of the DHCPv6 server to the required DHCPv6 client.



Dynamic Host Configuration Protocol v6 (DHCPv6) Relay Agent Interfaces

☑ Remote ID (Opt. 37)

Interface: P12.1

Select	Interface	Current Remote ID	Remote ID Type	DHCP Unique Identifier (DUID)	User Defined
□	P12.3	Device51	System Name	00:00:00:00:00:00:00:00:00:00:0	
□	vlan22	Device51	System Name	00:00:00:00:00:00:00:00:00:00:0	

2 entries.

Description

The page contains the following boxes:

- **Remote ID (Opt. 37)**

  When enabled the DHCP relay agent option 37 (Remote ID) is used. Specify the type of identifier in "Remote ID Type".

- **Interface**

  Select the IPv6 interface.

The table has the following columns:

- **Select**

  Select the row you want to delete.

- **Interface**

  Interface to which the settings relate.

- **Current Remote ID**

  Shows which remote ID is currently being used.

- **Remote ID Type**

  Select hat is used as the identifier for the IPv6 interface. The following options are available:

  – DUID

    DHCP Unique Identifier

  – System Name

    System name of the device

  – Management IP

    Management IPv6 address of the device

  – User Defined

    User-defined entry

- **DHCP Unique Identifier**

  Enter the DUID (DHCP Unique Identifier).

- **User Defined**

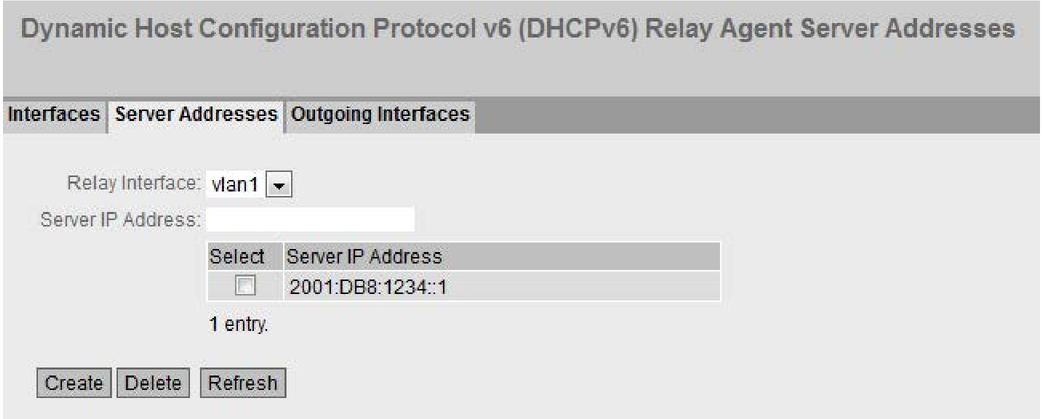
  Enter a user-defined entry as the identifier.

Steps in configuration

1. Enable Remote ID (Opt. 37).
2. Select the required interface and click the "Set Values" button.
3. Click the "Create" button. A new entry is generated in the table.
4. Specify the type of remote ID in "Remote ID Type" e.g. the system name. The system name of the device is used as the identifier.

5.7.6.2 Server Addresses

On this page you enable the DHCPv6 relay agent on the interface. You also specify which DHCPv6 server can be reached via it.



Dynamic Host Configuration Protocol v6 (DHCPv6) Relay Agent Server Addresses

Relay Interface: vlan1

Server IP Address:

Select	Server IP Address
□	2001:DB8:1234::1

1 entry.

Description

The page contains the following boxes:

- **Relay Interface**

  Select the interface on which the DHCPv6 relay agent accepts DHCPv6 requests.

- **Server IP Address**

  Enter the IPv6 address of the DHCPv6 server to which the DHCPv6 requests will be forwarded. The address can be either the unicast or the link local multicast address. With the link local multicast address you need to specify an interface, via which the DHCPv6 server can be reached. You configure the interface in "Layer 3 (IPv6) > DHCPv6 Relay Agent > Outgoing Interfaces".

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Server IP Address**

  Shows the IPv6 address of the DHCPv6 server.

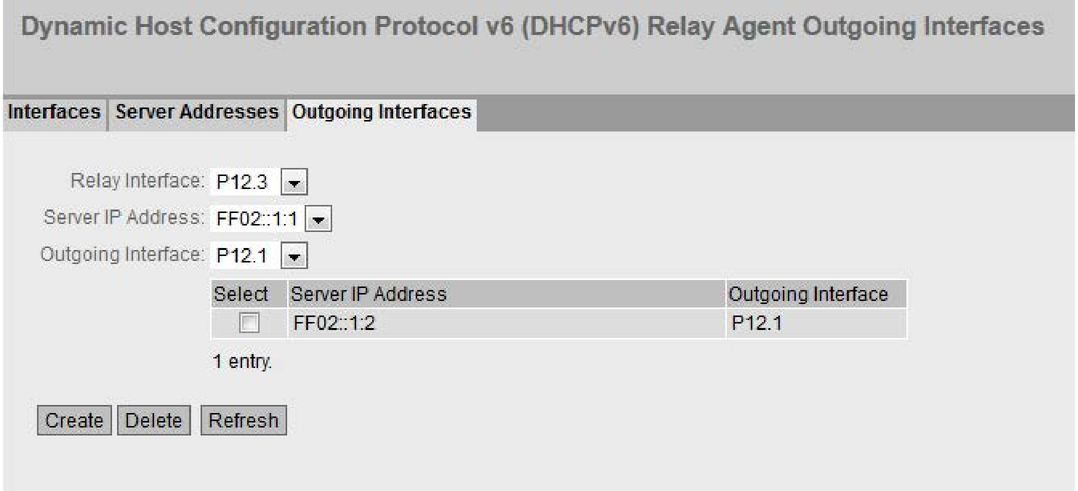
Steps in configuration

1. Select the required interface
2. Enter the IPv6 address of the DHCPv6 server.
3. Click the "Create" button. A new entry is generated in the table.

5.7.6.3 Outgoing Interfaces

Outgoing Interfaces

The link local multicast address (ff02::1:2) of the DHCPv6 server can only be reached by devices located on the same link. On this page, you specify the interface via which this DHCPv6 server can be reached.



Dynamic Host Configuration Protocol v6 (DHCPv6) Relay Agent Outgoing Interfaces

Relay Interface: P12.3
Server IP Address: FF02::1:1
Outgoing Interface: P12.1

Select	Server IP Address	Outgoing Interface
□	FF02::1:2	P12.1

1 entry.

Description

The page contains the following boxes:

- **Relay Interface**

  Select the IPv6 interface on which the DHCPv6 relay agent accepts DHCPv6 requests.
- **Server IP Address**

  Select the IPv6 address of the DHCPv6 server.
- **Outgoing Interface**

  Select the IPv6 interface via which the DHCPv6 server can be reached.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted.
- **Server IP Address**

  Shows the IPv6 address of the DHCPv6 server.
- **Outgoing Interface**

  Shows the IPv6 interface via which the DHCPv6 server can be reached.

5.7.7 VRRPv3

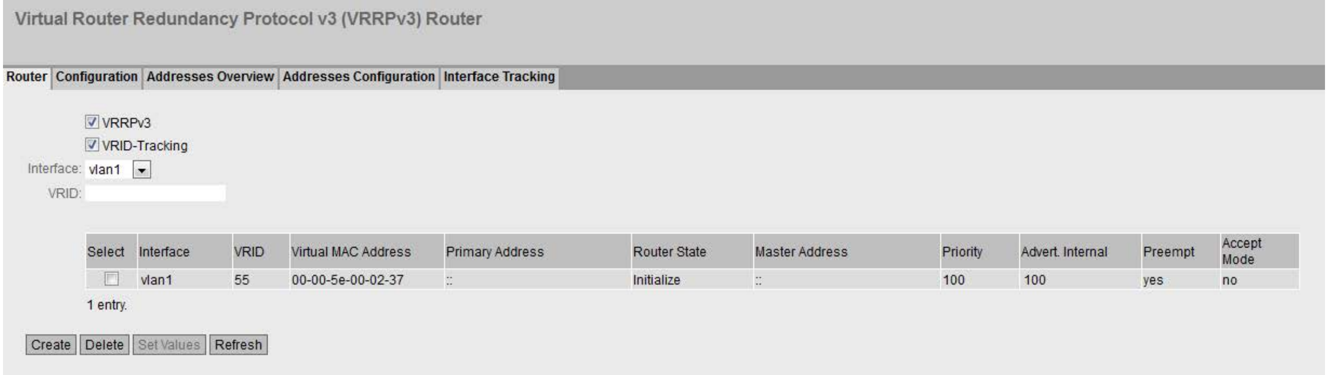
5.7.7.1 Routers

Introduction

Using the "Create" button, you can create new virtual routers. A maximum of 52 Virtual routers can be configured. You can configure other parameters on the "Configuration" tab.

Note

- This function is available only with layer 3.
- Simultaneous operation of VRRP and VRRPv3 is not possible.
- Select the "VRRPv3" check box to configure VRRPv3.
- You can use VRRPv3 on VLAN interfaces. Router ports are not supported.



☑ VRRPv3
☑ VRID-Tracking
Interface: vlan1
VRID:

Select	Interface	VRID	Virtual MAC Address	Primary Address	Router State	Master Address	Priority	Advert. Internal	Preempt	Accept Mode
□	vlan1	55	00-00-5e-00-02-37	::	Initialize	::	100	100	yes	no

1 entry.

Description

The page contains the following:

- **VRRPv3**

  Enable or disable routing using VRRPv3. Can only be enabled when "Layer 3 (IPv6) > Configuration" "IPv6 Routing" is enabled.

- **VRID-Tracking**

  Enable or disable VRID tracking.

  When enabled, all interfaces of a VRID are monitored. When the link of an interface changes from "up" to "down", the priority of all VRRP interfaces with the same VRID is reduced to the value "0".

  When the link of an interface changes back from "down" to "up", the original priority of the VRRP interfaces is restored.

- **Interface**

  Select the required VLAN interface operating as virtual router.
- **VRID**

  Enter the ID of the virtual router. This ID defines the group of routers that form a virtual router (VR). In the group, this is the same. It can no longer be used for other groups. Valid values are 1.. 255.

The table has the following columns:

- **Select**

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

  Shows the Interface that functions as the virtual router.
- **VRID**

  Shows the ID of the virtual router.
- **Virtual MAC Address**

  Shows the virtual MAC address of the virtual router.
- **Primary IP Address**

  Shows the numerically lowest IPv6 address in this VLAN. The entry "::" means that the "Primary" address on this VLAN is used. Otherwise all IPv6 addresses configured on this VLAN in the "Layer 3 (IPv6) > Subnets" menu are valid values.
- **Router State**

  Shows the current status of the virtual router. Possible values are:
  - Master

    The router is the master router and handles the routing functionality for all assigned IPv4 addresses.
  - Backup

    The router is the backup router. If the master router fails, the backup router takes over the tasks of the master router.
  - Initialize

    The virtual router has just been turned on. It will soon change to the "Master" or "Backup" state.
- **Master IP Address**

  Shows the IPv6 address of the master router.
- **Priority**

  Shows the priority of the virtual router.
  Valid values are 1-254.
  The current master router is automatically given 255. All other priorities can be distributed freely among the VRRPv3 routers. The higher the priority, the earlier the VRRPv3 router becomes "Master".

- **Advert. Internal**

  Shows the interval at which the master router sends VRRPv3 packets.

- **Preempt**

  Shows the precedence of a router when changing roles between backup and master.

  – yes

    This router has precedence when changing roles.

  – no

    This router does not have precedence when changing roles.

- **Accept Mode**

  Shows the precedence of a router when changing roles between backup and master.

  – Yes

    Virtual IP addresses also reply to pings.

  – No

    Virtual IP addresses do not reply to pings.

VRRP and DHCP server

If you want to operate a DHCP server on the devices of a VRRP group, the DHCP server must be configured on the master router. Backup routers do not react to DHCP queries. Make sure that the master router is statically configured and that after a failure, becomes the master of the VRRP group again.

Steps in configuration

1. Select the "VRRPv3" check box.
2. Select the required interface.
3. Enter the ID of the virtual router in the "VRID" input box.
4. Click the "Create" button. A new row is inserted in the table.
5. Select the "VRID Tracking" check box to monitor the VRID.
6. Click the "Set Values" button. To configure the virtual router, click on the "Configuration" tab.

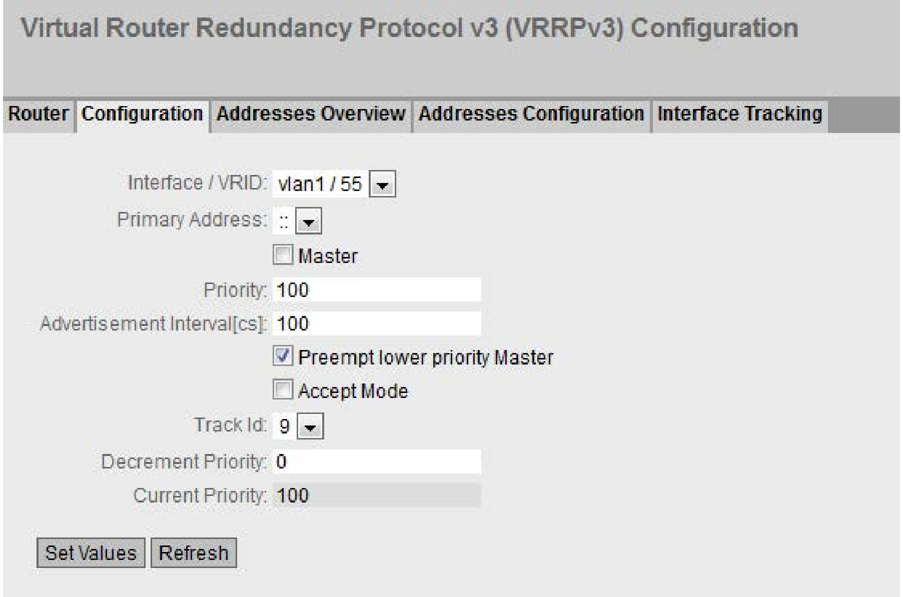
5.7.7.2 Configuration

Introduction

On this page, you configure the virtual router.

Note

This function is available only with layer 3.


Virtual Router Redundancy Protocol v3 (VRRPv3) Configuration

Interface / VRID: vlan1 / 55
Primary Address: ::
□ Master
Priority: 100
Advertisement Interval[cs]: 100
☑ Preempt lower priority Master
□ Accept Mode
Track Id: 9
Decrement Priority: 0
Current Priority: 100

Description

The page contains the following:

- **Interface / VRID**

  Select the ID of the virtual router to be configured.

- **Primary Address**

  Select the primary IPv6 address. If the router becomes master router, the router uses this IPv4 address.

  Note

  If you only configure one subnet on this VLAN, no entry is necessary. The entry is then ::. If you configure more than one subnet on the VLAN and you want a specific IPv6 address to be used as the source address for VRRP packets, select the IPv6 address. Otherwise, the IPv6 address with priority will be used.

- **Master**

  If enabled, the primary IPv6 address is entered for "Associated IP Address". This means that the highest priority IPv6 address of the VRRP router is used as the virtual IP address of the virtual master router. The backup routers in this group must disable the option and use the IPv6 address of the router in "Associated IP address".

- **Priority**

  Enter the priority of this virtual router. Valid values are 1-254.
  The current master router is always given 255. All other priorities can be distributed freely among the redundant routers. The higher the priority, the earlier the router becomes "Master".

- **Advertisement interval**

  Enter the interval in seconds after which a master router sends a VRRPv3 packet again.

- **Preempt lower priority Master**.

  Allow precedence when changing roles between backup and master based on the selection process.

- **Reply to pings on virtual interfaces (Accept Mode)**

  When enabled, the virtual IPv6 addresses also reply to the ping.

- **Track ID**
  Select a track ID.

- **Decrement Priority**
  Enter the value by which the priority of the VRRPv3 interface will be reduced.

- **Current Priority**
  Shows the priority of the VRRPv3 interface after the monitored interface has changed to the "down" status.

Steps in configuration

To configure a virtual router as the master router, follow the steps below:

1. Select the ID of the virtual router you want to configure from the "Interface / VRID" drop-down list.
2. Select the "Status" check box.
3. Select the source address from the "Primary Address" drop-down list.
4. From the "Priority" drop-down list, enter the priority of this virtual router.
5. Select the "Master" check box.
6. Enter the interval in "Advertisement Interval".
7. Select the "Preempt lower priority Master" check box.
8. Enable the "Reply to pings on virtual interfaces (Accept Mode)" check box.
9. Select a track ID.
10. Enter the value by which the priority of the VRRPv3 interface will be reduced
11. Click the "Set Values" button.

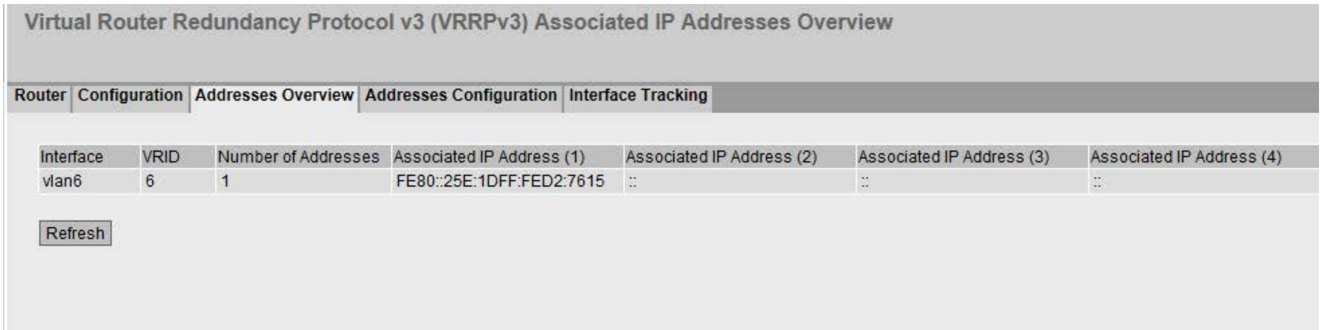
5.7.7.3 Addresses Overview

Overview

This page shows which IPv6 addresses the virtual router monitors. Each virtual router can monitor a maximum of 10 IPv6 addresses.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol v3 (VRRPv3) Associated IP Addresses Overview

Interface	VRID	Number of Addresses	Associated IP Address (1)	Associated IP Address (2)	Associated IP Address (3)	Associated IP Address (4)
vlan6	6	1	FE80::25E:1DFF:FED2:7615	::	::	::

Description of the displayed values

The table has the following columns:

- **Interface**

  Shows the Interface that functions as the virtual router.

- **VRID**

  Shows the ID of this virtual router.

- **Number of Addresses**

  Shows the number of IPv6 addresses.

- **Associated IP Address (1) ...Associated IP Address (10)**

  Shows the router IPv6 addresses monitored by this virtual router. If a router takes over the role of master, the routing function is taken over by this router for all these IPv6 addresses.

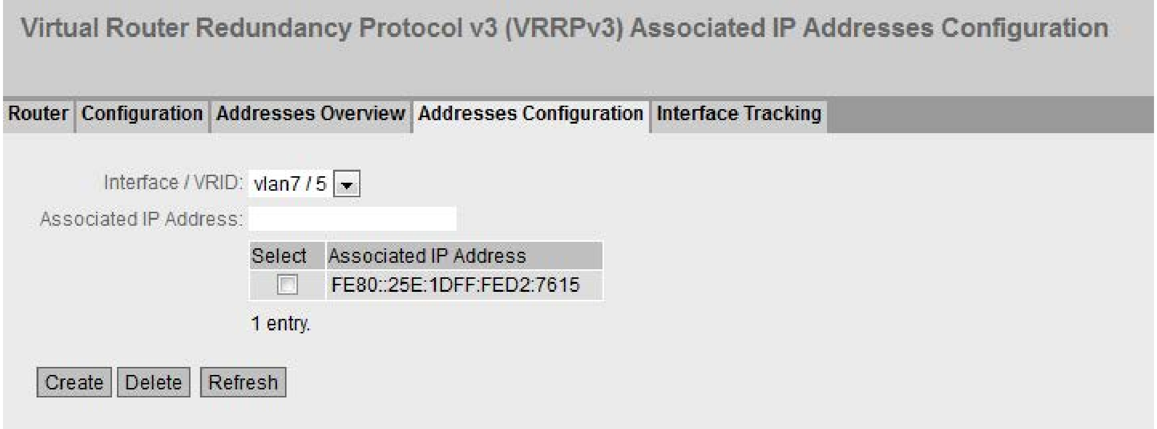
5.7.7.4 Addresses Configuration

Creating or changing the monitored IP addresses

On this page, you can create, modify or delete the IPv4 addresses to be monitored. A maximum of 10 IPv4 addresses can be monitored by a virtual router.

Note

This function is available only with layer 3.



Virtual Router Redundancy Protocol v3 (VRRPv3) Associated IP Addresses Configuration

Interface / VRID: vlan7 / 5

Associated IP Address:

Select	Associated IP Address
□	FE80::25E:1DFF:FED2:7615

1 entry.

Description

The page contains the following:

- **Interface / VRID**

  Select the ID of the virtual router.

- **Associated IP Address**

  Enter the IPv6 address that the virtual router will monitor.
  A maximum of 10 IPv6 addresses are possible.

The table has the following columns:

- **Select**

  Select the check box in the row to be deleted

- **Associated IP Address**

  Shows the IPv6 addresses that the virtual router monitors.

Steps in configuration

1. Select the ID of the virtual router.
2. Enter the IPv6 address that the virtual router will monitor.
3. Click the "Create" button. A new entry is generated in the table.

5.7.7.5 Interface Tracking

Introduction

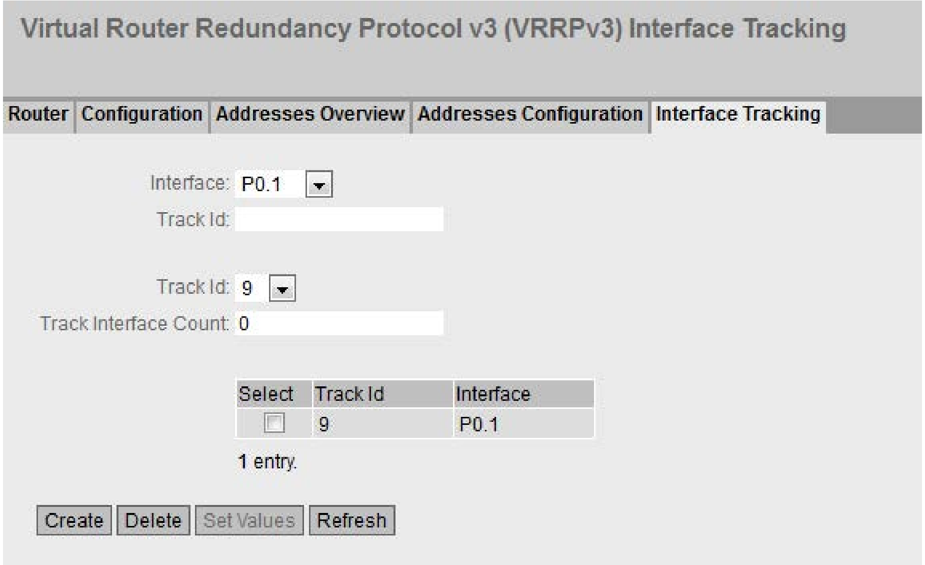
On this page, you configure the monitoring of interfaces.

When the link of a monitored interface changes from "up" to "down", the priority of the assigned VRRP interface is reduced. You configure the value by which the priority is reduced on the page "Layer 3 > VRRP/VRRPv3 > Configuration".

When the link of the interface changes back from "down" to "up", the original priority of the VRRP interface is restored.

Note

This function is available only with layer 3.



Interface: P0.1
Track Id:

Track Id: 9
Track Interface Count: 0

Select	Track Id	Interface
□	9	P0.1

1 entry.

Description of the displayed values

The page contains the following boxes:

- **Interface**

  From the drop-down list, select the interface to be monitored.

- **Track ID**

  Enter a track ID.

- **Track ID**

  Select a track ID.
- **Track Interface Count**

  Enter how many monitored interfaces need to change to the "down" status, before the priority is changed.

The table has the following columns:

- **Select**

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

  Shows the track ID.
- **Interface**

  Shows the interface that is being monitored.

Steps in configuration

1. Select the required interface from the "Interface" drop-down list.
2. In the "Track ID" box, enter the required ID.
3. Click the "Create" button.
4. Select an ID from the "Track-ID" drop-down list:
5. In the "Track Interface Count" enter the number of interfaces.
6. Click the "Set Values" button.
7. Link the monitoring to a VRRP interface in the "Configuration" tab.

5.7.8 OSPFv3

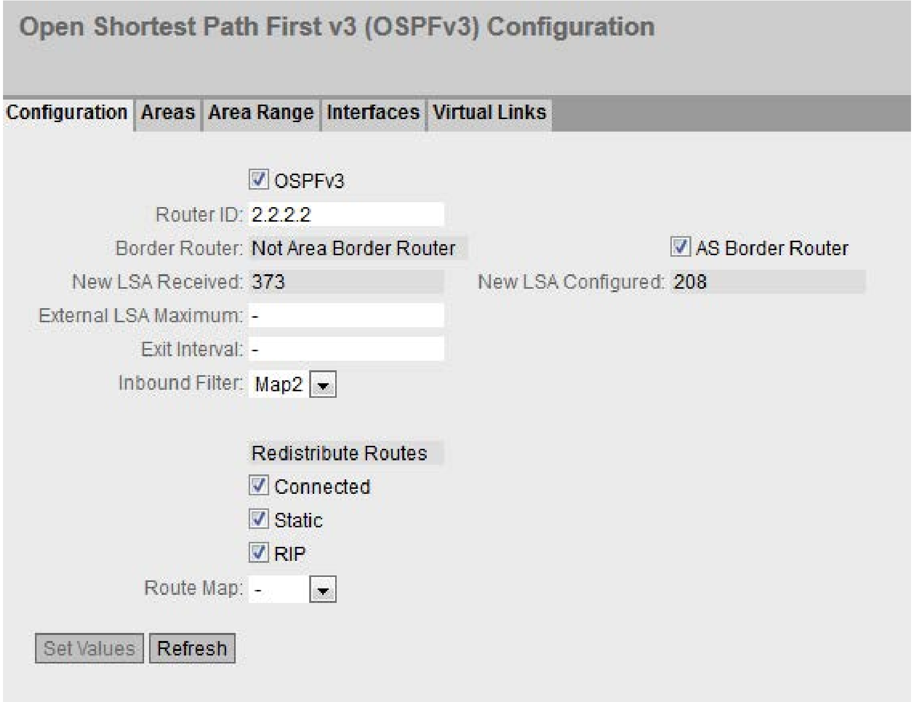
5.7.8.1 Configuration

Introduction

On this page, you configure the routing using OSPFv3.

Note

This function is available only with layer 3.



Open Shortest Path First v3 (OSPFv3) Configuration

☑ OSPFv3

Router ID: 2.2.2.2

Border Router: Not Area Border Router ☑ AS Border Router

New LSA Received: 373 New LSA Configured: 208

External LSA Maximum: -

Exit Interval: -

Inbound Filter: Map2

Redistribute Routes

☑ Connected

☑ Static

☑ RIP

Route Map: -

Description

The page contains the following boxes:

- **OSPFv3**

  Enable or disable routing using OSPFv3.

- **Router ID**

  Enter the designation of the OSPFv3 interfaces. The router ID is specified in IPv4 format and must be unique in the network.

- **Border Router**

  Displays the status of the OSPFv3 router. If the local system is an active member in at least 2 areas, this is an area border router.

- **AS Border Router**

  Specify whether the router is an AS border router. An AS border router intercedes between multiple autonomous systems, for example if you have an additional RIP network. An AS border router is also necessary to add and to distribute static routes.

- **New LSA Received**

  Shows the number of received LSAs. Updates and its own LSAs are not counted.

- **New LSA Configured**

  Shows the number of different LSAs sent by this local system.

- **External LSA Maximum**

  To limit the number of entries of external LSAs in the database, enter the maximum number of external LSAs.

- **Exit Interval [s]**

  Enter the interval after which the OSPFv3 router once again attempts to come out of the overflow status. A 0 means that the OSPFv3 router attempts to exit the overflow status only following a restart.

- **Inbound Filter**

  Select a route map that filters inbound routes.

- **Redistribute Routes**

  Specify which known routes are distributed using OSPFv3. You make different decisions for the route types Connected, Static and RIPng.

  Note

  The options can only be enabled on an AS border router. Enabling the Default and Static options, in particular, can cause problems if they are enabled at too many points in the network, for example, forwarding loops.

- **Route Map**

  Select a route map that filters which routes are forwarded using RIPng.

Steps in configuration

1. Select the "OSPFv3" check box.
2. Enter the ID of the router in the "Router ID" input box.
3. Select the "AS Border Router" check box.
4. Click the "Set Values" button.

5.7.8.2 Areas

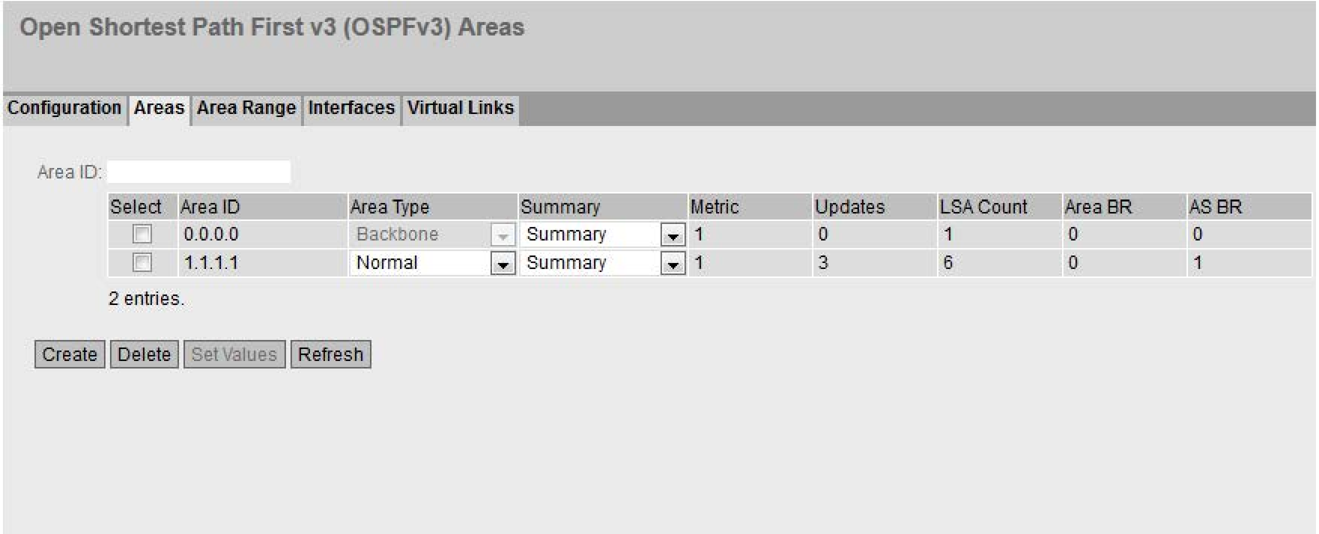
Overview

An autonomous system can be divided into smaller areas.

On this page, you can view, create, modify or delete the areas of the router.

Note

This function is available only with layer 3.


Open Shortest Path First v3 (OSPFv3) Areas

Area ID:

Select	Area ID	Area Type	Summary	Metric	Updates	LSA Count	Area BR	AS BR
□	0.0.0.0	Backbone	Summary	1	0	1	0	0
□	1.1.1.1	Normal	Summary	1	3	6	0	1

2 entries.

Description

The page contains the following:

- **Area ID**

  Enter the designation of the area. The database is synchronized for all routers of an area.
  The area identifier must be unique in the network.
  The area identifier is a 32-bit number with the following format: x.x.x.x where x = 0 ... 255
  The area identifier 0.0.0.0 is reserved for the backbone area and cannot be deleted.

This table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Area ID**

  Shows the designation of the area.

- **Area Type**
  Specify the type of area.
  - Normal
  - Stub
  - NSSA
  - Backbone
- **Summary**

  Specify whether summary LSAs are generated for this area.
  - Summary: Summary LSAs are generated and sent to the area.
  - No Summary: Summary LSAs are not generated and sent to the area.
- **Metric**

  Displays the costs for the OSPFv3 interface.
- **Updates**

  Shows the number of recalculations of the routing tables.
- **LSA Count**

  Shows the number of LSAs in the database.
- **Area BR**

  Shows the number of reachable area border routers (ABR) within this area.
- **AS BR**

  Shows the number of reachable autonomous system border routers (ASBR) in this area.

Steps in configuration

1. Enter the ID for the area in the "Area ID" input box.
2. Click the "Create" button. A new entry is generated in the table.
3. Select the type of area, for example Stub in the "Area Type" drop-down list.
4. Select the "Summary LSA" entry in the "Summary" drop-down list.
5. Click the "Set Values" button.

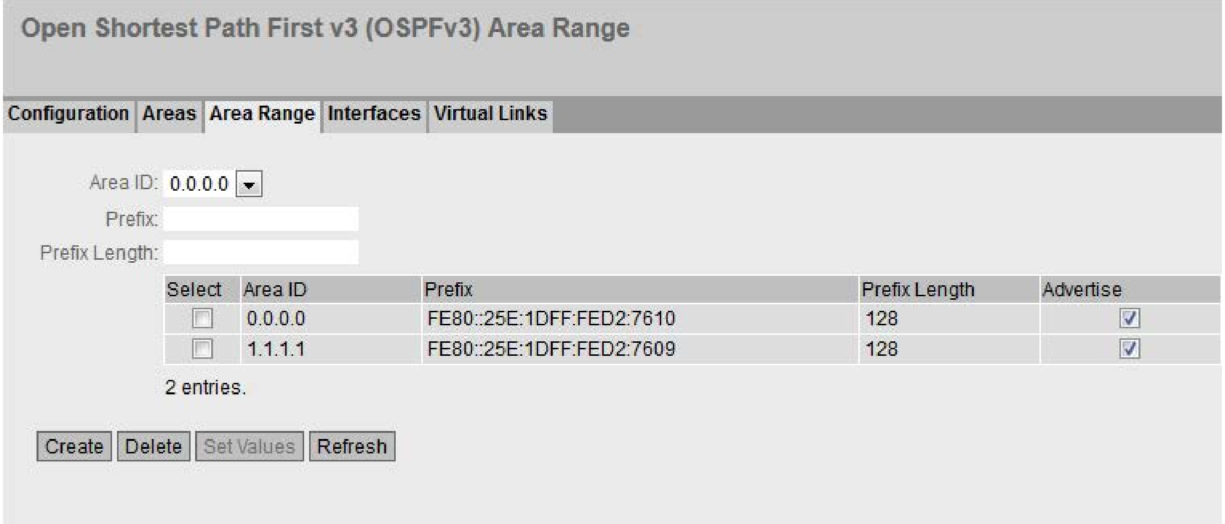
5.7.8.3 Area

Creating a new OSPFv3 area range .

On this page, you can group up to 4 networks under one area ID. The method is used only with area border routers. This means that an area border router only advertises one route for grouped areas to the outside.

Note

This function is available only with layer 3.



Area ID: 0.0.0.0
Prefix:
Prefix Length:

Select	Area ID	Prefix	Prefix Length	Advertise
□	0.0.0.0	FE80::25E:1DFF:FED2:7610	128	☑
□	1.1.1.1	FE80::25E:1DFF:FED2:7609	128	☑

2 entries.

Description

The page contains the following boxes:

- **Area ID**

  Select the area ID of the area. You specify the ID on the "Areas" tab.

- **Prefix**

  Enter the IPv6 address of the network that will be grouped.

- **Prefix Length**

  Enter the number of bits belonging to the prefix that will be grouped.

This table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Area ID**

  Shows the ID of the area.

- **Prefix**

  Shows the IPv6 address of the network that will be grouped.
- **Prefix Length**

  Enter the number of bits that will belong to the prefix.
- **Advertise**

  Enable this option to advertise the grouped network.

Steps in configuration

1. Select the area ID of the area.
2. Enter the prefix of the network that will be grouped.
3. Enter the prefix length of the network that will be grouped.
4. Click the "Create" button. A new entry is generated in the table.
5. Enable the "Advertise" option to advertise the grouped network.
6. Click the "Set Values" button.

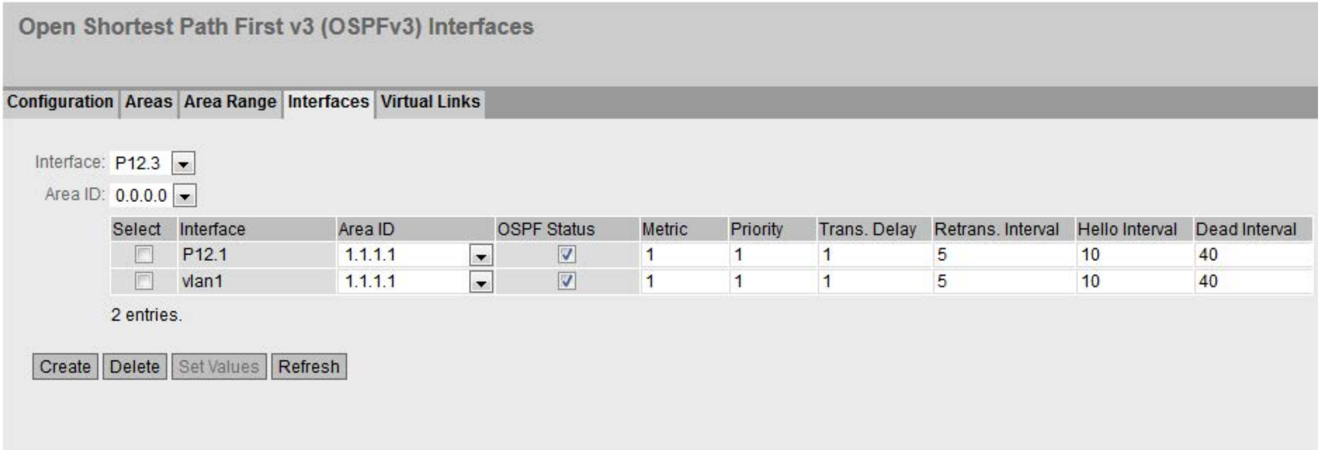
5.7.8.4 Interfaces

Overview

On this page, you can configure OSPFv3 interfaces.

Note

This function is available only with layer 3.



Interface: P12.3

Area ID: 0.0.0.0

Select	Interface	Area ID	OSPF Status	Metric	Priority	Trans. Delay	Retrans. Interval	Hello Interval	Dead Interval
□	P12.1	1.1.1.1	☑	1	1	1	5	10	40
□	vlan1	1.1.1.1	☑	1	1	1	5	10	40

2 entries.

Description

The page contains the following:

- **Interface**

  Select the IPv6 interface on which OSPFv3 will be enabled.

- **Area ID**
  Select the area ID of the area with which the OSPFv3 interface is connected.

  Note

  For the secondary interface select the same Area ID as for the corresponding primary interface.
  The information whether a primary or secondary interface is involved can be found in "Layer 3 (IPv6) > Subnets".

This table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Interface**

  Shows the OSPFv3 interface.

- **Area ID**

  Select the area ID of the area with which the OSPFv3 interface is connected.

- **OSPF Status**

  Specify whether or not OSPFv3 is active on the interface.

  – Enabled: OSPFv3 is enabled on the interface.

  – Disabled: OSPFv3 is disabled on the interface.

- **Metric**

  Enter the costs for the OSPFv3 interface.

- **Priority**

  Enter the router priority. The priority is only relevant for selecting the designated router or designated border router. This parameter can be selected differently on routers within the same subnet.
  Range of values: 0 to 255
  Default: 1.

- **Trans. Delay**

  Enter the required delay when sending a connection update.
  Range of values: 1 s to 3600 s
  Default: 1 s

- **Retrans. Interval**

  Enter the time after which an OSPFv3 packet is transferred again if no confirmation was received.

Range of values: 1 s to 3600 s
Default: 5 s

- **Hello Interval**

  Enter the interval between two Hello packets.
  Range of values: 1 s to 65,535 s
  Default: 10 s

- **Dead Interval**

  Enter the interval after which the neighbor router is marked as "failed" if no more Hello packets are received from it during this time.
  Default: 60 s

Steps in configuration

1. Select the required interface. The interface is configured as an OSPFv3 Interface
2. Select the area ID of the area with which the OSPFv3 interface is connected.
3. Click the "Create" button. A new entry is generated in the table.
4. Select the check box under "OSPF Status".
5. Enter suitable values or use the default settings for "Trans. Delay", "Retrans. Interval" and "Dead Interval".
6. Click the "Set Values" button.

5.7.8.5 Virtual Links

Overview

Due to the protocol, each area border router must have access to the backbone area. If a router is not connected directly to the backbone area, a virtual link to it is created.

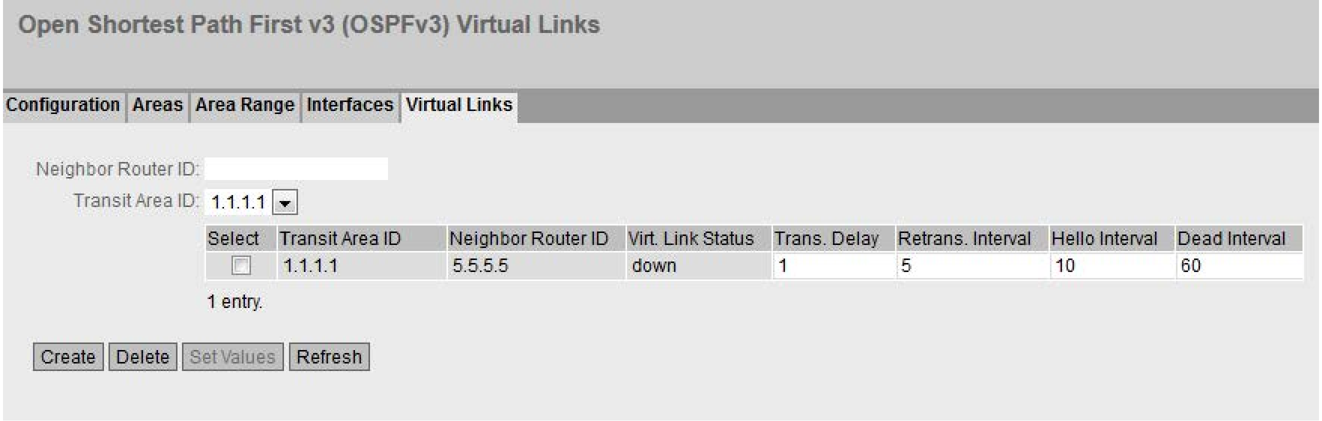
Note

This function is available only with layer 3.

Note

Note that when creating a virtual link both the transit area and the backbone area must already be configured.

A virtual link must be configured identically at both ends.



Neighbor Router ID:
Transit Area ID: 1.1.1.1

Select	Transit Area ID	Neighbor Router ID	Virt. Link Status	Trans. Delay	Retrans. Interval	Hello Interval	Dead Interval
□	1.1.1.1	5.5.5.5	down	1	5	10	60

1 entry.

Description

The page contains the following:

- **Neighbor Router ID**
  Enter the ID of the neighbor router at the other end of the virtual connection.
- **Transit Area ID**
- Select the ID of the area that connects the two routers.

This table contains the following columns:

- **Select**

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

  Shows the ID via which the two routers are connected.
- **Neighbor Router ID**

  Shows the ID of the neighbor router at the other end of the virtual connection.
- **Virt. Link Status**

  Specify the status of the virtual link. The following states are possible:

  – down: The virtual link is inactive.

  – point-to-point: The virtual link is active.
- **Trans. Delay**

  Enter the required delay when sending a connection update.
  Range of values: 1 s to 3600 s
  Default: 1 s
- **Retrans. Interval**

  Enter the time after which a packet is transferred again if no confirmation was received.
  Range of values: 1 s to 3600 s
  Default: 5 s

- **Hello Interval**

  Enter the interval between two Hello packets.
  Range of values: 1 s to 65,535 s
  Default: 10 s

- **Dead Interval**

  Enter the interval after which the neighbor router counts as "failed" if no more Hello packets are received from it during this time.
  Default setting: 60 s

Steps in configuration

1. Enter the ID of the neighbor router at the other end of the virtual link.
2. Select the area ID that connects the two routers.
3. Click the "Create" button. A new entry is generated in the table.
4. Enter suitable values in "Trans. Delay", "Retrans. Interval" and "Dead Interval".
5. Click the "Set Values" button.

5.7.9 RIPng

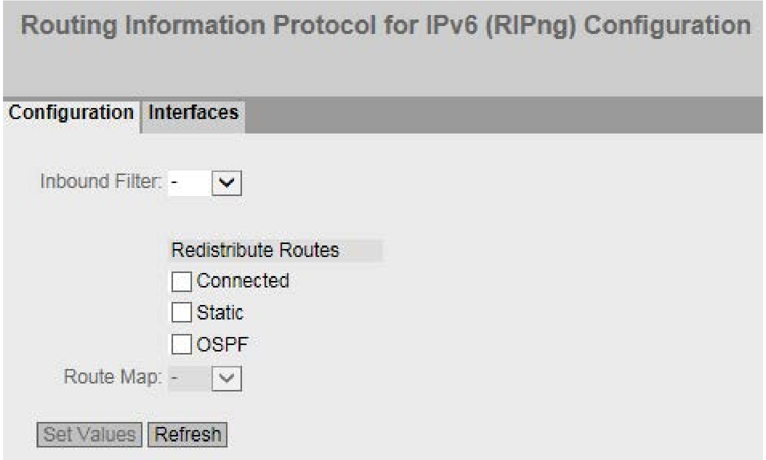
5.7.9.1 RIPng Configuration

On this page, you configure routing with RIPng.

Note

RIPng is available only on layer 3.

Settings



Routing Information Protocol for IPv6 (RIPng) Configuration

Inbound Filter: -

Redistribute Routes
□ Connected
□ Static
□ OSPF

Route Map: -

- **Inbound Filter**

  Select a route map that filters inbound routes.
- **Redistribute Routes**

  Specify which known routes are distributed using RIPv2.

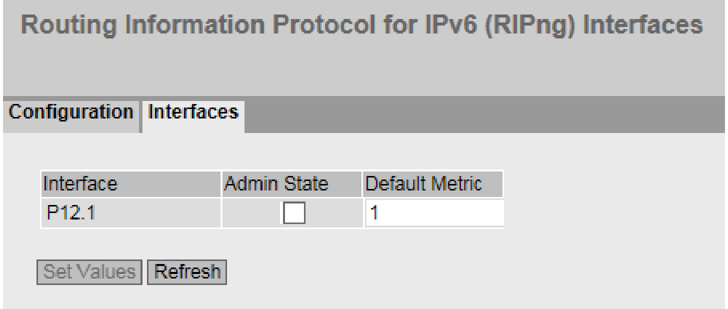
  The following types of route exist:
  - Connected
  - Static
  - OSPFv3
- **Route Map**

  Select a route map that filters which routes are forwarded using RIPng.

5.7.9.2 RIPng interfaces

Overview

On this page, you specify the interfaces that support RIPng.



Routing Information Protocol for IPv6 (RIPng) Interfaces

Interface	Admin State	Default Metric
P12.1	□	1

Image 5-21 RIPv2 Interfaces

Note

RIPng is available only on layer 3.

Description

This table contains the following columns:

- **Interface**

  Shows the available IPv6 interface.
- **Admin State**

  Enable or disable the RIPng routing for the interface.
- **Default Metric**

  Enter the costs for the RIPng interface.

5.8 The "Security" menu

5.8.1 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.

When you transfer the configuration of a device to TIA, the configured users, roles and groups are not transferred.

Compatibility with predecessor versions

With firmware version 5.1, user management was expanded by the RADIUS authorization mode "Vendor Specific". To ensure compatibility with firmware versions ≤ 5.0, the default setting was selected so that following a firmware update the earlier authentication mode "conventional" continues to be used.

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.

Depending on the RADIUS authorization mode you have selected on the "Security > AAA > RADIUS Client" page, the device evaluates different information of the RADIUS server.

RADIUS authorization mode "Standard"

If you have set the authorization mode "conventional", the authentication of users via a RADIUS server runs 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 administrator 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.

RADIUS authorization mode "Vendor Specific"

Requirement

For the RADIUS authorization mode "Vendor Specific" the following needs to be set on the RADIUS server:

- Manufacturer code: 4196
- Attribute number: 1
- Attribute format: Character string (group name)

Procedure

If you have set the authorization mode "Vendor Specific", the authentication of users via a RADIUS server runs 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.

   Case A: The RADIUS server reports a successful authentication and returns the group assigned to the user to the device.

   – The group is known on the device and the user is not entered in the table "External User Accounts"

     → The user is logged in with the rights of the assigned group.

   – The group is known on the device and the user is entered in the table "External User Accounts"

     → The user is assigned the role with the higher rights and logged in with these rights.

   – The group is not known on the device and the user is entered in the table "External User Accounts"

     → The user is logged in with the rights of the role linked to the user account.

   – The group is not known on the device and the user is not entered in the table "External User Accounts"

     → The user is logged in with the rights of the role "Default".

   Case B: The RADIUS server reports a successful authentication but does not return a group to the device.

   – The user is entered in the table "External User Accounts":

     → The user is logged in with the rights of the linked role "".

   – The user is not entered in the table "External User Accounts":

     → The user is logged in with the rights of the role "Default".

   Case C: The RADIUS server reports a failed authentication to the device:

   – The user is denied access.

Assignment of a VLAN via RADIUS or guest VLAN

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 following happens:

- 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 PVID 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 PVID of the port is reset to the value it had prior to authentication.

Note

If the PVID corresponds to the assigned PVID 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.

5.8.2 Users

5.8.2.1 Local Users

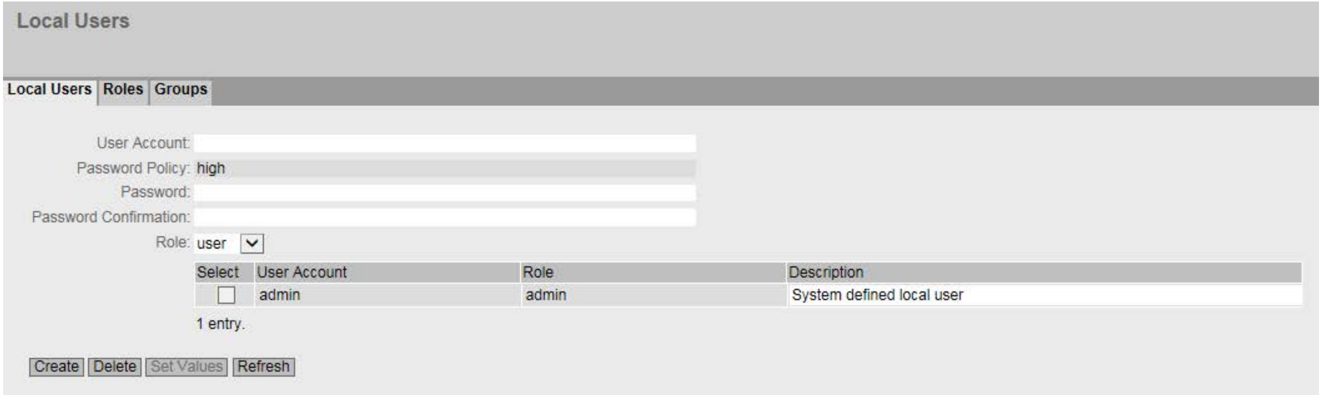
Local users

On this page, you create local users with the corresponding rights.

When you create or delete a local user this change is also made automatically in the table "External User Accounts". If you want to make change explicitly for the internal or external user table, use the CLI commands.

Note

The values displayed depend on the rights of the logged-in user.



User Account:
Password Policy: high
Password:
Password Confirmation:
Role: user

Select	User Account	Role	Description
□	admin	admin	System defined local user

1 entry.

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 6.0 the default user set in the factory "user" is no longer available when the product ships.

If you update a device to the firmware V6.0 the default user set in the factory "user" is initially still available. If you reset the device to the factory settings ("Restore Factory Defaults and Restart") the default user set in the factory "user" is deleted.

You can create new users with the role "user".

- **Password Policy**

  Shows which password policy is being used.

  - 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 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.

  You can choose between system-defined and self-defined roles, refer to the page "Security > Users > Roles.".

The table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

Note

The preset users as well as logged in users cannot be deleted or changed.

- **User Account**

  Shows the user name.

- **Role**

  Shows the role of the user.

- **Description**

  Displays a description of the user account. The description text can be up to 100 characters long.

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.
6. Enter a description of the user.
7. Click the "Set Values" 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.

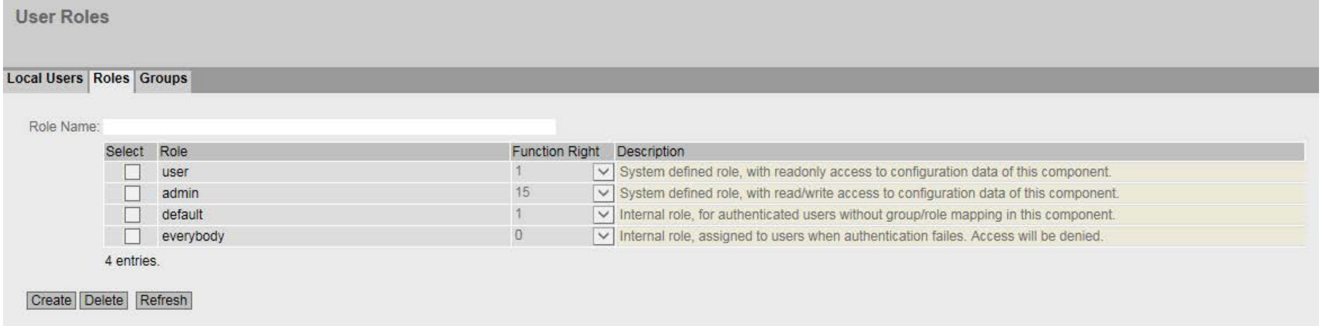
5.8.2.2 Roles

Roles

On this page, you create roles that are valid locally on the device.

Note

The values displayed depend on the rights of the logged-in user.



User Roles

Role Name:

Select	Role	Function Right	Description
□	user	1	System defined role, with readonly access to configuration data of this component.
□	admin	15	System defined role, with read/write access to configuration data of this component.
□	default	1	Internal role, for authenticated users without group/role mapping in this component.
□	everybody	0	Internal role, assigned to users when authentication failes. Access will be denied.

4 entries.

Description

The page contains the following:

- **Role Name**

  Enter the name for the role. The name must meet the following conditions:

  – It must be unique.

  – It must be between 1 and 64 characters long.

  Note

  Role name cannot be changed

  After creating a role, the name of the role can no longer be changed.

  If a name of a role needs to be changed, the role must be deleted and a new role created.

The table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

  Note

  Predefined roles and assigned roles cannot be deleted or modified.

- **Role**

  Shows the name of the role.

- **Function Right**

  Select the function rights of the role.

  – 1

    Users with this role can read device parameters but cannot change them.

  – 15

    Users with this role can both read and change device parameters.

  Note

  Function right cannot be changed

  If you have assigned a role, you can no longer change the function right of the role.

  If you want to change the function right of a role, follow the steps outlined below:

  1. Delete all assigned users.
  2. Change the function right of the role:
  3. Assign the role again.

- **Description**

  Enter a description for the role. With predefined roles a description is displayed. The description text can be up to 100 characters long.

Procedure

Creating a role

1. Enter the name for the role.
2. Click the "Create" button.
3. Select the function rights of the role.
4. Enter a description of the role.
5. Click the "Set Values" button.

Deleting a role

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.

5.8.2.3 Groups

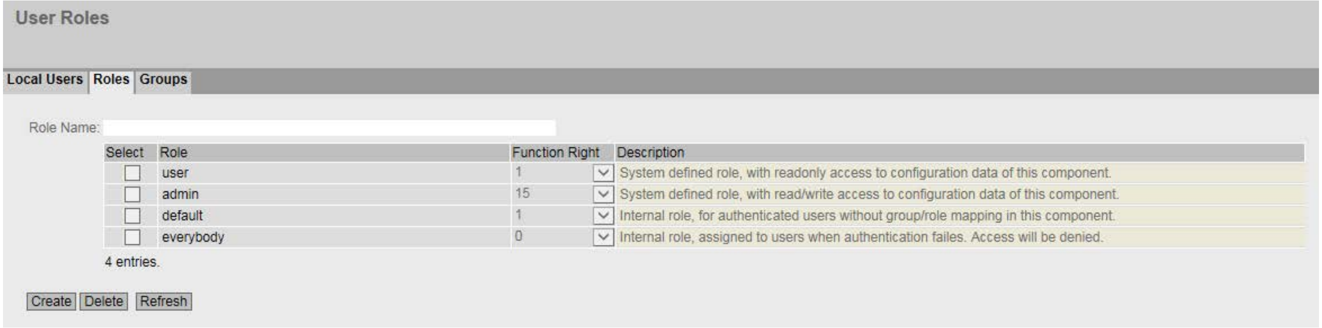
User Groups

On this page you link a group with a role.

In this example the group "Administrators" is linked to the "admin"role: The group is defined on a RADIUS server. The role is defined locally on the device. When a RADIUS server authenticates a user and assigns the user to the "Administrators" group, this user is given rights of the "admin" role.

Note

The values displayed depend on the rights of the logged-in user.



User Roles

Role Name:

Select	Role	Function Right	Description
□	user	1	System defined role, with readonly access to configuration data of this component.
□	admin	15	System defined role, with read/write access to configuration data of this component.
□	default	1	Internal role, for authenticated users without group/role mapping in this component.
□	everybody	0	Internal role, assigned to users when authentication failes. Access will be denied.

4 entries.

Description

The page contains the following:

- **Group Name**

  Enter the name of the group. The name must match the group on the RADIUS server.

  The name must meet the following conditions:

  – It must be unique.

  – It must be between 1 and 64 characters long.

The table contains the following columns:

- **Select**

  Select the check box in the row to be deleted.

- **Group**

  Shows the name of the group.

- **Role**

  Select a role. Users who are authenticated with the linked group on the RADIUS server receive the rights of this role locally on the device.

  You can choose between system-defined and self-defined roles, refer to the page "Security > Users > Roles.".

- **Description**

  Enter a description for the link of the group.to a role. The description text can be up to 100 characters long.

Procedure

Linking a group to a role.

1. Enter the name of a group.
2. Click the "Create" button.
3. Select a role.
4. Enter a description for the link of a group.to a role.
5. Click the "Set Values" button.

Deleting the link between a group and a role

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.

5.8.3 Passwords

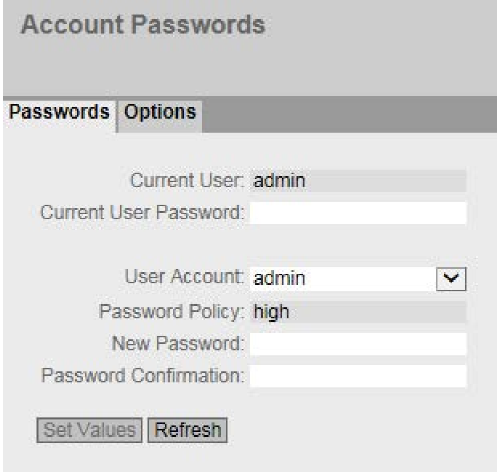
5.8.3.1 Passwords

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 in with the right to change device parameters, you can change the passwords for all user accounts. If you are logged in with read rights, you can only change your own password.


Account Passwords

Current User: admin
Current User Password:
User Account: admin
Password Policy: high
New Password:
Password Confirmation:

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

The factory settings for the passwords when the devices ship are as follows:

- admin: admin

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.

Note

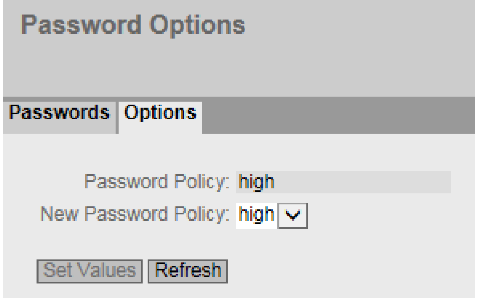
Changing the password in Trial mode

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.

5.8.3.2 Options

On this page you specify which password policy will be used when assigning new passwords.



Password Options

Password Policy: high

New Password Policy: high

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

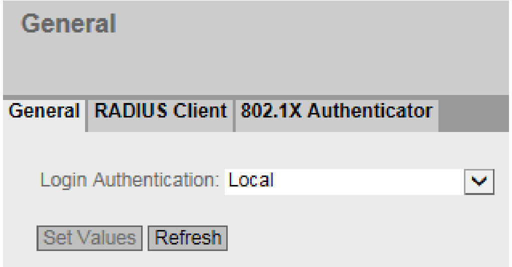
5.8.4 AAA

5.8.4.1 General

Login of network nodes

The designation used "AAA"" stands for "Authentication, Authorization, Accounting". This feature is used to identify and allow network nodes, to make the corresponding services available to them and to specify the range of use.

On this page, you configure the login.



General

General | RADIUS Client | 802.1X Authenticator

Login Authentication: Local

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.

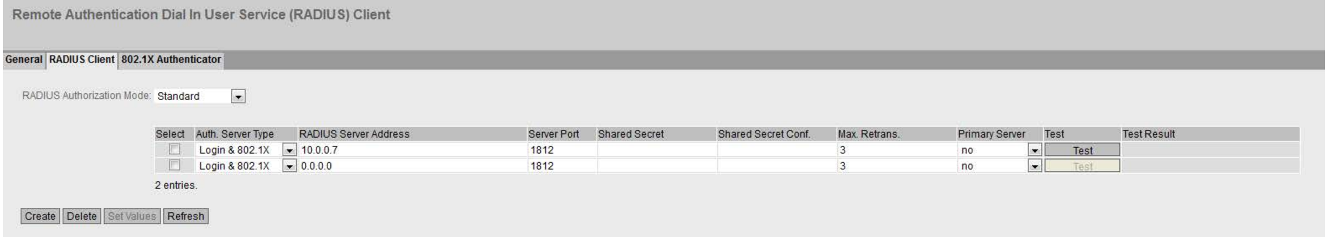
5.8.4.2 RADIUS Client

Authentication over 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.



Remote Authentication Dial In User Service (RADIUS) Client

RADIUS Authorization Mode: Standard

Select	Auth. Server Type	RADIUS Server Address	Server Port	Shared Secret	Shared Secret Conf.	Max. Retrans.	Primary Server	Test	Test Result
□	Login & 802.1X	10.0.0.7	1812			3	no	Test	
□	Login & 802.1X	0.0.0.0	1812			3	no	Test	

2 entries.

Description of the displayed boxes

The page contains the following boxes:

- **RADIUS Authorization Mode**

  For the login authentication, the RADIUS authorization mode specifies how the rights are assigned to the user with a successful authentication (Page 418).

  – Standard

  In this mode the user is logged in with administrator rights if the server returns the value "Administrative User" to the device for the attribute "Service Type". In all other cases the user is logged in with read rights.

  – Vendor Specific

  In this mode the assignment of rights depends on whether and which group the server returns for the user and whether or not there is an entry for the user in the table "External User Accounts".

The table has the following columns:

- **Select**
  Select the row you want to delete.
- **Auth. Server Type**

  Select the 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 IP address or the FQDN (Fully Qualified Domain Name) of the RADIUS server.
- **Server Port**
  Here, enter the input port on the RADIUS server. As default, input port 1812 is set. The range of values is 1 to 65535.
- **Shared Secret**
  Enter your access ID here. The range of values is 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. The range of values is 1 to 5.
- **Primary Server**
  Using the options in the drop-down list, specify whether or not this server is the primary server. You can select one of the options "yes" or "no".

- **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 Login & 802.1X
   – RADIUS Server Address
   – Server Port
   – Shared Secret
   – Confirm Shared Secret
   – 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:
   - RADIUS Server Address
   - Server Port
   - Shared Secret
   - Confirm Shared Secret
   - 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. The data is deleted from the memory of the device and the page is updated.

5.8.4.3 802.1x Authenticator

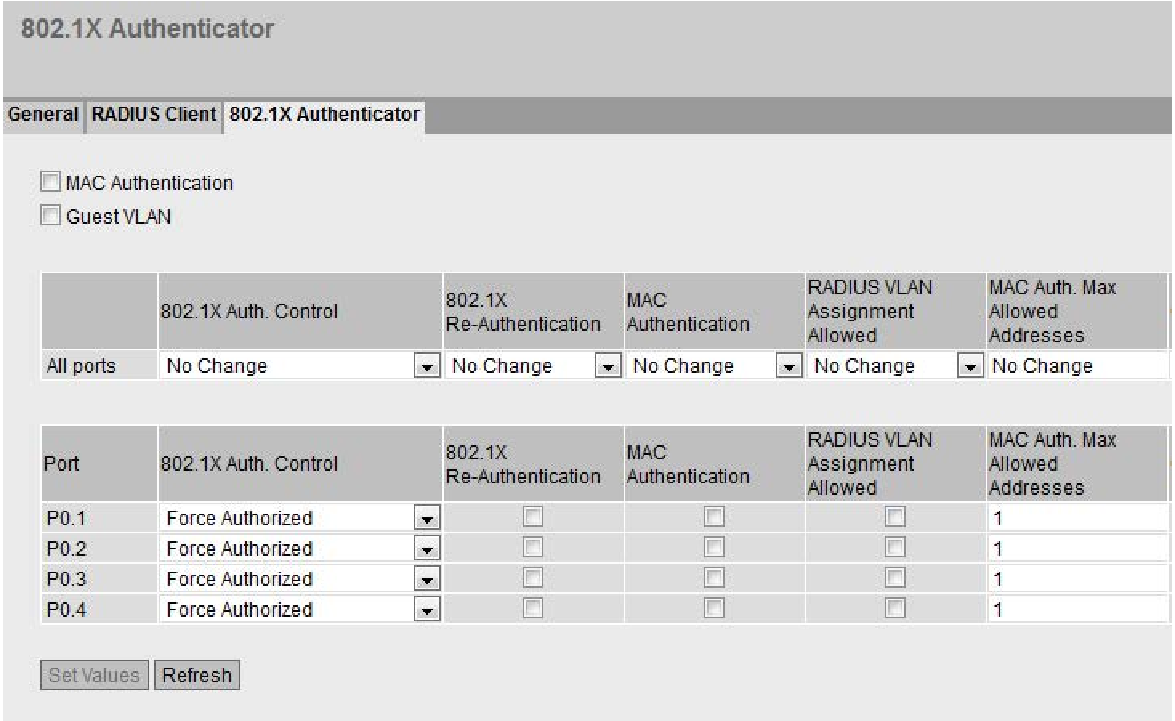
Setting up network access

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.



802.1X Authenticator

General | RADIUS Client | 802.1X Authenticator

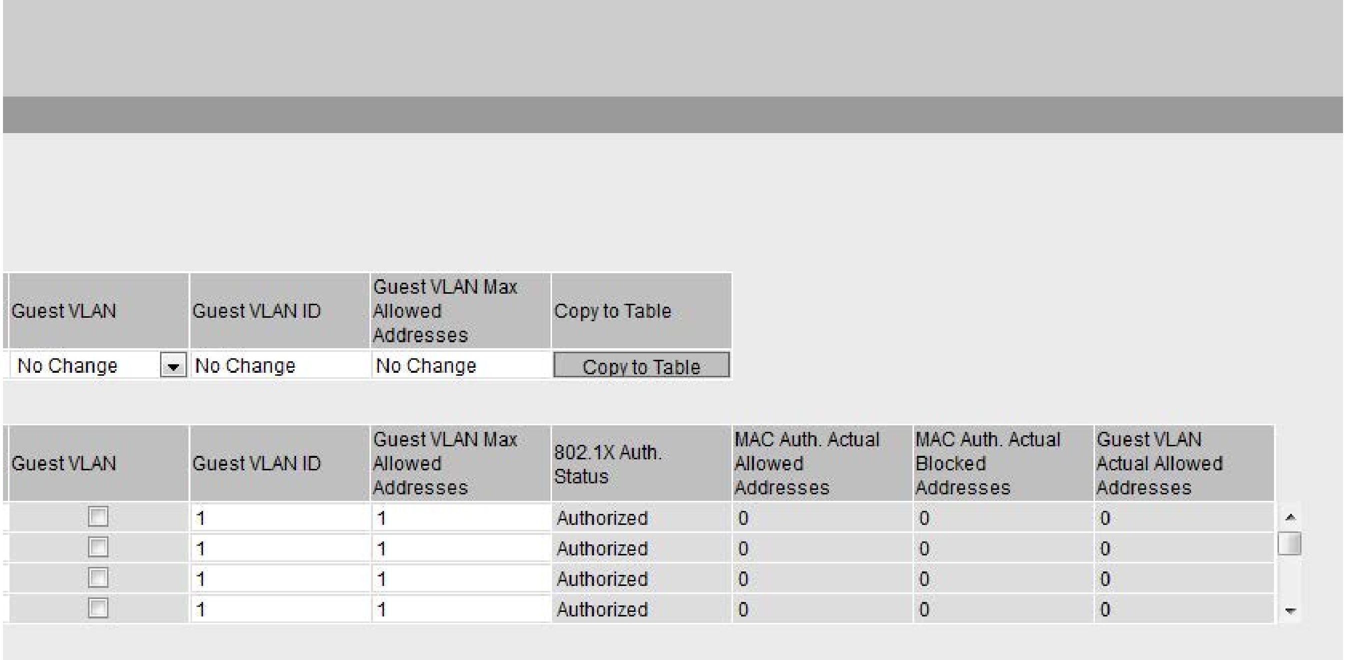
□ MAC Authentication
□ Guest VLAN

	802.1X Auth. Control	802.1X Re-Authentication	MAC Authentication	RADIUS VLAN Assignment Allowed	MAC Auth. Max Allowed Addresses
All ports	No Change	No Change	No Change	No Change	No Change

Port	802.1X Auth. Control	802.1X Re-Authentication	MAC Authentication	RADIUS VLAN Assignment Allowed	MAC Auth. Max Allowed Addresses
P0.1	Force Authorized	□	□	□	1
P0.2	Force Authorized	□	□	□	1
P0.3	Force Authorized	□	□	□	1
P0.4	Force Authorized	□	□	□	1

Set Values | Refresh

Image 5-22 802.1x 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

Image 5-23 802.1X 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 end devices can be connected to 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" 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 418) is rejected.
- **MAC Auth. Max Allowed Addresses**
  Enter how many end devices are allowed to be connected to 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 418) 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 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 connected end devices.
- **MAC Auth. Actual Blocked Addreses**
  Shows the number of currently blocked end devices.
- **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

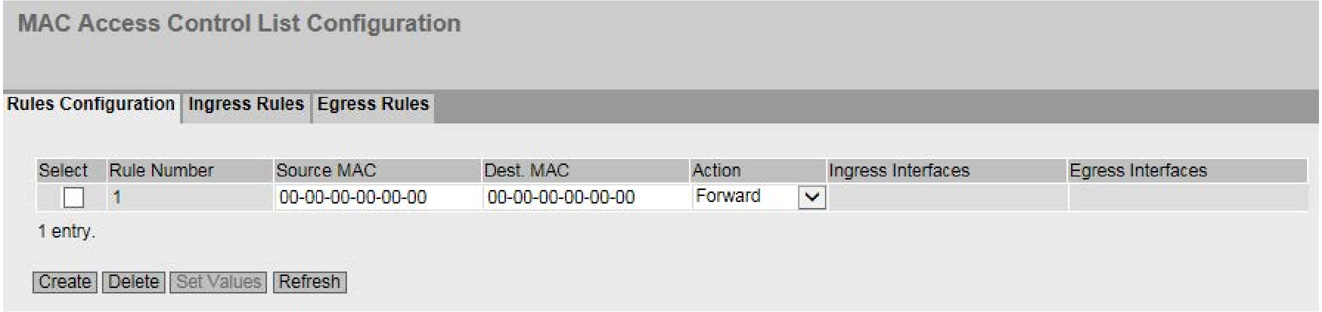
1. Select the required options in table 1.
2. Click the "Copy to table" button. The check box is enabled for all ports in table 2.
3. To apply the changes, click the "Set Values" button.

5.8.5 MAC ACL

5.8.5.1 Rules Configuration

Introduction

On this page, you specify the access rules for the MAC-based Access Control List. Using the MAC-based ACL, you can specify whether frames of certain MAC addresses are forwarded or discarded.



Select	Rule Number	Source MAC	Dest. MAC	Action	Ingress Interfaces	Egress Interfaces
□	1	00-00-00-00-00-00	00-00-00-00-00-00	Forward		

1 entry.

Description of the displayed boxes

The table has the following columns:

- **Select**
  Select the row you want to delete. If this entry is used, this is grayed out and you cannot delete it.
- **Rule Number**
  Shows the number of the ACL rule. If you create a new entry, a new line with a unique number is created.
- **Source MAC**
  Enter the unicast MAC address of the source.
- **Dest. MAC**
  Enter the unicast MAC address of the destination.
- **Action**
  Select whether the frame is forwarded or rejected when it corresponds to the ACL rule.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.
- **Ingress Interfaces**

  Shows a list of all ingress interfaces to which this rule applies.
- **Egress Interfaces**

  Shows a list of all egress interfaces to which this rule applies.

Note

Entering the MAC addresses

If you enter the address "00:00:00:00:00:00" for the source and/or destination MAC address, the rule created in this way applies to all source or destination MAC addresses.

Steps in configuration

1. Click the "Create" button. A new row with a unique number (rule number) is created in the table.
2. Enter the MAC address of the source in "Source MAC".
3. Enter the MAC address of the destination in "Dest MAC".
4. In the "Action" drop-down list select whether the frame is forwarded or rejected when it corresponds to the ACL rule.
5. Click the "Set Values" button.

Deleting an entry

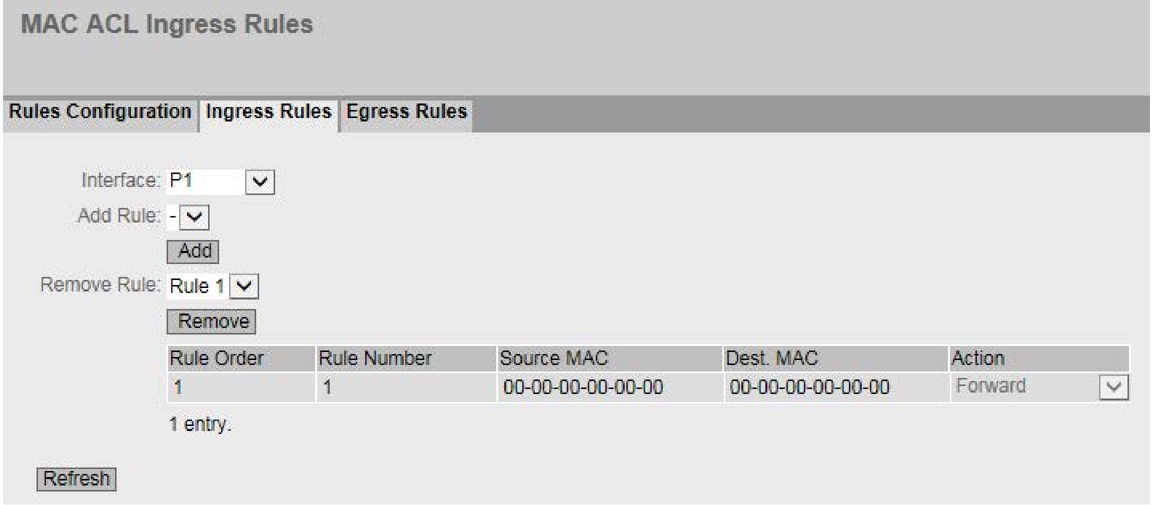
You cannot delete active entries.

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

5.8.5.2 Ingress Rules

Introduction

On this page, you specify the ACL rule according to which incoming frames are filtered at interfaces. You specify the ACL rules in the "Rules Configuration" tab.



Interface: P1

Add Rule: -

Remove Rule: Rule 1

Rule Order	Rule Number	Source MAC	Dest. MAC	Action
1	1	00-00-00-00-00-00	00-00-00-00-00-00	Forward

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **Interface**
  Select the required interface from the drop-down list. The available interfaces depend on your device.
- **Add Rule**
  In the drop-down list select the ACL rule to be assigned to the interface.
- **Add**
  To assign the ACL rule to the interface, click the "Add" button. The configuration is shown in the table.
- **Remove Rule**
  From the "Remove rule" drop-down list, select the ACL rule to be deleted.
- **Remove**
  To remove the ACL rule from the interface, click the "Remove" button.

The table has the following columns:

- **Rule Order**
  Shows the order of the ACL rules.
- **Rule Number**
  Shows the number of the ACL rule.
- **Source MAC**
  Shows the unicast MAC address of the source.
- **Dest. MAC**
  Shows the unicast MAC address of the destination.
- **Action**
  Shows the action.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.

Steps in configuration

Follow the steps below to assign an ACL rule to an interface:

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Add Rule" drop-down list.
3. Click the "Add" button. A new entry is generated in the table.

Follow the steps below to remove an ACL rule from an interface:

Note

active rules

You cannot delete active rules.

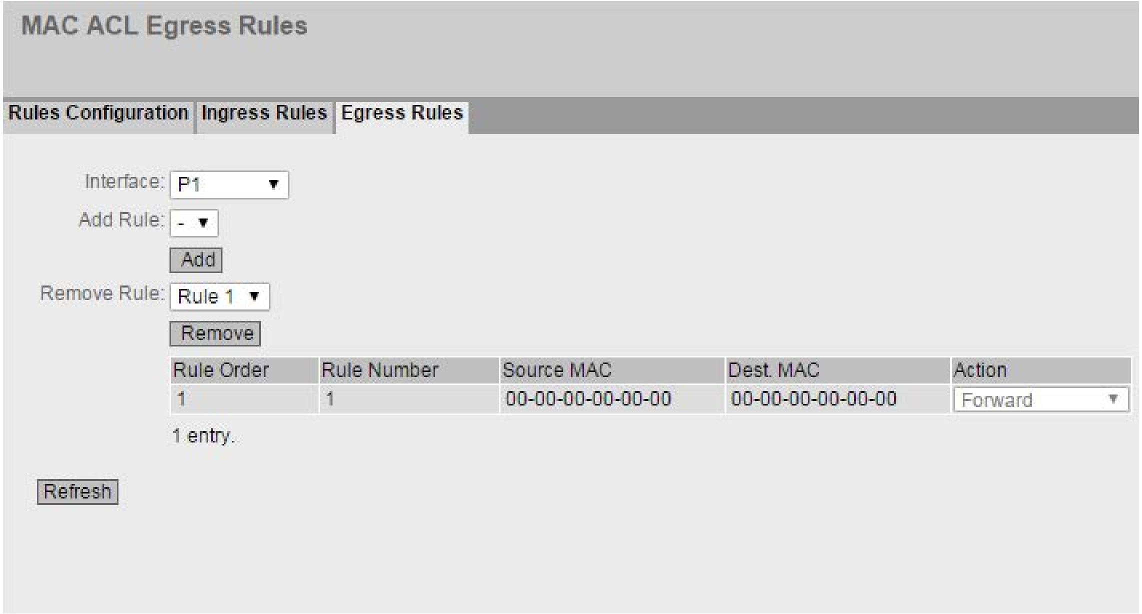
---

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Remove Rule" drop-down list.
3. Click the "Remove" button. The corresponding entry is removed in the table.

5.8.5.3 Egress Rules

Introduction

On this page, you specify the ACL rule according to which outgoing frames are filtered at interfaces. You specify the ACL rule in the "Rules Configuration" tab.



MAC ACL Egress Rules

Interface: P1

Add Rule: -

Remove Rule: Rule 1

Rule Order	Rule Number	Source MAC	Dest. MAC	Action
1	1	00-00-00-00-00-00	00-00-00-00-00-00	Forward

1 entry.

Description of the displayed boxes

The page contains the following boxes:

- **Interface**
  Select the required interface from the drop-down list. The available interfaces depend on your device.
- **Add Rule**
  In the drop-down list select the ACL rule to be assigned to the interface.

- **Add**
  To assign the ACL rule to the interface, click the "Add" button. The configuration is shown in the table.
- **Remove Rule**
  From the "Remove rule" drop-down list, select the ACL rule to be deleted.
- **Remove**
  To remove the ACL rule from the interface, click the "Remove" button.

The table has the following columns:

- **Rule Order**
  Shows the order of the ACL rules.
- **Rule Number**
  Shows the number of the ACL rule.
- **Source MAC**
  Shows the unicast MAC address of the source.
- **Dest. MAC**
  Shows the unicast MAC address of the destination.
- **Action**
  Shows the action.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.

Steps in configuration

Follow the steps below to assign an ACL rule to an interface:

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Add Rule" drop-down list.
3. Click the "Add" button. A new entry is generated in the table.

Follow the steps below to remove an ACL rule from an interface:

Note

active rules

You cannot delete active rules.

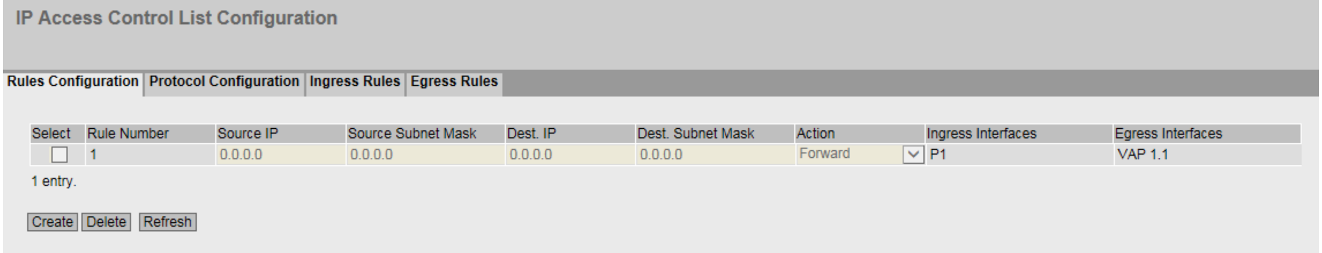
1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Remove Rule" drop-down list.
3. Click the "Remove" button. The corresponding entry is removed in the table.

5.8.6 IP ACL

5.8.6.1 Rules Configuration

Introduction

On this page, you specify the rules for the IP-based Access Control List. Using the IP-based ACL, you can specify whether frames of certain IPv4 addresses are forwarded or discarded.



IP Access Control List Configuration

Select	Rule Number	Source IP	Source Subnet Mask	Dest. IP	Dest. Subnet Mask	Action	Ingress Interfaces	Egress Interfaces
□	1	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	Forward	P1	VAP 1.1

1 entry.

Description of the displayed boxes

The table has the following columns:

- **Select**
  Select the row you want to delete. If this entry is used, this is grayed out and you cannot delete it.
- **Rule Number**
  Shows the number of the ACL rule. If you create a new entry, a new line with a unique number is created.
- **Source IP**
  Enter the IPv4 address of the source.
- **Source Subnet Mask**
  Enter the subnet mask of the source.
- **Dest. IP**
  Enter the IPv4 address of the destination.
- **Dest. Subnet Mask**
  Enter the subnet mask of the destination.
- **Action**
  Select whether the frame is forwarded or rejected when it corresponds to the ACL rule.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.

- **Ingress Interfaces**

  Shows a list of all ingress interfaces to which this rule applies.

- **Egress Interfaces**

  Shows a list of all egress interfaces to which this rule applies.

Note

Subnet mask for individual hosts

If you create the rule for a single system (one IPv4 address), specify the subnet mask "255.255.255.255".

Steps in configuration

1. Click the "Create" button. A new row with a unique number (rule number) is created in the table.
2. Enter the data of the source in "Source IP" and in "Source Subnet Mask".
3. Enter the data of the destination in "Dest. IP" and in "Dest. Subnet Mask".
4. In the "Action" drop-down list select whether the frame is forwarded or rejected when the frame corresponds to the ACL rule.
5. Click the "Set Values" button.

Deleting an entry

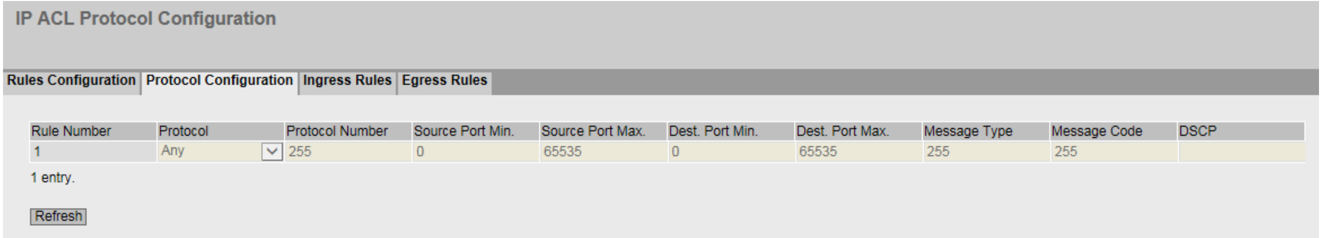
You cannot delete active entries.

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

5.8.6.2 Protocol Configuration

On this page, you specify the rules for protocols.

Settings



IP ACL Protocol Configuration

Rule Number	Protocol	Protocol Number	Source Port Min.	Source Port Max.	Dest. Port Min.	Dest. Port Max.	Message Type	Message Code	DSCP
1	Any	255	0	65535	0	65535	255	255	

1 entry.

Image 5-24 IP ACL Protocol Configuration

The table has the following columns:

- **Rule Number**

  Shows the number of the protocol rule. When you create a rule, a new row with a unique number is created.
- **Protocol**

  Select the protocol for which this rule is valid.
- **Protocol Number**

  Enter a protocol number to define further protocols.

  This box can only be edited if you have set "Other Protocol" for the protocol .
- **Source Port Min.**

  Enter the lowest possible port number of the source port.

  This box can only be edited if you have set "TCP" or "UDP"" for the protocol.
- **Source Port Max.**

  Enter the highest possible port number of the source port.

  This box can only be edited if you have set "TCP" or "UDP" for the protocol.
- **Dest. Port Min.**

  Enter the lowest possible port number of the destination port.

  This box can only be edited if you have set "TCP" or "UDP" for the protocol.
- **Dest. Port Max.**

  Enter the highest possible port number of the destination port.

  This box can only be edited if you have set "TCP" or "UDP" for the protocol.
- **Message Type**

  Enter a message type to decide the format of the message.

  This box can only be edited if you have set "ICMP" for the protocol.
- **Message Code**

  Enter a message code to specify the function of the message.

  This box can only be edited if you have set "ICMP" for the protocol.
- **DSCP**

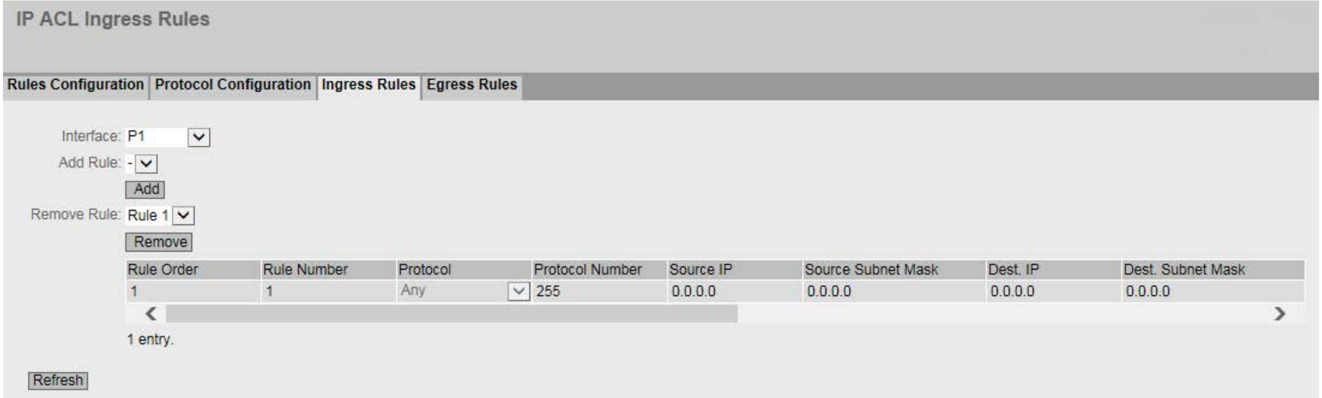
  Enter a value for classifying the priority.

  This box cannot be edited if you have set "ICMP" for the protocol.

5.8.6.3 Ingress Rules

Introduction

On this page, you specify the ACL rules according to which incoming frames are handled by interfaces. You specify the ACL rules in the "Rules Configuration" tab.



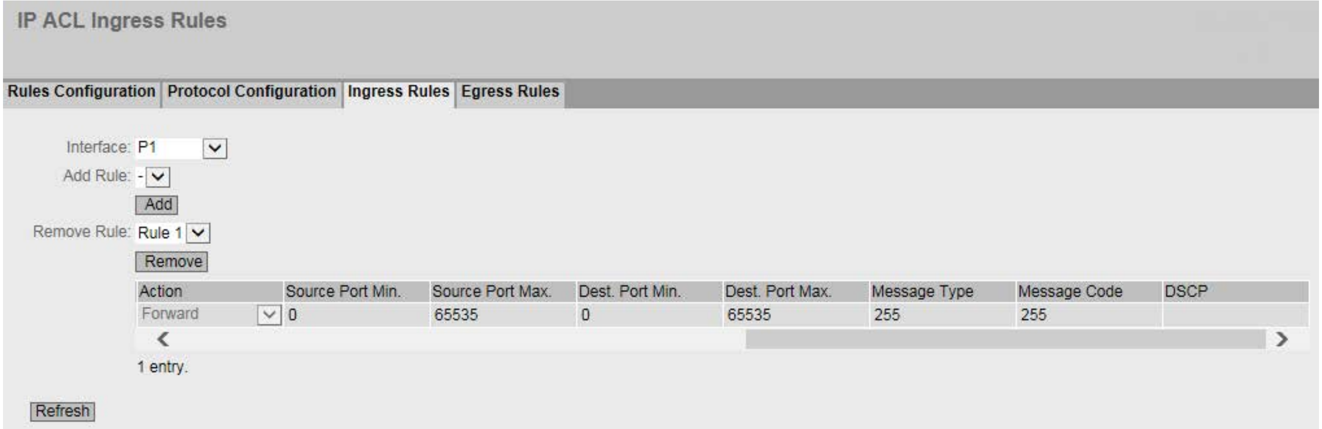
IP ACL Ingress Rules

Interface: P1
Add Rule: -
Remove Rule: Rule 1

Rule Order	Rule Number	Protocol	Protocol Number	Source IP	Source Subnet Mask	Dest. IP	Dest. Subnet Mask
1	1	Any	255	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0

1 entry.

Image 5-25 IP ACL ingress rules - first part of the table



IP ACL Ingress Rules

Interface: P1
Add Rule: -
Remove Rule: Rule 1

Action	Source Port Min.	Source Port Max.	Dest. Port Min.	Dest. Port Max.	Message Type	Message Code	DSCP
Forward	0	65535	0	65535	255	255	

1 entry.

Image 5-26 IP ACL ingress rules - second part of the table

Description of the displayed boxes

The page contains the following boxes:

- **Interface**
  Select the required interface from the drop-down list. The available interfaces depend on your device.
  To select a VLAN interface, an IP interface must be configured.

  Note

  If you use a VLAN interface, the ACL rule applies to all ports that belong to the VLAN.

- **Add Rule**
  In the drop-down list select the ACL rule to be assigned to the interface.
- **Add**
  To permanently assign the ACL rule to the interface, click the "Add" button. The configuration is shown in the table.
- **Remove Rule**
  From the "Remove rule" drop-down list, select the ACL rule to be deleted.
- **Remove**
  To remove the ACL rule from the interface, click the "Remove" button.

The table has the following columns:

- **Rule Order**
  Shows the order of the ACL rules.
- **Rule Number**
  Shows the number of the ACL rule.
- **Protocol**

  Shows the protocol for which this rule is valid.
- **Protocol Number**

  Shows the protocol number.
- **Source IP**
  Shows the IPv4 address of the source.
- **Source Subnet Mask**
  Shows the subnet mask of the source.
- **Dest IP**
  Shows the IP address of the destination.
- **Dest. Subnet Mask**
  Shows the subnet mask of the destination.
- **Action**
  Select whether the frame is forwarded or rejected when it corresponds to the ACL rule.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.

- **Source Port Min.**

  Shows the lowest possible port number of the source port.
- **Source Port Max.**

  Shows the highest possible port number of the source port.
- **Dest. Port Min.**

  Shows the lowest possible port number of the destination port.
- **Dest. Port Max.**

  Shows the highest possible port number of the destination port.
- **Message Type**

  Shows a message type to decide the format of the message.
- **Message Code**

  Shows a message code to specify the function of the message.
- **DSCP**

  Shows a value for classifying the priority.

Steps in configuration

Follow the steps below to assign an ACL rule to an interface:

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Add Rule" drop-down list.
3. Click the "Add" button. A new entry is generated in the table.

Follow the steps below to assign an ACL rule to an interface:

Note

active rules

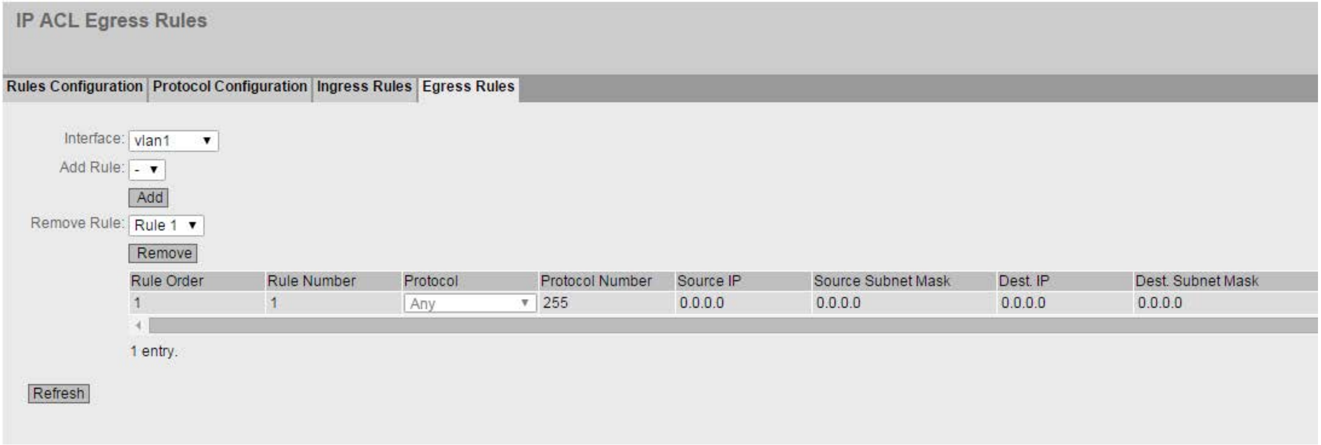
You cannot delete active rules.

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Remove Rule" drop-down list.
3. Click the "Remove" button. The corresponding entry is deleted.

5.8.6.4 Egress Rules

Introduction

On this page, you specify the ACL rules according to which outgoing frames are handled by interfaces. You specify the ACL rules in the "Rules Configuration" tab.



Interface: vlan1

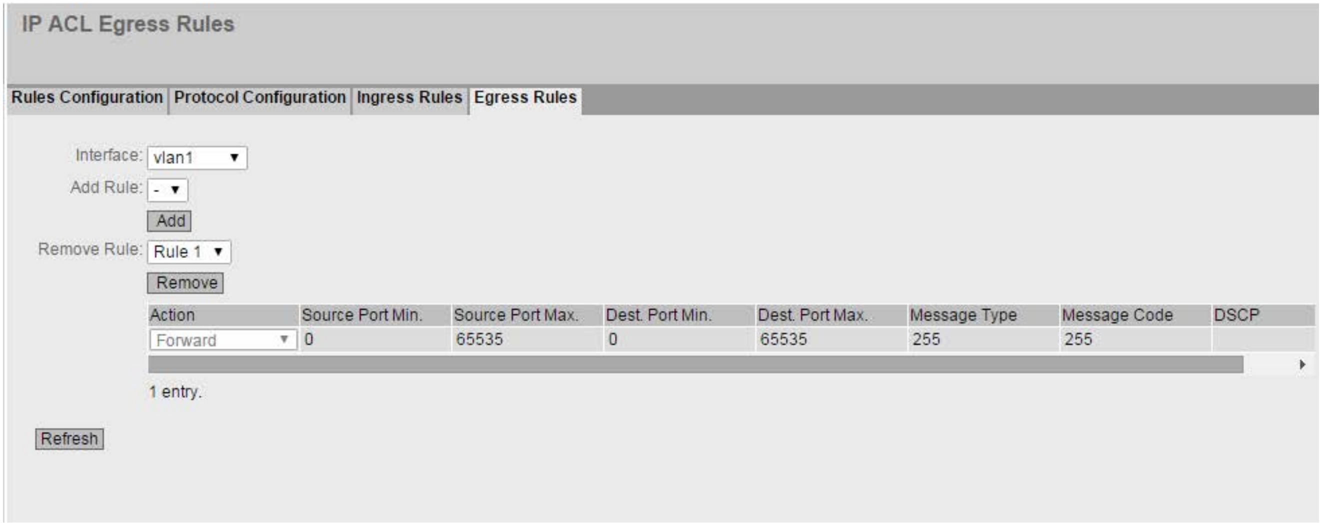
Add Rule: -

Remove Rule: Rule 1

Rule Order	Rule Number	Protocol	Protocol Number	Source IP	Source Subnet Mask	Dest. IP	Dest. Subnet Mask
1	1	Any	255	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0

1 entry.

Image 5-27 IP ACL egress rules - first part of the table



Interface: vlan1

Add Rule: -

Remove Rule: Rule 1

Action	Source Port Min.	Source Port Max.	Dest. Port Min.	Dest. Port Max.	Message Type	Message Code	DSCP
Forward	0	65535	0	65535	255	255	

1 entry.

Image 5-28 IP ACL egress rules - second part of the table

Description of the displayed boxes

The page contains the following boxes:

- **Interface**
  Select the required interface from the drop-down list. The available interfaces depend on the device.
  To select a VLAN interface, an IP interface must be configured.

  Note

  If you use a VLAN interface, the ACL rule applies to all ports that belong to the VLAN.

- **Add Rule**
  In the drop-down list select the ACL rule to be assigned to the interface.
- **Add**
  To assign the ACL rule to the interface, click the "Add" button. The configuration is shown in the table.
- **Remove Rule**
  From the "Remove rule" drop-down list, select the ACL rule to be deleted.
- **Remove**
  To remove the ACL rule from the interface, click the "Remove" button.

The table has the following columns:

- **Rule Order**
  Shows the order of the ACL rules.
- **Rule Number**
  Shows the number of the ACL rule.
- **Protocol**

  Shows the protocol for which this rule is valid.
- **Protocol Number**

  Shows the protocol number.
- **Source IP**
  Shows the IPv4 address of the source.
- **Source Subnet Mask**
  Shows the subnet mask of the source.
- **Dest IP**
  Shows the IP address of the destination.
- **Dest. Subnet Mask**
  Shows the subnet mask of the destination.
- **Action**
  Select whether the frame is forwarded or rejected when it corresponds to the ACL rule.
  - Forward
    If the frame complies with the ACL rule, the frame is forwarded.
  - Discard
    If the frame complies with the ACL rule, the frame is not forwarded.

- **Source Port Min.**

  Shows the lowest possible port number of the source port.
- **Source Port Max.**

  Shows the highest possible port number of the source port.
- **Dest. Port Min.**

  Shows the lowest possible port number of the destination port.
- **Dest. Port Max.**

  Shows the highest possible port number of the destination port.
- **Message Type**

  Shows a message type to decide the format of the message.
- **Message Code**

  Shows a message code to specify the function of the message.
- **DSCP**

  Shows a value for classifying the priority.

Steps in configuration

Follow the steps below to assign an ACL rule to an interface:

1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Add Rule" drop-down list.
3. Click the "Add" button. A new entry is generated in the table.

Follow the steps below to remove an ACL rule from an interface:

Note

active rules

You cannot delete active rules.

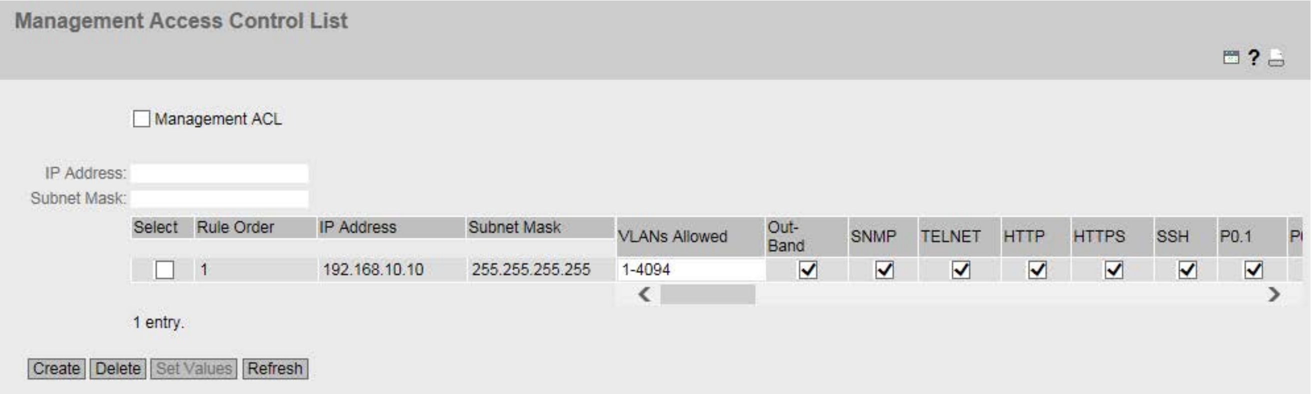
1. Select the interface from the "Interface" drop-down list.
2. Select the ACL rule in the "Remove Rule" drop-down list.
3. Click the "Remove" button. The corresponding entry is removed in the table.

5.8.7 Management ACL

Description of configuration

On this page, you can increase the security of your device. To specify which station with which IPv4 address is allowed to access your device, configure the IPv4 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. You define the VLAN in which the station may be located. This ensures that only certain stations within a VLAN have access to the device.



□ Management ACL

IP Address:
Subnet Mask:

Select	Rule Order	IP Address	Subnet Mask	VLANs Allowed	Out-Band	SNMP	TELNET	HTTP	HTTPS	SSH	P0.1	P
□	1	192.168.10.10	255.255.255.255	1-4094	☑	☑	☑	☑	☑	☑	☑	

1 entry.

Description of the displayed boxes

Note

If you enable this function, note the following

A bad configuration on the "Management Access Control List" page can result in you being unable to access the device. 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 from 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 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 of the ACL rules.
- **IP address**
  Shows the IPv4 address.
- **Subnet Mask**
  Shows the subnet mask.
- **VLANs Allowed**
  Enter the number of the VLAN in which the device is located. The station can only access the device if it is located in this configured VLAN. If this input box remains empty, there is no restriction relating to the VLANs.
- **Out-Band**
  Specify whether or not the IPv4 address can access the switch via the out-band port.
- **SNMP**
  Specify whether the station (or the IPv4 address) can access the device using the SNMP protocol.
- 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 switch using the HTTPS protocol.
- **SSH**
  Specify whether the station (or the IPv4 address) can access the switch using the SSH protocol.
- **Px.y**
  Specify whether the station (or the IPv4 address) can access this device via this port (slot.port).

Steps in configuration

Changing the entry

1. Configure the data of the entry you want to modify.
2. Click the "Set Values" button to transfer the changes to the device.

Creating a new entry

Note

Note that 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.

1. In the "IP Address" input box, enter the IPv4 address of the device and in the "Subnet Mask" input box the corresponding subnet mask.
2. Click the "Create" button to create a new row in the table.
3. Configure the entries of the new row.
4. Click the "Set Values" button to transfer the new entry to the device.

Deleting entries

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 "Remove" button. The entries are deleted and the page is updated.

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6.1 Firmware update - via WBM

Requirement

- The device has an IP address.
- The user is logged in with administrator rights.

Firmware update via HTTP

1. Click "System > Load&Save" in the navigation area. Click the "HTTP" tab.
2. Click the "Load" button in the "Firmware" table row.
3. Go to the storage location of the firmware file.
4. Click the "Open" button in the dialog. The file is uploaded.

Firmware update - via TFTP

1. Click "System > Load&Save" in the navigation area. Click the "TFTP" tab.
2. Enter the IP address of the TFTP server in the "TFTP Server Address" input box.
3. Enter the port of the TFTP server in the "TFTP Server Port" input box.
4. Click the "Load file" button in the "Firmware" table row.
5. Go to the storage location of the firmware file.
6. Click the "Open" button in the dialog. The file is uploaded.

Result

The firmware is has been transferred completely to the device.

On the "Information > Versions" there are the entries "Firmware" and "Firmware Running". Firmware Runningshows the version of the current firmware. "Firmware" shows the firmware version stored after loading the firmware. To activate this firmware, restart the device with "System > Restart".

6.2 Firmware update via WBM or CLI not possible

Cause

If there is a power failure during the firmware update, it is possible that the IE switch is no longer accessible using Web Based Management or the Command Line Interface.

Solution

If the IE switch cannot be reached using WBM or CLI, you can download the firmware to your IE switch using TFTP.

Follow the steps below to load new firmware using TFTP:

1. Turn off the power to the IE switch.
2. Press the Reset button and reconnect the power to the IE switch while holding down the button.
3. Hold down the button until the red fault LED (F) starts to flash after approximately 30 seconds.
4. Release the button.

   The bootloader waits in this state for a new firmware file that you can download by TFTP.
5. Connect a PC via the Ethernet interface with the out-band interface of the IE switch.
6. Assign an IP address to the IE switch with the Primary Setup Tool.
7. In the command prompt, change to the directory where the file with the new firmware is located and then execute the command "tftp -i <ip address> PUT <firmware>". As an alternative, you can use a different TFTP client.

Result

The firmware is transferred to the IE switch.

Note

Please note that the transfer of the firmware can take several minutes. During the transmission, the red error LED (F) flashes.

Once the firmware has been transferred completely to the IE switch, the IE switch is restarted automatically.

6.3 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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