Operating Instructions

RY-LGSP28-10
RY-LGSP28-28
RY-LGSP28-52/xxx

19” Switches:
RY-Switches of the 28-Series
Firmware Release v8.40.1589
Hardware Version v1.02
Mechanical Version v1.01
PoE Firmware Version 208-211

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1 INTRODUCTION

These operating instructions describe the commissioning of the switches and the configuration of the most important basic functions.

All persons using this manual should have the following skills:

- Knowledge of how to install and operate electronic devices
- Experience with using computer systems
- Knowledge of Local Area Networks (LANs) and a general knowledge of IP communications
- Knowledge on working with web browsers

1.1 Contents

This operating manual is divided into the following chapters:

1. Introduction
2. Commissioning of the switches
3. Diagnostic tools and firmware upgrades

1.2 About Us

In all situations where a network is required to transmit high-quality video content fast and securely, barox Kommunikation's range of POWERHAUS switches guarantee pioneering connections.

barox Kommunikation designs, coordinates and supplies everything from a simple, point-to-point connection to a large area network running multicast applications.

1.3 Website

Information on our full range of switches as well as download links to our data sheets, documentation and the latest firmware are available on our website: www.barox.ch.

1.4 Support

Our POWERHAUS Partners are available to help you should you have any problems or questions regarding the configuration of your switches.

2 Short Description

All our RY switches are manageable, full Gigabit IP switches with layer 2/2+ functionality. We offer a range of different models with a varying number of optical and electrical ports which − depending on the model − can support anything up to PoE++.

2.1 Special Features for Video Networks

- **Active Camera Monitoring**

Cameras powered via a PoE connection from the switch are continually monitored. In the case of a camera failure, the switch automatically restarts the camera all by itself. Should this operation fail, the switch automatically sends out an alarm via SNMP.

- **Active Monitoring of the PoE Power Supply**

Should the amount of power requested from the switch be too high, e.g. through a defective camera, the switch will automatically send out an alarm via SNMP.

- **Active Management of the Level of PoE Power Supplied**

When the switch is started up, the individual PoE ports can be started up one after another to avoid overloading the PoE power supply.

- **Other Useful Features**

Jumbo Frames up to 9,600 Bytes are supported at 1 Gbit/s and also 100 Mbit/s.
Port security by means of MAC address restriction and IP identification.

Readability and provision of certificates, resp.
Extra high backplane performance for smooth video transmission at full port utilisation

Ports using PoE can be detected at the push of a button (front panel).

2.2 DMS (Device Management System)

The switch is equipped with an integrated network monitoring and control system that uses a very simple method to provide the user with an excellent overview of the whole network.
The network Topology View provides a quick overview of all the switches and terminal equipment in the network, e.g. IP cameras and servers, together with information on their respective IP addresses, device types and device descriptions. Plans showing the floor layout and the local environment can be stored as background images. These allow the user to quickly access specific network equipment − even without special knowledge of the IP structure.
Finalised plans can then be exported again and included in the documentation.

3 Commissioning

The switches can be configured using a web browser. To do this, a PC/laptop can be connected to any desired RJ45 port. Care should be taken to ensure that the IP address of the PC/laptop belongs to the same network segment as the switch. For example: 192.168.1.111.

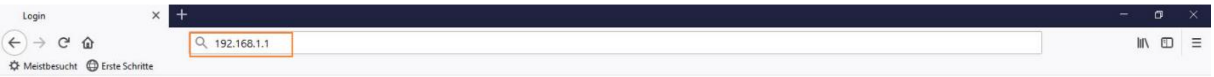
Alternatively, the switches can also be configured via a CLI (console port). In this document, the switch configuration is explained using a web browser.

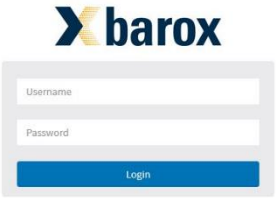
3.1 Factory Default and Login

The switches are supplied with the following factory default settings:

IP address:	192.168.1.1
Subnet mask:	255.255.255.0
User:	admin
Password:	admin

A connection can be made to the switch by entering the IP address of the switch (192.168.1.1) straight into a web browser. To log in, the user simply enters the user name and password listed above.

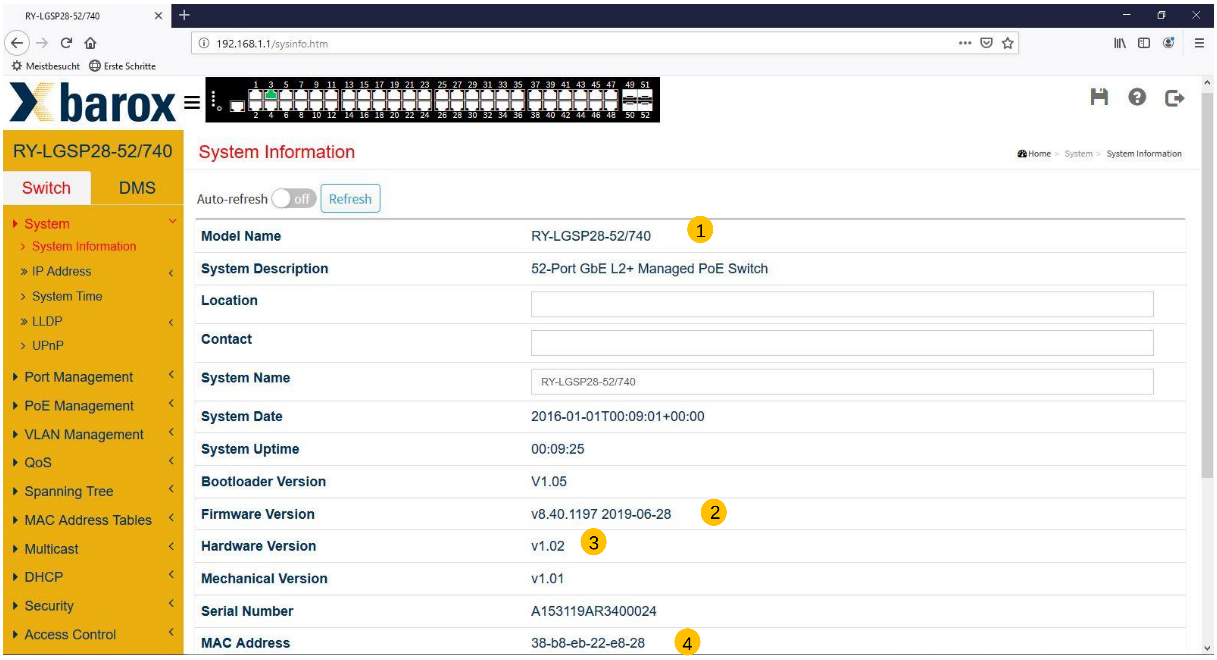




Once the login process has been successfully completed, the “System Information” page is automatically displayed showing the most important information on the switch.

3.2 System Information

This page displays the most important information on the switch.



System Information

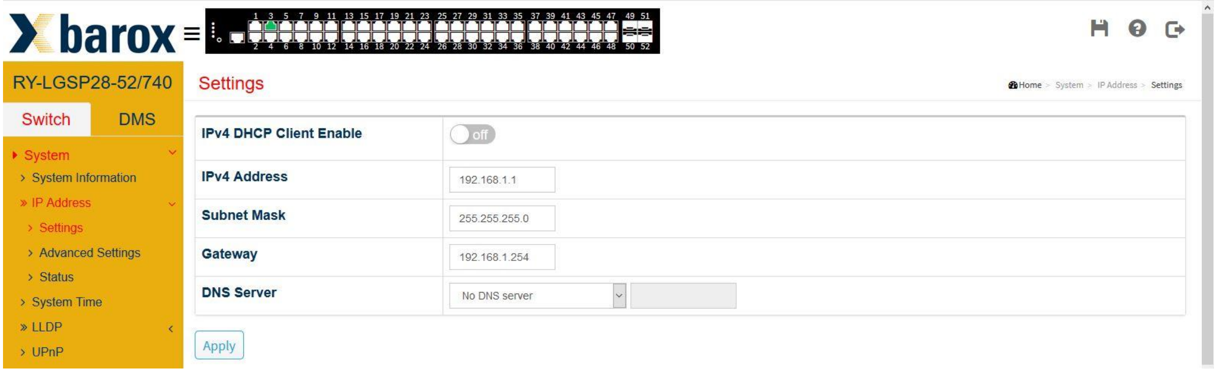
Model Name	RY-LGSP28-52/740
System Description	52-Port GbE L2+ Managed PoE Switch
Location	
Contact	
System Name	RY-LGSP28-52/740
System Date	2016-01-01T00:09:01+00:00
System Uptime	00:09:25
Bootloader Version	V1.05
Firmware Version	v8.40.1197 2019-06-28
Hardware Version	v1.02
Mechanical Version	v1.01
Serial Number	A153119AR3400024
MAC Address	38-b8-eb-22-e8-28

Key:

1. Name of the switch model
2. Firmware version
3. Hardware version
4. MAC address

3.3 Set a Static IP Address or use DHCP

The first step is to allocate an IP address to the switch. To do this, go to the “Switch/System/IP Address/Settings” menu in the navigation tree.



Settings

IPv4 DHCP Client Enable	off
IPv4 Address	192.168.1.1
Subnet Mask	255.255.255.0
Gateway	192.168.1.254
DNS Server	No DNS server

Static IP Address

In the above image, one can see that the IP address of the switch is 192.168.1.1 and that the subnet mask is 24 (255.255.255.0). The gateway has the IP address 192.168.1.254.

If the switch is to be allocated a new IP address, the existing IP address is simply overwritten and then confirmed by clicking on the “Apply” icon. The same applies, if the subnet mask or gateway address needs to be changed.

DHCP

If the switch is to be integrated into a network where a DHCP server allocates the IP addresses, the sliding switch “IPv4 DHCP Client Enable” needs to be set to “on”.

The DHCP server will then allocate an IP address to the switch within the pre-defined range.

There are now two ways of finding out which IP address has been allocated.

a) Software tool, e.g.: SoftPerfect Network Scanner

https://www.heise.de/download/product/network-scanner-13270

b) Console port

This method requires using the console cable supplied with the switch. The console port of the switch is an RS232 interface, i.e. a PC/laptop with a serial interface or a USB-RS232 adapter is required.

To configure the switch via the CLI port, we recommend using the “PuTTY” software.

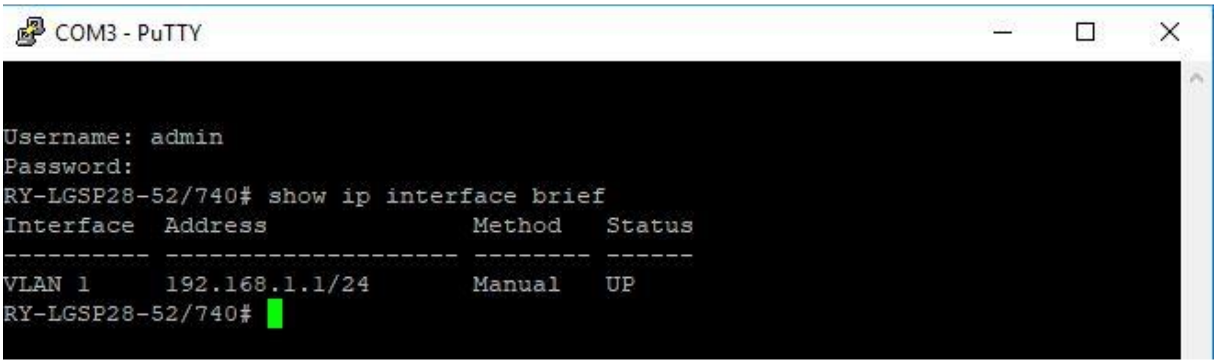
http://www.chip.de/downloads/PuTTY_12997392.html

The factory default settings of the CLI interface are as follows:

Bit rate:	115,200
Data bits	8
Parity:	None
Stop bits:	1
Flow control:	None

Once the connection is established using the serial interface, the user needs to log on using the user name and password.

The following command can be used to show the IP address:
RY-LGSP28-52/740# ***show ip interface brief***



```
Username: admin
Password:
RY-LGSP28-52/740# show ip interface brief
Interface  Address              Method   Status
---------- -------------------- -------- ------
VLAN 1     192.168.1.1/24       Manual   UP
RY-LGSP28-52/740#
```

➔ Important: This change now needs to be permanently saved.

To do this, access the switch by entering the new IP address in the web browser and then click on the diskette symbol at the top right-hand corner.

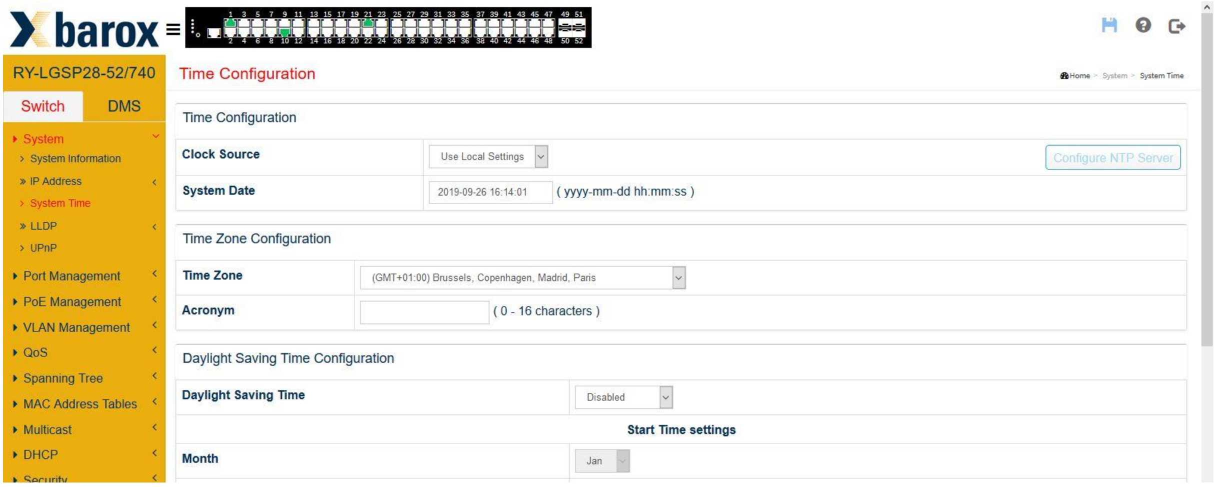
3.4 Time Configuration

The system time used by barox Kommunikation switches can either be configured manually or via an NTP server. The whole purpose of defining the time is to use it in the log file. If an error message is generated, a date stamp is added to the respective entry in the log file so that the downtime and/or the time when the error occurred is accurately recorded which helps to localise the possible causes.

3.4.1. Local Settings

In the "System/System Time" menu, select "Use Local Settings" as "Clock Source". The date and time are then manually entered in the specified format in the field next to "System Date" and then confirmed using the "Apply" button.

➔ If the switch is restarted, the time is deleted and needs to be re-configured as the switch does not have its own backup battery.



Time Configuration

Time Configuration

Clock Source	Use Local Settings
System Date	2019-09-26 16:14:01 (yyyy-mm-dd hh:mm:ss)

Time Zone Configuration

Time Zone	(GMT+01:00) Brussels, Copenhagen, Madrid, Paris
Acronym	(0 - 16 characters)

Daylight Saving Time Configuration

Daylight Saving Time	Disabled
Start Time settings	
Month	Jan

3.4.2. NTP (Network Time Protocol)

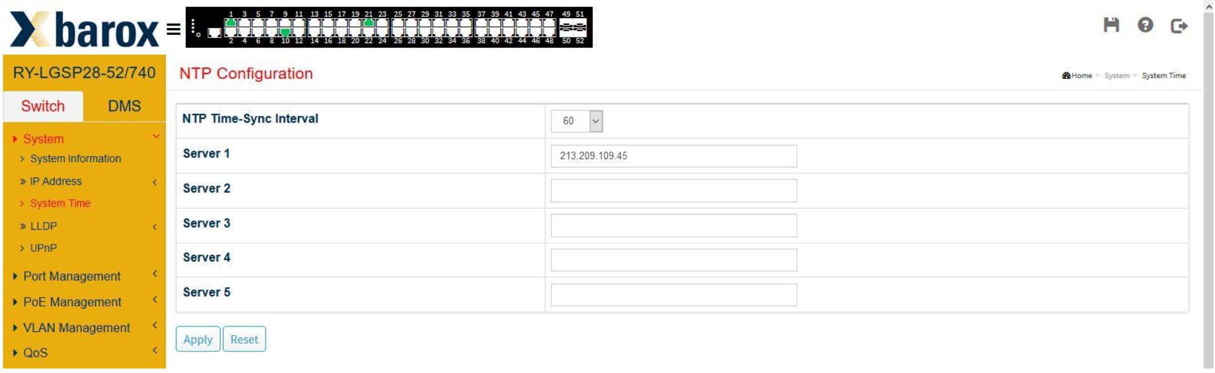
The Network Time Protocol is a standard for synchronising clocks in computer systems using packet-based communication networks.

As time servers generally broadcast Greenwich Mean Time, the “Time Zone” must be selected accordingly to ensure that a) the time is correct and b) the system switches correctly between summer and winter time.

Configuration is done in two steps.

The first step is to select “Use NTP Server” as a clock source. This activates the icon in the top right-hand corner of the mask “Configure NTP Server”.

Clicking the icon leads to the entry mask, which is the second step.



NTP Configuration

NTP Time-Sync Interval	60
Server 1	213.209.109.45
Server 2	
Server 3	
Server 4	
Server 5	

However, if the time is to be retrieved from specific source, for example from a time server, NTP server, firewall etc., the respective IP address must be entered in the “Server 1” field. This is the only way of ensuring that the switch can actually contact the respective IP address. Up to 5 sources can be defined.

The NTP Time-Sync Interval defines the time interval used for synchronising the time. 5, 10, 15, 30, 60 and 120 minutes are possible.

If there is no time source available in one’s own network and the time is to be retrieved from an external source via the Internet, it is possible to enter the external NTP server details directly, e.g. 213.209.109.45 at http://www.pool.ntp.org/de/

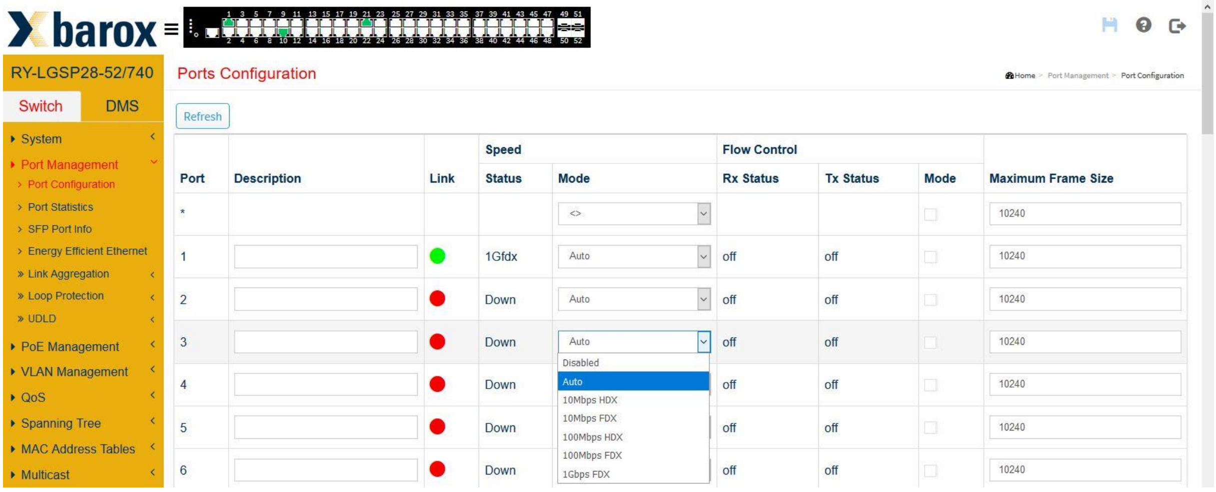
As soon as the switch can access the time and date, the correct date is shown in the “System Date” field.

3.5 Port Configuration

The ports are set to “Auto” mode when they leave the factory. Auto-negotiation is the procedure which allows two connected Ethernet network ports to independently negotiate and configure the highest-possible transmission speed as well as the duplex mode. This procedure only applies to twisted pair cables − not to fibre optic connections.

Nevertheless, in some cases the terminal device may not be correctly recognised. This sometimes occurs when using a camera with a 100 Mbit/s interface. In this case, the port must be manually set to 100 Mbit/s.

If a port is not to be used for security reasons, this can be disabled completely. In this case, the configuration mode should be set to “Disabled”.



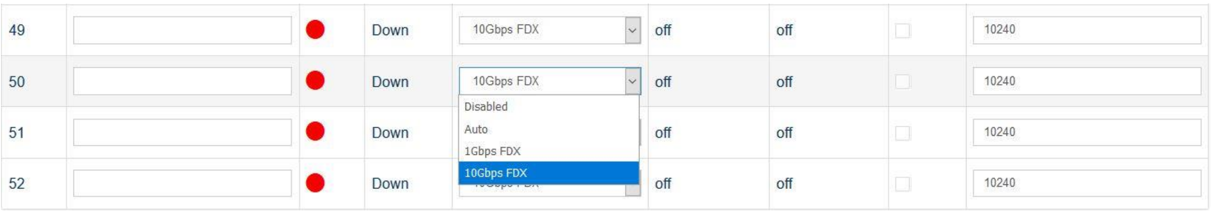
Ports Configuration

Port	Description	Link	Speed Status	Speed Mode	Flow Control Rx Status	Flow Control Tx Status	Flow Control Mode	Maximum Frame Size
*				<>			□	10240
1		●	1Gfdx	Auto	off	off	□	10240
2		●	Down	Auto	off	off	□	10240
3		●	Down	Auto	off	off	□	10240
4		●	Down		off	off	□	10240
5		●	Down		off	off	□	10240
6		●	Down		off	off	□	10240

3.5.1. SFP Port

The SFP ports are also equipped with an Auto mode. This is different to the auto-negotiation procedure used by copper ports. SFP ports are only capable of recognising the transmission speed through auto-negotiation and only support full duplex mode.

In some cases, a switch may not correctly detect whether an SFP is a 100 Mb or 1000 Mb model which will prevent the latter from functioning. In such cases, the port data rate needs to be set manually.



49		●	Down	10Gbps FDX	off	off	□	10240
50		●	Down	10Gbps FDX	off	off	□	10240
51		●	Down		off	off	□	10240
52		●	Down		off	off	□	10240

The SFP ports of the switches are not coded. This means that SFPs supplied by other manufacturers can be used − whereby no guarantee is supplied that these will function properly.

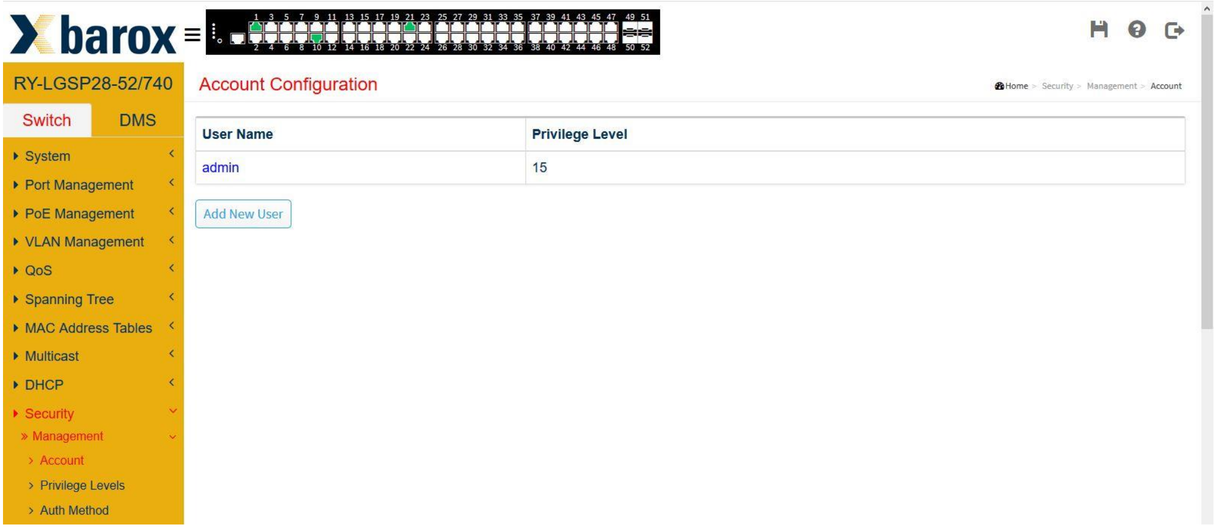
The barox Kommunikation product range includes SFPs for multi and single mode fibres with transmission speeds of 100 Mbit/s, 1 Gbit/s and 10 Gbit/s. Distances of between 550 m and 120 km can be achieved depending on the type of fibre and transmission speed.

➔ Please also refer to http://www.barox.ch/cm/produkte/product/ip-produkte/zubehoer/ac-sfp

3.6 Change of User Name and Password

barox Kommunikation switches offer the option of generating a number of users with different rights. Up to 15 different levels can be defined.

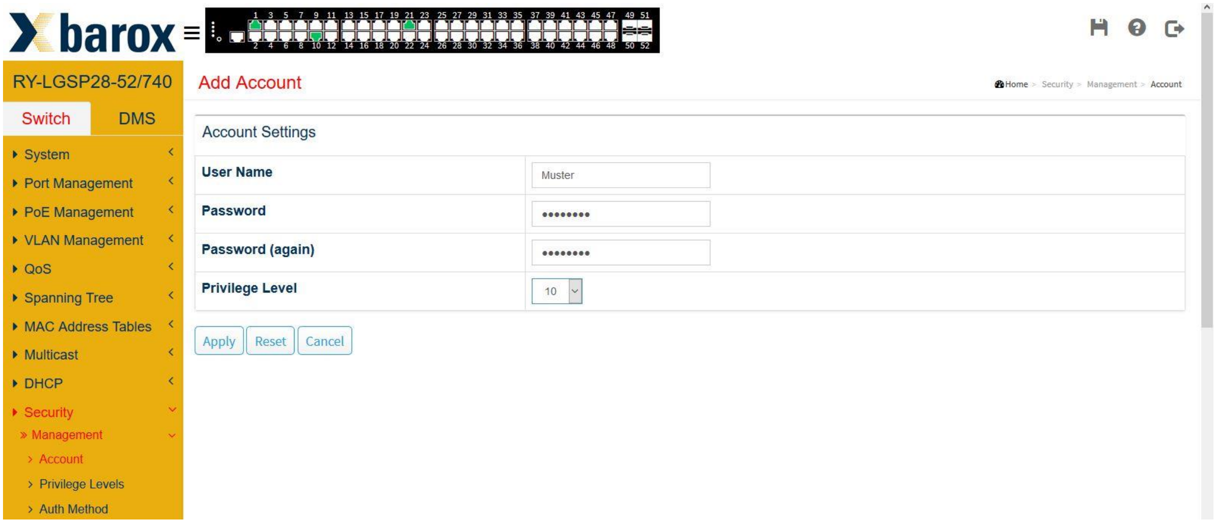
Level 15 is the highest level and is intended to be used by the administrators.



Account Configuration

User Name	Privilege Level
admin	15

Another r user can be generated by clicking on “Add New User”. Then the “User Name”, “Password” and “Privilege Level” need to be defined.



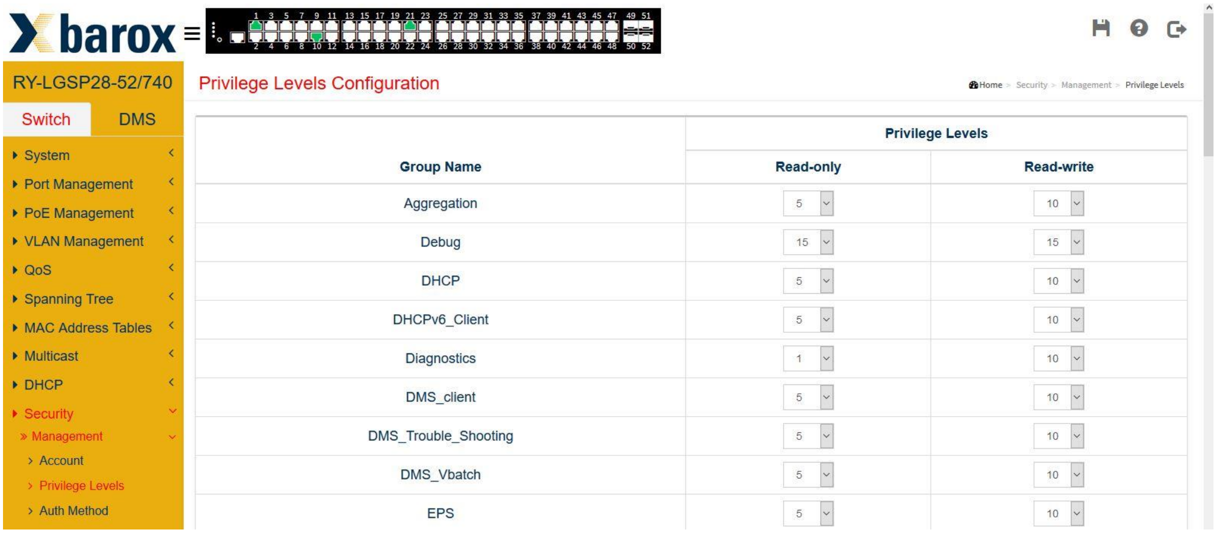
Add Account

Account Settings

User Name	Muster
Password	••••••••
Password (again)	••••••••
Privilege Level	10

The exact range of rights applying to the new user can now be defined in the “Privilege Level” menu.

In the following example, the technician concerned has a privilege level of 10, i.e. he/she is allowed to configure everything based on his/her Read/Write rights. However, this technician’s “Debug” rights are so limited that he/she cannot even read “Debug” data.



Privilege Levels Configuration

	Privilege Levels	
Group Name	Read-only	Read-write
Aggregation	5	10
Debug	15	15
DHCP	5	10
DHCPv6_Client	5	10
Diagnostics	1	10
DMS_client	5	10
DMS_Trouble_Shooting	5	10
DMS_Vbatch	5	10
EPS	5	10

This table is highly complex which allows extremely precise rights to be granted. For example, it is possible to define a user who can only read the MAC table.

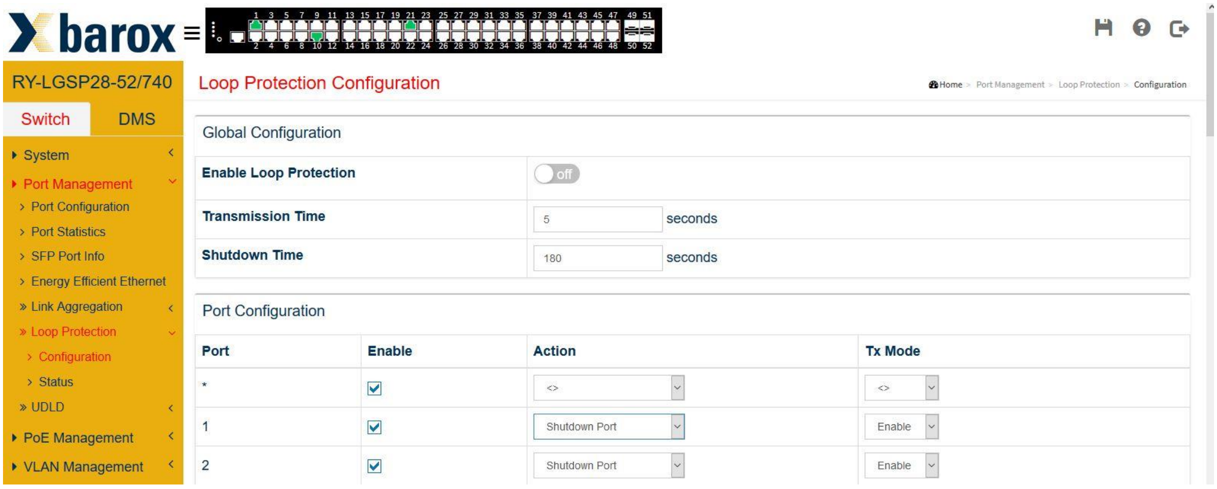
3.7 Loop Protection

In larger networks, it is very easy to accidentally, resp. unintentionally, make physical connections that result in a loop. If no loop protocol (e.g. RSTP) has been activated, the whole network hangs and becomes inoperative.

The “Loop Protection” feature was specially designed to handle such situations. Once this feature has been activated, it is possible to define whether the respective port should be shut down, merely an entry made in the log file or both (“Shutdown Port and Log”), if a loop is accidentally created.

➔ Ports already actively running RSTP must not additionally be monitored using the Loop Protection feature. This would lead to massive malfunctions within the network.

“Shutdown Time” shows how long a port is to remain disabled, should a loop be detected. Possible time entries: 0 – 604,800 s (7 days). If “0” is entered here, the port will remain deactivated until the switch is rebooted.



Loop Protection Configuration

Global Configuration

Enable Loop Protection	off
Transmission Time	5 seconds
Shutdown Time	180 seconds

Port Configuration

Port	Enable	Action	Tx Mode
*	☑	<>	<>
1	☑	Shutdown Port	Enable
2	☑	Shutdown Port	Enable

3.8 Ring Configuration

To guarantee redundancy within the network, it is crucial to set up a ring topology. To ensure that the network is not overloaded by a broadcast storm, a protection mechanism is required.

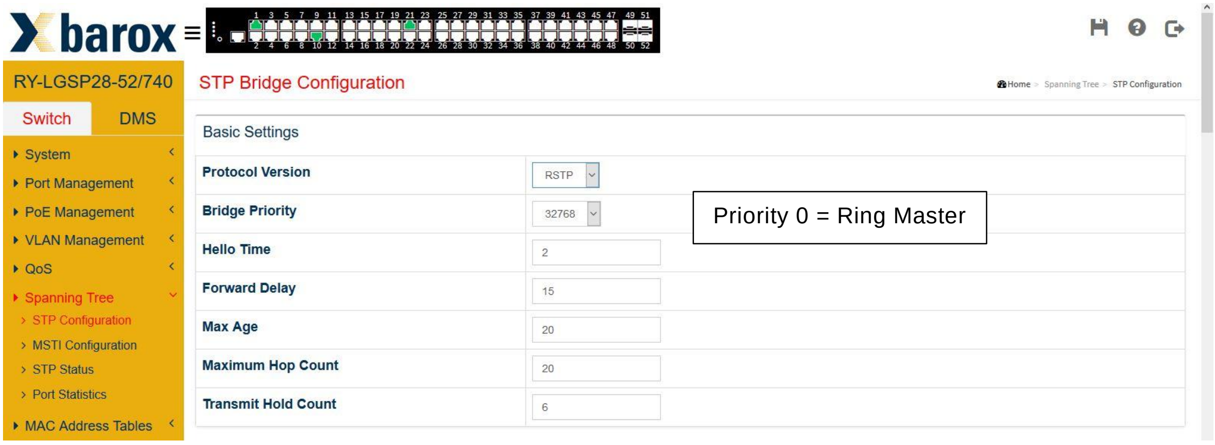
RSTP (Rapid Spanning Tree Protocol) is one of the fundamental protocols used in an Ethernet network. It ensures that no network loops are created within individual network segments. Unlike an IP packet, an Ethernet frame does not have a maximum Time to Live (TTL) and, therefore, may potentially go around in circles for an indefinite period of time. This, in turn, could overload the network and, in the worst case, bring the network to a standstill.

How the Rapid Spanning Tree Protocol works is explained in detail in Wikipedia.
https://de.wikipedia.org/wiki/Spanning_Tree_Protocol

3.8.1. Ring Master

In a ring topology, one switch must be defined as the master which then assumes the task of monitoring the ring. In the event that a connection is interrupted, this master then notifies all the other switches in the ring so that the alternative connection can be activated. The switch with Priority 0 is the ring master.

The RSTP protocol is designed to automatically make the switch with the lowest MAC address the ring master, if no ring master has been defined.



STP Bridge Configuration

Basic Settings

Protocol Version	RSTP
Bridge Priority	32768
Hello Time	2
Forward Delay	15
Max Age	20
Maximum Hop Count	20
Transmit Hold Count	6

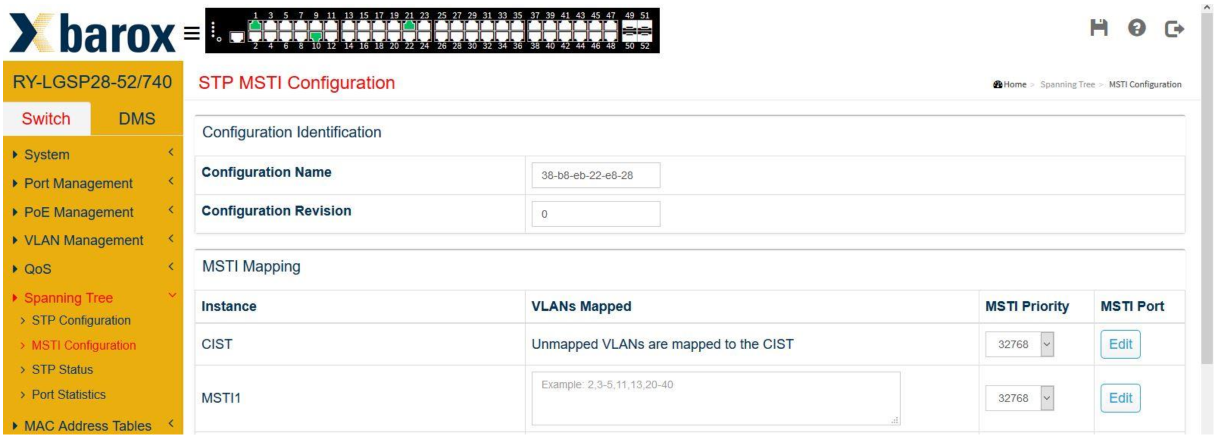
Priority 0 = Ring Master

The desired protocol version must be selected in the “Spanning Tree/STP Configuration” menu. RSTP is supported by all switch manufacturers – making it compatible with third-party manufacturers.

The switch factory default is set to “Bridge Priority” 32768. If the switch is to act as master, the Bridge Priority must be set to “0”. All the other values can be left as they are.

3.8.2. Port Configuration

The menu item “CIST” in the menu “MSTI Configuration” must be edited for defining the ports, which are integrated into the ring.



STP MSTI Configuration

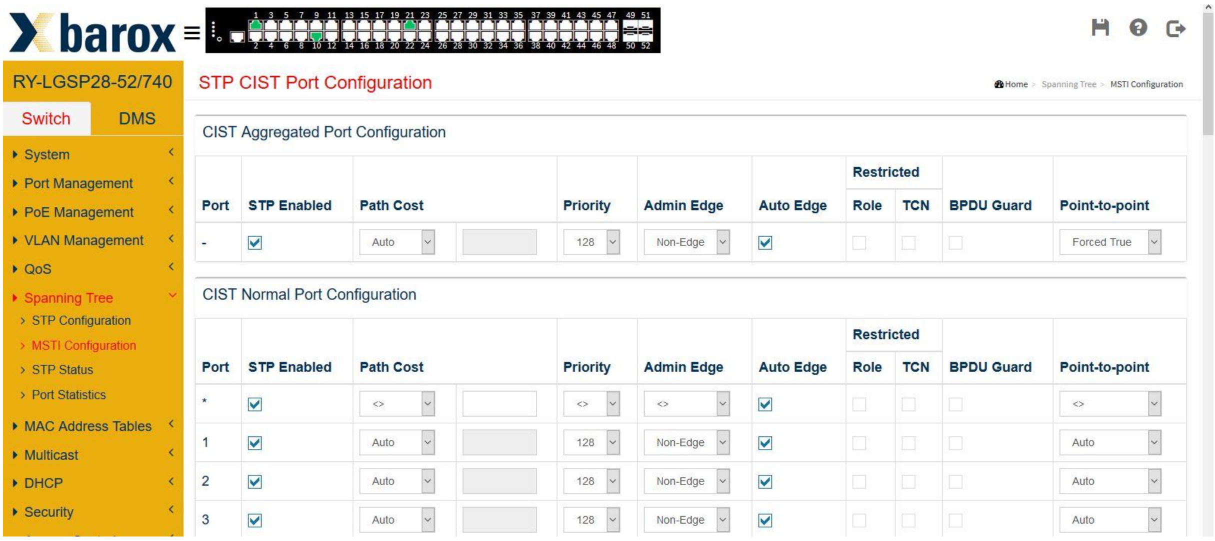
Configuration Identification

Configuration Name	38-b8-eb-22-e8-28
Configuration Revision	0

MSTI Mapping

Instance	VLANs Mapped	MSTI Priority	MSTI Port
CIST	Unmapped VLANs are mapped to the CIST	32768	Edit
MSTI1	Example: 2,3-5,11,13,20-40	32768	Edit

The factory default for all ports is “STP Enabled”. This means that, in theory, the ring can be created using any desired port. To optimally distribute the load across the network, it is possible to define that the data packet flow be channelled using Path Cost. The term “Path Cost” originates from the time when lines were leased for A to B connections which meant that they were expensive.



STP CIST Port Configuration

CIST Aggregated Port Configuration

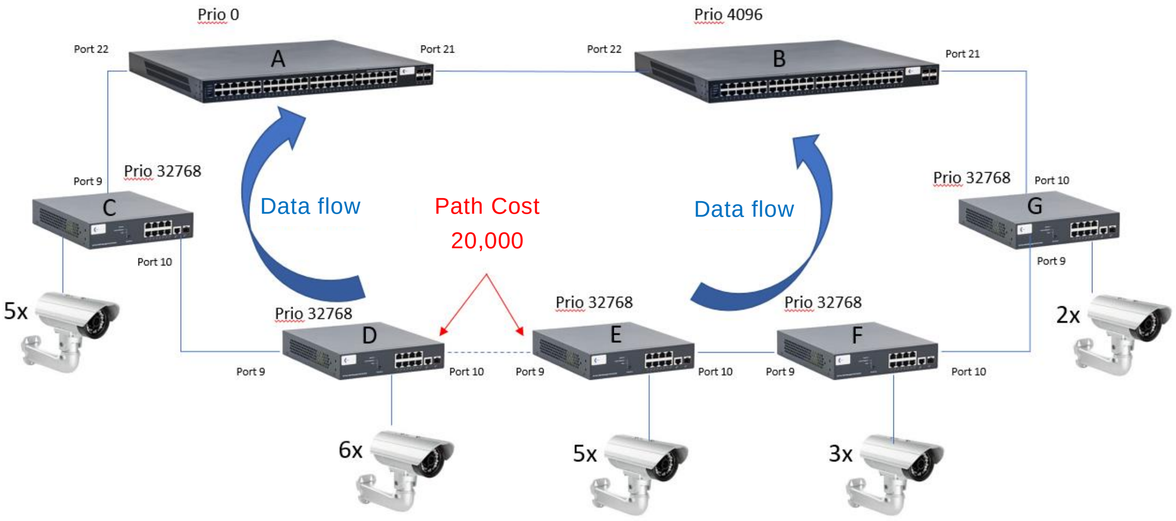
Port	STP Enabled	Path Cost		Priority	Admin Edge	Auto Edge	Restricted Role	Restricted TCN	BPDU Guard	Point-to-point
-	☑	Auto		128	Non-Edge	☑	□	□	□	Forced True

CIST Normal Port Configuration

Port	STP Enabled	Path Cost		Priority	Admin Edge	Auto Edge	Restricted Role	Restricted TCN	BPDU Guard	Point-to-point
*	☑	<>		<>	<>	☑	□	□	□	<>
1	☑	Auto		128	Non-Edge	☑	□	□	□	Auto
2	☑	Auto		128	Non-Edge	☑	□	□	□	Auto
3	☑	Auto		128	Non-Edge	☑	□	□	□	Auto

Example:

In a larger ring with numerous terminal devices and larger data volumes it makes sense to channel the data flow within the ring to distribute the load evenly across the switches (load-sharing). To achieve this, the path cost needs to be defined.



In the above example, the network consists of two central switches (A+B) and 5 other switches that form the ring. All in all, 21 cameras have been installed − each supplying 5 Mbit/s of video data, i.e. a total of over 100 Mbit/s of data.

Scenario 1: Only RSTP is active on all the switches

The switch with the lowest MAC address functions as the master. This may be the smallest switch in the ring with the lowest CPU performance. The direction of data flow is not known.

In the case of an interruption, the switch-over may take a little longer as this small switch cannot process the data so quickly.

Scenario 2: RSTP is active on all the switches, switch A has Prio 0 and switch B Prio 4096

In this case, switch A has been defined to assume the role of master. If this switch fails, switch B will take over the role of master. Switch A monitors the ring. Should network traffic be interrupted, switch A’s CPU has enough power to be able to react quickly. Port 21 of switch A may be marked as being “Blocked”. The data from all the video cameras will then be provided via port 22. Small switch C then has to process the data from all the video cameras, causing a bottleneck.

Scenario 3: RTSP active, the master and Path Cost have been defined

This configuration precisely defines how the data should flow. The load is distributed on two sides. None of the switches is pushed to the limit. As the path cost of switch D, port 10 and switch E, port 9, is higher than that of all the other ports in the ring, this route will only be activated, if network traffic is interrupted.

Path Cost − default setting:

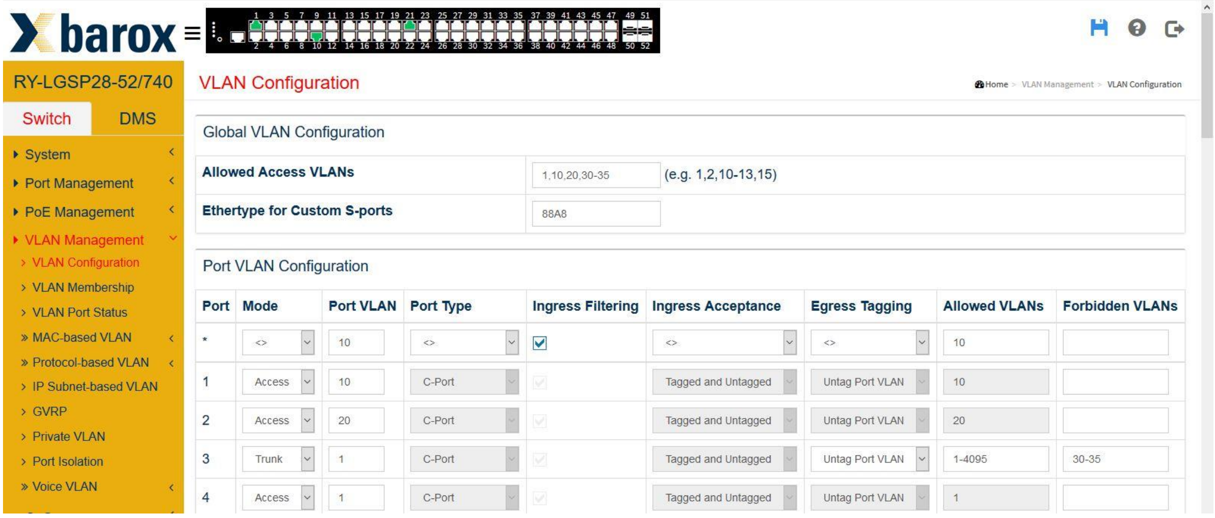
The cost depends on the distance from the root bridge (master) and the available uplink to the target. Normally, the path cost of reaching the target via a 100 Mbit/s uplink is higher than that of a 1 Gbit/s uplink. In this case, the 100 Mbit/s link would be blocked from being used as a redundant path. Although path costs have been standardised according to the IEEE provisions, different values can be manually specified, for example, to select a preferred uplink where the speeds are identical so as to reflect the real cost of a leased line.

➔ Wherever possible, one should aim to realise a configuration that corresponds to the one illustrated in the above image.

3.9 VLAN Configuration

VLAN configuration is effected on one single page.

All the VLAN numbers requiring configuration must be listed in the field “Allowed Access VLANs”.



VLAN Configuration

Global VLAN Configuration

Allowed Access VLANs	1,10,20,30-35 (e.g. 1,2,10-13,15)
Ethertype for Custom S-ports	88A8

Port VLAN Configuration

Port	Mode	Port VLAN	Port Type	Ingress Filtering	Ingress Acceptance	Egress Tagging	Allowed VLANs	Forbidden VLANs
*	<>	10	<>	☑	<>	<>	10	
1	Access	10	C-Port	☑	Tagged and Untagged	Untag Port VLAN	10	
2	Access	20	C-Port	☑	Tagged and Untagged	Untag Port VLAN	20	
3	Trunk	1	C-Port	☑	Tagged and Untagged	Untag Port VLAN	1-4095	30-35
4	Access	1	C-Port	☑	Tagged and Untagged	Untag Port VLAN	1	

Once the VLAN numbers have been entered, the individual ports can be allocated to a specific function and VLAN.

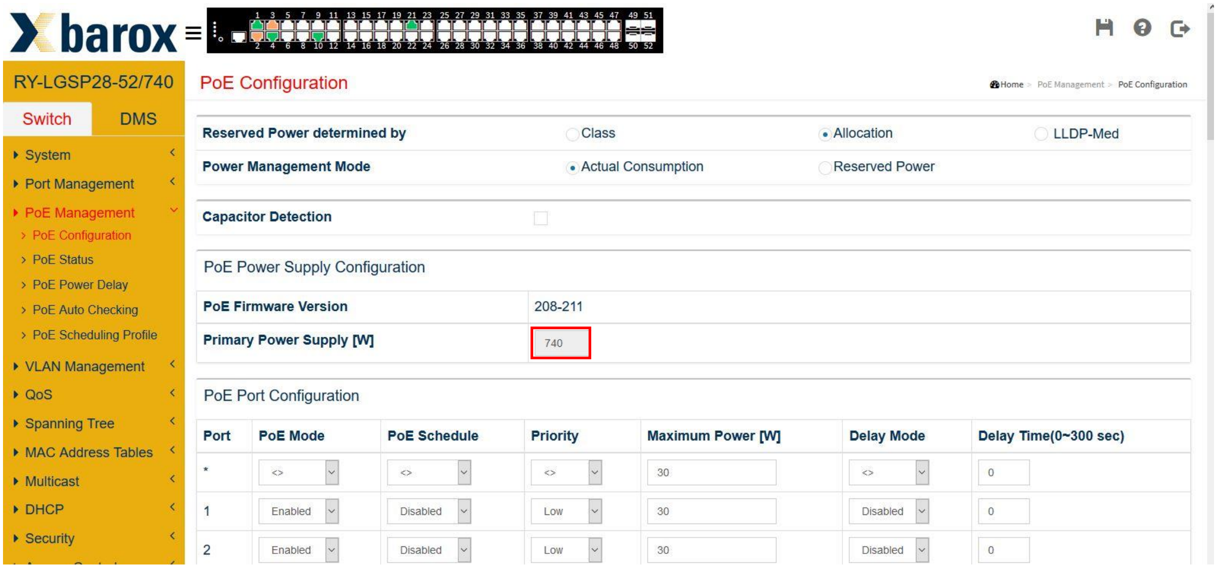
Mode	VLAN	Function
Access	No.	A terminal device is to be connected to this port
Trunk	---	Connection between two switches
Hybrid	---	Connection between two switches or to a terminal device

The allowed VLANs can be defined in the “Allowed VLANs” column both in “Trunk” and “Hybrid” mode. The same applies to forbidden VLANs, which can be defined in the column “Forbidden VLANs”.

3.10 Power over Ethernet (PoE)

With respect to PoE, the switch has numerous options for optimising PoE implementation. Power can be controlled, resp. turned on or off, on a time or event-triggered basis. In addition, powered devices (e.g. PoE cameras) can be monitored and rebooted, if required.

3.10.1. PoE Configuration



PoE Configuration

Reserved Power determined by	○ Class	● Allocation	○ LLDP-Med
Power Management Mode	● Actual Consumption	○ Reserved Power	
Capacitor Detection	□		

PoE Power Supply Configuration

PoE Firmware Version	208-211
Primary Power Supply [W]	740

PoE Port Configuration

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	30	<>	0
1	Enabled	Disabled	Low	30	Disabled	0
2	Enabled	Disabled	Low	30	Disabled	0

Every switch has a pre-defined performance capacity. This describes how much power can be supplied via the PoE ports. The crucial component here is the power supply installed in the switch. In the above example using an RY-LGSP28-52 switch with 24 PoE+ ports, a maximum of 740 W can be supplied. This means that it is impossible to connect a 30 W terminal device to each of the 48 ports as this would require a total of 1,440 W. The integrated power unit cannot supply this much power.

This means that it is important to keep track of how much power is being supplied per port.

POE appliances are divided into various categories depending on their respective consumption.

Class	Power available to the powered device	Classification signature
0	0.44 – 12.96 W	0 to 4 mA
1	0.44 – 3.84 W	9 to 12 mA
2	3.84 – 6.49 W	17 to 20 mA
3	6.49 – 12.95 W	26 to 30 mA
4	12.95 – 25.50 W (only 802.3at/Type 2)[4]	36 to 44 mA

https://de.wikipedia.org/wiki/Power_over_Ethernet

Reserved Power determined by

One can define how the maximum amount of power to be supplied is determined in the section “Reserved Power determined by”.

- Class = corresponds to the class to which the terminal device says it belongs
- Allocation = according to the value stated in the “Maximum Power (W)” column
- LLDP-Med = ditto Class mode, pulls the information via LLDP (where possible)

If the terminal device exceeds the predefined power limit, the port turns PoE off.

Power Management Mode

This is where one defines how the switch should behave should the maximum possible power level be exceeded.

Actual Consumption

Should the amount of power demanded by the devices exceed the maximum possible amount of power that the switch can provide, PoE is turned off completely. If the power limit is only exceeded by one single port, PoE is only turned off to this port.

The importance of the individual ports is defined in the “Priority” column. Ports set to “Low” are turned off immediately, whereas ports set to “Critical” are turned off last should the maximum power level be exceeded.

Reserved

Ports set to “Reserved” are only turned off, if the power reserved for them in the “Maximum Power (W)” column is exceeded.

PoE Schedule

Each individual port can be allocated to a time schedule. A total of 16 time schedules can be created.

3.10.2. PoE Power Delay

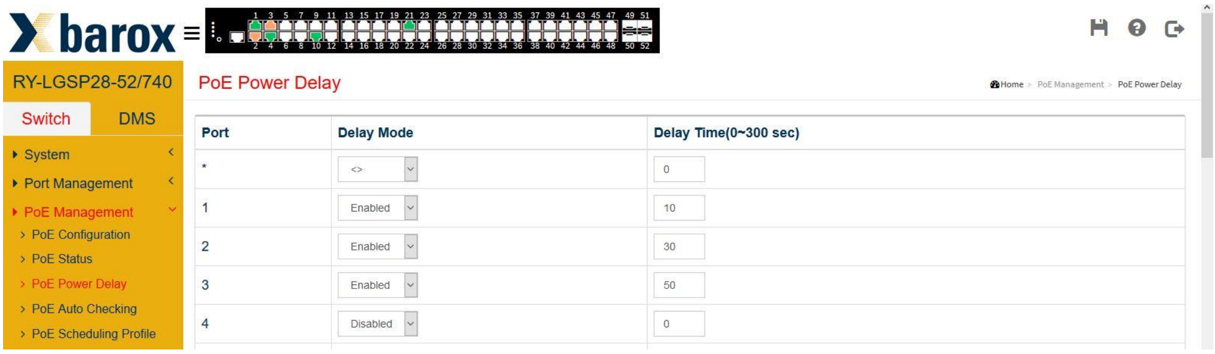
As already mentioned, the switch can provide a limited amount of power.

However, today’s IP cameras require an ever-increasing amount of power. If a pan/tilt camera with an integrated heater and IR emitter is used, the amount of power required will climb even higher.

When rebooting, switching between day and night mode, turning on the heater or IR emitter etc., a camera needs considerably more power (peak power supply) than during steady, uninterrupted operation.

Should several cameras connected to one switch all log in at the same time, the maximum amount of power that can be supplied by this switch might be exceeded. Exceeding this maximum power level will cause the switch to immediately log itself back off and may also cause damage to the power supply, if numerous unsuccessful attempts are made.

To avoid this problem, one can configure the individual ports to start up one after the other in the following menu. In the example below, port 1 is activated after 10 seconds and ports 2 and 3 are activated in 20 seconds intervals.



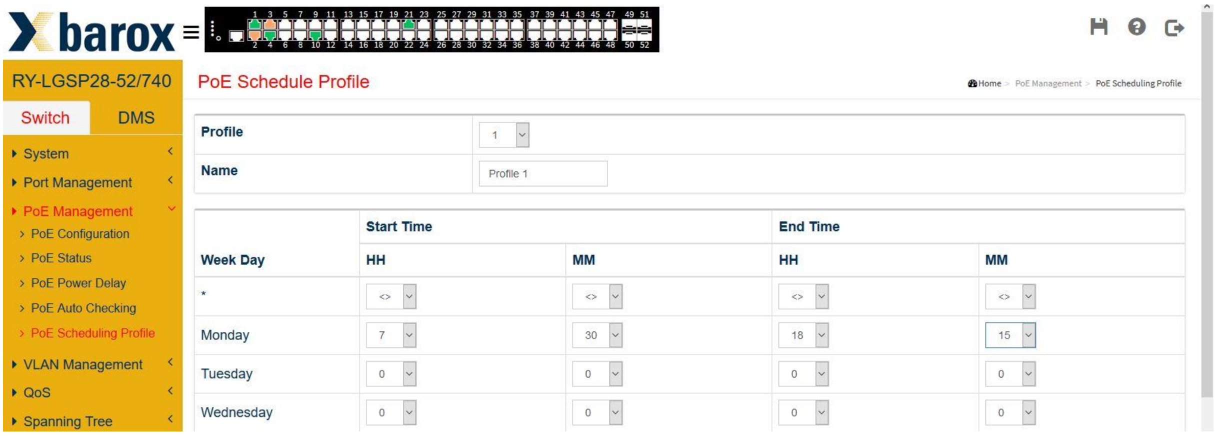
PoE Power Delay

Port	Delay Mode	Delay Time(0~300 sec)
*	<>	0
1	Enabled	10
2	Enabled	30
3	Enabled	50
4	Disabled	0

3.10.3. PoE Schedule

Turning the power on and off can also be controlled using a weekly schedule. Up to 16 different profiles can be created. Each individual port can be allocated to a specific profile.

In the following example, the camera and power at the PoE port, resp., is turned on only Monday between 07:30 to 18:15 Hrs.



PoE Schedule Profile

Profile	1
Name	Profile 1

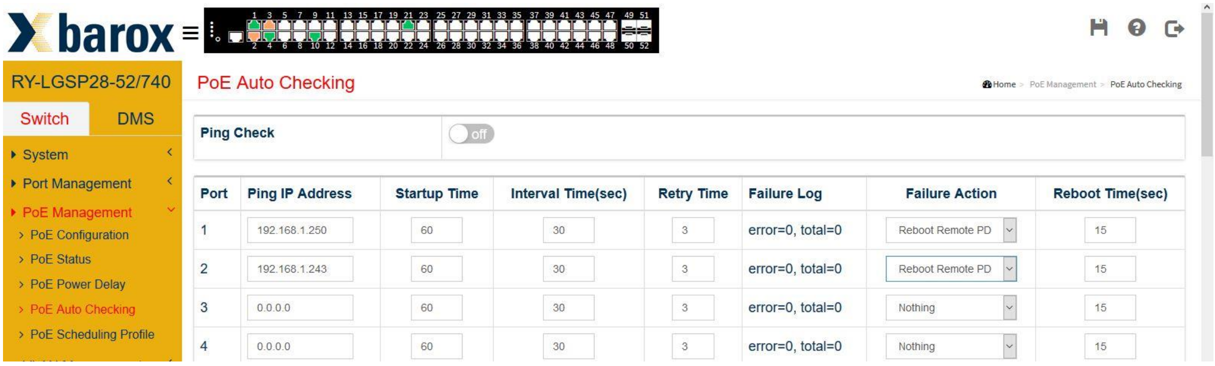
	Start Time		End Time	
Week Day	HH	MM	HH	MM
*	<>	<>	<>	<>
Monday	7	30	18	15
Tuesday	0	0	0	0
Wednesday	0	0	0	0

3.10.4. PoE Auto Checking

PoE Auto Checking is used to monitor functionality. For example, the camera connected to port 1 with IP address 192.168.1.250 can be pinged every 30 seconds to check its availability.

After 3 failed attempts, PoE to port 1 is turned off and turned back on after 15 seconds. This forces the camera to reboot.

60 seconds after the camera has rebooted, the ping monitoring mechanism will kick in again.



PoE Auto Checking

Ping Check: off

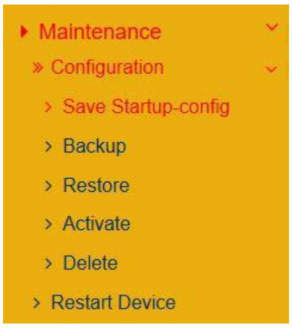
Port	Ping IP Address	Startup Time	Interval Time(sec)	Retry Time	Failure Log	Failure Action	Reboot Time(sec)
1	192.168.1.250	60	30	3	error=0, total=0	Reboot Remote PD	15
2	192.168.1.243	60	30	3	error=0, total=0	Reboot Remote PD	15
3	0.0.0.0	60	30	3	error=0, total=0	Nothing	15
4	0.0.0.0	60	30	3	error=0, total=0	Nothing	15

3.11 Saving and Retrieving the Configuration

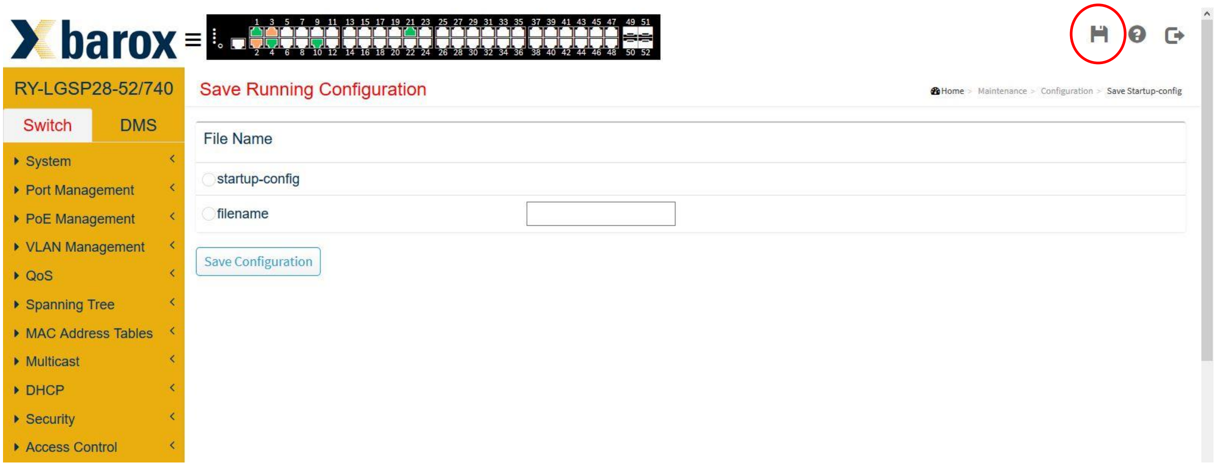
All changes must be saved. Clicking on “Apply” saves the change to the memory. However, if the device is rebooted, the memory is deleted and all these changes are lost. This means that all changes need to be permanently saved.

There are two ways to do this:

- Maintenance/Configuration/Save startup-config menu item



- Diskette symbol on each screen



Save Running Configuration

File Name

○ startup-config

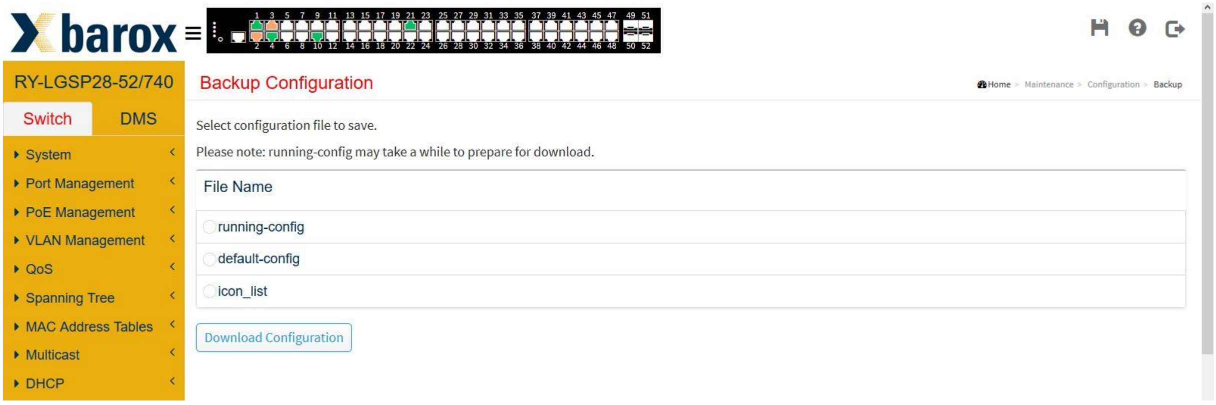
○ filename

Save Configuration

3.11.1. Download Configuration

The current switch configuration can be downloaded and saved separately. The configuration file thus generated can be uploaded, if the switch is replaced, or used in cases where several switches are to be identically configured and only the respective IP address changed.

That saves a huge amount of time. We strongly recommend saving the “startup-config file”.



Backup Configuration

Select configuration file to save.

Please note: running-config may take a while to prepare for download.

File Name

○ running-config

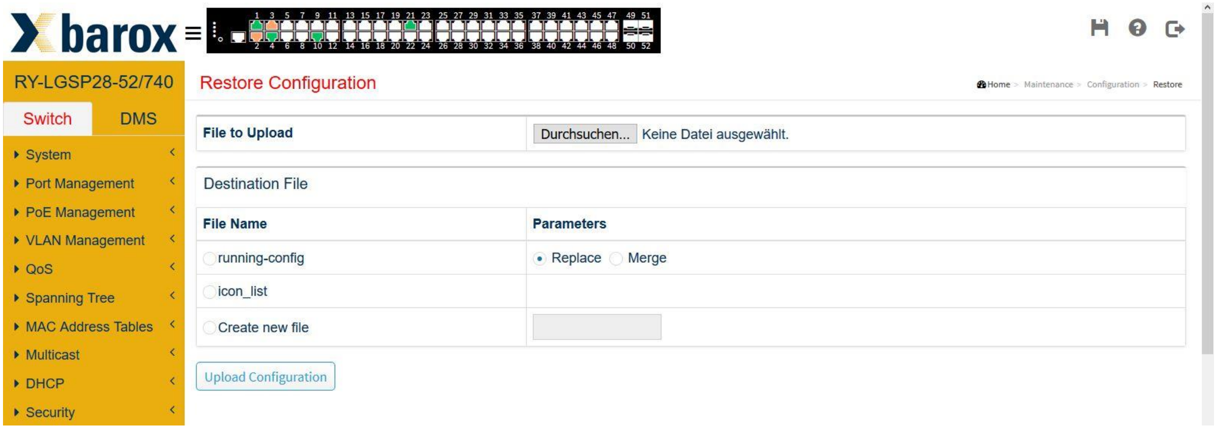
○ default-config

○ icon_list

Download Configuration

3.11.2. Upload Configuration

The opposite scenario is uploading a configuration file to the switch. In this case, the path where the file is stored and stored as “running-config”. Subject to a successful operation the file must then be saved as “startup-config –File” as described above.



Restore Configuration

File to Upload	Durchsuchen... Keine Datei ausgewählt.

Destination File

File Name	Parameters
○ running-config	● Replace ○ Merge
○ icon_list	
○ Create new file	

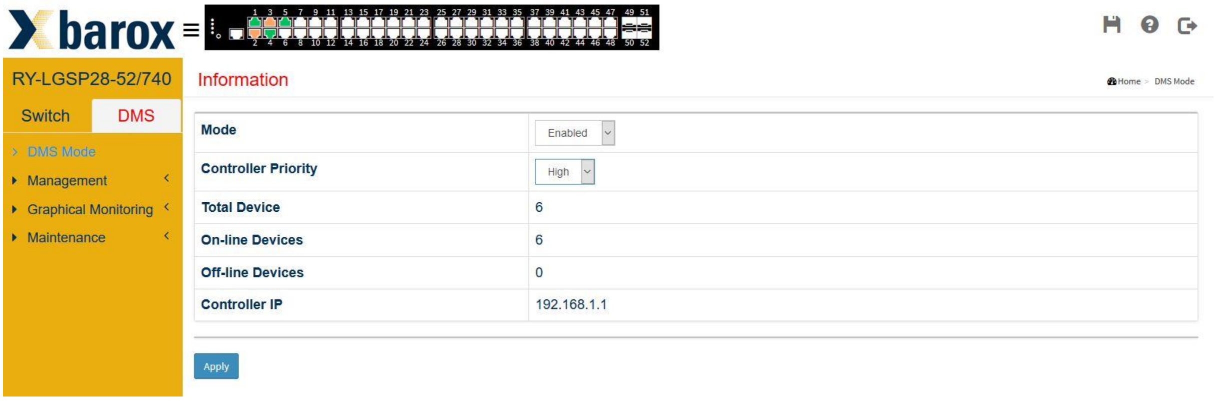
4 DMS Device Management System

The switch is equipped with an integrated network monitoring and control system that uses a very simple method to provide the user with an excellent overview of the whole network. The network topology view provides a quick overview of all the switches and terminal equipment in the network, e.g. IP cameras and servers, together with information on their respective IP addresses, device types and device descriptions. Plans showing the floor layout and the local environment can be stored as background images. These allow the user to quickly access specific network equipment − even without special knowledge of the IP structure. Finalised plans can then be exported again and included in the documentation.

4.1 Management

To use DMS functionality, one needs to switch over to the “DMS” tab. DMS is activated as a factory default. The Information page (DMS Mode) shows how many devices have been recognised in the network and how many of these are on-line (active), resp. off-line (inactive). Off-line devices are those that are either turned off or have failed (defective terminal device) or are no longer available in the network (e.g. service laptop that is taken home by the installation technician after having completed the configuration).

To be able to use DMS, one switch in the network must have been defined as the master. This switch collects all the information and then passes this on to all the DMS-capable switches in the network. The “Controller IP” field shows which switch (IP address) functions as the master.



Information

Mode	Enabled
Controller Priority	High
Total Device	6
On-line Devices	6
Off-line Devices	0
Controller IP	192.168.1.1

Determining the DMS Master:

The mode “High” must be selected in the field “Controller Priority” of the switch, which is supposed to be the master. The definition of the most powerful switch for this task is recommended, as the DMS requires additional computing power. Further switches in the network can be rated as “Mid” or “Low” depending on their power capability. The “Controller Priority” of a switch shall be set to “none” where a switch shall never be used as a switch master.

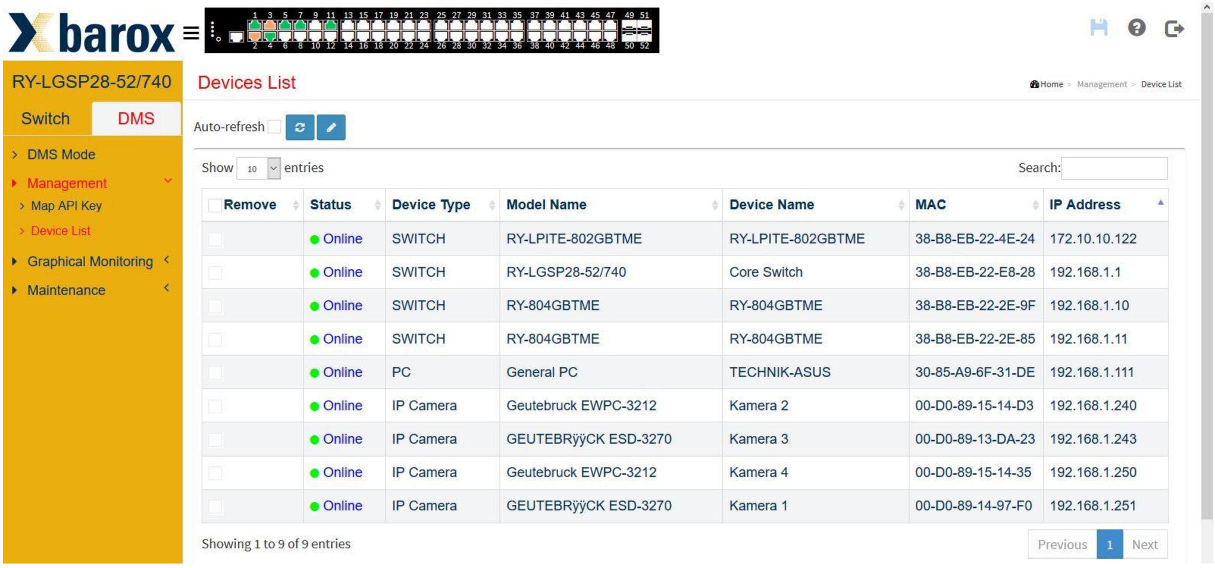
In case of a very high network load the DMS can be switched on at the switch with the lowest usage rate (and deactivated at the other switches), resp. Attention shall be paid as some functions can only be used in a limited way and this method is recommended in case of a homogenous structure using barox switches.

The master switch can be determined using the IP address in the line “Controller IP”.

Devices List

This page shows all the devices that are either online or offline in the network. The device type, status, device name as well as the MAC and IP addresses are provided in tabular form.

All the devices − including those with IP addresses in other network segments − are listed. This useful function helps when a non-configured device is integrated into the network, the IP address of which is unknown.



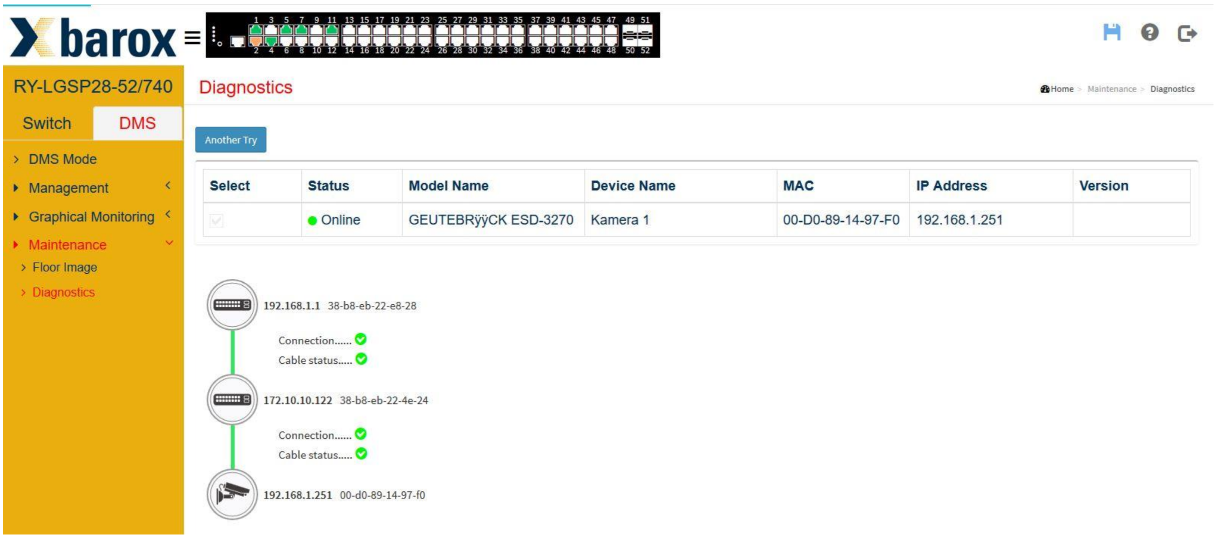
Devices List

Remove	Status	Device Type	Model Name	Device Name	MAC	IP Address
□	● Online	SWITCH	RY-LPITE-802GBTME	RY-LPITE-802GBTME	38-B8-EB-22-4E-24	172.10.10.122
□	● Online	SWITCH	RY-LGSP28-52/740	Core Switch	38-B8-EB-22-E8-28	192.168.1.1
□	● Online	SWITCH	RY-804GBTME	RY-804GBTME	38-B8-EB-22-2E-9F	192.168.1.10
□	● Online	SWITCH	RY-804GBTME	RY-804GBTME	38-B8-EB-22-2E-85	192.168.1.11
□	● Online	PC	General PC	TECHNIK-ASUS	30-85-A9-6F-31-DE	192.168.1.111
□	● Online	IP Camera	Geutebruck EWPC-3212	Kamera 2	00-D0-89-15-14-D3	192.168.1.240
□	● Online	IP Camera	GEUTEBRÿÿCK ESD-3270	Kamera 3	00-D0-89-13-DA-23	192.168.1.243
□	● Online	IP Camera	Geutebruck EWPC-3212	Kamera 4	00-D0-89-15-14-35	192.168.1.250
□	● Online	IP Camera	GEUTEBRÿÿCK ESD-3270	Kamera 1	00-D0-89-14-97-F0	192.168.1.251

Showing 1 to 9 of 9 entries

The connection to a device can be checked − even across a row of switches − simply by clicking on the “Online”, resp. “Offline” status symbol. Should there be in interruption anywhere in the connection chain, this can be seen here.

The same information can be checked using the “Maintenance/Diagnostics” menu.



Diagnostics

Select	Status	Model Name	Device Name	MAC	IP Address	Version
☑	● Online	GEUTEBRÿÿCK ESD-3270	Kamera 1	00-D0-89-14-97-F0	192.168.1.251	

192.168.1.1 38-b8-eb-22-e8-28

Connection...... ✓

Cable status..... ✓

172.10.10.122 38-b8-eb-22-4e-24

Connection...... ✓

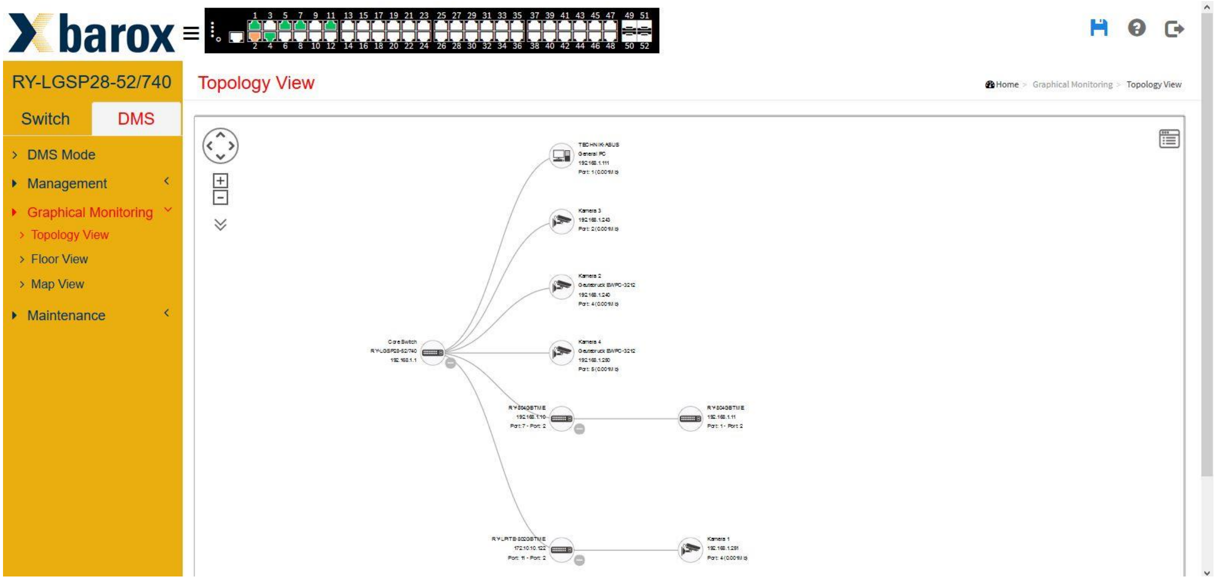
Cable status..... ✓

192.168.1.251 00-d0-89-14-97-f0

4.2 Graphical Monitoring

Topology View

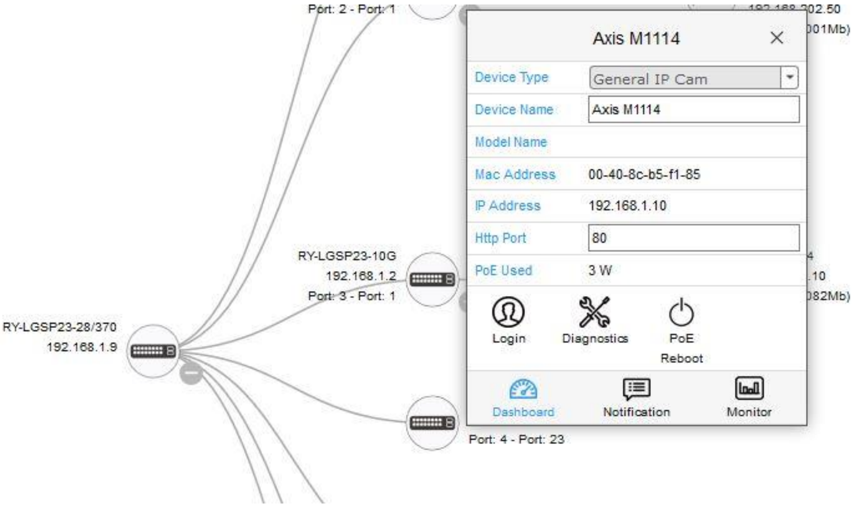
In the topology view, the whole network, incl. all the connected IP terminal devices, is automatically displayed in a diagram. If a terminal device is correctly recognised, it is represented by a corresponding symbol (camera, switch, access point etc.). All the respective information, such as device name, IP address, data rate etc., are displayed next to the symbol. All the settings can also be manually configured.



By clicking on a symbol, the “Dashboard” of the respective device is displayed.

In this “Dashboard”, the device type and name can be defined. The MAC and IP addresses as well as the real-time PoE requirement, in as far as the device is a PoE appliance, can also be read.

Additionally, by clicking on “Login”, the device can be directly accessed or diagnostics on the connection carried out. The PoE appliance can also be easily rebooted by simply clicking on the “PoE Reboot” icon.



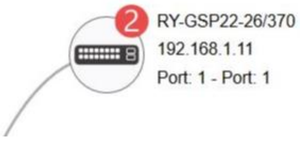
Axis M1114

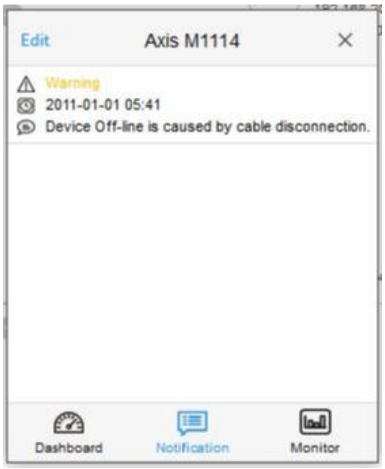
Device Type	General IP Cam
Device Name	Axis M1114
Model Name	
Mac Address	00-40-8c-b5-f1-85
IP Address	192.168.1.10
Http Port	80
PoE Used	3 W

If a device

- was briefly unavailable (defective cable, appliance disconnected etc.)
- was not immediately viewable via ONVIF
- was connected using an existing IP address
- etc.

a red number appears next to the symbol. The red figure shows how many messages have been generated for this device. By clicking on “Notification” in the menu, these messages can be read and edited.

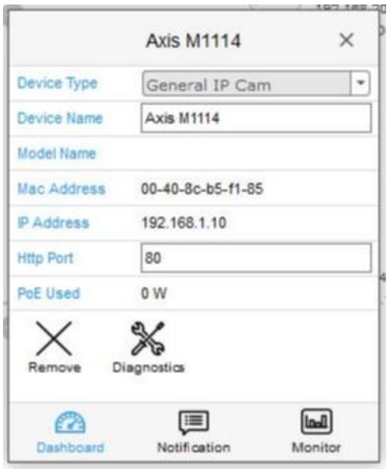




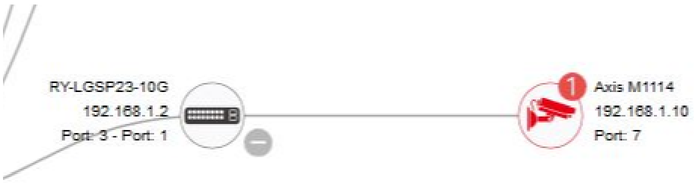
Warning
2011-01-01 05:41
Device Off-line is caused by cable disconnection.

If a device is no longer available in the network, it is shown in red in the topology view and the “Remove” symbol is made available in the “Dashboard”. By clicking on “Remove”, this device is permanently removed from the topology view.

It is vital to select “Remove” when, for example, a defective camera is to be replaced by a new camera using the same IP address. The switch not only stores the IP address but also the MAC address. If the old IP address is not removed using the “Remove” tool, the switch expects the old camera with its original combination of IP and MAC address to return and will set the new camera back to the default IP address over and over again despite this having the same IP address. This occurs because the new camera has a different MAC address.



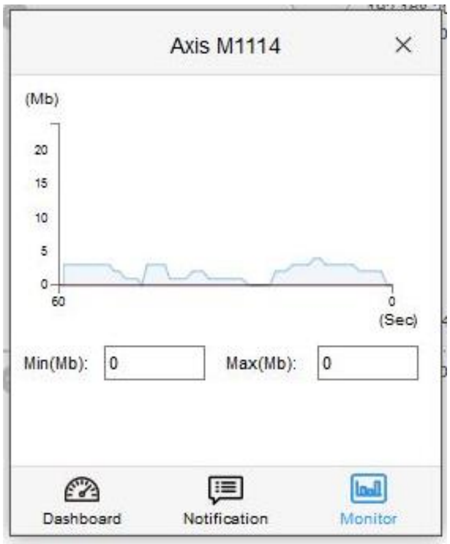
Device Type	General IP Cam
Device Name	Axis M1114
Model Name	
Mac Address	00-40-8c-b5-f1-85
IP Address	192.168.1.10
Http Port	80
PoE Used	0 W



Another useful tool is the “Monitor” feature.

This shows the data flow (e.g. from a camera)
in real time.

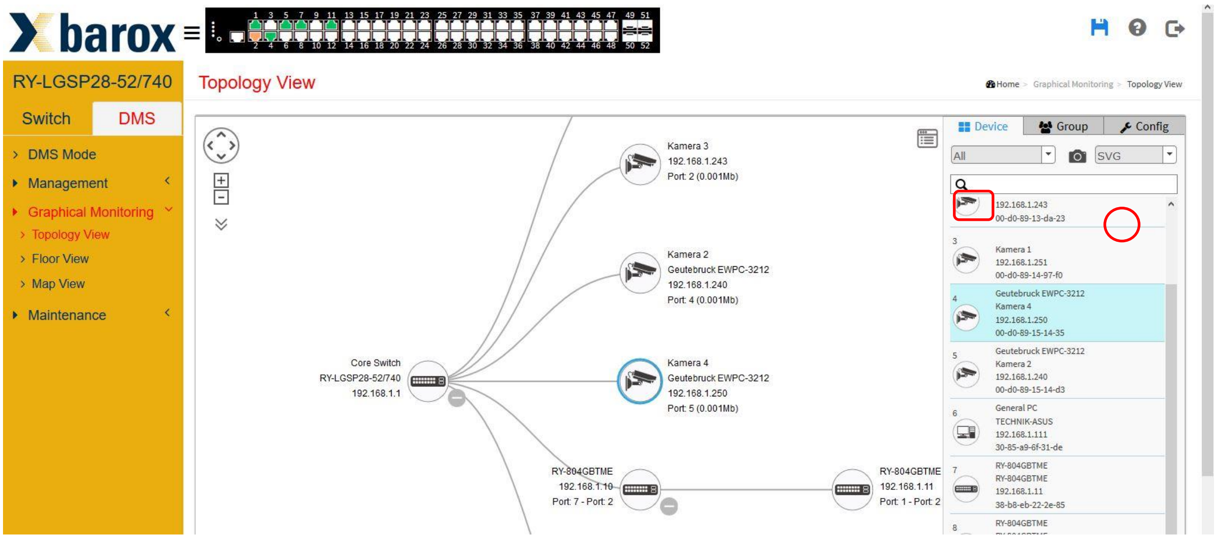
The thresholds within which the data flow should move can be set using Min(Mb) and Max(Mb). This means that one can see at a glance whether everything is alright.



Min(Mb): 0 Max(Mb): 0

At the top right of the topology view screen, there is a “Device” icon which can be used to display all the devices at once.

When an entry in the list is clicked on, the corresponding device is displayed in blue in the network diagram.



192.168.1.243
00-d0-89-13-da-23

3
Kamera 1
192.168.1.251
00-d0-89-14-97-f0

4
Geutebruck EWPC-3212
Kamera 4
192.168.1.250
00-d0-89-15-14-35

5
Geutebruck EWPC-3212
Kamera 2
192.168.1.240
00-d0-89-15-14-d3

6
General PC
TECHNIK-ASUS
192.168.1.111
30-85-a9-6f-31-de

7
RY-804GBTME
RY-804GBTME
192.168.1.11
38-b8-eb-22-2e-85

8
RY-804GBTME

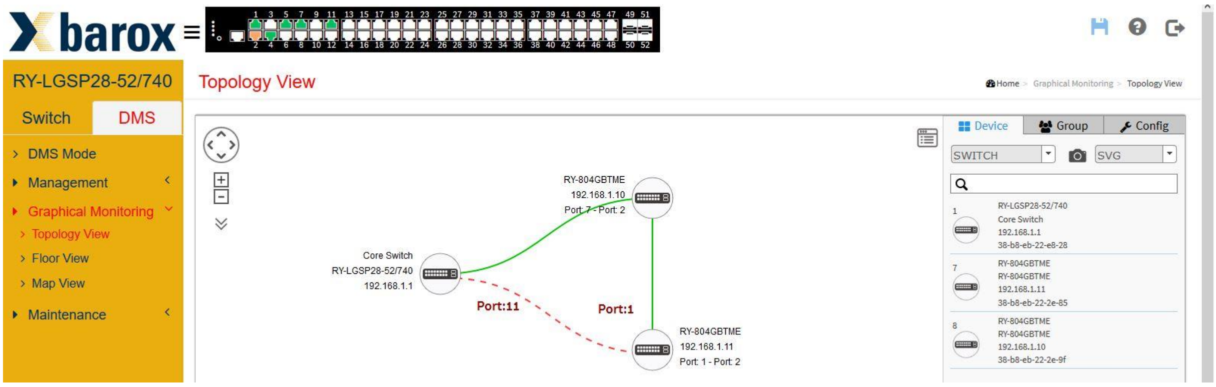
This tool also offers the option of printing out the network plan in SVG or PNG format – or directly to a PDF document. This requires first selecting the format and then clicking on the camera symbol.

The “Topology View” provides the option of presenting the ring structure. To do so the list “Switches” must be selected in the tab “Device”. Following this the ring is displayed using a dashed red line showing the defined link and the ports, which are defined as alternative ports.

Two conditions must be fulfilled for this representation:

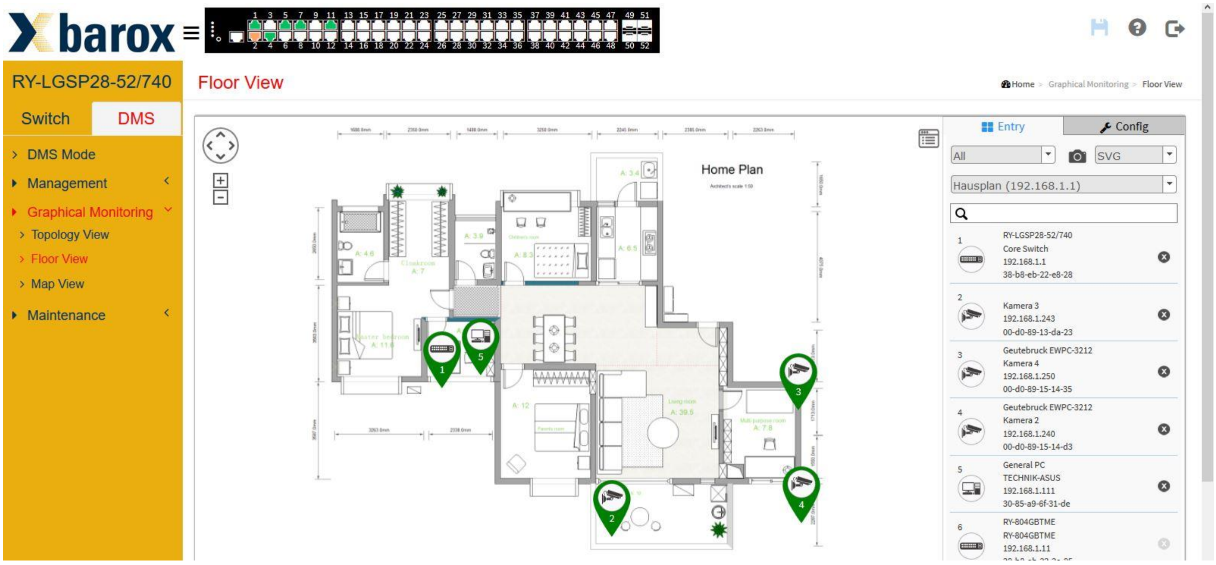
a) RSTP as ring protocol

b) The ring only consists of RY switches supporting the DMS



Floor View

Uploaded, resp. imported building and floor plans and/or plans of the local environment can be viewed in the floor view. This serves as a foundation, resp. background image, for representing the network setup. This function provides a good guide for carrying out on-site tasks and can also be printed out to document the system, as described above.



To position a camera or switch in a plan, all that needs to be done is to click on the respective device in the list to select it and then to position this device in the plan − done.

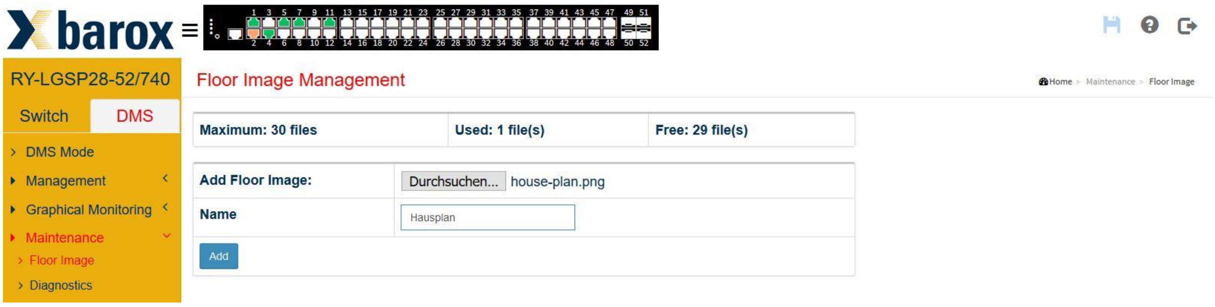
Map View

The same function is also possible using Map View. The background image is directly generated using Google Maps. This requires an internet connection and Google licences for using the service.

4.3 Maintenance

To use a plan as a background image, one needs to switch to the “Maintenance” menu.

The path and file name must be entered in the “Floor Image” menu and then uploaded using “Add”.

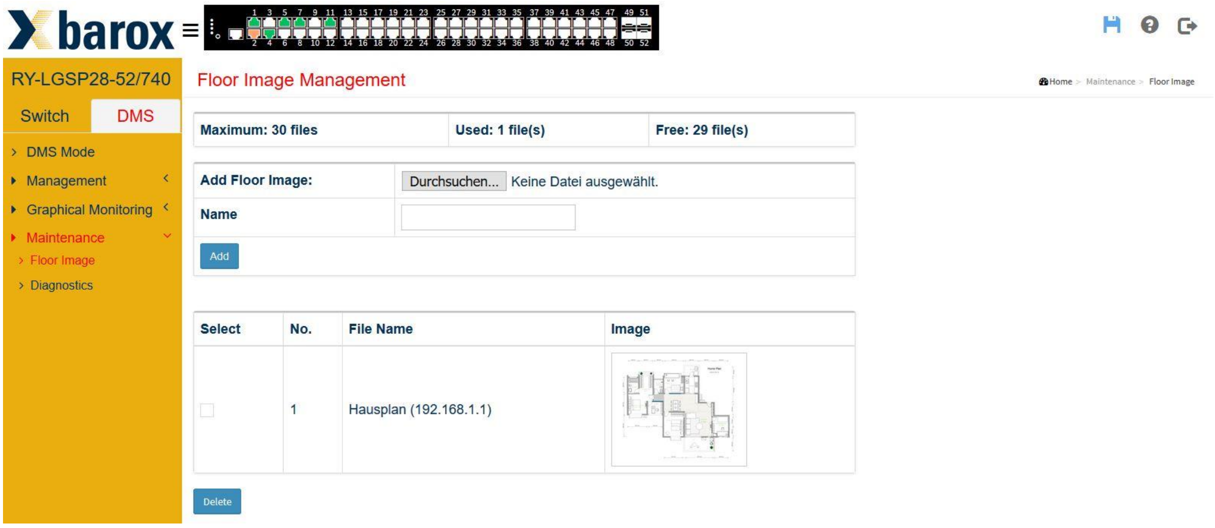


Floor Image Management

Maximum: 30 files	Used: 1 file(s)	Free: 29 file(s)

Add Floor Image:	Durchsuchen... house-plan.png
Name	Hausplan

The uploaded plans are then listed in the lower section of the web page. Up to 30 files can be saved.



Floor Image Management

Maximum: 30 files	Used: 1 file(s)	Free: 29 file(s)

Add Floor Image:	Durchsuchen... Keine Datei ausgewählt.
Name	

Select	No.	File Name	Image
□	1	Hausplan (192.168.1.1)	

Diagnostics

This function was described and explained on page 24 under the heading “Devices List”.

5 Switch Management in the Security Focus

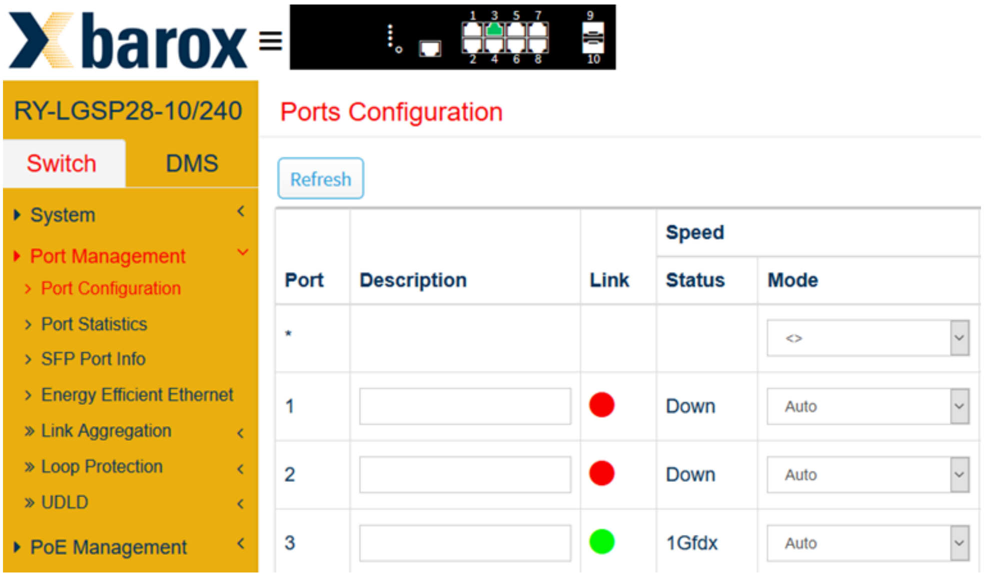
The following topics shall provide information on content and configuration of the extended network settings and the security. Knowledge and skills on commissioning such like IP configuration, login and VLAN configuration are basic preconditions for the configuration.

5.1 Management and Security on Switch Level (Layer 1 and 2)

5.1.1. Bandwidth Settings and Restrictions

Port-based Ethernet settings:

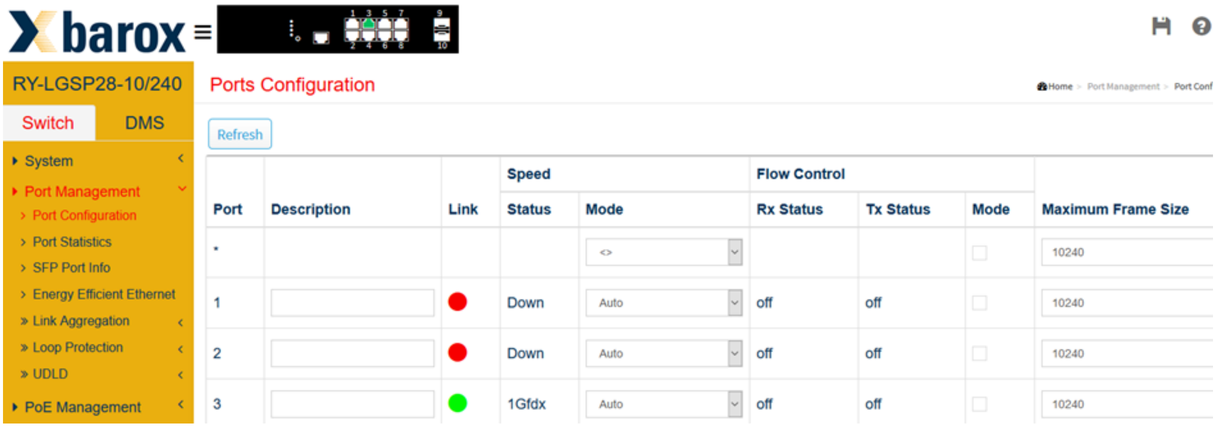
The manual selection of the required ETH standard is required in some scenarios. For example in case of a connection of network components, which do not provide an automatic negotiation of the standard or because of certain deployment scenarios, which demand a reduction of the ETH standard. The settings 10/100/1000/10000 FDX/HDX (ETH standard depending on the model) can be selectively set per port using the web GUI as illustrated thereafter.



Ports Configuration

Port	Description	Link	Speed Status	Mode
*				<>
1		●	Down	Auto
2		●	Down	Auto
3		●	1Gfdx	Auto

Some applications require the adjustments of the Ethernet frame sizes. This can also be done in the menu section “Ports Configuration” in the field “Maximum Frame Size” as described in the following screenshot.



Ports Configuration

Port	Description	Link	Speed		Flow Control			Maximum Frame Size
			Status	Mode	Rx Status	Tx Status	Mode	
*				<>			□	10240
1		●	Down	Auto	off	off	□	10240
2		●	Down	Auto	off	off	□	10240
3		●	1Gfdx	Auto	off	off	□	10240

! Important, when setting the frame size: Please pay attention to set the exact values in order to avoid malfunctions!

5.1.2. Information Regarding the General Consideration of the Bandwidth Demand

The consideration of the following items is recommended when planning the bandwidth demand and the related deployment of suitable barox switches:

- Deployment of the required Ethernet standards (10/100/1000/10000) under consideration of possible terminal device upgrades

- Planning of reserves, scaled at the backplane power of the switch
  -> 30 % are frequently recommended

- The maximum Ethernet specification per terminal device shall be considered when calculating the demand

5.1.3. Securing the Ports using MAC Configuration Settings

The MAC table:

Besides the automatic management the MAC table can basically also be adjusted manually. This is often required where certain network terminal devices require a static allocation with regard to VLAN and port. Furthermore the manual allocation provides a basic protection and scalable access restriction, resp.

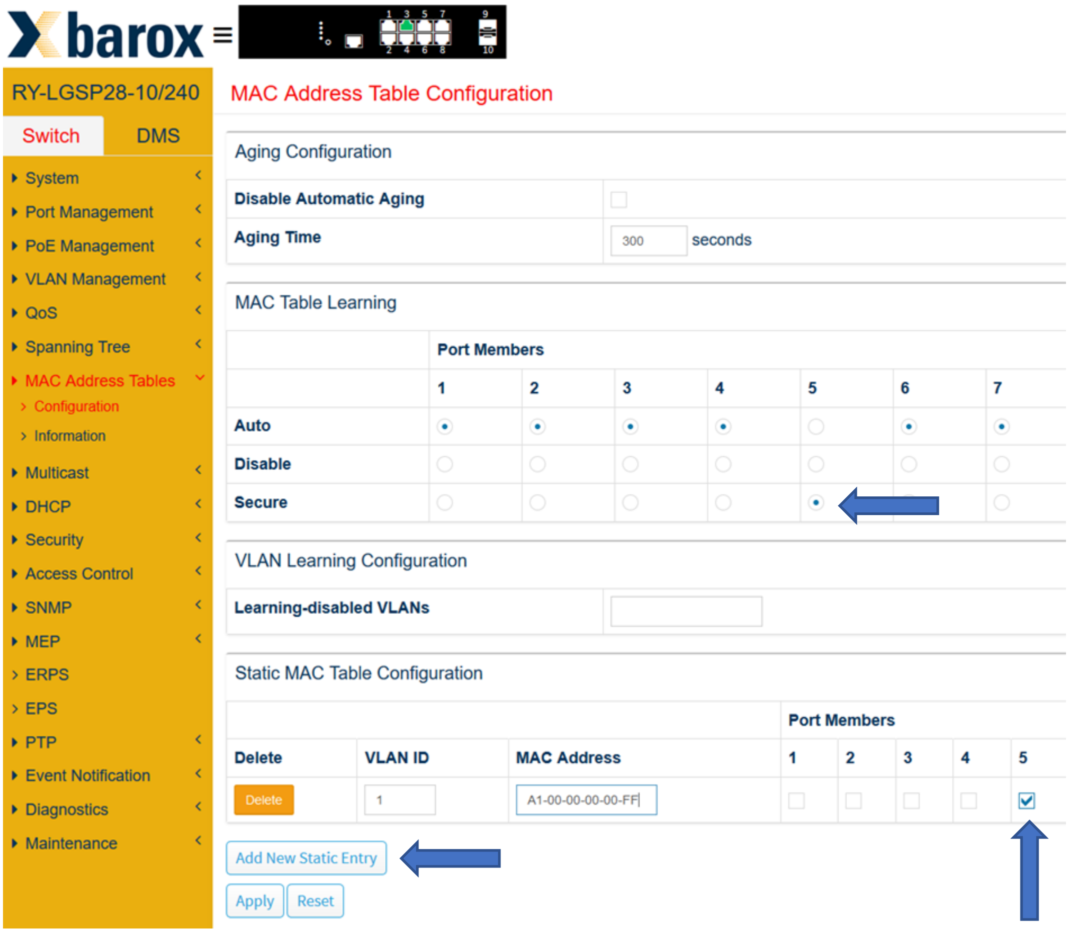
MAC Filtering and Port Configuration

Example configuration of a static MAC table:

The device with the MAC address A1:00:00:00:00:FF shall only be capable to use port 5 in VLAN 1 for a connection.

1. Selection of “Add New Static Entry” in the menu Switch -> Configuration -> MAC Table
2. Input of the VLAN ID, MAC address and setting the port members 5 in “MAC Table Learning” to “Secure”
3. Confirmation of the entries by clicking “Apply”

The following screenshot explains this.



MAC Address Table Configuration

Aging Configuration

Disable Automatic Aging	□
Aging Time	300 seconds

MAC Table Learning

	Port Members						
	1	2	3	4	5	6	7
Auto	●	●	●	●	○	●	●
Disable	○	○	○	○	○	○	○
Secure	○	○	○	○	●	○	○

VLAN Learning Configuration

Learning-disabled VLANs	

Static MAC Table Configuration

			Port Members				
Delete	VLAN ID	MAC Address	1	2	3	4	5
Delete	1	A1-00-00-00-00-FF	□	□	□	□	☑

The protection using MAC filtering provides a simple protection against an unwanted network access. Nevertheless it does not e.g. protect against the widely spread attack type „MAC-Spoofing“.

Port security using ACL, starting in Layer 2

Policy-based security of ports using MAC address verification via ACL

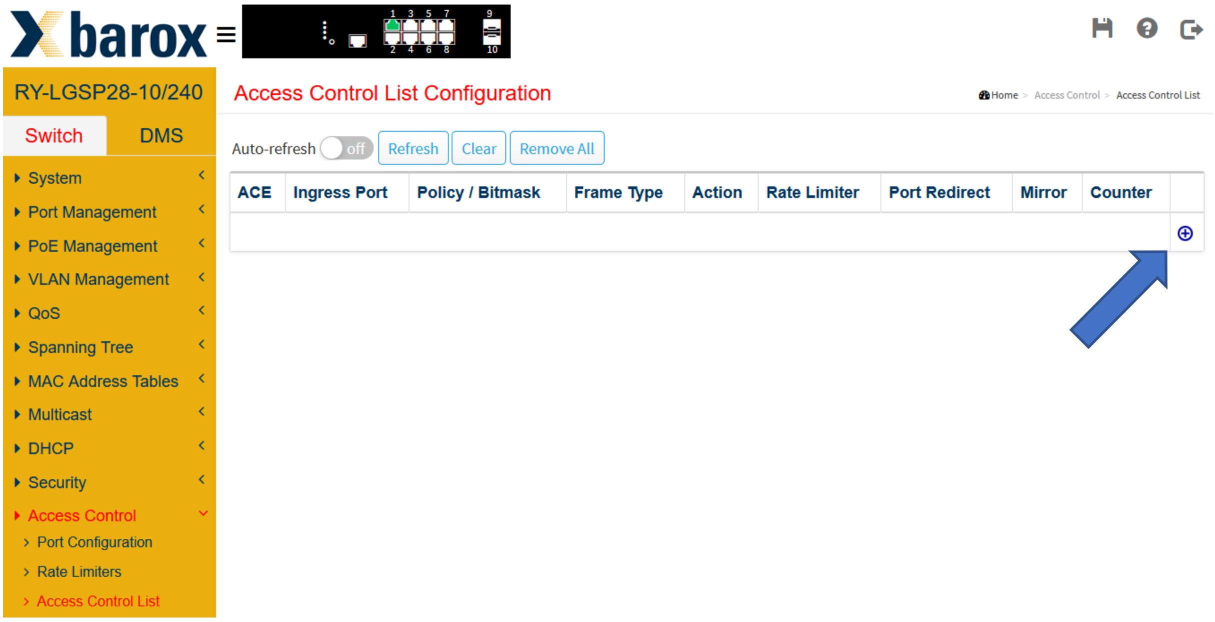
Preliminary considerations:

The example describes the protection of a port using the physical Ethernet address at the barox switch.

The ACL function functions similar to a network firewall. It sequentially verifies policies and conditions, resp., and triggers the profile and related actions depending on the emergence of the condition. In this example this is the verification, whether a distinct MAC address and terminal, resp., is connected to a distinct port of the switch. The port shall be administratively and physically be switched off, where this is not the case (shutdown). The ACL also allows the realisation of higher network layers with policies for TCP/IP up to data flow control.

Configuration:

The creation of ACLs/ACEs is effected in the menu ”*Access Control* > *Access Control List*”.
A new policy is generated by clicking the “+” symbol as follows:



Access Control List Configuration

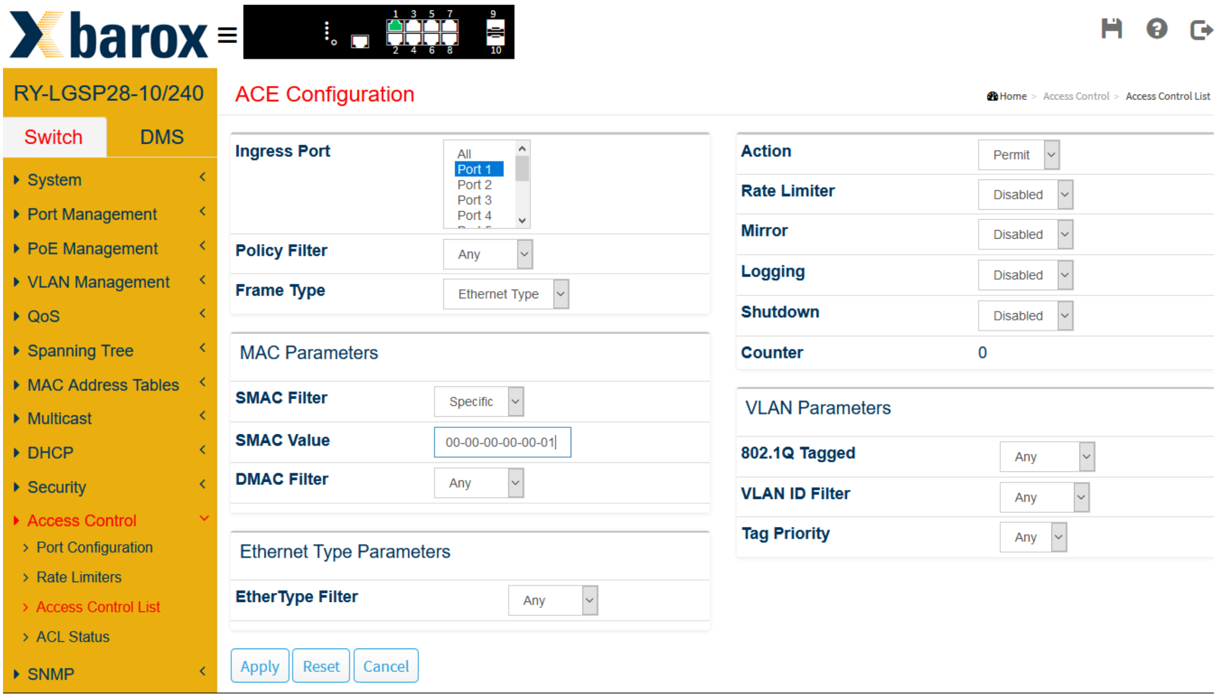
ACE	Ingress Port	Policy / Bitmask	Frame Type	Action	Rate Limiter	Port Redirect	Mirror	Counter	
									⊕

In this example a specific MAC address policy is generated for port 1.

Settings:

Ingress Port: Port 1
Policy Filter: Any
Frame Type: Ethernet Type
SMAC Filter: Specific
SMAC Value: “MAC-Address of the terminal”
DMAC Filter: Any
Ether Type Filter: Any
Action: Permit

Further settings can be derived from the following figure. Following the setting of the parameters the input is confirmed by clicking “Apply”.



ACE Configuration

Ingress Port: All / **Port 1** / Port 2 / Port 3 / Port 4
Policy Filter: Any
Frame Type: Ethernet Type

MAC Parameters

SMAC Filter: Specific
SMAC Value: 00-00-00-00-00-01
DMAC Filter: Any

Ethernet Type Parameters

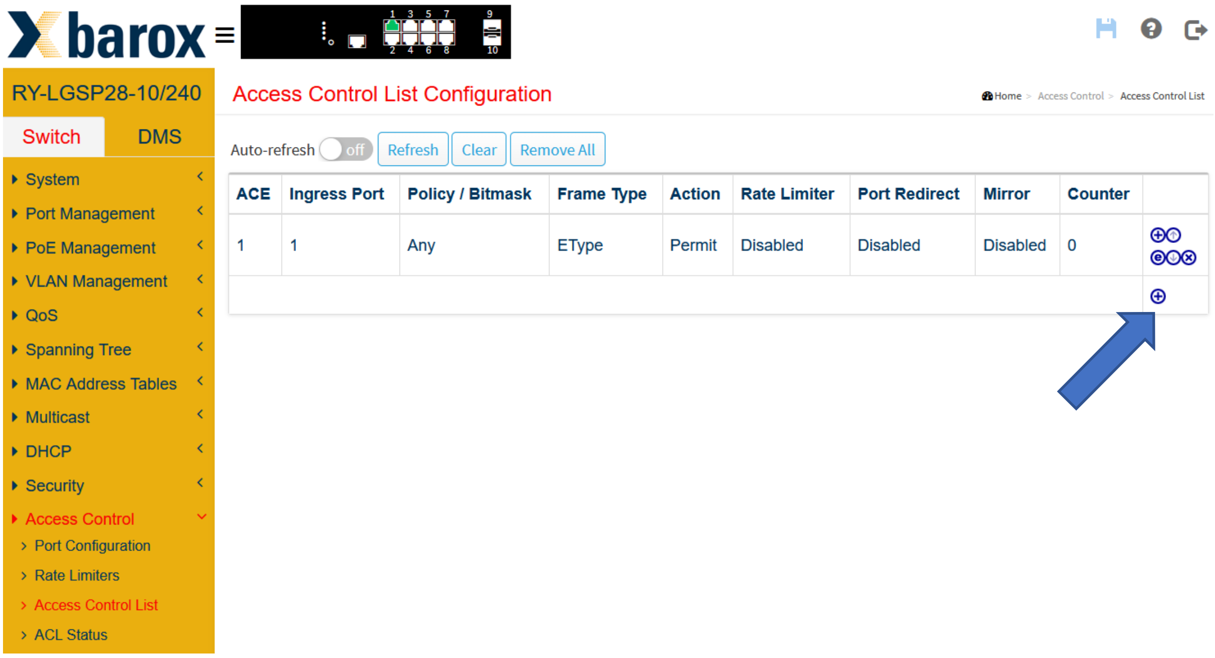
EtherType Filter: Any

Action: Permit
Rate Limiter: Disabled
Mirror: Disabled
Logging: Disabled
Shutdown: Disabled
Counter: 0

VLAN Parameters

802.1Q Tagged: Any
VLAN ID Filter: Any
Tag Priority: Any

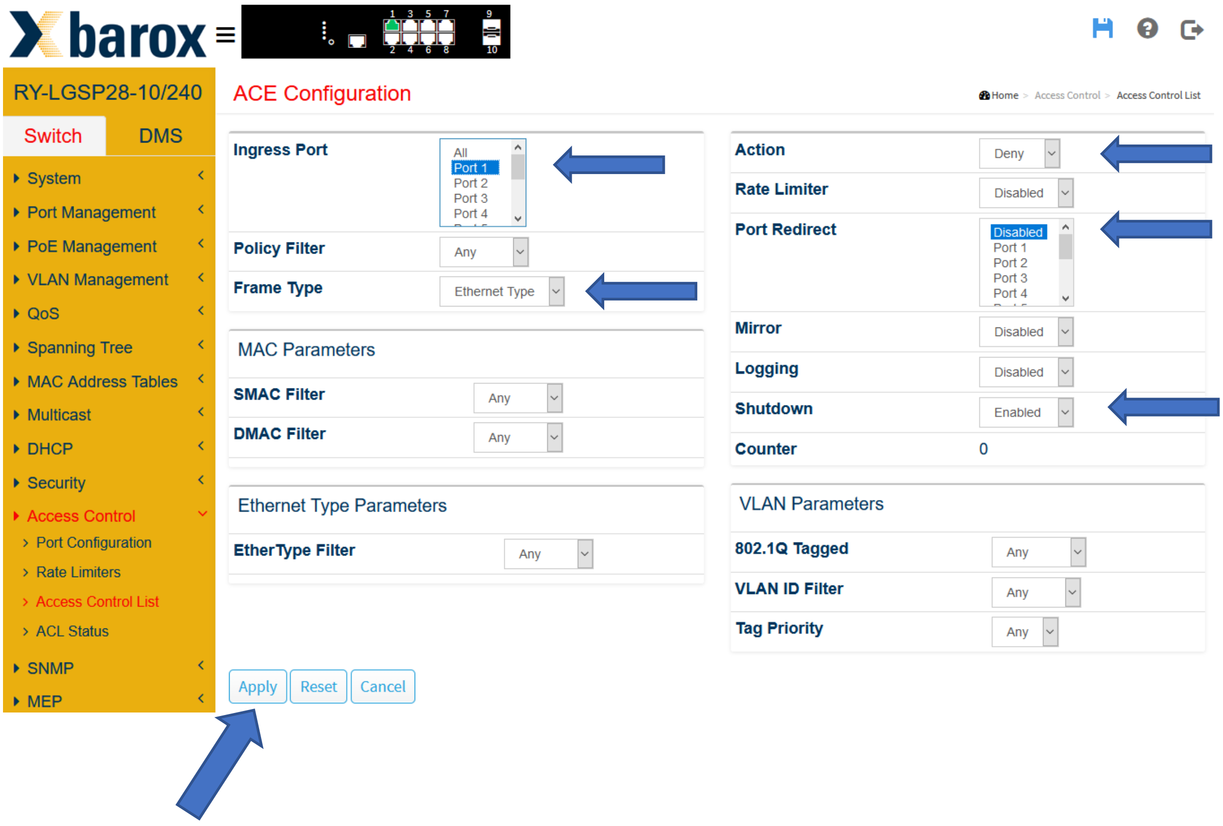
A second policy is required following the generation of the first one. It is generated by clicking the “+” symbol.



Access Control List Configuration

ACE	Ingress Port	Policy / Bitmask	Frame Type	Action	Rate Limiter	Port Redirect	Mirror	Counter	
1	1	Any	EType	Permit	Disabled	Disabled	Disabled	0	⊕⊙ ⊙⊙⊗
									⊕

The following policy controls that no further MAC addresses are allowed at port 1. All further MAC addresses are rejected accordingly. The settings can be assumed as follows:



ACE Configuration

Ingress Port	All Port 1 (selected) Port 2 Port 3 Port 4
Policy Filter	Any
Frame Type	Ethernet Type

MAC Parameters

SMAC Filter	Any
DMAC Filter	Any

Ethernet Type Parameters

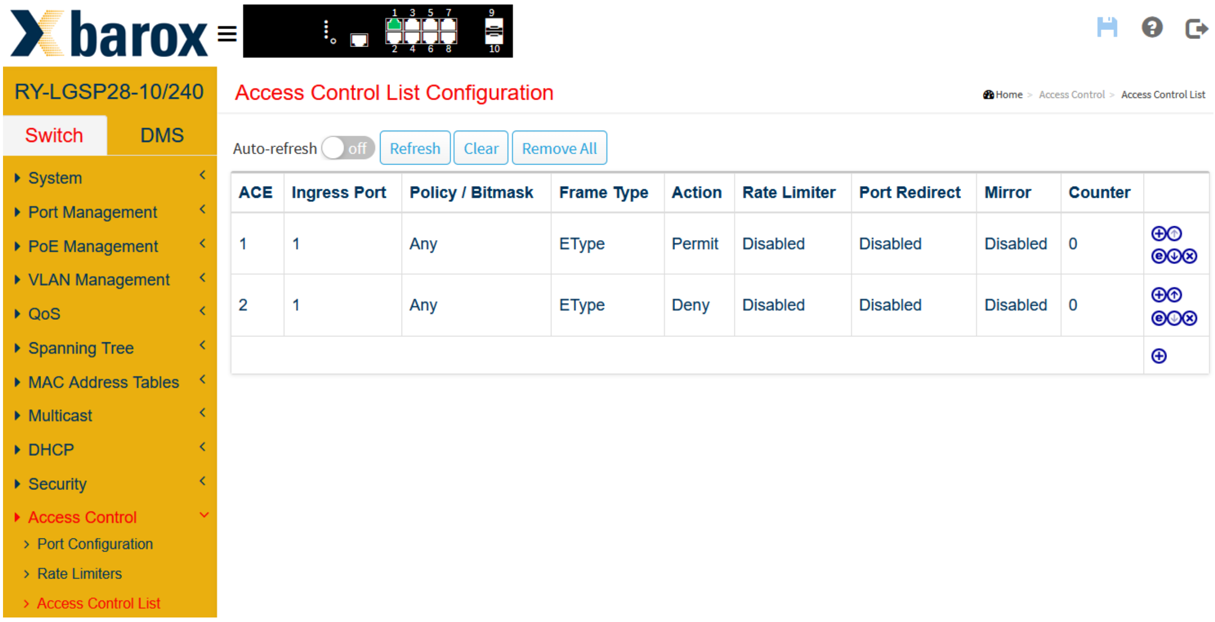
EtherType Filter	Any

Action	Deny
Rate Limiter	Disabled
Port Redirect	Disabled (selected) Port 1 Port 2 Port 3 Port 4
Mirror	Disabled
Logging	Disabled
Shutdown	Enabled
Counter	0

VLAN Parameters

802.1Q Tagged	Any
VLAN ID Filter	Any
Tag Priority	Any

Following configuration the policy should be presented as follows:

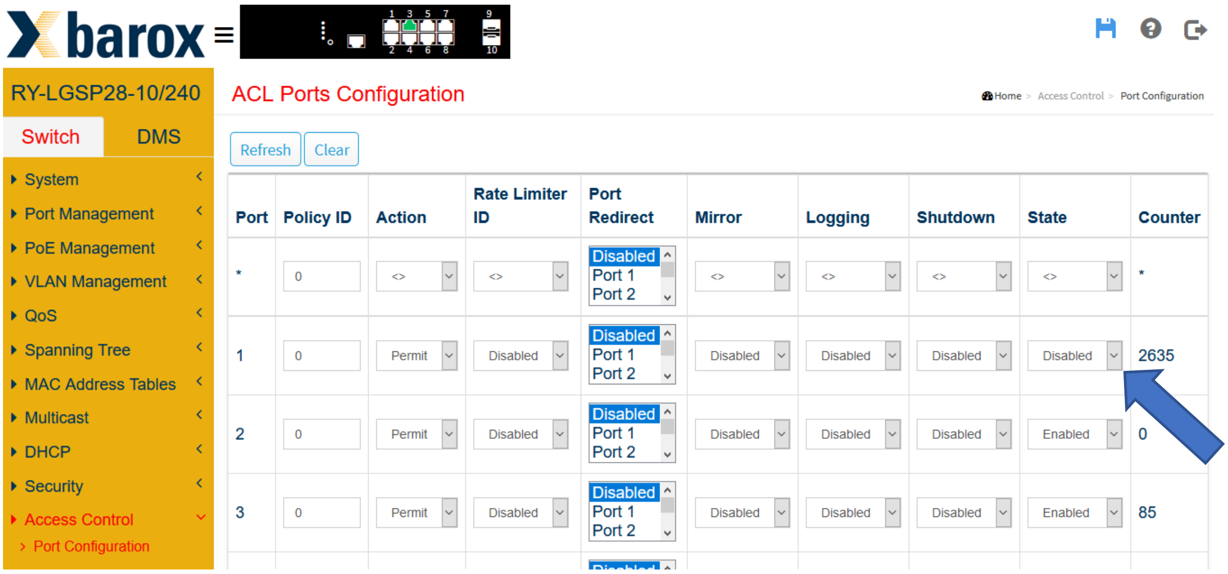


Access Control List Configuration

ACE	Ingress Port	Policy / Bitmask	Frame Type	Action	Rate Limiter	Port Redirect	Mirror	Counter	
1	1	Any	EType	Permit	Disabled	Disabled	Disabled	0	⊕⊕ ⊗⊕⊗
2	1	Any	EType	Deny	Disabled	Disabled	Disabled	0	⊕⊕ ⊗⊕⊗
									⊕

The switch will allow the communication with the network where a terminal with the allowed MAC address is connected. Port 1 is switched off if a terminal with a MAC address deviating from the allowed one is connected.

The port overview in the header line and the menu “*Access Control > Port Configuration*“ in the state “Disabled” provide indications on the connections of non-allowed terminals as shown in the following:

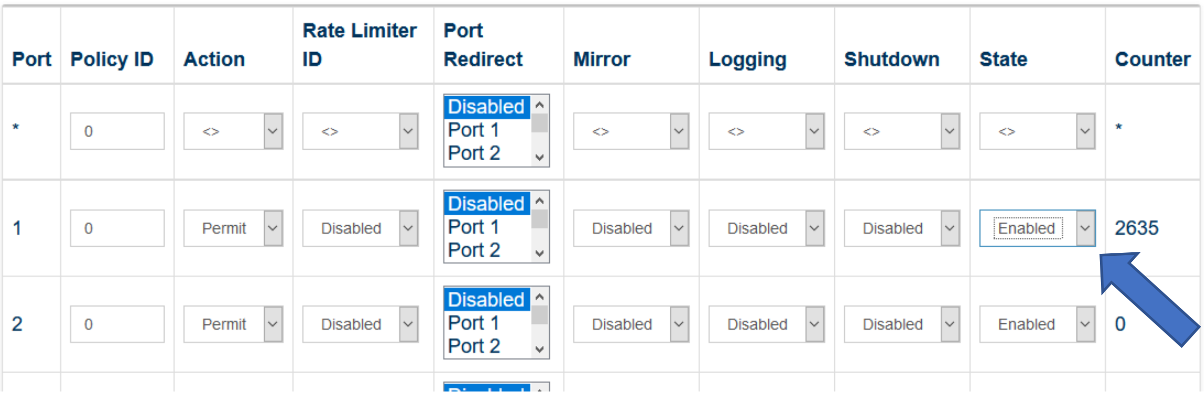


ACL Ports Configuration

Port	Policy ID	Action	Rate Limiter ID	Port Redirect	Mirror	Logging	Shutdown	State	Counter
*	0	<>	<>	Disabled Port 1 Port 2	<>	<>	<>	<>	*
1	0	Permit	Disabled	Disabled Port 1 Port 2	Disabled	Disabled	Disabled	Disabled	2635
2	0	Permit	Disabled	Disabled Port 1 Port 2	Disabled	Disabled	Disabled	Enabled	0
3	0	Permit	Disabled	Disabled Port 1 Port 2	Disabled	Disabled	Disabled	Enabled	85

Port reactivation

Reactivation of the port is effected by setting the state (in this menu) to “Enabled” and confirmation of this action by clicking “Apply”.

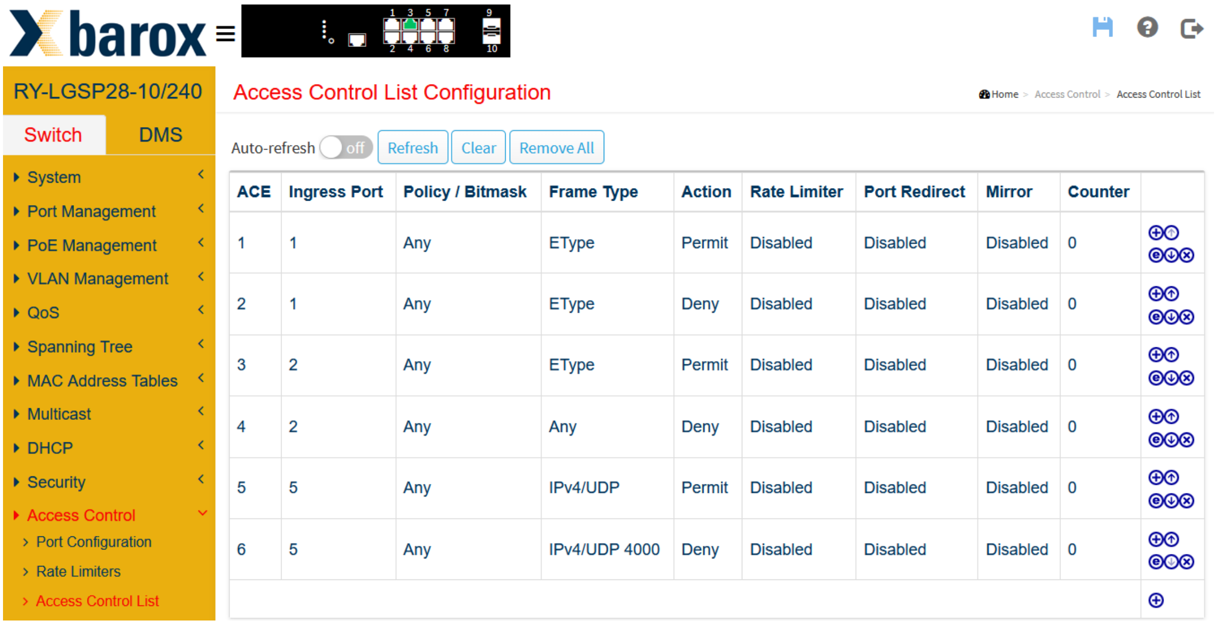


Port	Policy ID	Action	Rate Limiter ID	Port Redirect	Mirror	Logging	Shutdown	State	Counter
*	0	<>	<>	Disabled Port 1 Port 2	<>	<>	<>	<>	*
1	0	Permit	Disabled	Disabled Port 1 Port 2	Disabled	Disabled	Disabled	Enabled	2635
2	0	Permit	Disabled	Disabled Port 1 Port 2	Disabled	Disabled	Disabled	Enabled	0

When doing so attention must be paid for connecting the correct device with the matching MAC address or no terminal to the port.

Information related to the generation of several port policies:

The ACL generation for MAC addresses is a good choice in case of a low number of ports. One policy for allowing the specific MAC address and one policy for rejecting other MAC addresses must be generated for each port. Attention must be paid, that the switch checks all policies top-down in each case and the sequence is maintained exactly during the configuration. Please refer to the following example:

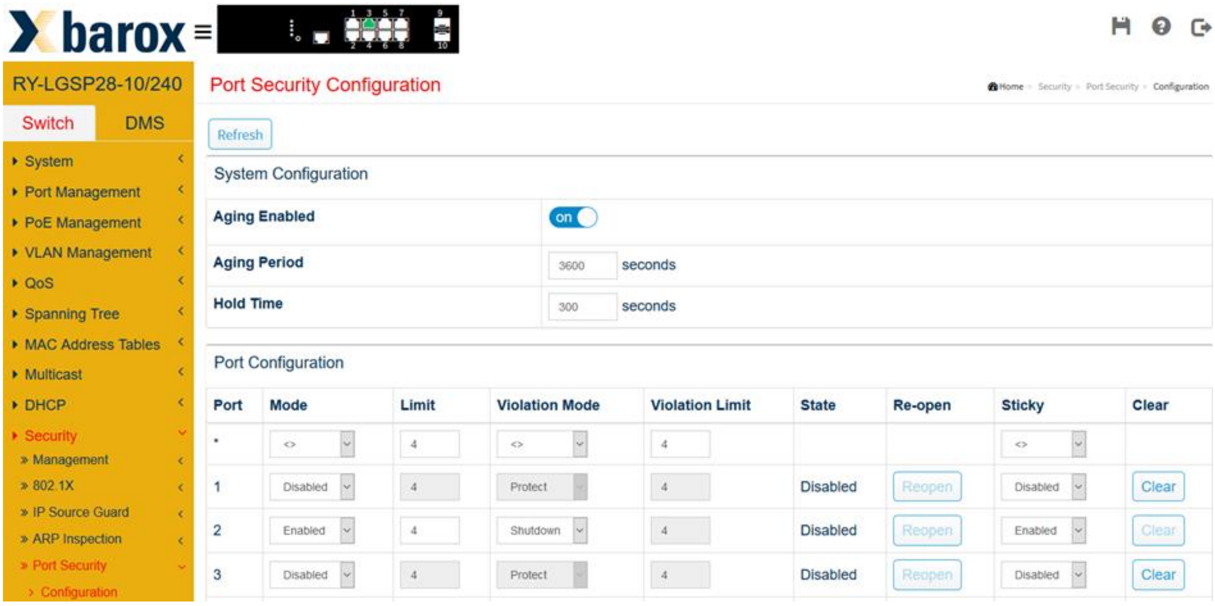


Access Control List Configuration

ACE	Ingress Port	Policy / Bitmask	Frame Type	Action	Rate Limiter	Port Redirect	Mirror	Counter
1	1	Any	EType	Permit	Disabled	Disabled	Disabled	0
2	1	Any	EType	Deny	Disabled	Disabled	Disabled	0
3	2	Any	EType	Permit	Disabled	Disabled	Disabled	0
4	2	Any	Any	Deny	Disabled	Disabled	Disabled	0
5	5	Any	IPv4/UDP	Permit	Disabled	Disabled	Disabled	0
6	5	Any	IPv4/UDP 4000	Deny	Disabled	Disabled	Disabled	0

5.1.4. Port Security with Limit Control Settings

The use of Limit Control is recommended where unmanaged switches with terminal devices are connected to the barox switch. Basically this function enables the blocking of the network communication of further unwanted IP/Ethernet terminals which are connected to free ports of the unmanaged switches. For planning purposes the complete number of network devices including the unmanaged switch, which are connected to the respective port of the barox switch, needs to be determined. E.g.: The total limit is 4 where one unmanaged switch with three further network terminals is connected to port 2 of the barox switch. The configuration must be activated first. Furthermore the respective port is activated, the limit is determined and the action selected, which applies in case of an exceedance. The learning of the terminal devices is activated and enabled using the “*Sticky”* function. During the configuration the devices must be physically connected to the barox switch using the port to be configured. The following screenshot shows a visual representation of the settings:



Port Security Configuration

System Configuration

Aging Enabled	on
Aging Period	3600 seconds
Hold Time	300 seconds

Port Configuration

Port	Mode	Limit	Violation Mode	Violation Limit	State	Re-open	Sticky	Clear
*	<>	4	<>	4			<>	
1	Disabled	4	Protect	4	Disabled	Reopen	Disabled	Clear
2	Enabled	4	Shutdown	4	Disabled	Reopen	Enabled	Clear
3	Disabled	4	Protect	4	Disabled	Reopen	Disabled	Clear

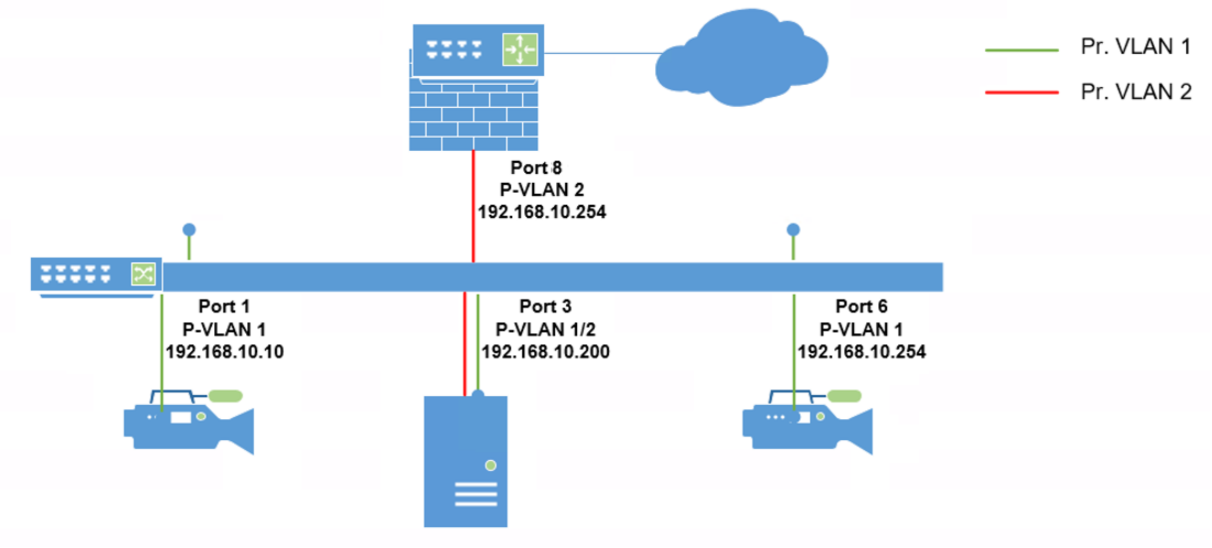
5.1.5. Private VLAN with Port Isolation

The use of port isolation und private VLAN is suited for e.g. the separation of terminals in the same VLAN. It prevents a lockup starting on layer 2 and enables the communication of a further sub-network in the same VLAN. In case of a flat network design selected ports can communicate with further networks, e.g. a WAN connection for remote access.

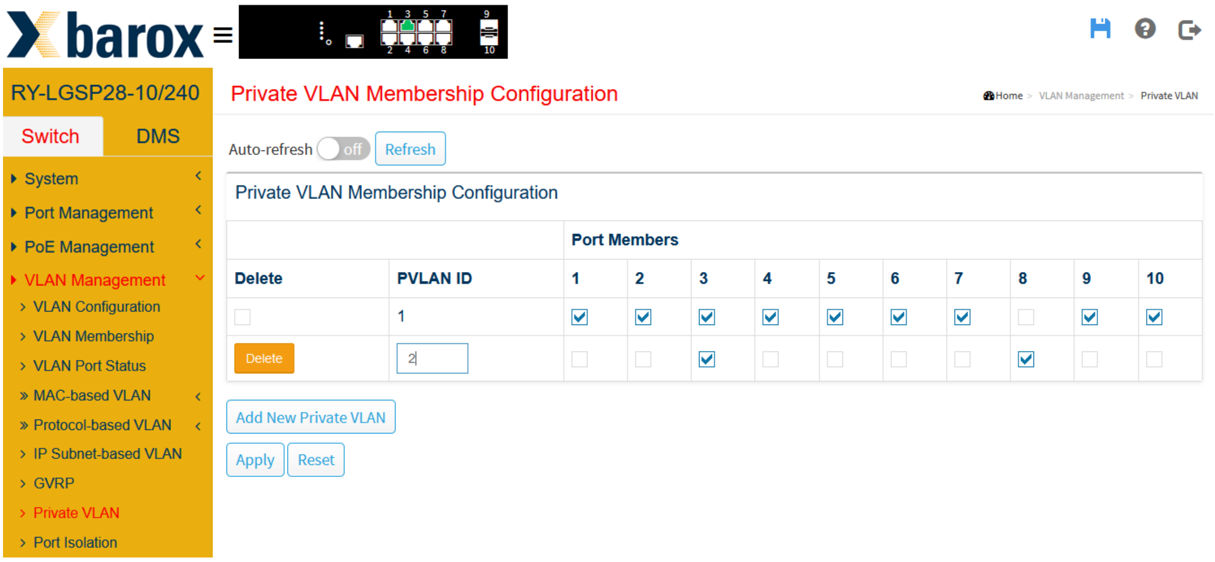
Information regarding the deployment planning:

- Record which components communicate with each other
- Add the logical separation (Private VLAN) of the components and the IP addresses to the documentation

Example configuration:



Step 1:



Private VLAN Membership Configuration

Auto-refresh off Refresh

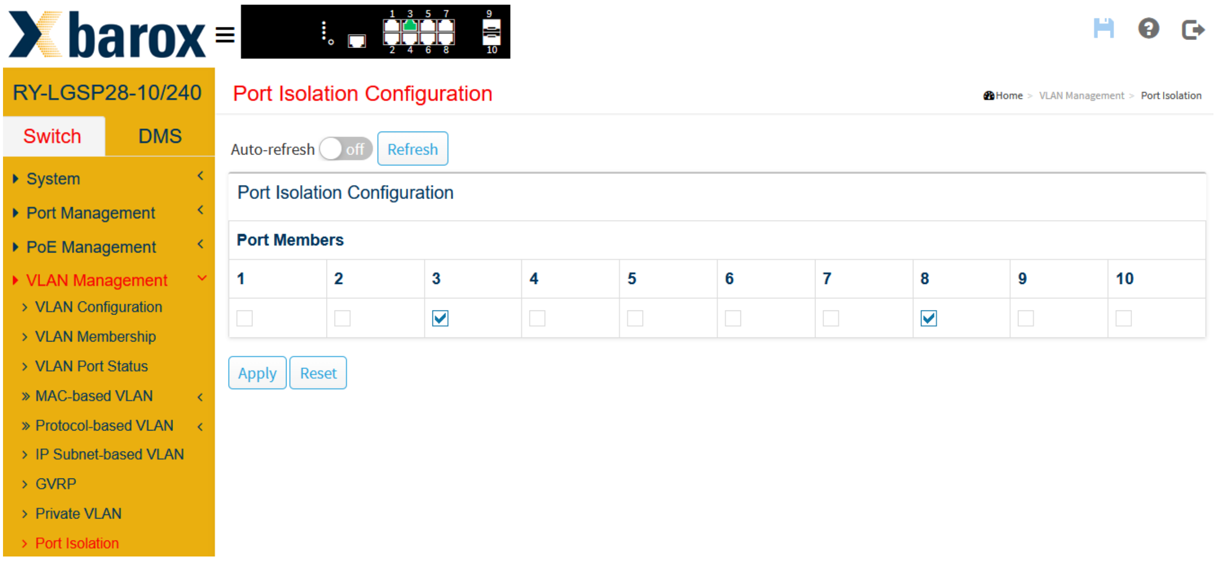
Private VLAN Membership Configuration

		Port Members									
Delete	PVLAN ID	1	2	3	4	5	6	7	8	9	10
□	1	☑	☑	☑	☑	☑	☑	☑	□	☑	☑
Delete	2	□	□	☑	□	□	□	□	☑	□	□

Add New Private VLAN

Apply Reset

Step 2:



Port Isolation Configuration

Auto-refresh off

Port Isolation Configuration

Port Members

1	2	3	4	5	6	7	8	9	10
□	□	☑	□	□	□	□	☑	□	□

5.2 Use and Protection of IP Functions (Layer 3)

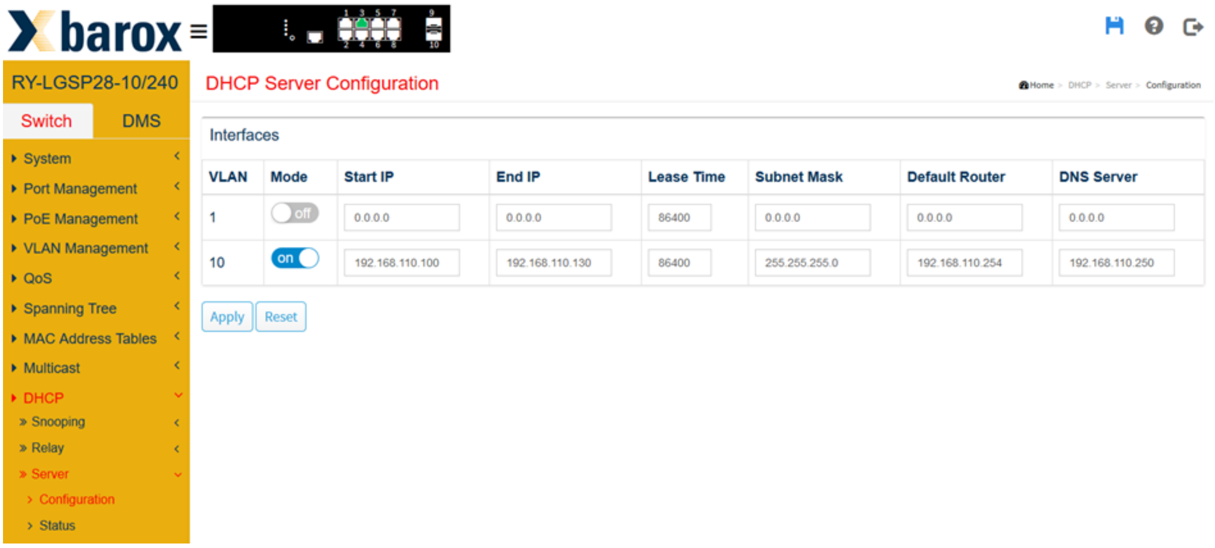
5.2.1. DHCP Server

Information regarding the use of DHCP servers in video networks

It has to be checked, whether the use of a DHCP server is generally required by the network design. This service provides the advantages of an automated network information distribution but also a variety of vulnerabilities.

Example of a basic configuration and commissioning of the DHCP service

At first the VLAN range of the service, the size of the DHCP pool by stating the start and end and further information like e.g. the lease time in seconds, network mask, gateway and DNS server for the client communication are determined. Then the service is generally activated in “*Mode*“ using the setting “*on*“ as shown below:



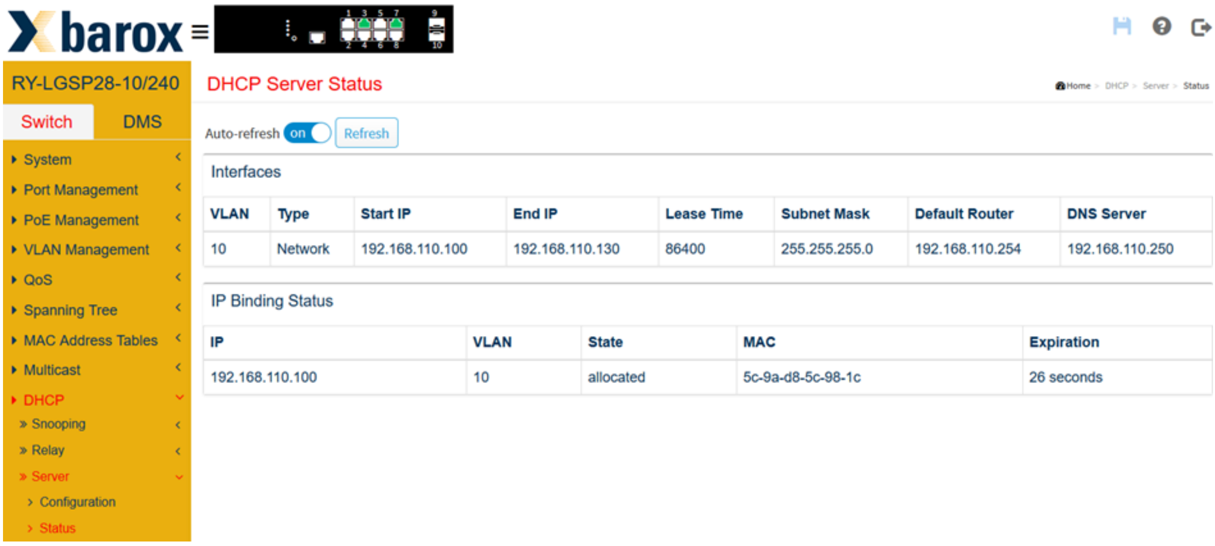
DHCP Server Configuration

Interfaces

VLAN	Mode	Start IP	End IP	Lease Time	Subnet Mask	Default Router	DNS Server
1	off	0.0.0.0	0.0.0.0	86400	0.0.0.0	0.0.0.0	0.0.0.0
10	on	192.168.110.100	192.168.110.130	86400	255.255.255.0	192.168.110.254	192.168.110.250

Apply Reset

An overview of the service status and the allocated client addresses, resp., can be found as follows:



DHCP Server Status

Auto-refresh on Refresh

Interfaces

VLAN	Type	Start IP	End IP	Lease Time	Subnet Mask	Default Router	DNS Server
10	Network	192.168.110.100	192.168.110.130	86400	255.255.255.0	192.168.110.254	192.168.110.250

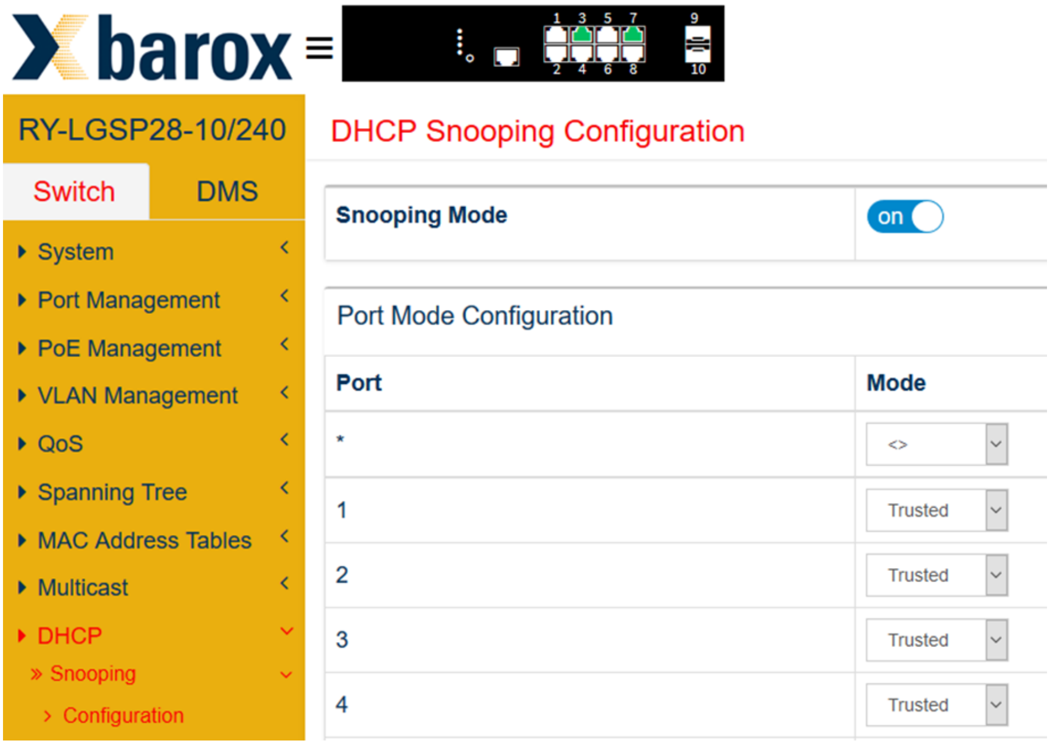
IP Binding Status

IP	VLAN	State	MAC	Expiration
192.168.110.100	10	allocated	5c-9a-d8-5c-98-1c	26 seconds

5.2.2. Protection of DHCP by ARP Inspection

The protection against unwanted DHCP clients and the protection against a manipulation of the ARP cache, resp., can be realised using ARP Inspection. Following activation of the functions the DHCP clients can be managed statically as recipients in a table. The setting of the size of the DHCP address pool using the number of clients is the basic precondition for a maximum security.

At first the Snooping function is generally activated in the menu “*Snooping Mode*“ as shown below. Furthermore settings can be chosen for the trustworthy switch ports. The mode must be set to “Trusted” for the inspection function to work.



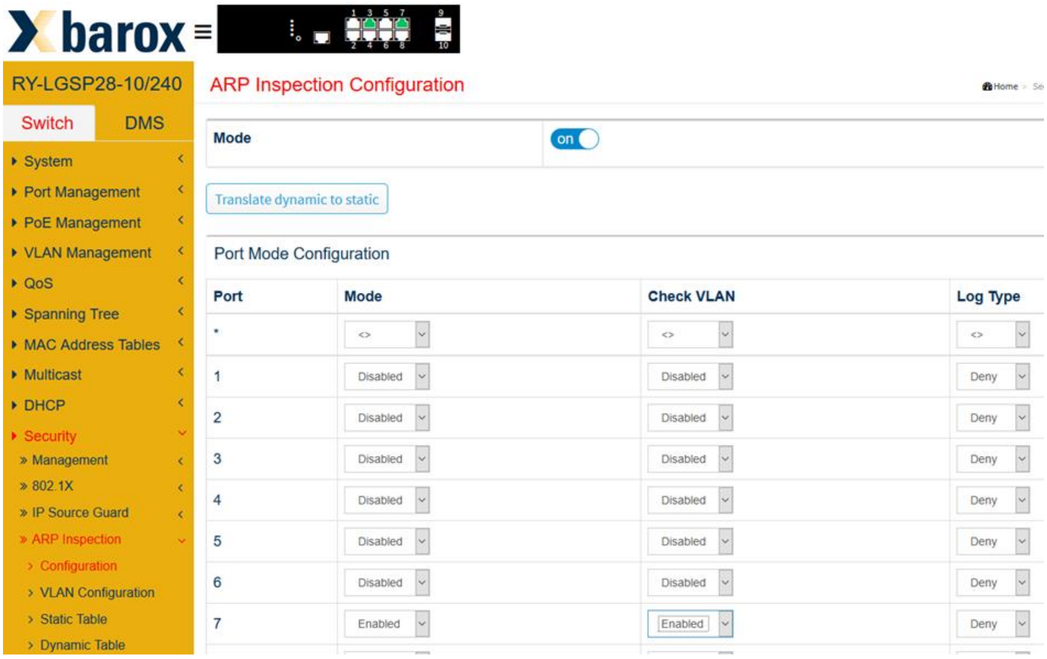
DHCP Snooping Configuration

Snooping Mode: on

Port Mode Configuration

Port	Mode
*	<>
1	Trusted
2	Trusted
3	Trusted
4	Trusted

Furthermore the port parameters are activated and configured. The ARP Inspection is activated for port 7 as shown in the following example, the verification of the VLAN is activated and the log type is set to “none”.



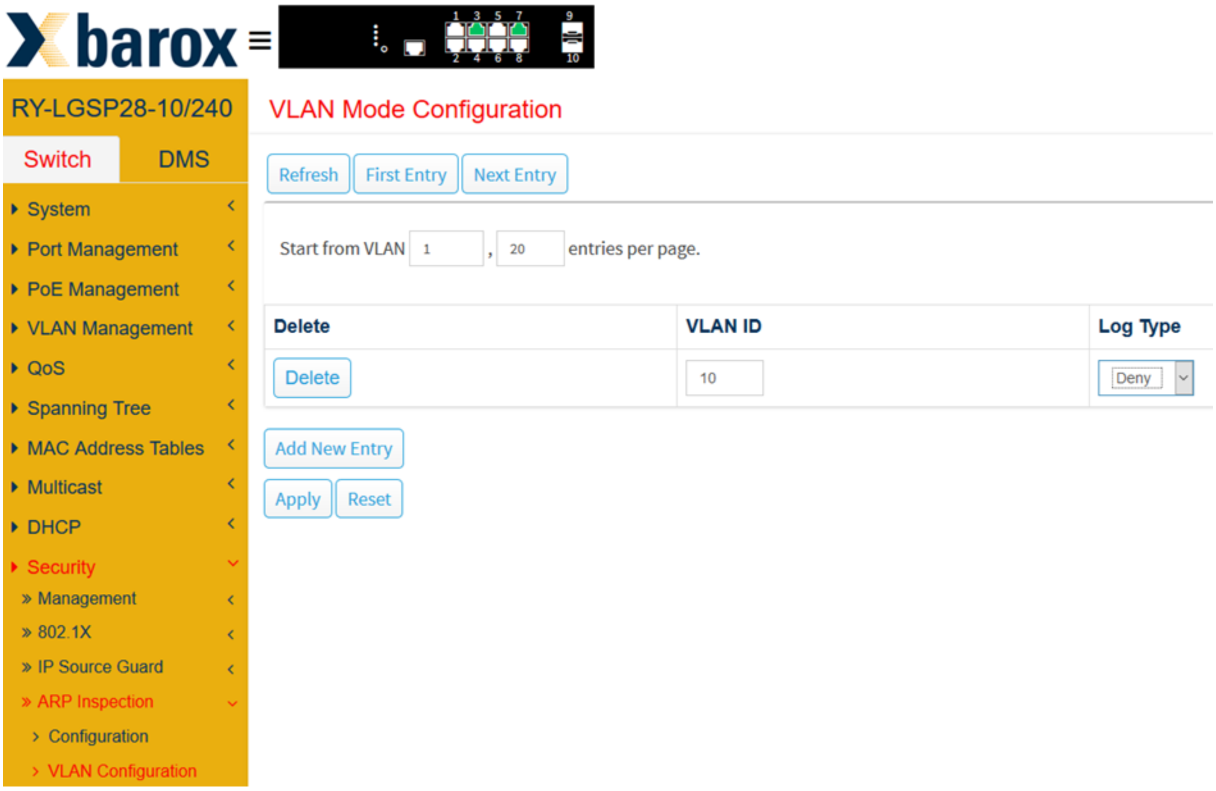
ARP Inspection Configuration

Mode: on

Port Mode Configuration

Port	Mode	Check VLAN	Log Type
*	<>	<>	<>
1	Disabled	Disabled	Deny
2	Disabled	Disabled	Deny
3	Disabled	Disabled	Deny
4	Disabled	Disabled	Deny
5	Disabled	Disabled	Deny
6	Disabled	Disabled	Deny
7	Enabled	Enabled	Deny

Following this the VLANs, which shall be included in the check, are determined and the log type (trust position) is determined as shown below.

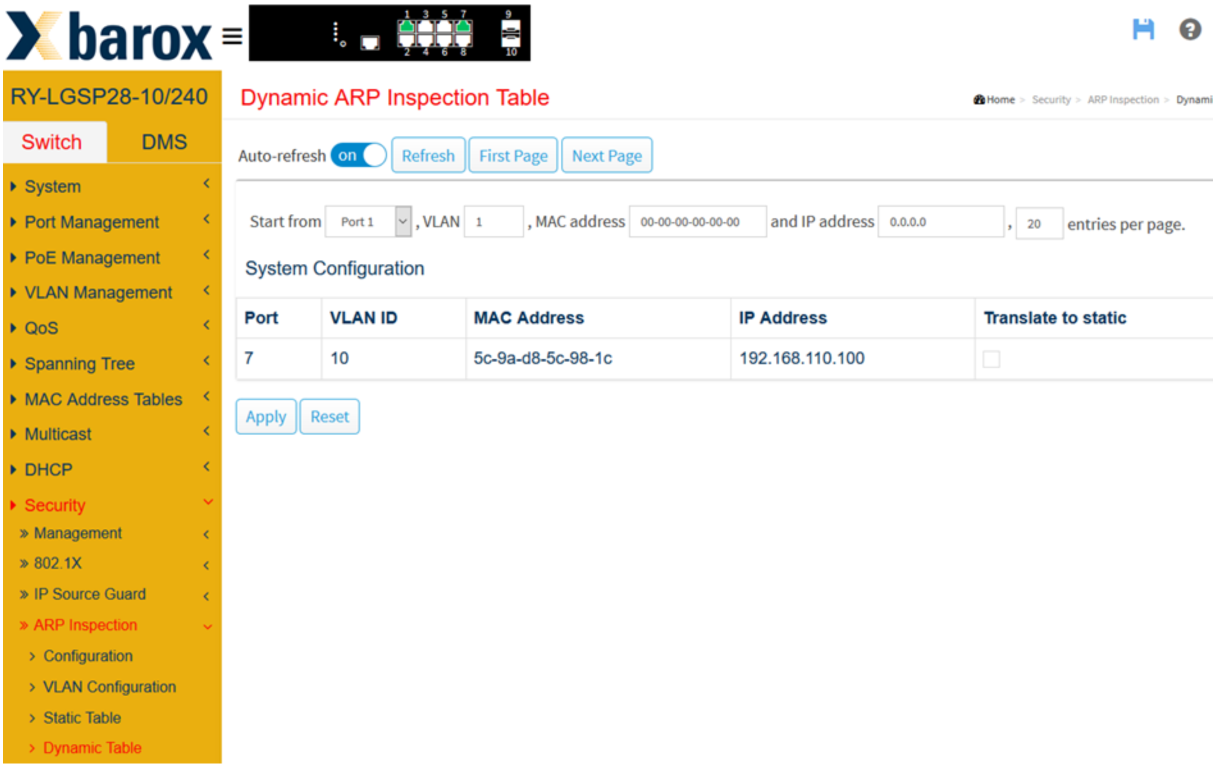


VLAN Mode Configuration

Start from VLAN 1 , 20 entries per page.

Delete	VLAN ID	Log Type
Delete	10	Deny

The DHCP clients can be connected upon the completion of the settings. Following the distribution of the IP addresses by the DHCP service the clients and their layer 2 and 3 characteristics become visible in the dynamic ARP inspection table and can subsequently be translated into the static ARP inspection table.



Dynamic ARP Inspection Table

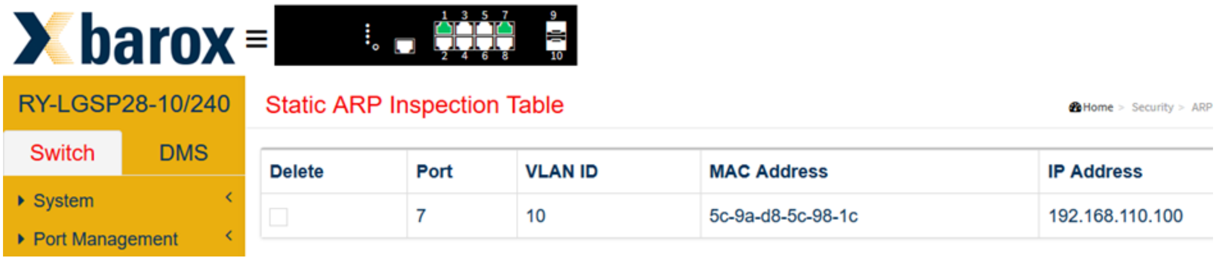
Auto-refresh on

Start from Port 1 , VLAN 1 , MAC address 00-00-00-00-00-00 and IP address 0.0.0.0 , 20 entries per page.

System Configuration

Port	VLAN ID	MAC Address	IP Address	Translate to static
7	10	5c-9a-d8-5c-98-1c	192.168.110.100	□

The following screenshot shows a static entry. An IP address is reserved for the client according to the table.



Static ARP Inspection Table

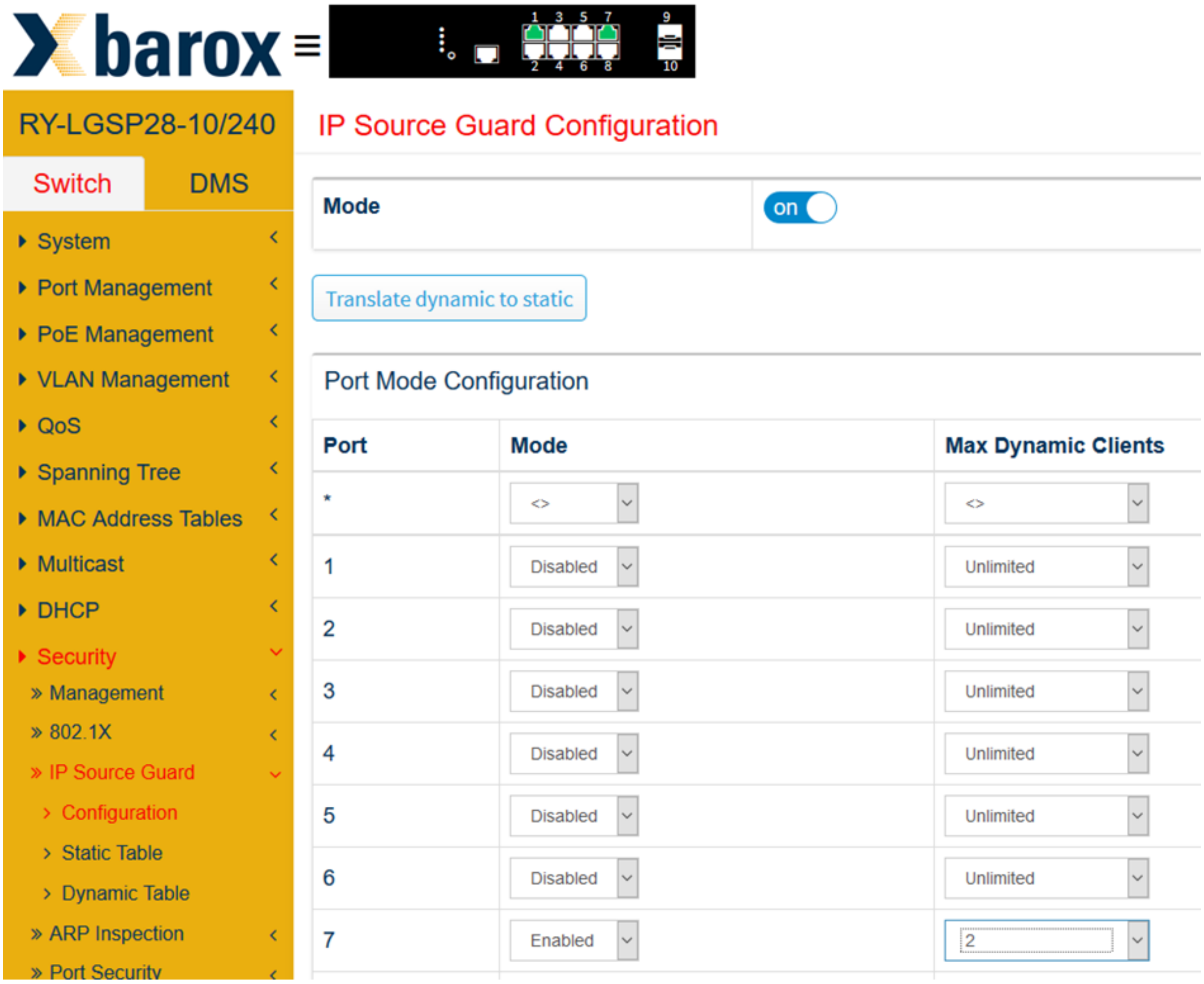
Delete	Port	VLAN ID	MAC Address	IP Address
□	7	10	5c-9a-d8-5c-98-1c	192.168.110.100

5.2.3. IP Source Guard

Deployment and Configuration:

An extended function for the protection of the terminal side is provided by using the IP Source Guard function. This function links the predefined static IP address of the connected devices with the examination of the MAC addresses of the source terminal devices. E.g. it provides protection against so-called “IP Spoofing”.

As shown in the following screenshot this function is generally activated and can be adjusted on a per-port basis.



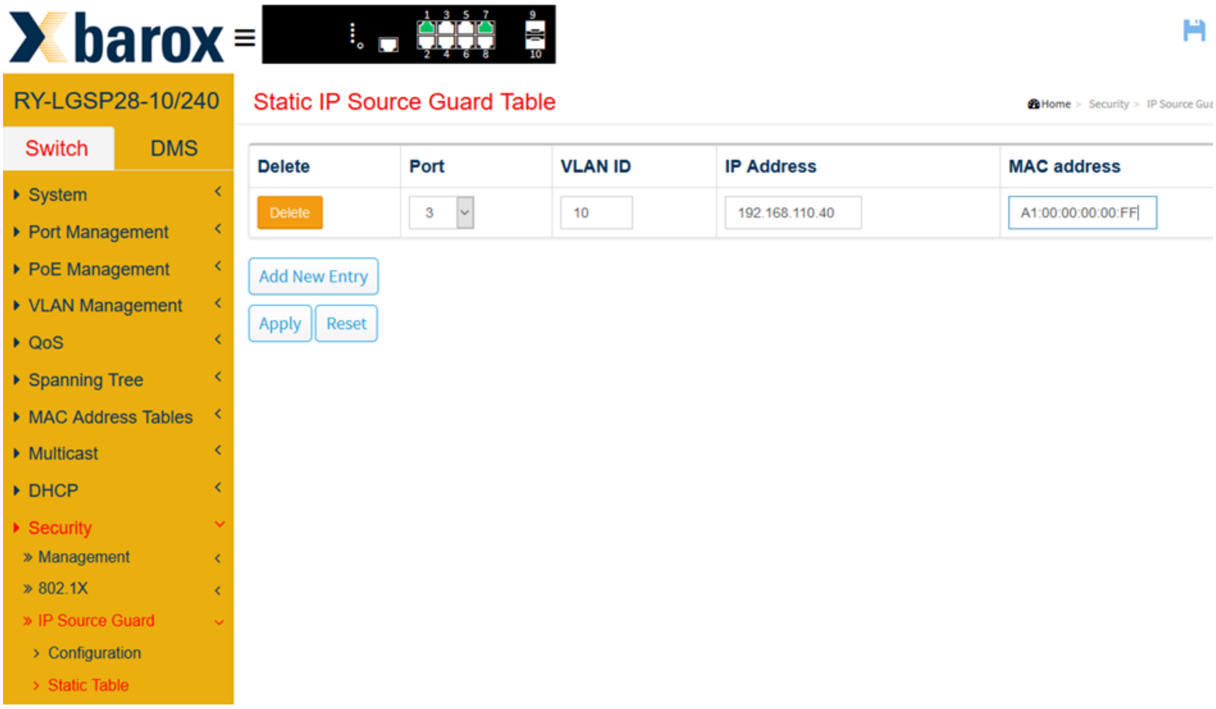
IP Source Guard Configuration

Mode	on

Port Mode Configuration

Port	Mode	Max Dynamic Clients
*	<>	<>
1	Disabled	Unlimited
2	Disabled	Unlimited
3	Disabled	Unlimited
4	Disabled	Unlimited
5	Disabled	Unlimited
6	Disabled	Unlimited
7	Enabled	2

Once this function is switched on the configuration can be effected using static entries as shown below:

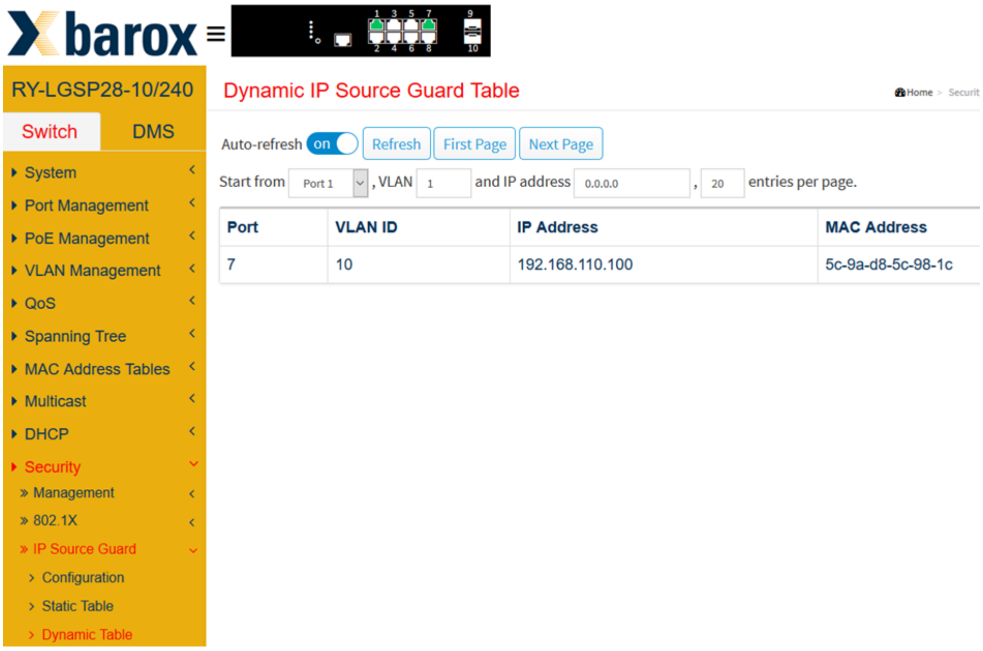


Static IP Source Guard Table

Delete	Port	VLAN ID	IP Address	MAC address
Delete	3	10	192.168.110.40	A1:00:00:00:00:FF

The use of IP Source Guard enables the extended protection function by securing the ports by means of the MAC and IP address. Compared to port security, where static MAC address entries per port prevent a potential attack, IP Source Guard provides the verification of the IP address of the connected device using static entries. The switch will block the port‘s network communication where the connected device does not comply with the allocated MAC and IP address. This means, that the attacker must know the MAC address and IP address of the device for gaining access to the network.

IP Source Guard provides a further option for securing a DHCP service, which is configured on the switch. The DHCP snooping function is required in this deployment scenario. The function is activated using the menu “*Switch > DHCP > Snooping > Configuration*”. The protected clients can be viewed using the dynamic table as shown in the following screenshot:



Dynamic IP Source Guard Table

Auto-refresh on

Start from Port 1 , VLAN 1 and IP address 0.0.0.0 , 20 entries per page.

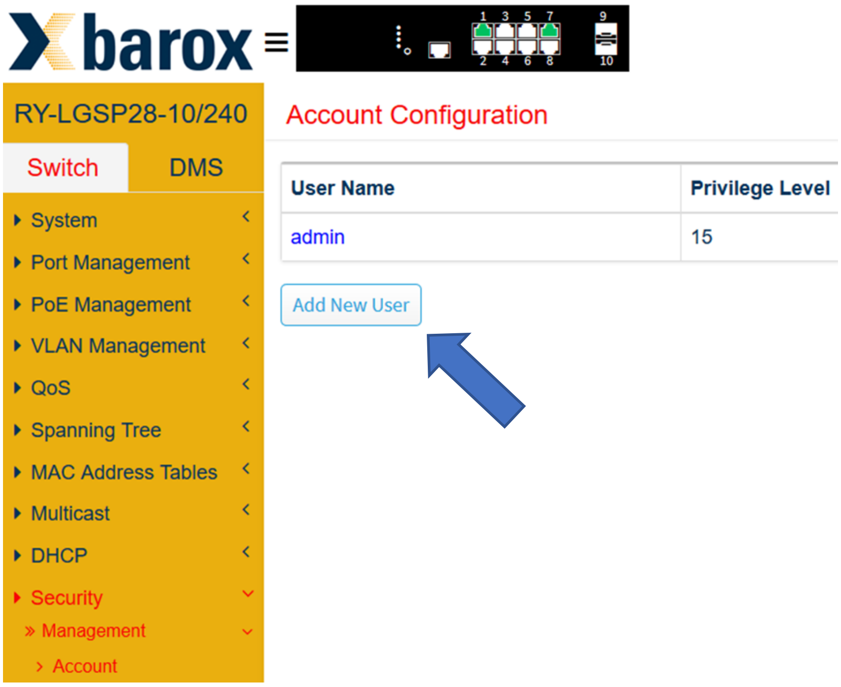
Port	VLAN ID	IP Address	MAC Address
7	10	192.168.110.100	5c-9a-d8-5c-98-1c

5.3 Protection of the Switch Management and Network Administration (Layer 3–7)

5.3.1. User Management and Configuration

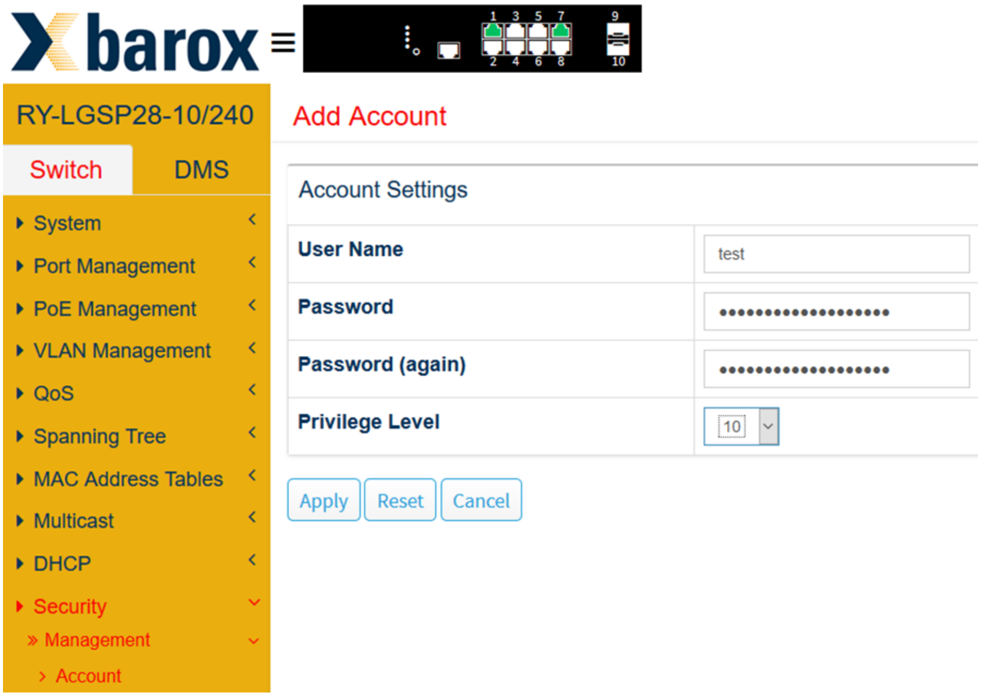
User Generation:

The following example shows the generation of a further user:



Account Configuration

User Name	Privilege Level
admin	15



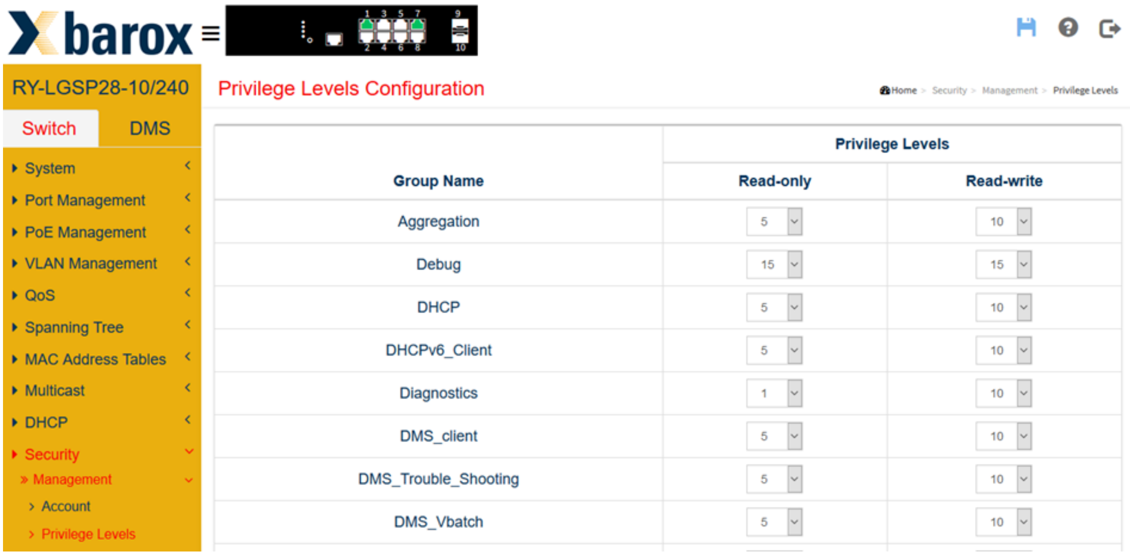
Add Account

Account Settings

User Name	test
Password	•••••••••••••••••••
Password (again)	•••••••••••••••••••
Privilege Level	10

Basic settings of user rights and privileges:

- The privilege level serves the purpose of grading the rights to apply configuration settings and read/write rights of such values, resp. It is generally recommended not to change the default values. Such rights should be allocated when generating new users.
- Information: Scaling the rights of a further user on the basis of authorisation and competencies is helpful.



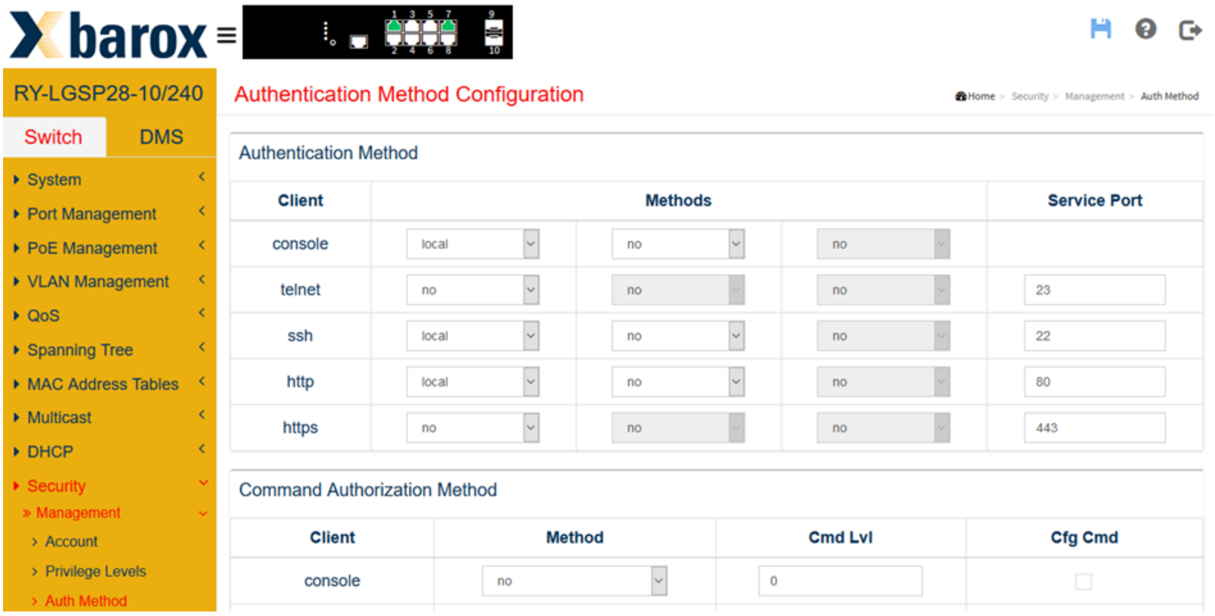
Privilege Levels Configuration

Group Name	Privilege Levels	
	Read-only	Read-write
Aggregation	5	10
Debug	15	15
DHCP	5	10
DHCPv6_Client	5	10
Diagnostics	1	10
DMS_client	5	10
DMS_Trouble_Shooting	5	10
DMS_Vbatch	5	10

5.3.2. Deployment and Authentication Settings using the Switch Management

Securing access to the CLI **SSH** vs. **Telnet**

The access method can be set and non-required functions can be disabled, resp., as shown below. The general deactivation of the Telnet access function is recommended where this is allowed by the network design. Configuration methods can be set as shown below:



Authentication Method Configuration

Authentication Method

Client	Methods			Service Port
console	local	no	no	
telnet	no	no	no	23
ssh	local	no	no	22
http	local	no	no	80
https	no	no	no	443

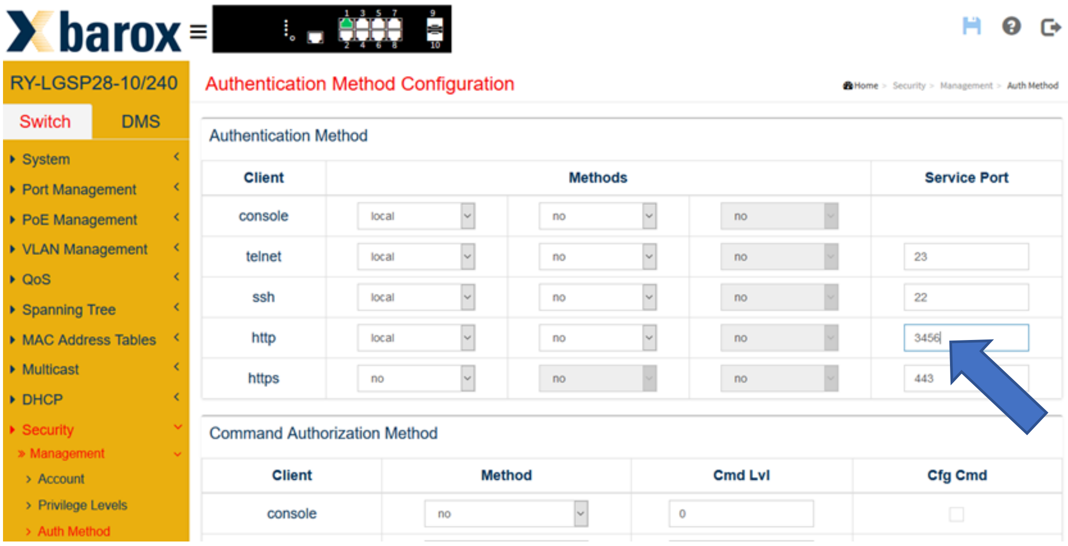
Command Authorization Method

Client	Method	Cmd Lvl	Cfg Cmd
console	no	0	□

- The use of the SSH protocol for the command line-based management (CLI) is recommended, as this method provides the encrypted connection.

Management of the access to the web GUI using HTTP

- The generation of a separate user for HTTP is recommended.
- Change of port 80, information: Please pay attention to the port information when accessing via a browser!
- Access via HTTPS provides the highest level of protection due to the encryption of the connection.



Authentication Method Configuration

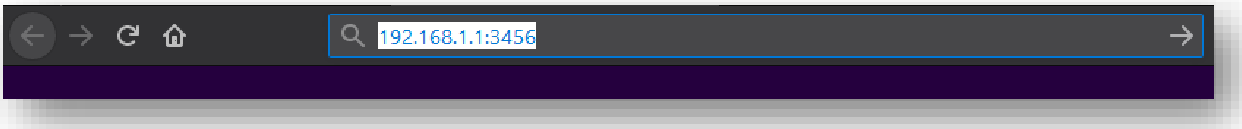
Authentication Method

Client	Methods			Service Port
console	local	no	no	
telnet	local	no	no	23
ssh	local	no	no	22
http	local	no	no	3456
https	no	no	no	443

Command Authorization Method

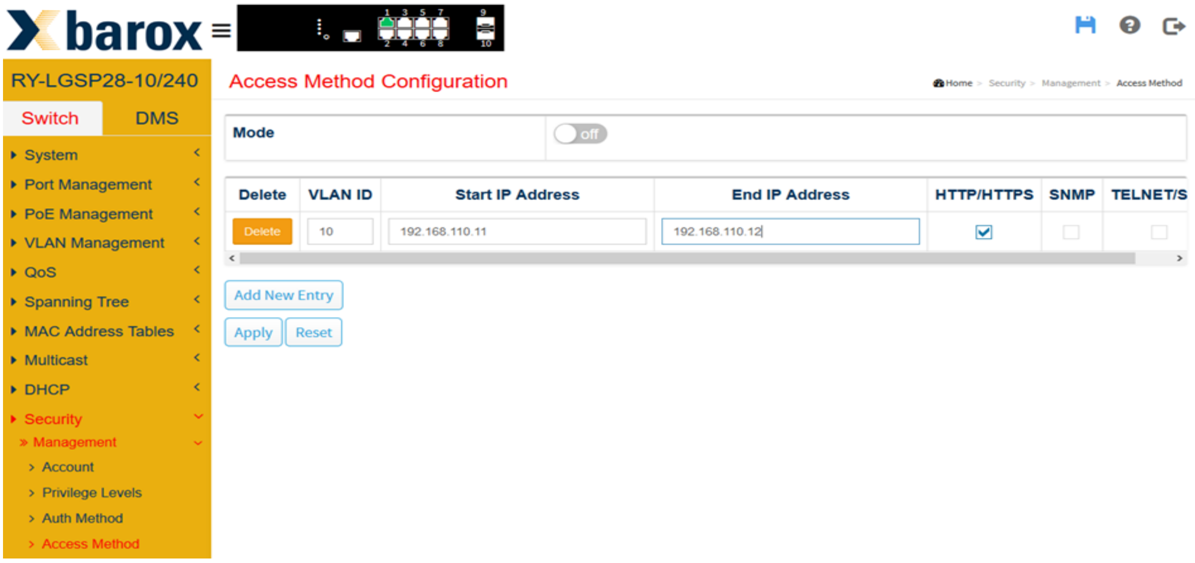
Client	Method	Cmd Lvl	Cfg Cmd
console	no	0	□

The following example shows the entry of the management address using a changed port:



192.168.1.1:3456

The restriction of the management access and its methods to certain IP address ranges and VLANs is possible. This can be effected in the access management as shown in the following example:



Access Method Configuration

Mode: off

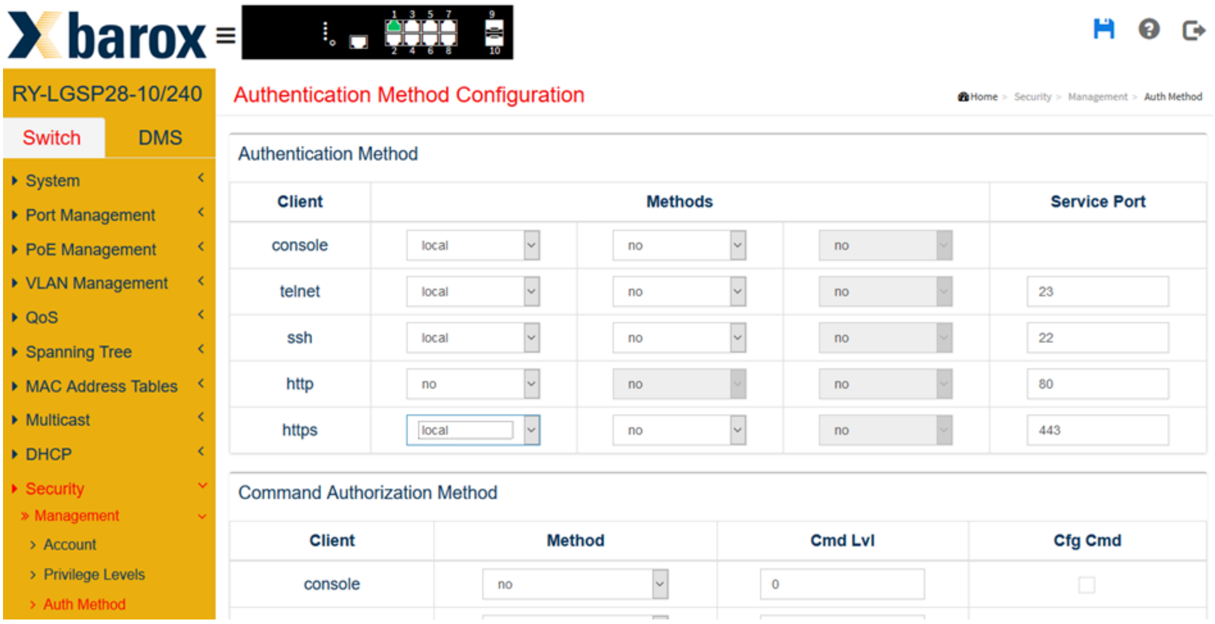
Delete	VLAN ID	Start IP Address	End IP Address	HTTP/HTTPS	SNMP	TELNET/S
Delete	10	192.168.110.11	192.168.110.12	☑	□	□

! Attention !

The selection of a method for each entry is mandatory. The switch cannot be managed in this VLAN and access to the management is prohibited where the respective method should nevertheless be generally switched off. In case of a “wrong configuration” this can be reversed by a restart of the device.

5.3.3. Access Management and Use of HTTPS

The setting option for using the HTTPS protocol is shown below:



Authentication Method Configuration

Authentication Method

Client	Methods			Service Port
console	local	no	no	
telnet	local	no	no	23
ssh	local	no	no	22
http	no	no	no	80
https	local	no	no	443

Command Authorization Method

Client	Method	Cmd Lvl	Cfg Cmd
console	no	0	□

The standard port can be changed also for this method.

The HTTP option should be disabled where this mode is activated. The switch GUI is called up in the browser using the HTTPS protocol phrase https://192.168.XX(YourManagement IP):1234(YourPort) in the URL field. Following this the browser communication to the management interface is effected using encryption.

5.3.4. Configuration and Use of Certificate-based Access to the Management

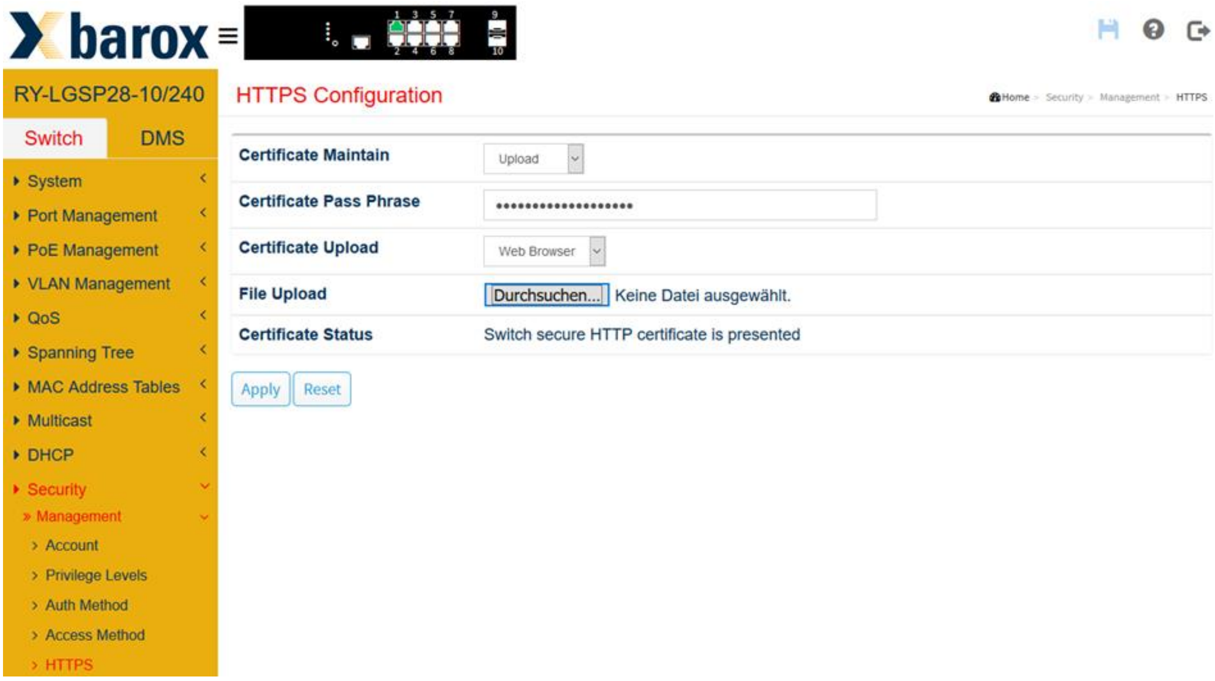
Brief information regarding the use of certificates:

A certificate-based connection enables one of the currently highest protection levels for network-based configuration services. Nevertheless the use should be verified, as the connection to the management can only be effected using the media which have implemented the certificate.

Setting options and methods, resp., are shown in the following:

- Generation of the certificate for later use, which can be downloaded and installed using the browser

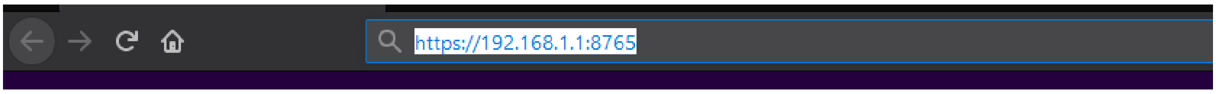
- Upload of an externally generated certificate



HTTPS Configuration

Certificate Maintain	Upload
Certificate Pass Phrase	••••••••••••••••••
Certificate Upload	Web Browser
File Upload	Durchsuchen... Keine Datei ausgewählt.
Certificate Status	Switch secure HTTP certificate is presented

- The browser access is effected following the installation of the certificate and determination of the HTTPS authentication method via the HTTPS protocol



https://192.168.1.1:8765

5.4 SNMP – Monitoring- and Administration Function

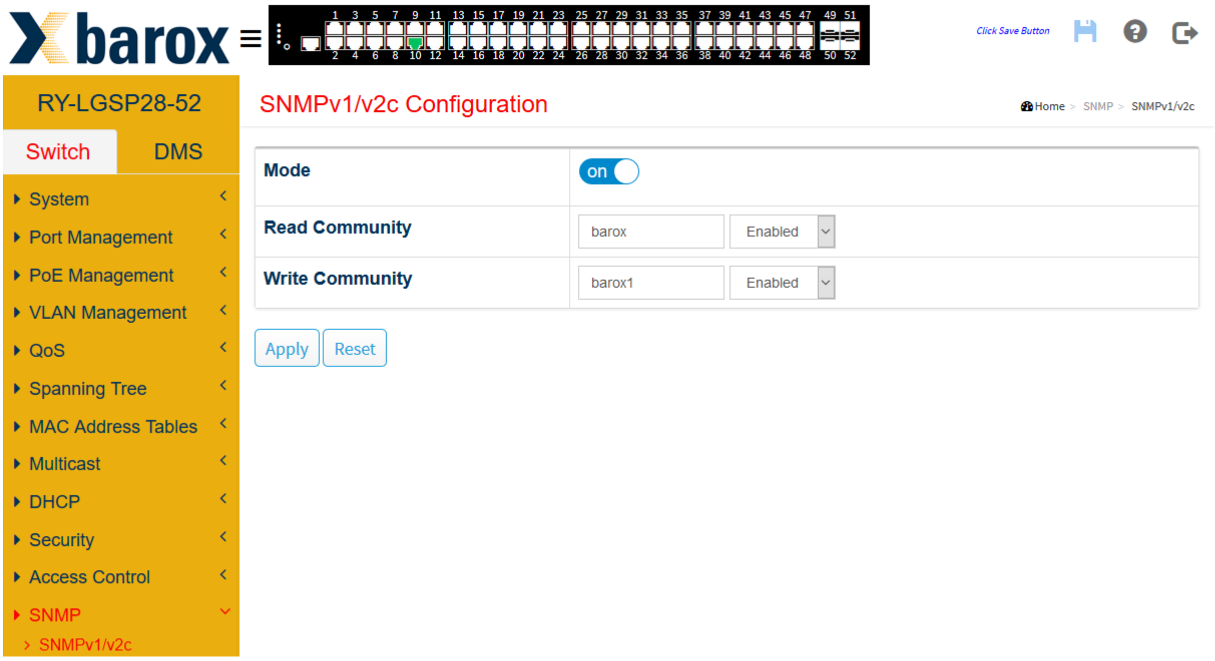
SNMP was developed by the IETF (Internet Engineering Task Force) and as a protocol serves the purpose of monitoring, control and configuration of network elements.

5.4.1. Configuration of SNMP v2c

The following example describes a basic SNMP v2 configuration for a system status enquiry or the transmission of system events via SNMP traps. The following steps shall show the use of an SNMP Community.

Activation of the SNMP v2 Function

The mode should be generally. Furthermore the names for the Read and Write communities are determined and the Write community is activated.



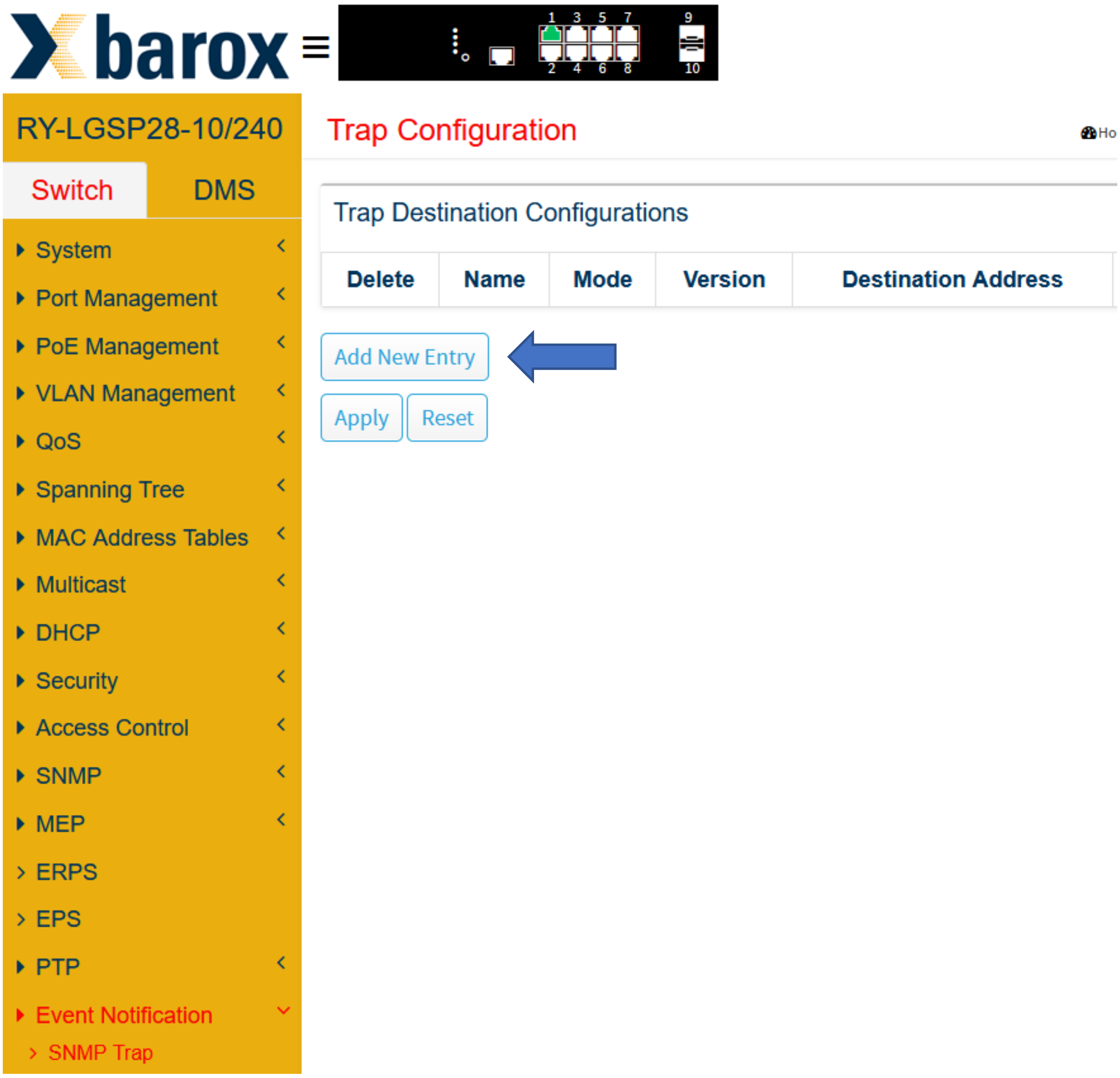
SNMPv1/v2c Configuration

Mode	on	
Read Community	barox	Enabled
Write Community	barox1	Enabled

Following this the changes must be saved to the start-up configuration and the switch must be restarted.

5.4.2. SNMP Trap Configuration

The parameters required for the connection to the target recipient shall be determined prior to the receipt of SNMP trap messages. This starts with the generation of a configuration.



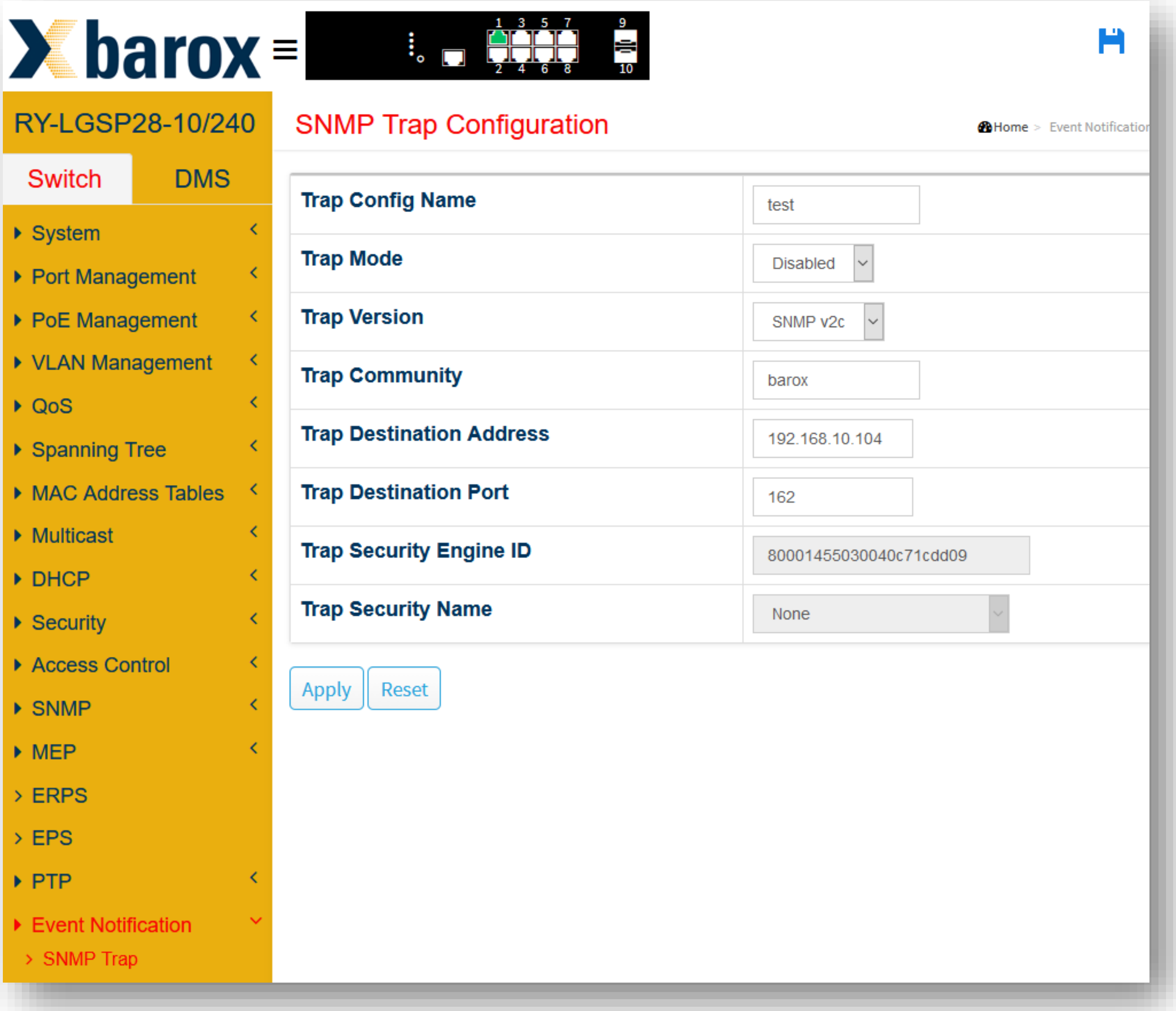
Trap Destination Configurations

Delete	Name	Mode	Version	Destination Address

The example shows the setting of the following values for a new configuration:

- Trap Config Name -> A name should be allocated
- Trap Mode -> UDP or TCP – As usual UDP should be used for a start
- Trap Version -> Selection of SNMP v2c
- Trap Community -> The previously generated community name must be entered here
- Trap Destination Address -> Entry of the IP address of the trap recipient
- Trap Destination Port -> Entry of the port at the recipient
- Further settings can be assumed from the default settings

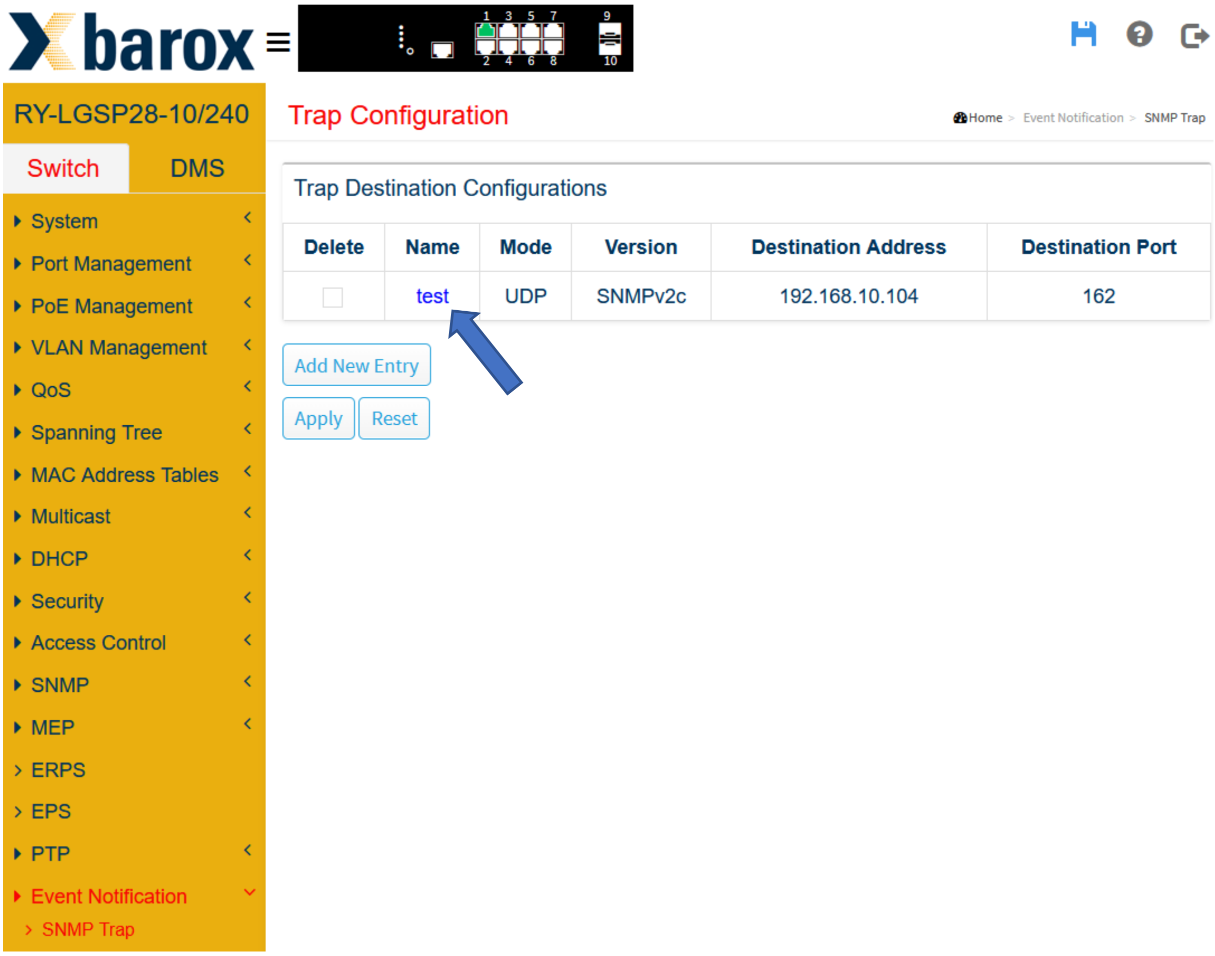
Following this the settings are confirmed by clicking “Apply”.



SNMP Trap Configuration

Trap Config Name	test
Trap Mode	Disabled
Trap Version	SNMP v2c
Trap Community	barox
Trap Destination Address	192.168.10.104
Trap Destination Port	162
Trap Security Engine ID	80001455030040c71cdd09
Trap Security Name	None

Following its generation the new configuration is displayed on the super-ordinated layer. The configuration can be opened by selecting the name.

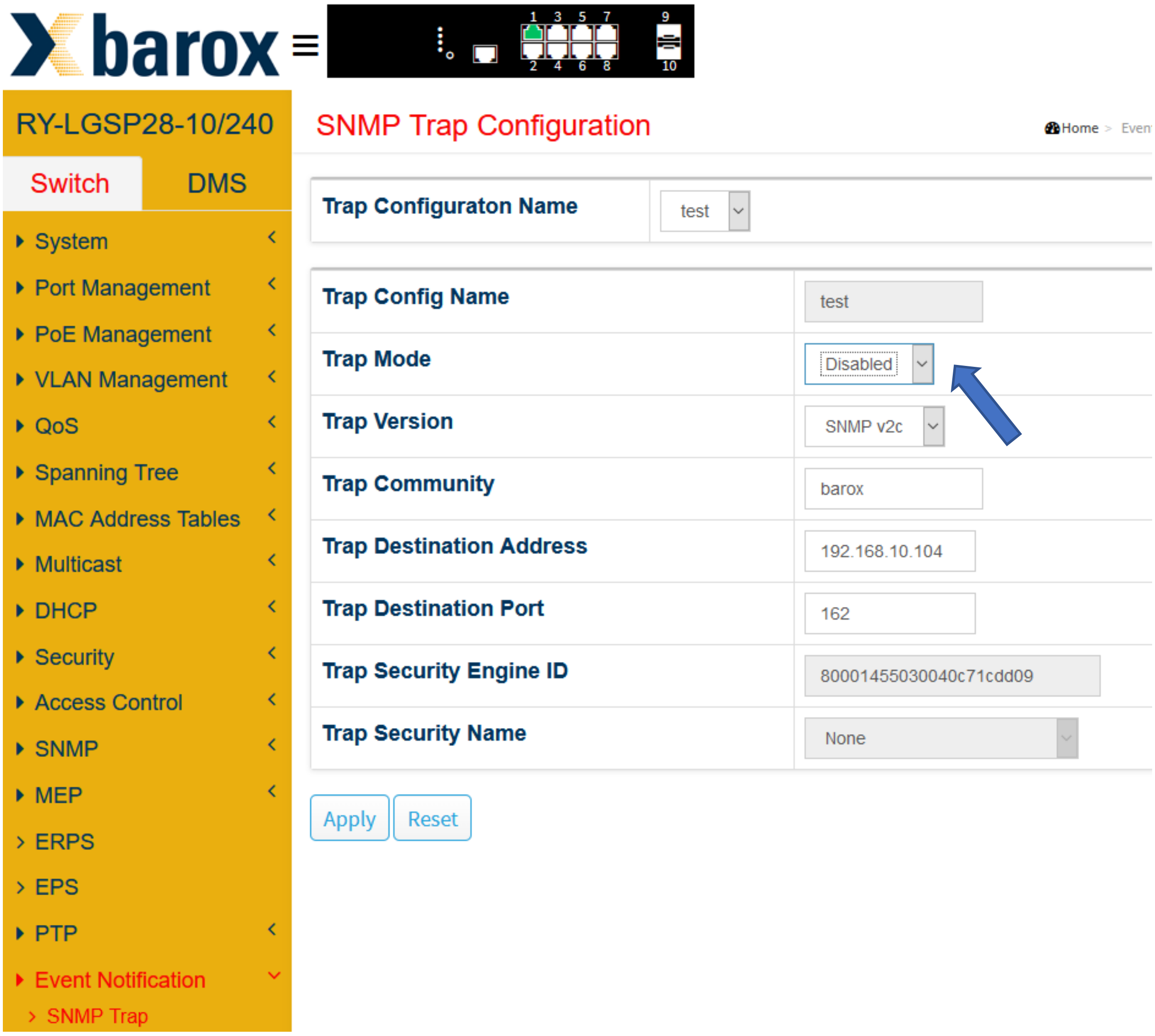


Trap Destination Configurations

Delete	Name	Mode	Version	Destination Address	Destination Port
□	test	UDP	SNMPv2c	192.168.10.104	162

Deactivation of the SNMP Trap Function

The deactivation can be effected in two ways. On the one hand it can be deactivated by erasing the configuration. Setting the configuration to “Disabled” is recommended where trap messaging shall only be used sporadically.



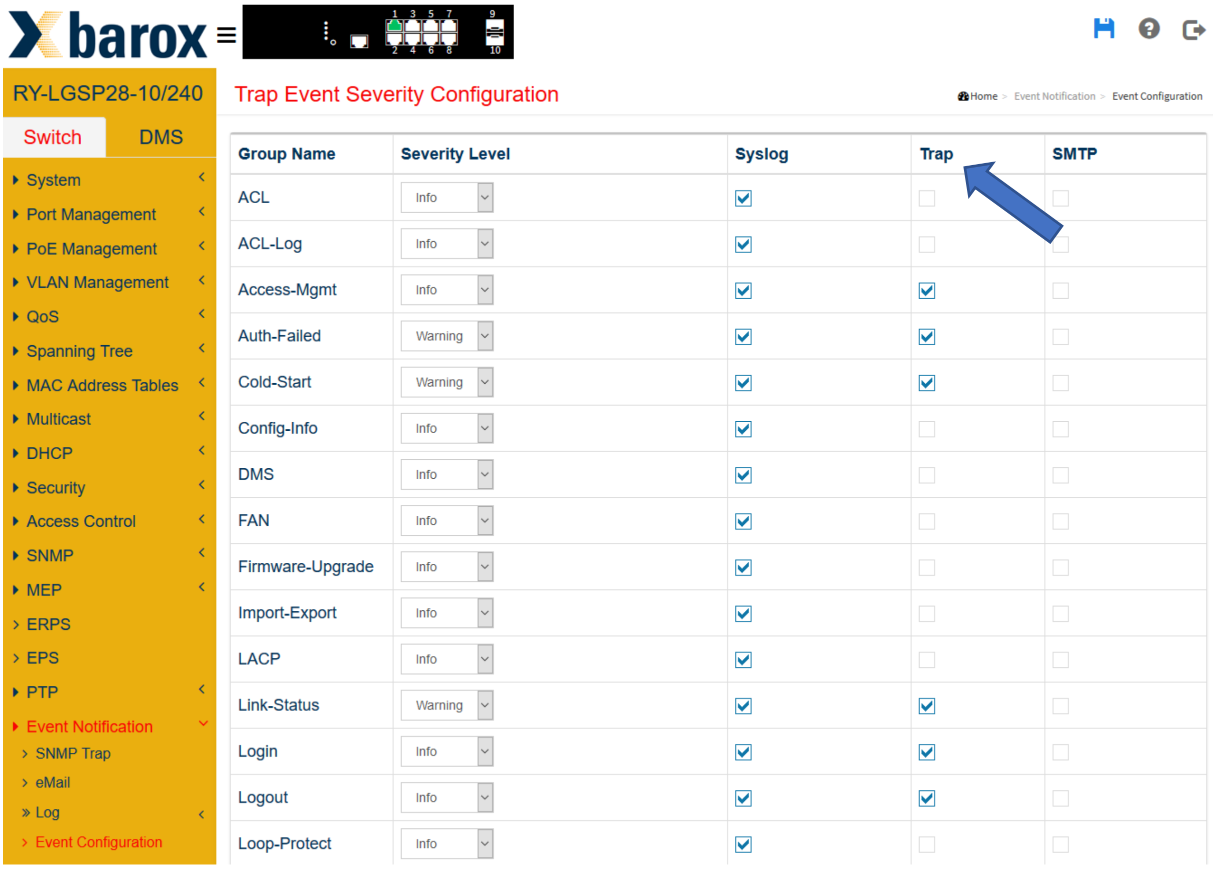
SNMP Trap Configuration

Trap Configuraton Name	test

Trap Config Name	test
Trap Mode	Disabled
Trap Version	SNMP v2c
Trap Community	barox
Trap Destination Address	192.168.10.104
Trap Destination Port	162
Trap Security Engine ID	80001455030040c71cdd09
Trap Security Name	None

5.4.3. Supplementary Information regarding the Sending of SNMP Traps

Please assure yourself, that the events triggering a trap are configured accordingly. These settings can be configured per terminal device elsewhere in the configuration menu as shown in the following screenshot. Some events − such like e.g. port events − must also be set accordingly in the port configuration.



Trap Event Severity Configuration

Group Name	Severity Level	Syslog	Trap	SMTP
ACL	Info	☑	□	□
ACL-Log	Info	☑	□	□
Access-Mgmt	Info	☑	☑	□
Auth-Failed	Warning	☑	☑	□
Cold-Start	Warning	☑	☑	□
Config-Info	Info	☑	□	□
DMS	Info	☑	□	□
FAN	Info	☑	□	□
Firmware-Upgrade	Info	☑	□	□
Import-Export	Info	☑	□	□
LACP	Info	☑	□	□
Link-Status	Warning	☑	☑	□
Login	Info	☑	☑	□
Logout	Info	☑	☑	□
Loop-Protect	Info	☑	□	□

Further information regarding the reading and testing of the configuration can be found in “5.6 Reading-out SNMP Traps”.

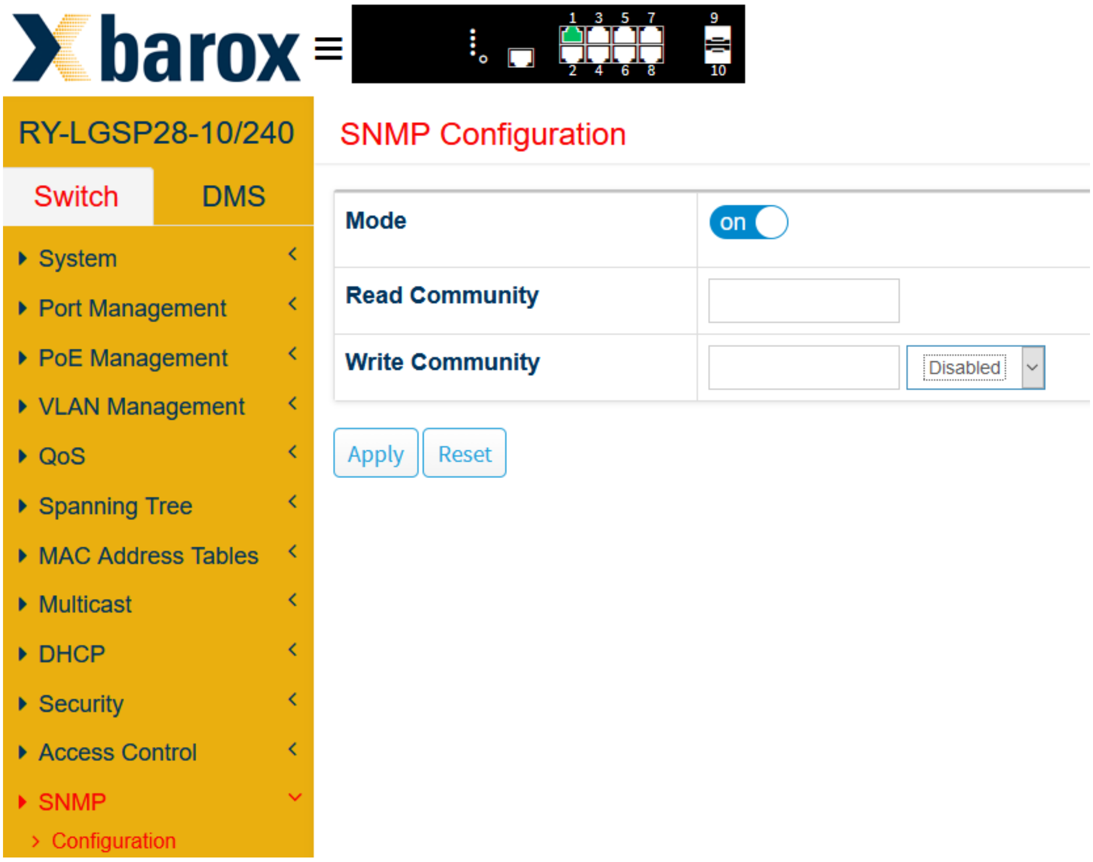
5.5 SNMP v3 Configuration

Starting position:

The increased need for network security generates raised requirements for administrating and monitoring network components. This can e.g. be effected using SNMP in version 3 with authentication. The following example describes a basic SNMP v3 configuration for a system status enquiry or the transmission of system events via SNMP traps. The following steps shall demonstrate the use of authentication and password protection.

5.5.1. Activation of the SNMP v3 Function

The mode should be generally enabled. Furthermore the Read and Write community's text entries (standard "public" and "private") must be erased and the Write community must be set to the state "Disabled".

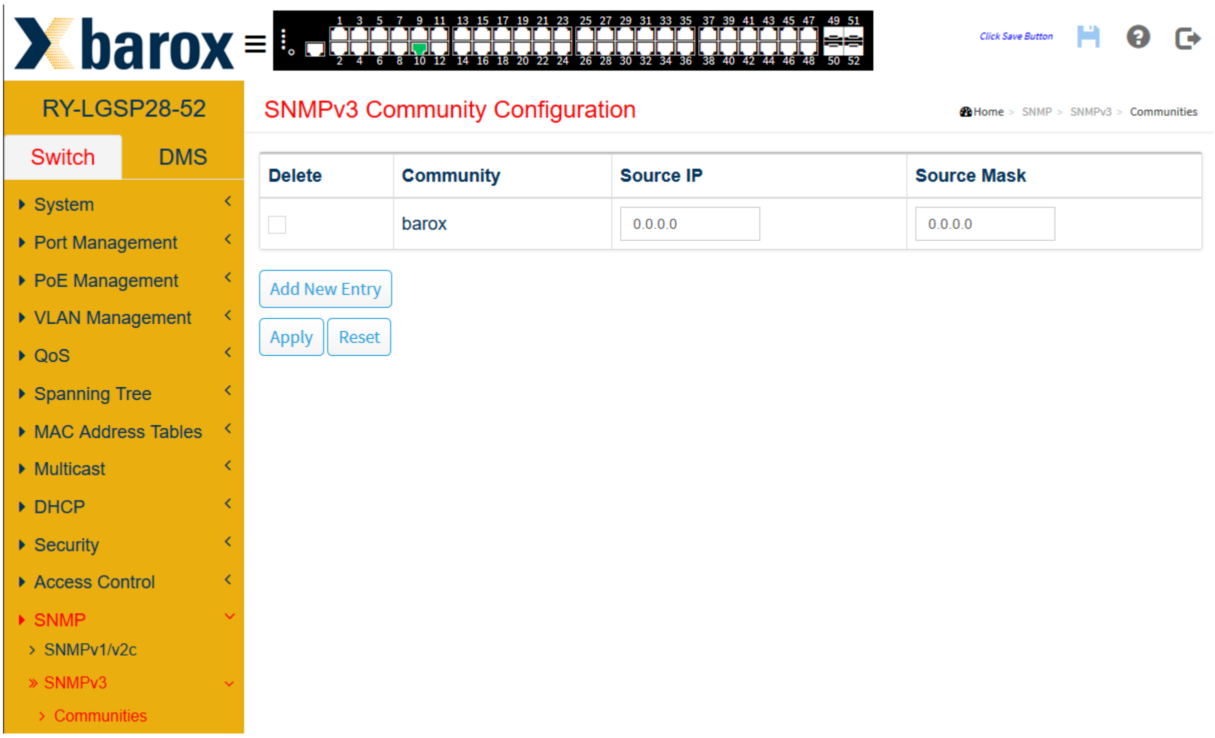


SNMP Configuration

Mode	on	
Read Community		
Write Community		Disabled

Generation of a dedicated Community

When generating the community the setting of source IP and mask can remain as 0.0.0.0 in each case. This enables the transmission and the receipt of SNMP messages across several subnetworks.

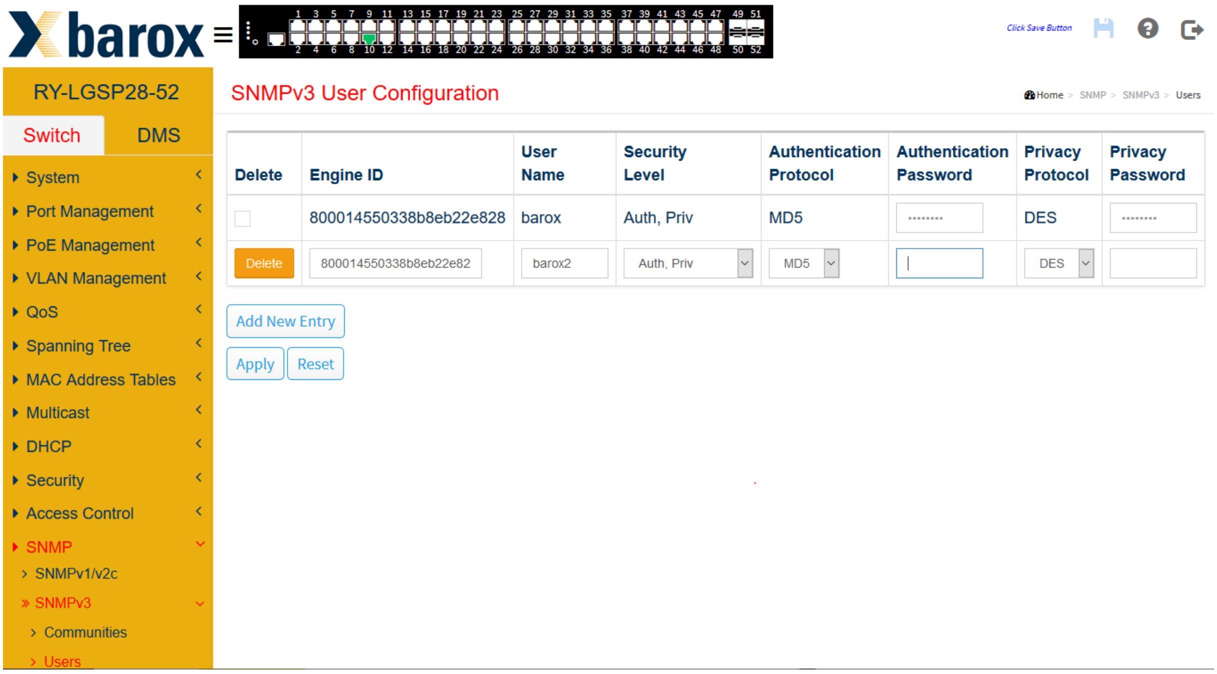


SNMPv3 Community Configuration

Delete	Community	Source IP	Source Mask
□	barox	0.0.0.0	0.0.0.0

Generation of a new User

When configuring a new user attention should be paid for imperatively adding the Engine ID to the new user object automatically. In this example the security level *"Auth, Priv"* shall also be set along with the determination of the user name. When selecting the authentication "MD5" and the privacy protocol DES attention shall be paid as the length of both passwords must be at least eight characters (numbers and character combinations).

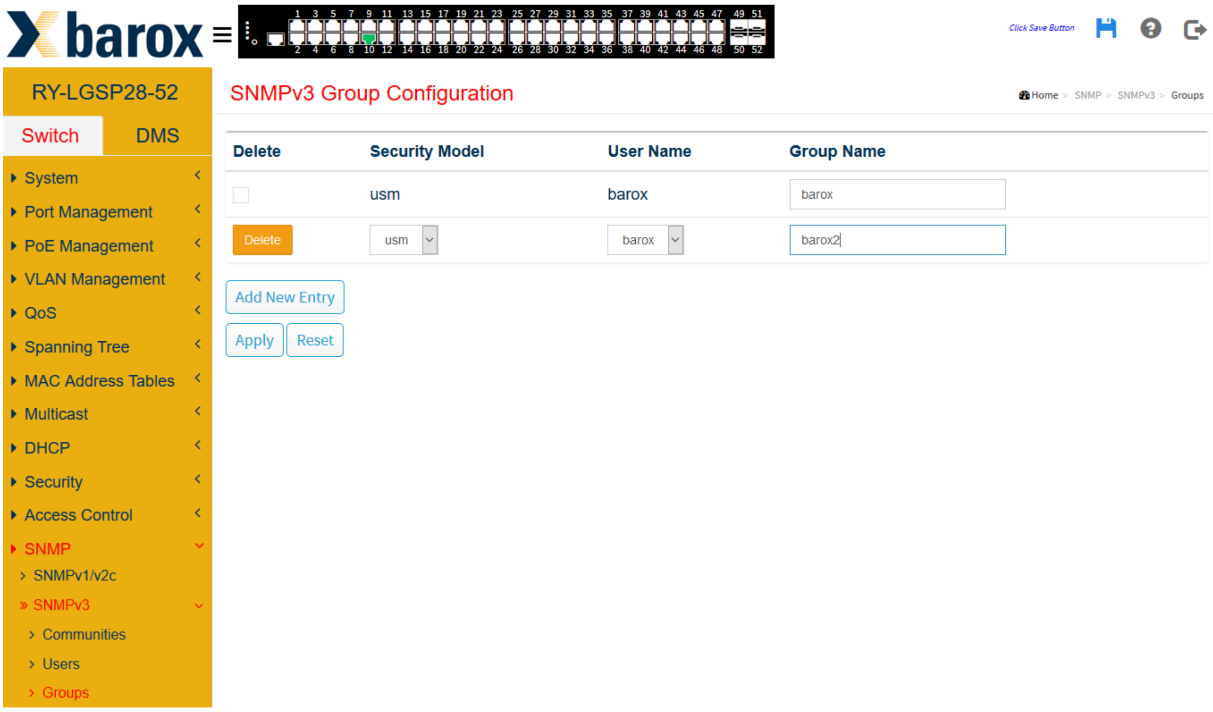


SNMPv3 User Configuration

Delete	Engine ID	User Name	Security Level	Authentication Protocol	Authentication Password	Privacy Protocol	Privacy Password
□	800014550338b8eb22e828	barox	Auth, Priv	MD5	••••••••	DES	••••••••
Delete	800014550338b8eb22e82	barox2	Auth, Priv	MD5	|	DES	

Generation of a Group

The security model *“usm”* shall be selected when configuring a new group in SNMP v3. The previously generated user name shall be selected as *“Security Name”*, following this a group name must be determined.

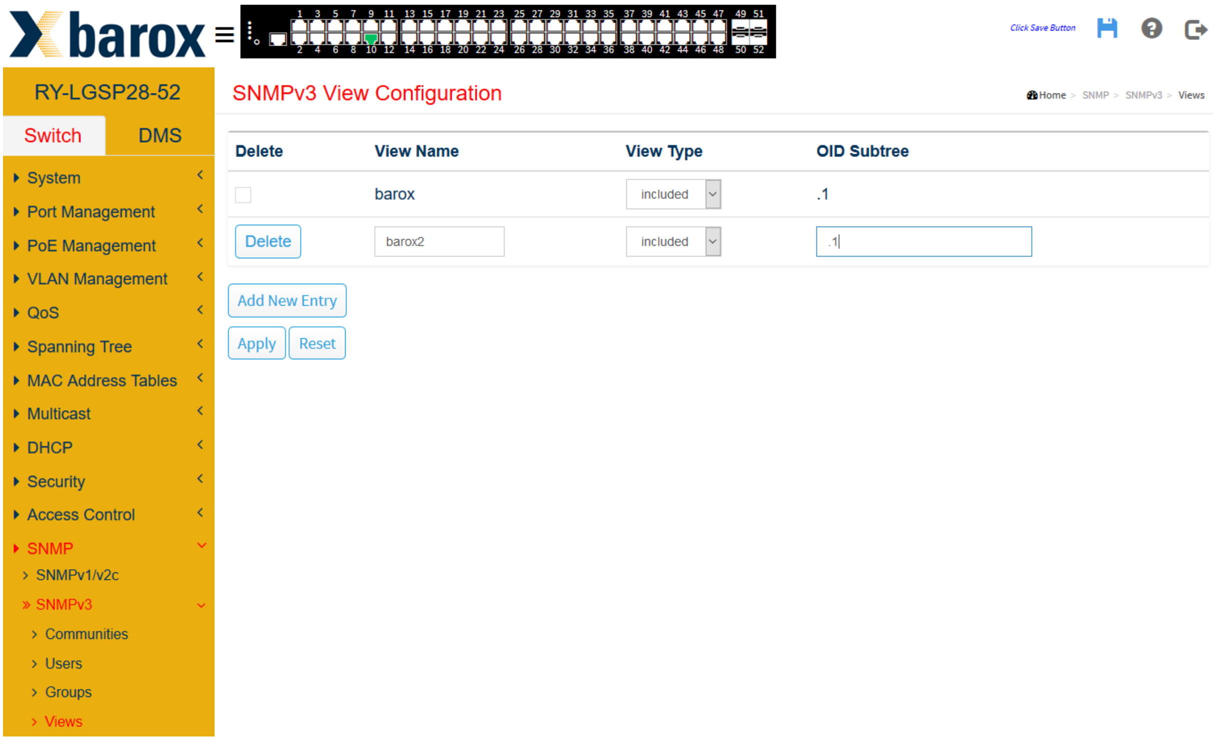


SNMPv3 Group Configuration

Delete	Security Model	User Name	Group Name
□	usm	barox	barox
Delete	usm	barox	barox2

Setting the View Configuration

At the beginning the View Name is determined. Setting the OID to a value “.1” is recommended providing all SNMP-relevant messages can be viewed. This enables the complete view to all distributed OIDs.

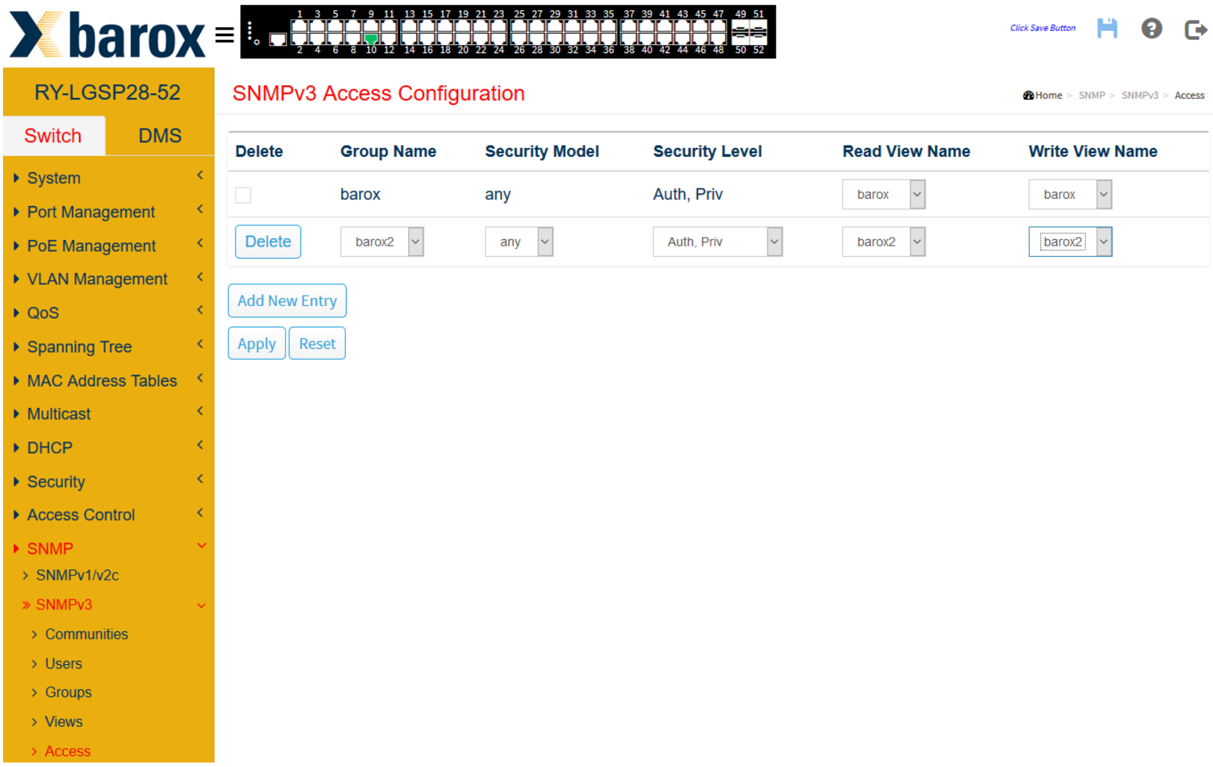


SNMPv3 View Configuration

Delete	View Name	View Type	OID Subtree
□	barox	included	.1
Delete	barox2	included	.1

Configuration of the Access Method

A new entry with authentication and privatisation method shall be generated for doing so. At the beginning the previously generated group must be selected in “Group Name”. Furthermore the “*Security Model” “***usm**” and the “*Security Level*” “**Auth, Priv**” are allocated to the group. The latter ones are required for reading and writing the views, which were previously generated in “Read View Name” and “Write View Name”.



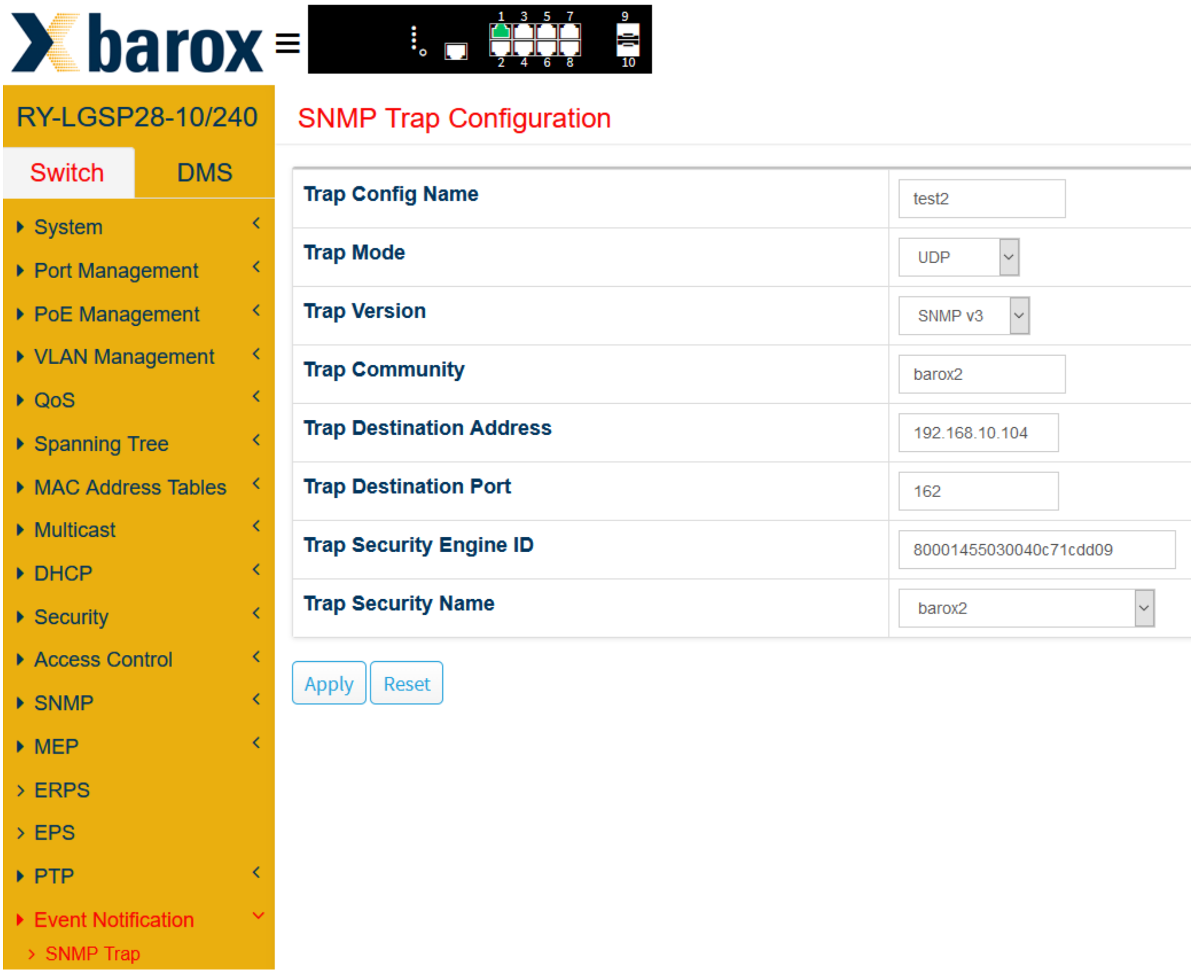
SNMPv3 Access Configuration

Delete	Group Name	Security Model	Security Level	Read View Name	Write View Name
□	barox	any	Auth, Priv	barox	barox
Delete	barox2	any	Auth, Priv	barox2	barox2

5.5.2. SNMP Trap Configuration

The example shows the setting of the following values for a new configuration:

- Trap Config Name -> A name should be allocated
- UDP or TCP – UDP should be used for a start as usual
- Trap Version -> Selection of SNMP v3
- Trap Community -> The previously generated community name must be entered here
- Trap Destination Address -> Entry of the IP address of the trap recipient
- Trap Destination Port -> Entry of the port at the recipient
- Trap Security Engine ID -> The user‘s Engine ID must be entered here
- Trap Security Name -> Selection of the respective user
- Following this the settings are confirmed by clicking “Apply”.

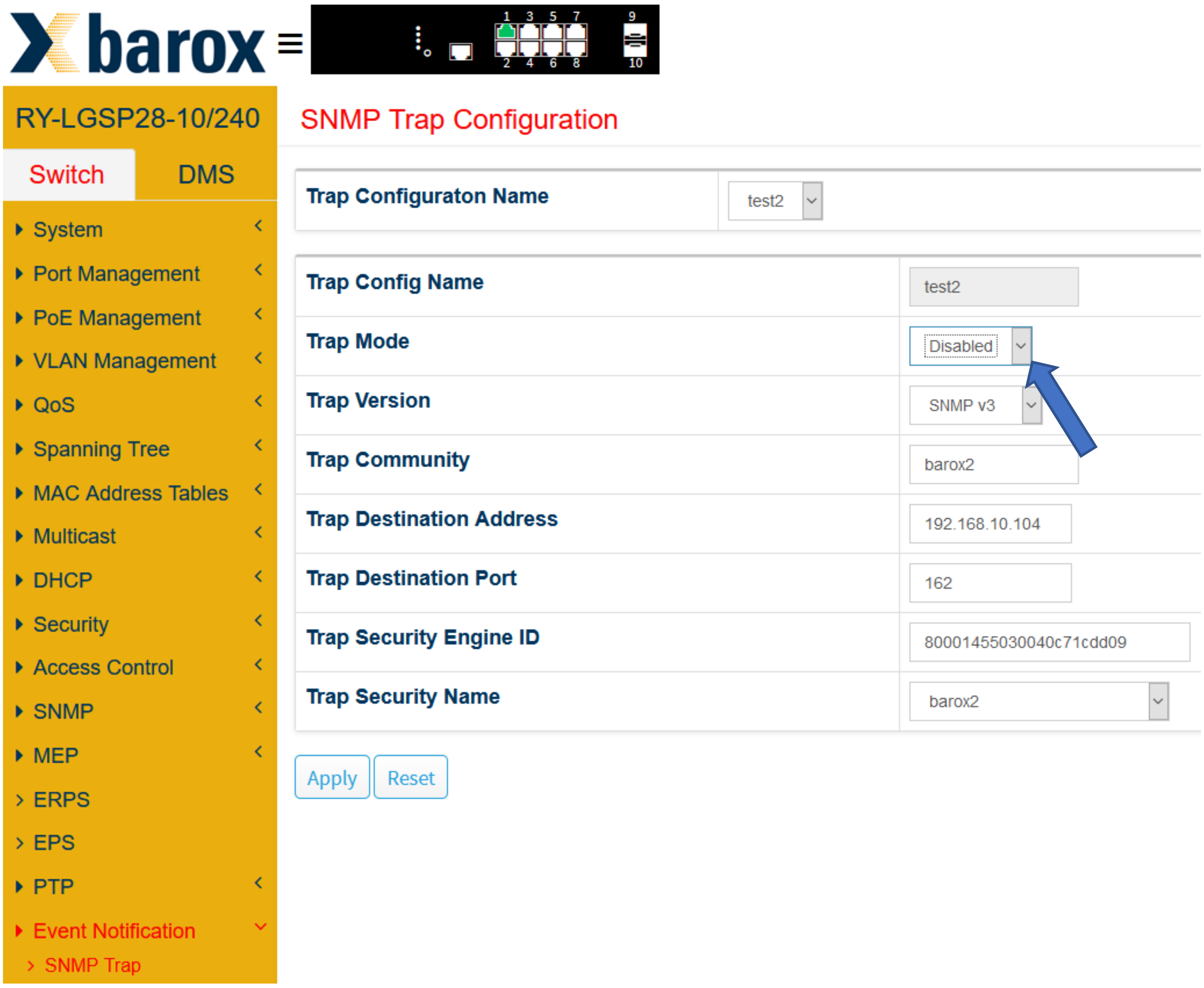


SNMP Trap Configuration

Trap Config Name	test2
Trap Mode	UDP
Trap Version	SNMP v3
Trap Community	barox2
Trap Destination Address	192.168.10.104
Trap Destination Port	162
Trap Security Engine ID	80001455030040c71cdd09
Trap Security Name	barox2

Deactivation of the SNMP Trap Function

The deactivation can be effected in two ways. On the one hand it can be deactivated by erasing the configuration. Setting the configuration to “Disabled” is recommended where trap messaging shall only be used sporadically.



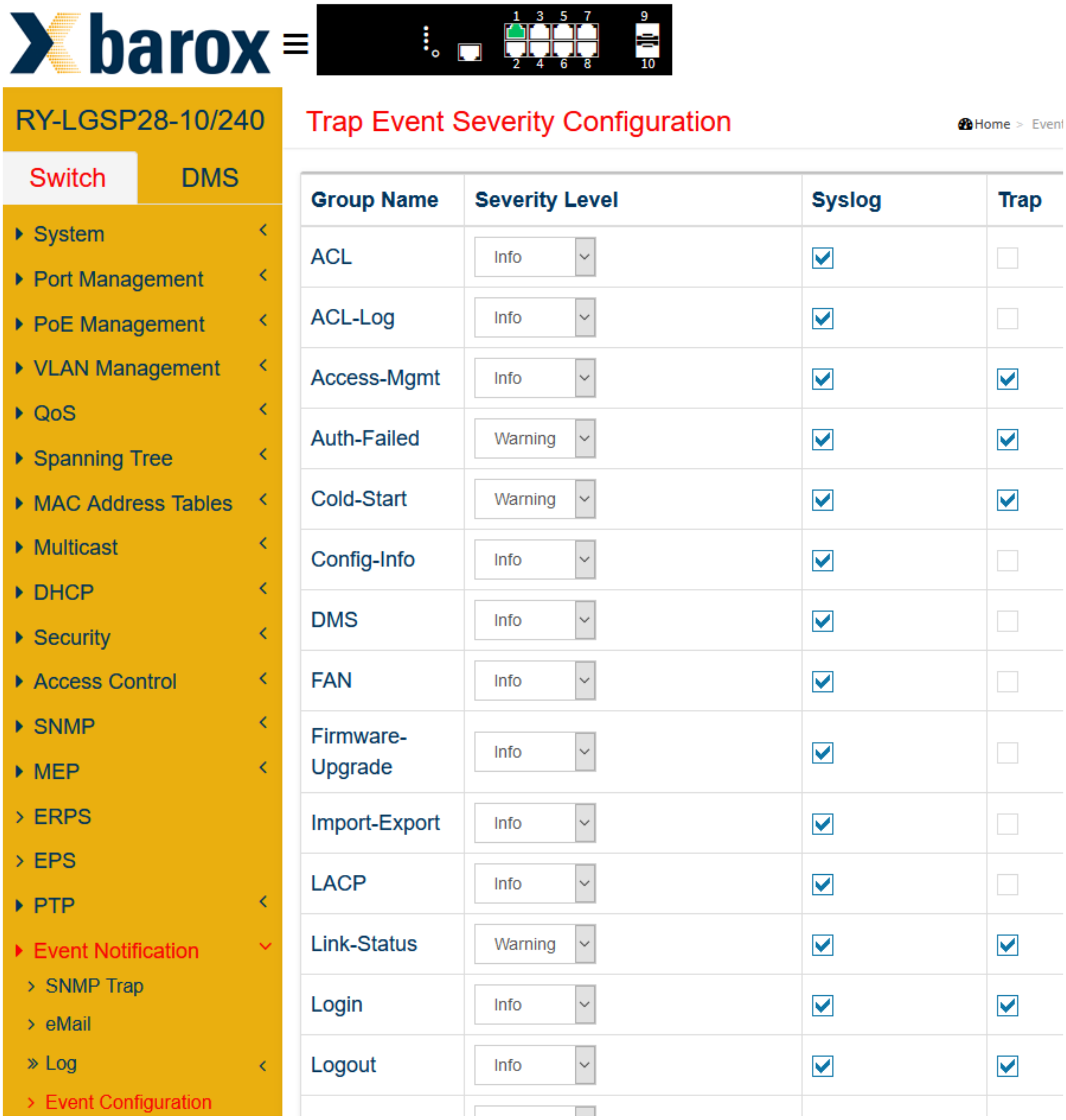
SNMP Trap Configuration

Trap Configuraton Name	test2

Trap Config Name	test2
Trap Mode	Disabled
Trap Version	SNMP v3
Trap Community	barox2
Trap Destination Address	192.168.10.104
Trap Destination Port	162
Trap Security Engine ID	80001455030040c71cdd09
Trap Security Name	barox2

5.5.3. Supplementary Information regarding the Sending of SNMP Traps

Please assure yourself, that the events triggering a trap are configured accordingly. These settings can be configured per terminal device elsewhere in the configuration menu as shown in the following screenshot. Some events − such like e.g. port events − must also be set accordingly in the port configuration.



Trap Event Severity Configuration

Group Name	Severity Level	Syslog	Trap
ACL	Info	☑	□
ACL-Log	Info	☑	□
Access-Mgmt	Info	☑	☑
Auth-Failed	Warning	☑	☑
Cold-Start	Warning	☑	☑
Config-Info	Info	☑	□
DMS	Info	☑	□
FAN	Info	☑	□
Firmware-Upgrade	Info	☑	□
Import-Export	Info	☑	□
LACP	Info	☑	□
Link-Status	Warning	☑	☑
Login	Info	☑	☑
Logout	Info	☑	☑

5.6 Reading SNMP Traps

Various parameters of the barox switch configurations can be read out and set, resp., using the SNMP protocol. So-called “SNMP/MIB Browser” are basically required for doing so. But also network-/recording-/sniffer software can be utilised to read SNMP transmissions.

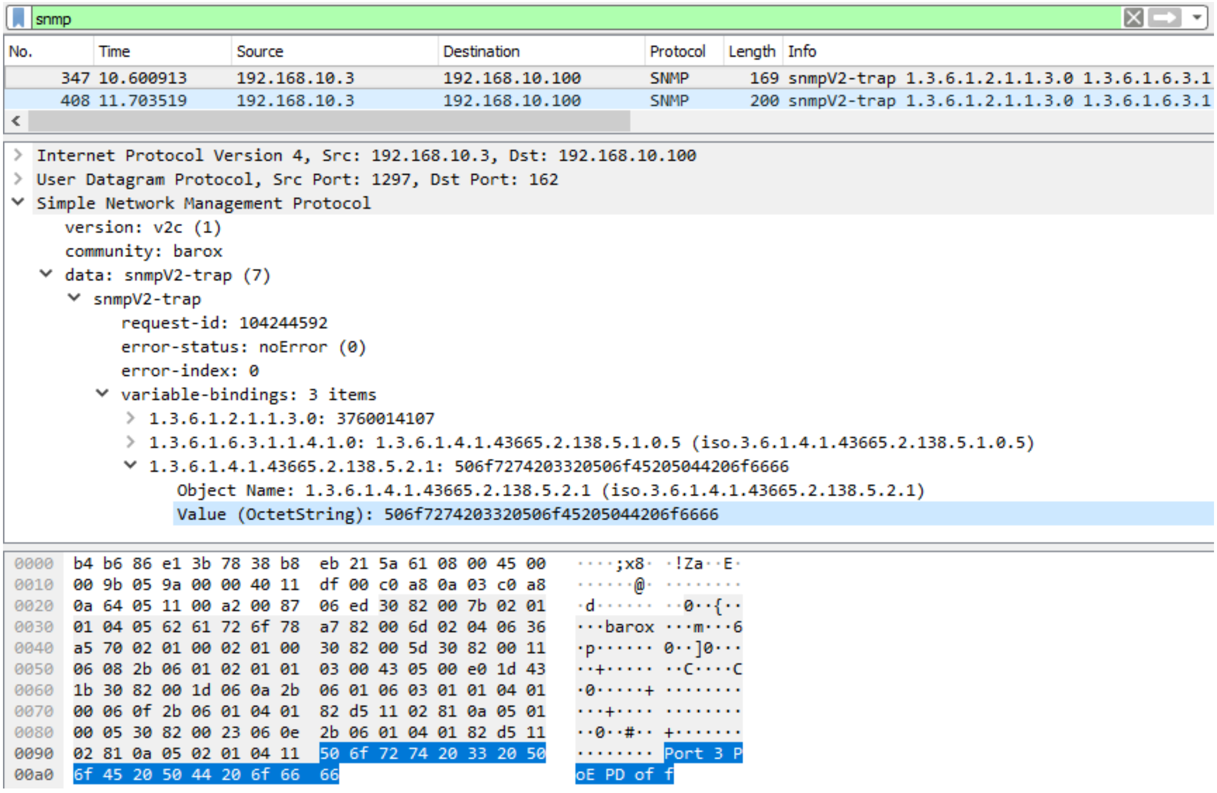
The reading-out of an SNMP v2 trap is briefly explained using the following example:

Starting position:

A PoE camera is unplugged and plugged in again at the Ethernet port 3 of the switch.
A PC in the network is configured for the receipt of SNMP traps. The software Wireshark (https://www.wireshark.org) for reading-out and for a user-friendly view *”iReasoning MIB Browser” (http://www.ireasoning.com/mibbrowser.shtml) are used.

The PoE camera is unplugged / PD device is offline:

Copy of the information, which is sent by the switch:



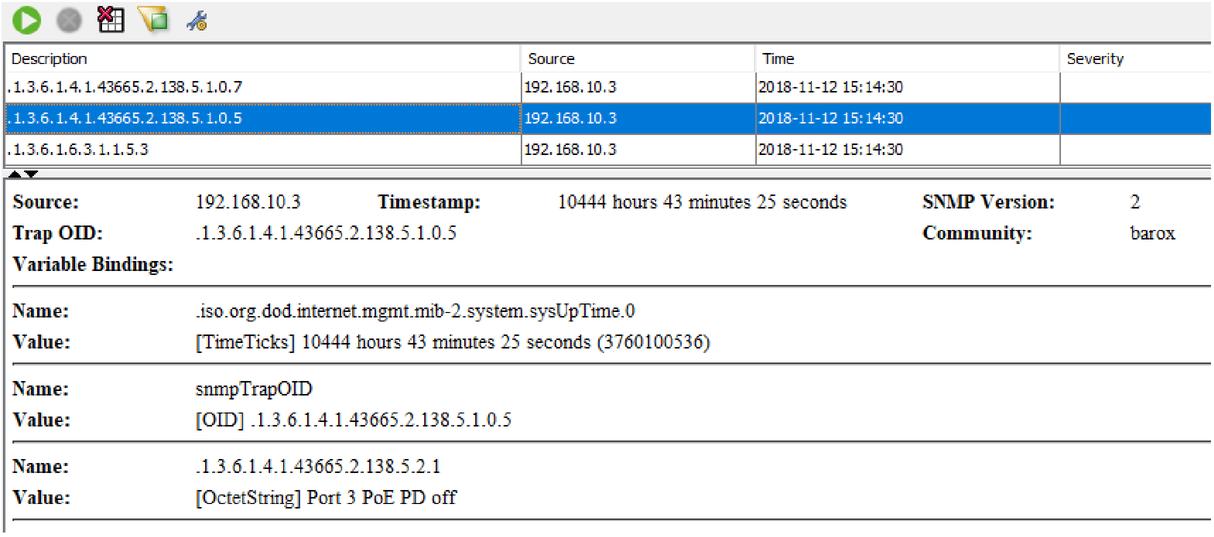
```
snmp
No.     Time        Source          Destination      Protocol  Length  Info
    347 10.600913   192.168.10.3    192.168.10.100   SNMP      169     snmpV2-trap 1.3.6.1.2.1.1.3.0 1.3.6.1.6.3.1
    408 11.703519   192.168.10.3    192.168.10.100   SNMP      200     snmpV2-trap 1.3.6.1.2.1.1.3.0 1.3.6.1.6.3.1
```

```
> Internet Protocol Version 4, Src: 192.168.10.3, Dst: 192.168.10.100
> User Datagram Protocol, Src Port: 1297, Dst Port: 162
v Simple Network Management Protocol
    version: v2c (1)
    community: barox
  v data: snmpV2-trap (7)
    v snmpV2-trap
        request-id: 104244592
        error-status: noError (0)
        error-index: 0
      v variable-bindings: 3 items
        > 1.3.6.1.2.1.1.3.0: 3760014107
        > 1.3.6.1.6.3.1.1.4.1.0: 1.3.6.1.4.1.43665.2.138.5.1.0.5 (iso.3.6.1.4.1.43665.2.138.5.1.0.5)
        v 1.3.6.1.4.1.43665.2.138.5.2.1: 506f7274203320506f45205044206f6666
            Object Name: 1.3.6.1.4.1.43665.2.138.5.2.1 (iso.3.6.1.4.1.43665.2.138.5.2.1)
            Value (OctetString): 506f7274203320506f45205044206f6666
```

```
0000  b4 b6 86 e1 3b 78 38 b8  eb 21 5a 61 08 00 45 00   ····;x8· ·!Za··E·
0010  00 9b 05 9a 00 00 40 11  df 00 c0 a8 0a 03 c0 a8   ······@· ········
0020  0a 64 05 11 00 a2 00 87  06 ed 30 82 00 7b 02 01   ·d······ ··0··{··
0030  01 04 05 62 61 72 6f 78  a7 82 00 6d 02 04 06 36   ···barox ···m···6
0040  a5 70 02 01 00 02 01 00  30 82 00 5d 30 82 00 11   ·p······ 0··]0···
0050  06 08 2b 06 01 02 01 01  03 00 43 05 00 e0 1d 43   ··+····· ··C····C
0060  1b 30 82 00 1d 06 0a 2b  06 01 06 03 01 01 04 01   ·0·····+ ········
0070  00 06 0f 2b 06 01 04 01  82 d5 11 02 81 0a 05 01   ···+···· ········
0080  00 05 30 82 00 23 06 0e  2b 06 01 04 01 82 d5 11   ··0··#·· +·······
0090  02 81 0a 05 02 01 04 11  50 6f 72 74 20 33 20 50   ········ Port 3 P
00a0  6f 45 20 50 44 20 6f 66  66                        oE PD of f
```

* Please pay attention to the respective software vendor‘s licencing conditions when using the software.

View of the information in the SNMP browser:



Description	Source	Time	Severity
.1.3.6.1.4.1.43665.2.138.5.1.0.7	192.168.10.3	2018-11-12 15:14:30	
.1.3.6.1.4.1.43665.2.138.5.1.0.5	192.168.10.3	2018-11-12 15:14:30	
.1.3.6.1.6.3.1.1.5.3	192.168.10.3	2018-11-12 15:14:30	

Source: 192.168.10.3 **Timestamp:** 10444 hours 43 minutes 25 seconds **SNMP Version:** 2
Trap OID: .1.3.6.1.4.1.43665.2.138.5.1.0.5 **Community:** barox
Variable Bindings:

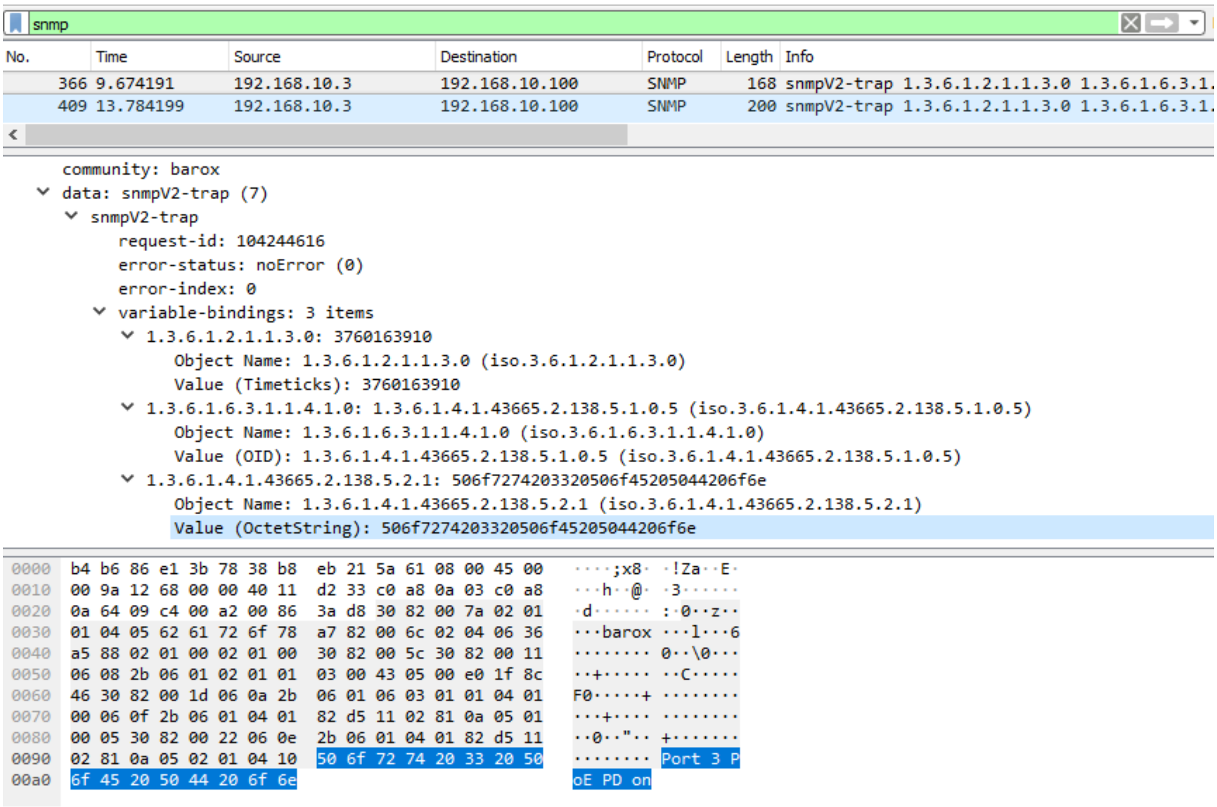
Name: .iso.org.dod.internet.mgmt.mib-2.system.sysUpTime.0
Value: [TimeTicks] 10444 hours 43 minutes 25 seconds (3760100536)

Name: snmpTrapOID
Value: [OID] .1.3.6.1.4.1.43665.2.138.5.1.0.5

Name: .1.3.6.1.4.1.43665.2.138.5.2.1
Value: [OctetString] Port 3 PoE PD off

PoE camera is connected again / PD device is online:

Recording of the information, which is sent by the switch:



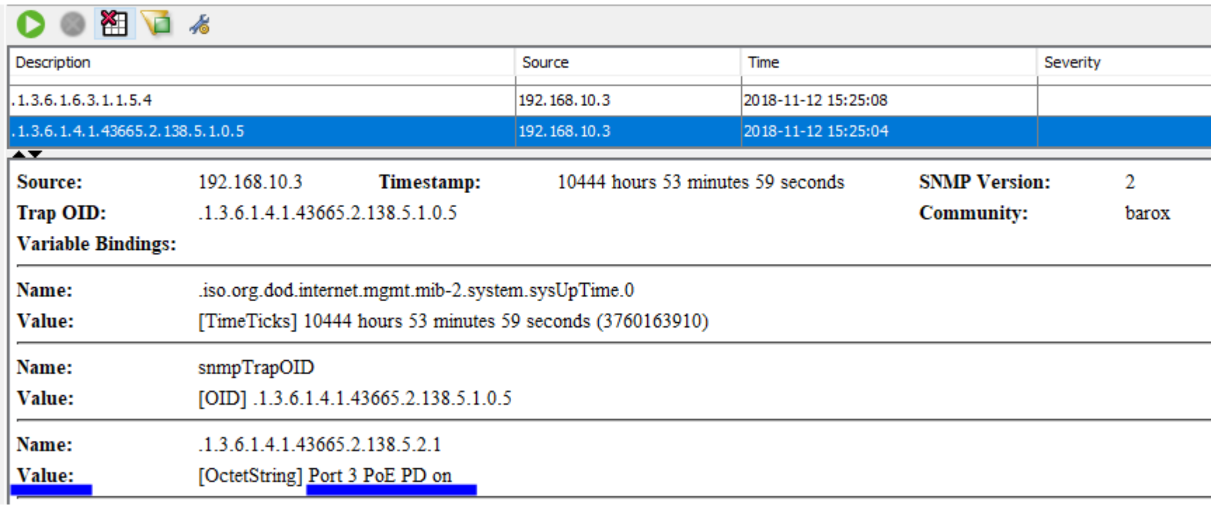
```
snmp
No.     Time        Source          Destination      Protocol  Length Info
    366 9.674191    192.168.10.3    192.168.10.100   SNMP         168 snmpV2-trap 1.3.6.1.2.1.1.3.0 1.3.6.1.6.3.1.
    409 13.784199   192.168.10.3    192.168.10.100   SNMP         200 snmpV2-trap 1.3.6.1.2.1.1.3.0 1.3.6.1.6.3.1.
```

```
    community: barox
  ˅ data: snmpV2-trap (7)
    ˅ snmpV2-trap
          request-id: 104244616
          error-status: noError (0)
          error-index: 0
      ˅ variable-bindings: 3 items
        ˅ 1.3.6.1.2.1.1.3.0: 3760163910
              Object Name: 1.3.6.1.2.1.1.3.0 (iso.3.6.1.2.1.1.3.0)
              Value (Timeticks): 3760163910
        ˅ 1.3.6.1.6.3.1.1.4.1.0: 1.3.6.1.4.1.43665.2.138.5.1.0.5 (iso.3.6.1.4.1.43665.2.138.5.1.0.5)
              Object Name: 1.3.6.1.6.3.1.1.4.1.0 (iso.3.6.1.6.3.1.1.4.1.0)
              Value (OID): 1.3.6.1.4.1.43665.2.138.5.1.0.5 (iso.3.6.1.4.1.43665.2.138.5.1.0.5)
        ˅ 1.3.6.1.4.1.43665.2.138.5.2.1: 506f7274203320506f45205044206f6e
              Object Name: 1.3.6.1.4.1.43665.2.138.5.2.1 (iso.3.6.1.4.1.43665.2.138.5.2.1)
              Value (OctetString): 506f7274203320506f45205044206f6e
```

```
0000  b4 b6 86 e1 3b 78 38 b8  eb 21 5a 61 08 00 45 00   ····;x8· ·!Za··E·
0010  00 9a 12 68 00 00 40 11  d2 33 c0 a8 0a 03 c0 a8   ···h··@· ·3······
0020  0a 64 09 c4 00 a2 00 86  3a d8 30 82 00 7a 02 01   ·d······ :·0··z··
0030  01 04 05 62 61 72 6f 78  a7 82 00 6c 02 04 06 36   ···barox ···l···6
0040  a5 88 02 01 00 02 01 00  30 82 00 5c 30 82 00 11   ········ 0··\0···
0050  06 08 2b 06 01 02 01 01  03 00 43 05 00 e0 1f 8c   ··+····· ··C·····
0060  46 30 82 00 1d 06 0a 2b  06 01 06 03 01 01 04 01   F0·····+ ········
0070  00 06 0f 2b 06 01 04 01  82 d5 11 02 81 0a 05 01   ···+···· ········
0080  00 05 30 82 00 22 06 0e  2b 06 01 04 01 82 d5 11   ··0··"·· +·······
0090  02 81 0a 05 02 01 04 10  50 6f 72 74 20 33 20 50   ········ Port 3 P
00a0  6f 45 20 50 44 20 6f 6e                            oE PD on
```

View of the information in the SNMP browser:

Frequently a value used for reading and interpreting, resp., the status/message of the SNMP message is added to the related OIDs (Object Identifier for Information Units) of the traps. In this example the last line is marked for illustration purposes.



Description	Source	Time	Severity
.1.3.6.1.6.3.1.1.5.4	192.168.10.3	2018-11-12 15:25:08	
.1.3.6.1.4.1.43665.2.138.5.1.0.5	192.168.10.3	2018-11-12 15:25:04	

Source: 192.168.10.3 **Timestamp:** 10444 hours 53 minutes 59 seconds **SNMP Version:** 2

Trap OID: .1.3.6.1.4.1.43665.2.138.5.1.0.5 **Community:** barox

Variable Bindings:

Name: .iso.org.dod.internet.mgmt.mib-2.system.sysUpTime.0

Value: [TimeTicks] 10444 hours 53 minutes 59 seconds (3760163910)

Name: snmpTrapOID

Value: [OID] .1.3.6.1.4.1.43665.2.138.5.1.0.5

Name: .1.3.6.1.4.1.43665.2.138.5.2.1

Value: [OctetString] Port 3 PoE PD on

5.7 Use of MIB Files for Reading-out and Control of the Switches

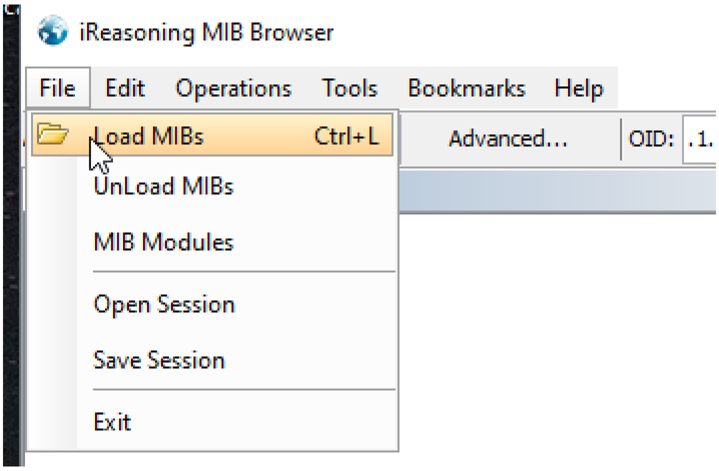
Fundamentally status enquiries for manageable devices in the network such as switches, routers or servers must mostly be effected using the SNMP functionality. For security reasons or because of manufacturer-specific aspects so-called MIB files are frequently required for enquiring the devices. These files comprise information about the identification parameters of the functions.

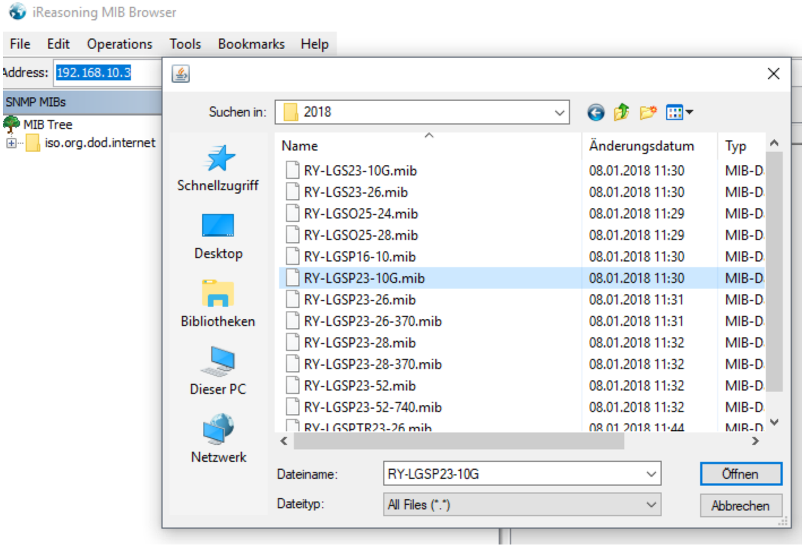
Enquiry of Switch Status Functions using SNMP and MIB Files

As an introduction the use of an MIB browser is fundamentally recommended. The *“iReasoning MIB Browser“ (http://www.ireasoning.com/mibbrowser.shtml) is used in the example for a user-friendly view. Furthermore the browser must be configured with the respective SNMP parameters for connecting to the respective switch.

Step 1: Import of the MIB File

During the import attention must be paid for selecting the suitable MIB file for the respective switch. The required MIB files can be identified by their prefix “*mib*”.





Address: 192.168.10.3

Suchen in: 2018

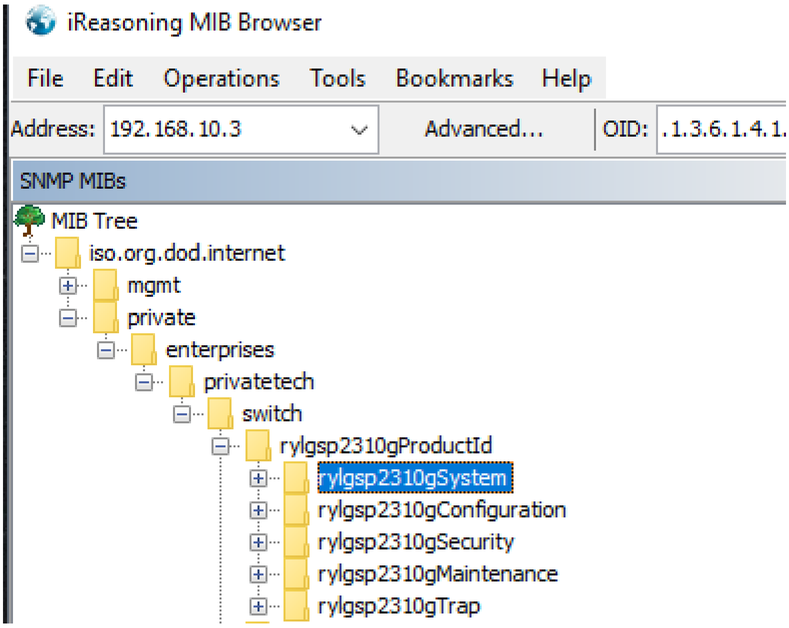
Name	Änderungsdatum	Typ
RY-LGS23-10G.mib	08.01.2018 11:30	MIB-D
RY-LGS23-26.mib	08.01.2018 11:30	MIB-D
RY-LGSO25-24.mib	08.01.2018 11:29	MIB-D
RY-LGSO25-28.mib	08.01.2018 11:29	MIB-D
RY-LGSP16-10.mib	08.01.2018 11:30	MIB-D
RY-LGSP23-10G.mib	08.01.2018 11:30	MIB-D
RY-LGSP23-26.mib	08.01.2018 11:31	MIB-D
RY-LGSP23-26-370.mib	08.01.2018 11:31	MIB-D
RY-LGSP23-28.mib	08.01.2018 11:32	MIB-D
RY-LGSP23-28-370.mib	08.01.2018 11:32	MIB-D
RY-LGSP23-52.mib	08.01.2018 11:32	MIB-D
RY-LGSP23-52-740.mib	08.01.2018 11:32	MIB-D
RY-LGSPTR23-26.mib	08.01.2018 11:44	MIB-D

Dateiname: RY-LGSP23-10G

Dateityp: All Files (*.*)

* Please pay attention to the respective software vendor‘s licencing conditions when using the software!

Following the successful import the MIB structures are available as shown below:

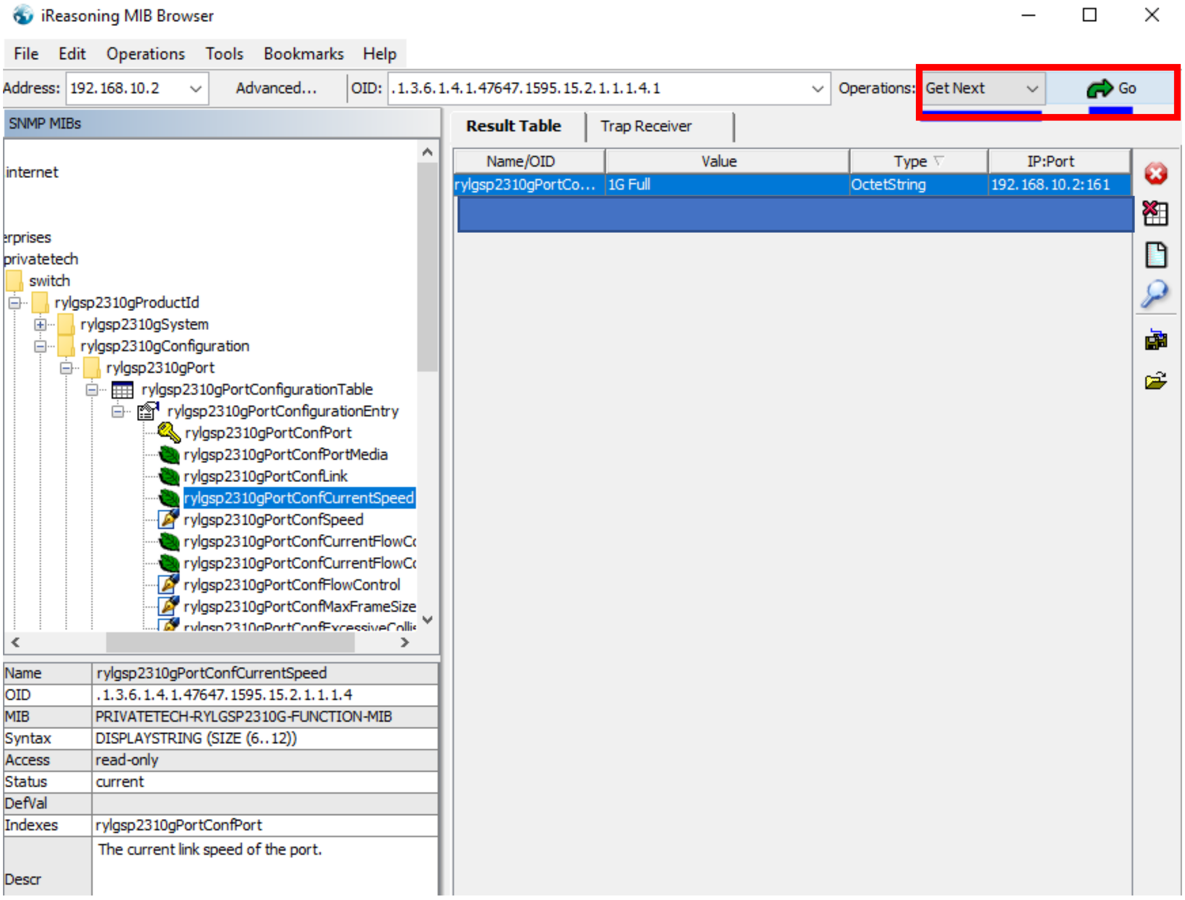


Address: 192.168.10.3

OID: .1.3.6.1.4.1.

Step 2: Generating Enquiries

For generating an enquiry the desired status is selected first. The enquiry is then generated using the operation "*Get Next*" and clicking "*Go*". Upon completion of a successful enquiry the status information is displayed in the results table as shown in the following example:


iReasoning MIB Browser
File
Edit
Operations
Tools
Bookmarks
Help
Advanced...
Go
SNMP MIBs
Result Table
Trap Receiver
internet
erprises
privatetech
switch
rylgsp2310gProductId
rylgsp2310gSystem
rylgsp2310gConfiguration
rylgsp2310gPort
rylgsp2310gPortConfigurationTable
rylgsp2310gPortConfigurationEntry
rylgsp2310gPortConfPort
rylgsp2310gPortConfPortMedia
rylgsp2310gPortConfLink
rylgsp2310gPortConfCurrentSpeed
rylgsp2310gPortConfSpeed
rylgsp2310gPortConfCurrentFlowCc
rylgsp2310gPortConfCurrentFlowCc
rylgsp2310gPortConfFlowControl
rylgsp2310gPortConfMaxFrameSize
rylgsp2310gPortConfExcessiveCollis

Address: 192.168.10.2

OID: .1.3.6.1.4.1.47647.1595.15.2.1.1.1.4.1

Operations: Get Next

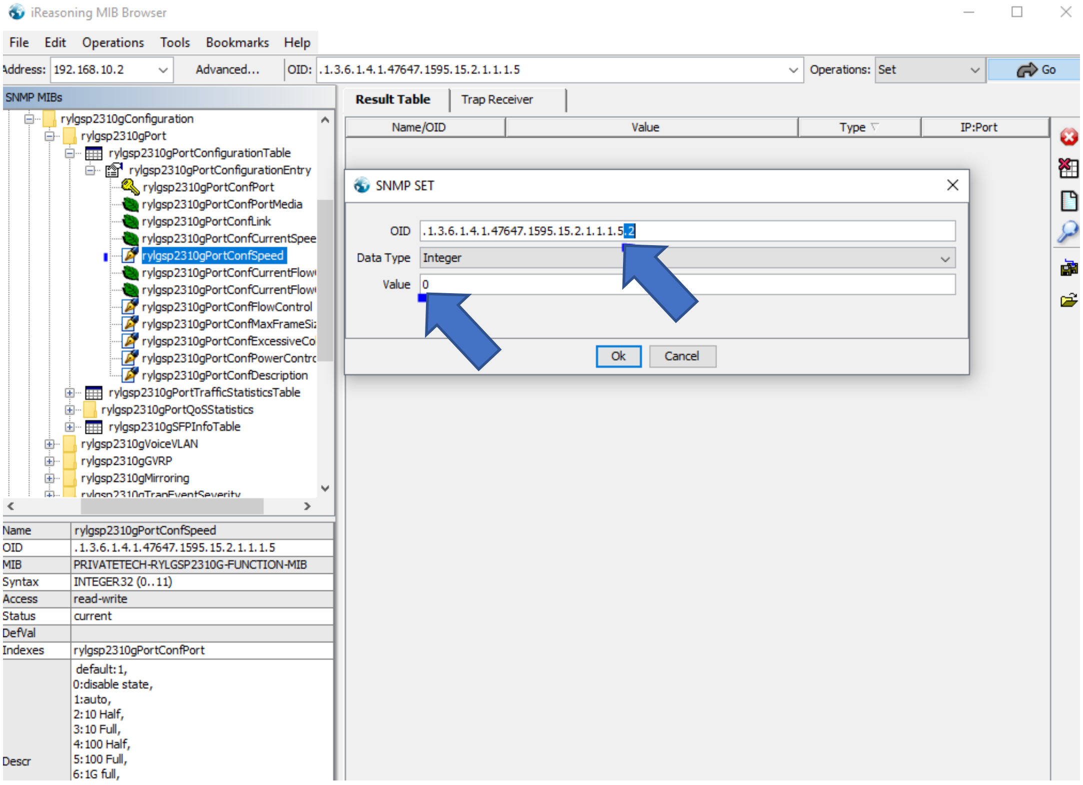
Name/OID	Value	Type	IP:Port
rylgsp2310gPortCo...	1G Full	OctetString	192.168.10.2:161

Name	rylgsp2310gPortConfCurrentSpeed
OID	.1.3.6.1.4.1.47647.1595.15.2.1.1.1.4
MIB	PRIVATETECH-RYLGSP2310G-FUNCTION-MIB
Syntax	DISPLAYSTRING (SIZE (6..12))
Access	read-only
Status	current
DefVal	
Indexes	rylgsp2310gPortConfPort
Descr	The current link speed of the port.

5.8 Control of Switch Functions via SNMP and MIB using the “SET” Operation

The “SET” operation via the SNMP protocol can be a further method for controlling barox switches. The basic SNMP configurations at the switch and of the MIB browser are preconditions. In the following an example for using the SET operation for triggering a port deactivation and re-activation at the switch is shown.

For the deactivation of port 2 of the switch the port configuration is searched in the MIB directory. When doing so attention must be paid for selecting the right information block with write function. The SET operation is opened by a click on “*Go*“ and the OID entry is complemented by “*.2*“ (label of port 2). In addition to this the value “*0*“ (for deactivation) is entered and confirmed by “OK”. A respective success message is generated upon a successful operation.


iReasoning MIB Browser
File
Edit
Operations
Tools
Bookmarks
Help
Advanced...
Go
SNMP MIBs
rylgsp2310gConfiguration
rylgsp2310gPort
rylgsp2310gPortConfigurationTable
rylgsp2310gPortConfigurationEntry
rylgsp2310gPortConfPort
rylgsp2310gPortConfPortMedia
rylgsp2310gPortConfLink
rylgsp2310gPortConfCurrentSpee
rylgsp2310gPortConfSpeed
rylgsp2310gPortConfCurrentFlow
rylgsp2310gPortConfCurrentFlow
rylgsp2310gPortConfFlowControl
rylgsp2310gPortConfMaxFrameSi
rylgsp2310gPortConfExcessiveCo
rylgsp2310gPortConfPowerContr
rylgsp2310gPortConfDescription
rylgsp2310gPortTrafficStatisticsTable
rylgsp2310gPortQoSStatistics
rylgsp2310gSFPInfoTable
rylgsp2310gVoiceVLAN
rylgsp2310gGVRP
rylgsp2310gMirroring
rylgsp2310gTrapEventSeverity
Result Table
Trap Receiver
Name/OID
Value
Type
IP:Port
SNMP SET
Ok
Cancel

Address: 192.168.10.2

OID: .1.3.6.1.4.1.47647.1595.15.2.1.1.1.5

Operations: Set

SNMP SET

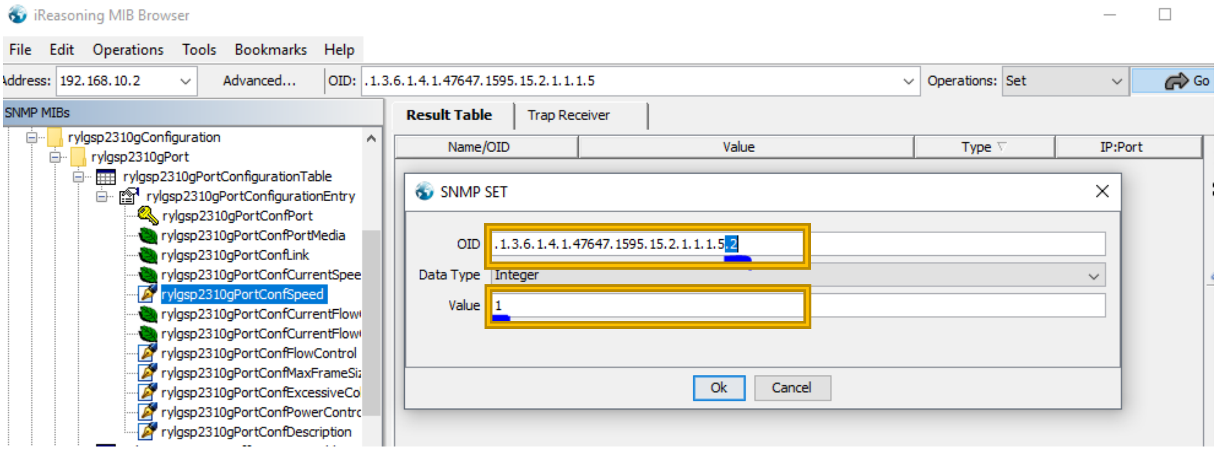
OID .1.3.6.1.4.1.47647.1595.15.2.1.1.1.5.2

Data Type Integer

Value 0

Name	rylgsp2310gPortConfSpeed
OID	.1.3.6.1.4.1.47647.1595.15.2.1.1.1.5
MIB	PRIVATETECH-RYLGSP2310G-FUNCTION-MIB
Syntax	INTEGER32 (0..11)
Access	read-write
Status	current
DefVal	
Indexes	rylgsp2310gPortConfPort
Descr	default:1, 0:disable state, 1:auto, 2:10 Half, 3:10 Full, 4:100 Half, 5:100 Full, 6:1G full,

For the activation of port 2 of the switch the port configuration is searched in the MIB directory. When doing so attention must be paid for selecting the respective information block with write function. The SET operation is opened by a click on “*Go*“ and the OID entry is complemented by “*.2*“ (label of port 2). In addition to this the value “*1*“ (for activation) is entered and confirmed by “OK”. A respective success message is generated upon a successful operation.



Address: 192.168.10.2

OID: .1.3.6.1.4.1.47647.1595.15.2.1.1.5

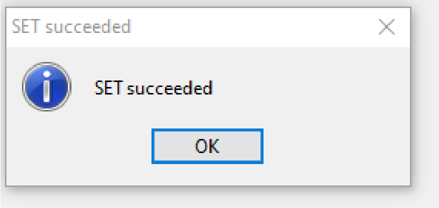
Operations: Set

rylgsp2310gConfiguration
rylgsp2310gPort
rylgsp2310gPortConfigurationTable
rylgsp2310gPortConfigurationEntry
rylgsp2310gPortConfPort
rylgsp2310gPortConfPortMedia
rylgsp2310gPortConfLink
rylgsp2310gPortConfCurrentSpee
rylgsp2310gPortConfSpeed
rylgsp2310gPortConfCurrentFlow
rylgsp2310gPortConfCurrentFlow
rylgsp2310gPortConfFlowControl
rylgsp2310gPortConfMaxFrameSi
rylgsp2310gPortConfExcessiveCo
rylgsp2310gPortConfPowerContr
rylgsp2310gPortConfDescription

OID: .1.3.6.1.4.1.47647.1595.15.2.1.1.5.2

Data Type: Integer

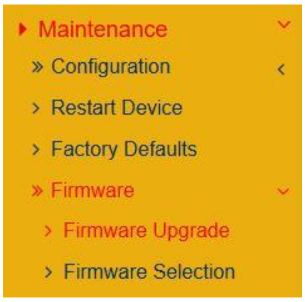
Value: 1

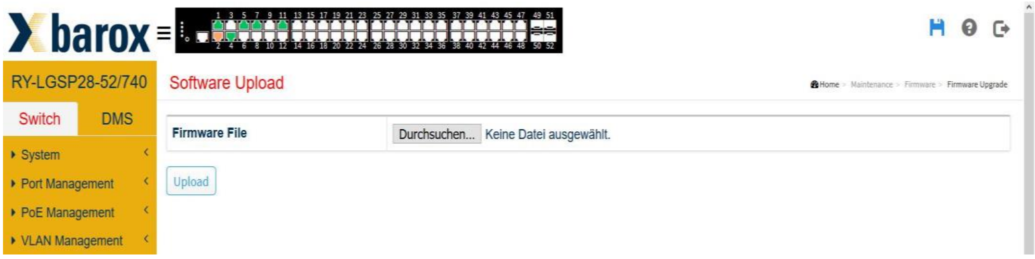


SET succeeded

6 Firmware Upgrade

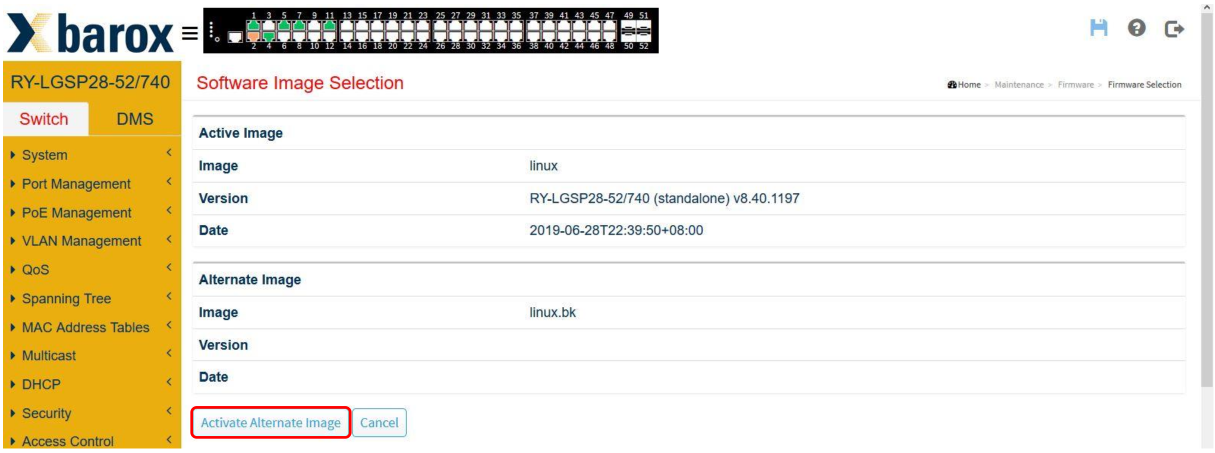
It is recommended to sporadically update the firmware as the software is regularly updated to remove bugs. New features are also introduced.





Firmware File: Keine Datei ausgewählt.

Following the upgrade the new firmware is immediately available. Any old firmware can very simply be re-activated in the menu “Firmware Selection” where the old firmware shall be applied again for some reason.



Active Image	
Image	linux
Version	RY-LGSP28-52/740 (standalone) v8.40.1197
Date	2019-06-28T22:39:50+08:00

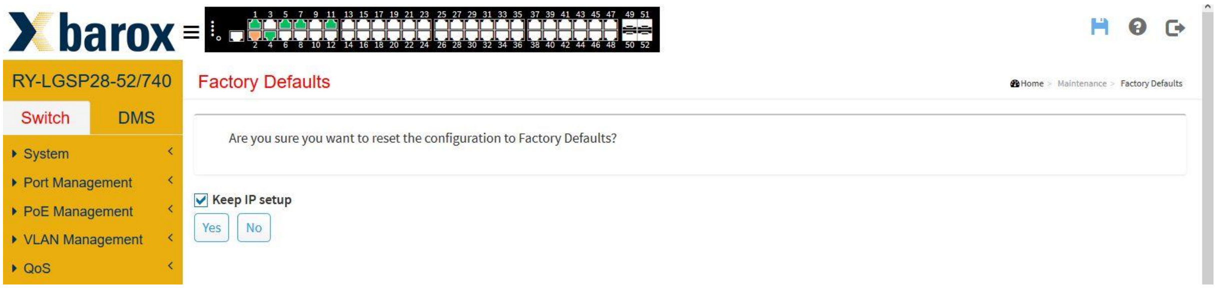
Alternate Image	
Image	linux.bk
Version	
Date	

7 Factory Defaults

The switches can be reset to the factory defaults at any time.

This is done either via the “Maintenance/Factory Defaults” menu or by pressing the reset button at the front (for longer than 10 seconds).

Checking the “Keep IP setup” box ensures that the switch retains the configured IP address. Otherwise, everything is reset to the factory defaults.



Are you sure you want to reset the configuration to Factory Defaults?

☑ Keep IP setup

8 WARRANTY

barox Kommunikation guarantees that their products shall remain free from material and machining faults for the duration of the warranty period specific to the country in question. The warranty provided by barox Kommunikation is totally independent from any other guarantee commitment on the part of the vendor resulting from the respective purchase contract with the end customer and shall not affect this commitment in any way.

barox Kommunikation shall remedy any product defects caused by poor material quality and/or a machining error of which barox Kommunikation is notified during the warranty period. barox Kommunikation shall then decide at their own discretion what measures to take to alleviate the defect. The warranty for any repaired or replaced components shall then continue to apply for the remaining warranty period.

The warranty programme shall not apply to any products from which the serial numbers have been removed, rendered illegible or changed. In addition, the warranty shall not cover the following damage:

1. Damage caused by an accident or improper or incorrect operation of the device, in particular, non-compliance with the instructions for use applying to the respective product
2. Damage caused by using components not manufactured or sold by barox Kommunikation
3. Damage caused by changes made without the prior written approval of barox Kommunikation
4. Damage caused by maintenance work not carried out by barox Kommunikation or authorised representatives of barox Kommunikation
5. Damage caused during transport, through negligence, fluctuations in or loss of the power supply, force majeure or the operating environment
6. Damage due to normal wear and tear
7. Damage caused by computer viruses or other software
8. Damage caused by setting, resp. reconfiguring passwords

For any services supplied by barox Kommunikation in connection with remedying defects or damage as a result of any of the grounds for exclusion listed above, an additional fee for manpower, transport and parts shall be incurred. An additional fee shall be charged for reinstalling the original software.