



# Technical Bulletin

## PAVIRO Network Configuration Guide – v2.0

**Related Products:**

PAVIRO Controller PVA-4CR12

**Severity:**

- Immediate action required
- Action strongly recommended
- Informative

### PAVIRO Network Configuration Guide

This Technical Bulletin describes the configuration of a PAVIRO network.

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## 1. Introduction

This Technical Bulletin covers the configuration of a specific Barox switch for use with a PAVIRO network. The interface, shown in the Technical Bulletin, is specific for the Barox LT-L802GBTME switch. Other switches will have different management interfaces.

The Barox LT-L802GBTME switch must be used for networked PAVIRO systems to meet the EN54-16. In case fiber connectors are required, the AC-SFP-SX-E or AC-SFP-LX-E-10 SFP modules must be used. For EN54-16 systems, the switch must be powered by a PLN-24CH12 power supply.

Please order the switch directly at Barox by using the following order reference: “LT-L802GBTME/BO”. You will receive a LT-L802GBTME switch with firmware, required for an EN54-16 certified networked PAVIRO system. This switch is preconfigured to meet the specifications of a networked PAVIRO system.

The certified switch can be found at the Barox website by using the keyword “LT-L802GBTME/BO”. If you have the standard switch LT-L802GBTME, the switch must be updated with PAVIRO specific firmware and configuration file, available on Bosch website.

### Notice!

If you need to exchange a switch of an already existing networked PAVIRO system, you can use the LT-L802GBTME. The current switch and the predecessor LT-802GBTME (FW v2.8.1b) can be used in one network, only when using IRIS-Net 4.0.1 and higher. Both switches need to be configured according to their respectively network configuration guide using RSTP. ERPS is not supported in such a mixed setup.

## 2. Basics

The Barox LT-L802GBTME switches should be configured as follows:

Parameter	Description	Default settings
IP address	Generally individual IP addresses are mandatory for all networks with multiple devices.  Switches are allowed to have identical IP addresses in case no access to the web interface is needed.	IP address: 192.168.1.254 subnet mask: 255.255.255.0
Firmware	Same switch firmware and boot loader is recommended for all networks with multiple switches.	FW: v3.0.3b
Rapid Spanning Tree Protocol (RSTP)	For redundant connection (ring, mesh) of multiple racks. Mandatory for all networks where ring or mesh connections are used.	Configured and activated for all ports with the Dante™ suitable parameters:  Hello Time: 9 Forward Delay: 30 Max Age: 22
Green Mode / Green Ethernet	Feature for saving energy in Ethernet switches during periods with low network activity.  Green Mode very likely causes synchronization issues on a Dante network with device clocks drifting away from the system-wide clock. Thus the Green Mode needs to be completely deactivated.	Deactivated
Fault contact	The switch has to transfer a fault information to the PA system via fault relay (mandatory for EN54-16 systems).	Not configured  The configuration of the fault relay has to be done individually to fit the system wiring.
Internet Group Management Protocol (IGMP) Snooping	This is a feature for the control of multicast traffic. The IGMP Snooping function analyzes IGMP packets between hosts and multicast routers. If IGMP snooping is active, but no querier is defined, it can cause problems with the audio master and thus needs to be disabled.	Deactivated
Storm Protection	This is a feature for saving bandwidth. If the Broadcast/Unicast/Multicast storm is over a certain threshold, the switch will automatically filter out the broadcast frames.  This function can cause problems with the audio network and the IRIS-Net Device Scan. Thus storm protection options need to be disabled.	Deactivated

Parameter	Description	Default settings
System Log	<p>The logging function records the events that occur in the switch. This function helps to understand the activity of the switch and diagnose problems.</p>	<p>Active</p> <p>System Log via external server is disabled.</p>
Virtual LANs	<p>Virtual LANs (Local Area Network) are used to separate a physical LAN into multiple logical sub-networks.</p> <p>Trunk Ports:</p> <ul style="list-style-type: none"> <li>- For easy connection of multiple racks with VLANs.</li> <li>- Trunk ports must carry all VLANs.</li> <li>- Mandatory for all networks where multiple switches and VLANs are used.</li> </ul> <p>VLANs are not needed for a PAVIRO network, these details are provided for completeness.</p>	<p>One VLAN is configured. All ports are on VLAN 1. The web interface can be accessed via VLAN 1.</p>

**Notice!**

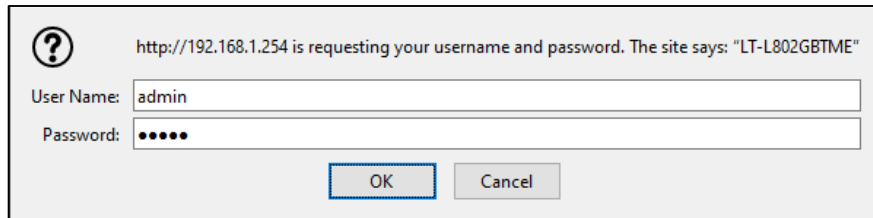
Save the configuration.

After making changes to the switch configuration do not forget to save the configuration permanently – otherwise the configuration will be lost after a reboot.

### 3. Adapt configuration

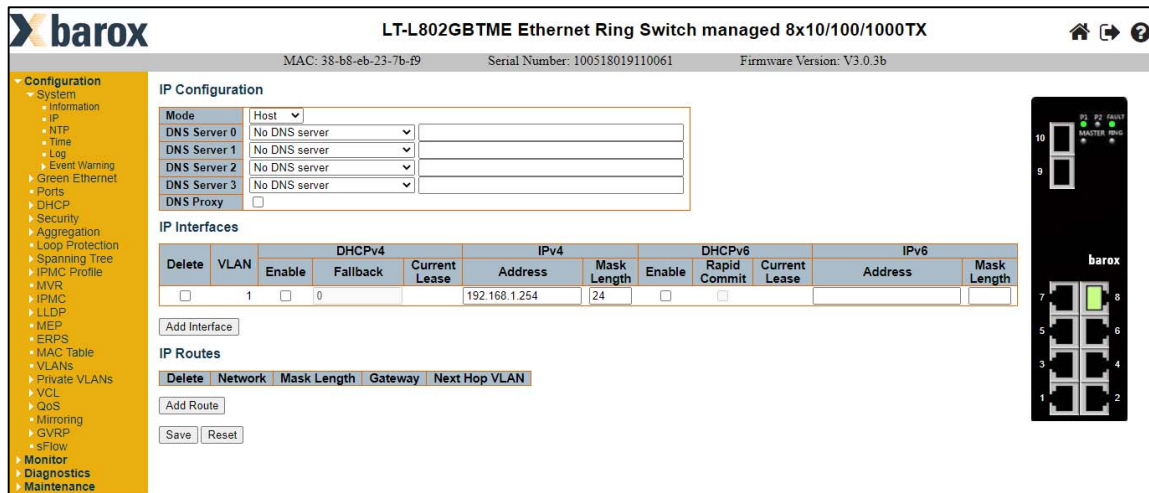
#### 3.1. Login via webservice

1. Connect to the switch’s default IP address 192.168.1.254 via the web browser.
2. Enter user name “admin” and password “admin” and click on the OK button to login.



#### 3.2. Change IP address

1. Go to *Configuration > System > IP*.
2. Change *IP Address* and *Subnet Mask*.
3. Change *Gateway address* and *DNS address* (optional).  
If you have a network with multiple (interconnected) Subnets, a Gateway can be defined.
4. Click on the *Apply* button.
5. Reconnect to the new IP address and log in again.



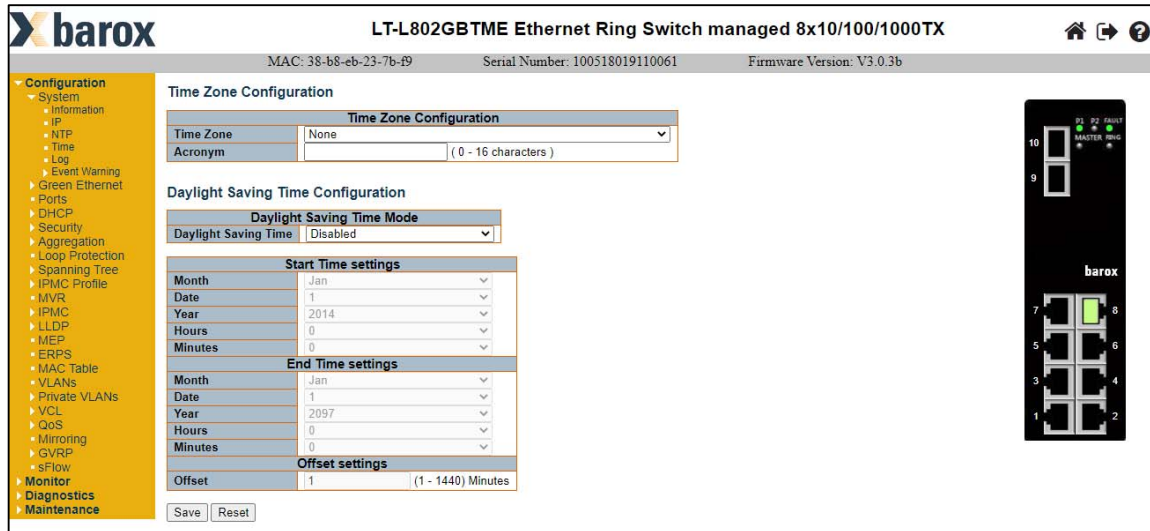
**Notice!**

The label-based audio routing used by Audinate’s Dante protocol, will not support multiple Subnets and works only in a single Subnet with flat hierarchy. Other Audio Routing implementations, like direct Routing over Audio Routed Network Interface (ARNI), are currently NOT supported in IRIS-Net and PAVIRO.

### 3.3. System time and system information

#### Edit System Time

1. Go to *Configuration > System > Time*.
2. Select the *Time Zone*.
3. Click on the *Save* button.

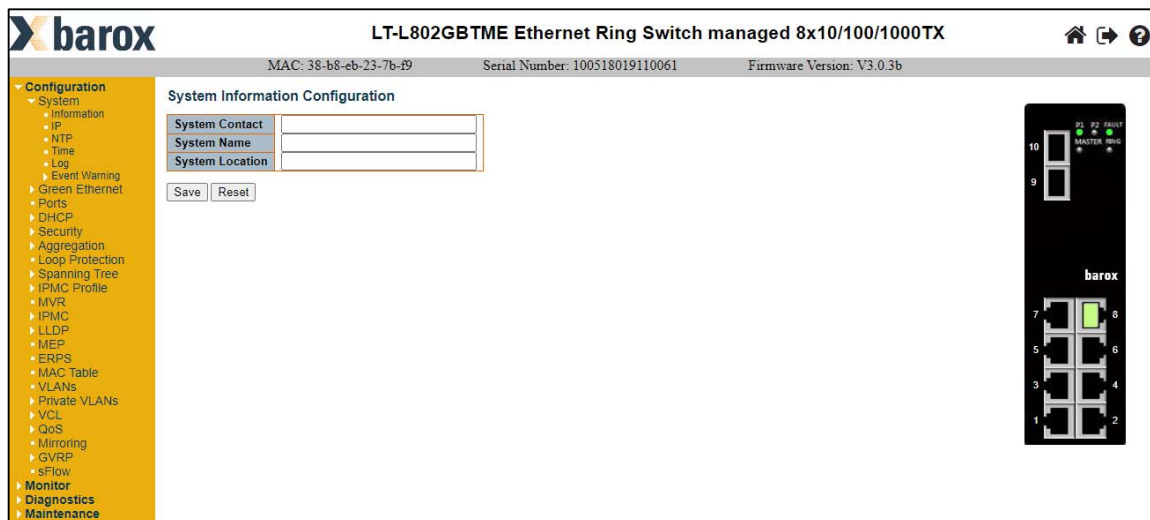


#### Notice!

The switch can also be synched to a NTP server (*Configuration > System > NTP*).

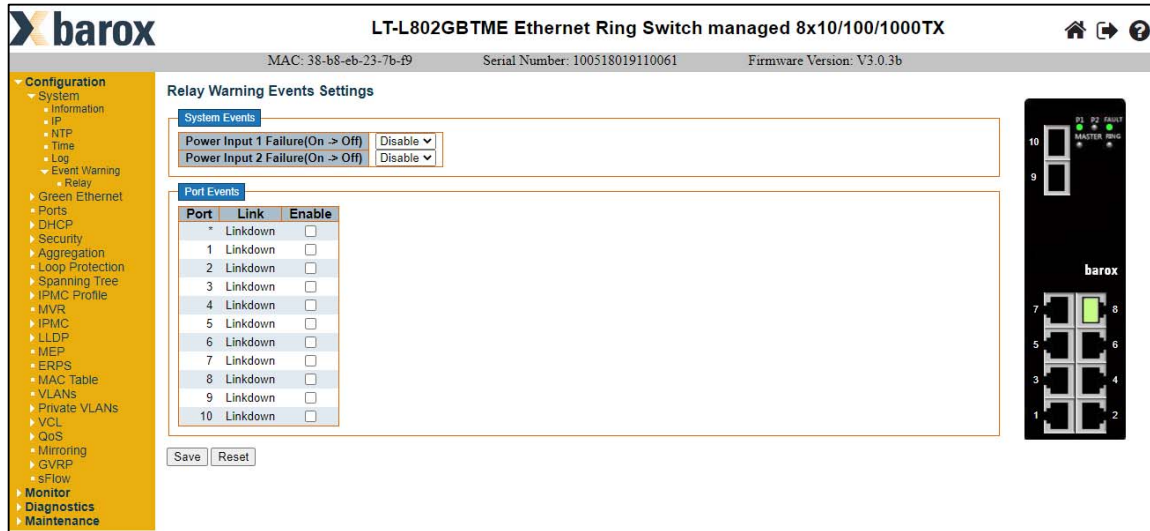
#### Edit system information (contact, name and location)

1. Go to *Configuration > System > Information*.
2. Enter a *System Contact*, *System Name* and a *System Location*.



### 3.4. Fault Contact

1. Go to *Configuration > System > Event Warning > Relay*.
2. Configure due to the requirements of the system, when the relay should be active.
3. Click the *Save* button.

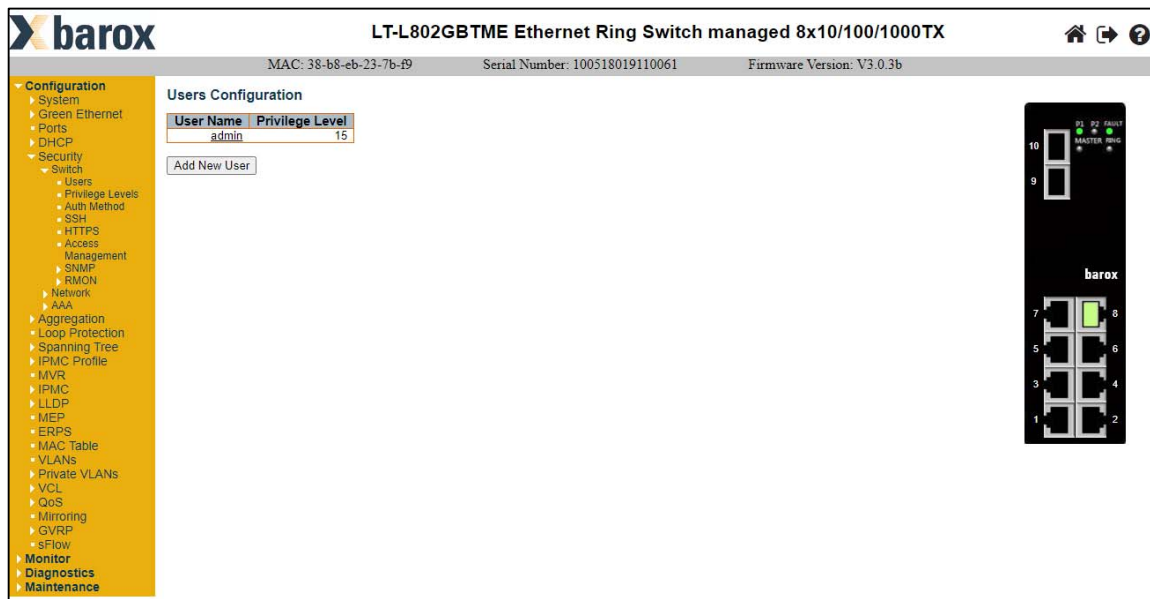


Notice!  
Do not forget to save the changes made!

### 3.5. Change admin password

1. Go to *Configuration > Security > Switch > Users*.
2. Click on the *admin* to edit the password of the administrative account.

Notice!  
Please change this password for every switch in your network, to comply with EN54-16 standards.



### 3.6. System Log

The switch offers two options of viewing the log entries:

#### Option 1

View the Log entries via the web browser:

1. Go to *Monitor > System > Log*.
2. Select the *Syslog Level*.
3. Click on the ID to see more details about a logging entry.

Notice!

Logging entries can be deleted by selecting the *Clear Level* and pressing the *Clear* button!

LT-L802GBTME Ethernet Ring Switch managed 8x10/100/1000TX

MAC: 38-b8-eb-23-7b-f9    Serial Number: 100518019110061    Firmware Version: V3.0.3b

System Log Information

Level: All    Clear Level: All

The total number of entries is 15 for the given level.

Start from ID 1 with 20 entries per page.

ID	Level	Time	Message
1	Informational	1970-01-01T00:00:01+00:00	SYS-BOOTING: Switch just made a cold boot.
2	Notice	1970-01-01T00:00:06+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to down.
3	Warning	1970-01-01T00:00:12+00:00	Power P1 plugin
4	Notice	1970-01-01T00:04:43+00:00	LINK-UPDOWN: Interface GigabitEthernet 1/8, changed state to up.
5	Notice	1970-01-01T00:04:44+00:00	LINK-UPDOWN: Interface GigabitEthernet 1/8, changed state to down.
6	Notice	1970-01-01T00:04:48+00:00	LINK-UPDOWN: Interface GigabitEthernet 1/8, changed state to up.
7	Notice	1970-01-01T00:04:52+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to up.
8	Notice	1970-01-01T00:06:08+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to down.
9	Warning	1970-01-01T00:06:08+00:00	Power P1 plugin
10	Notice	1970-01-01T00:06:37+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to up.
11	Notice	1970-01-01T00:07:03+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to up.
12	Notice	1970-01-01T00:07:37+00:00	LINK-UPDOWN: Interface GigabitEthernet 1/8, changed state to down.
13	Notice	1970-01-01T00:07:37+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to down.
14	Notice	1970-01-01T00:07:44+00:00	LINK-UPDOWN: Interface GigabitEthernet 1/8, changed state to up.
15	Notice	1970-01-01T00:07:46+00:00	LINK-UPDOWN: Interface Vlan 1, changed state to up.

#### Option 2

View the Log entries via an external Server:

1. Go to *Configuration > System > Log*.
2. Enable the System Log by enabling the *Server Mode*.
3. Add the *Server Address*.
4. Select the *Syslog Level*.
5. Click the *Save* button.

LT-L802GBTME Ethernet Ring Switch managed 8x10/100/1000TX

MAC: 38-b8-eb-23-7b-f9    Serial Number: 100518019110061    Firmware Version: V3.0.3b

System Log Configuration

Server Mode: Disabled

Server Address: [Empty]

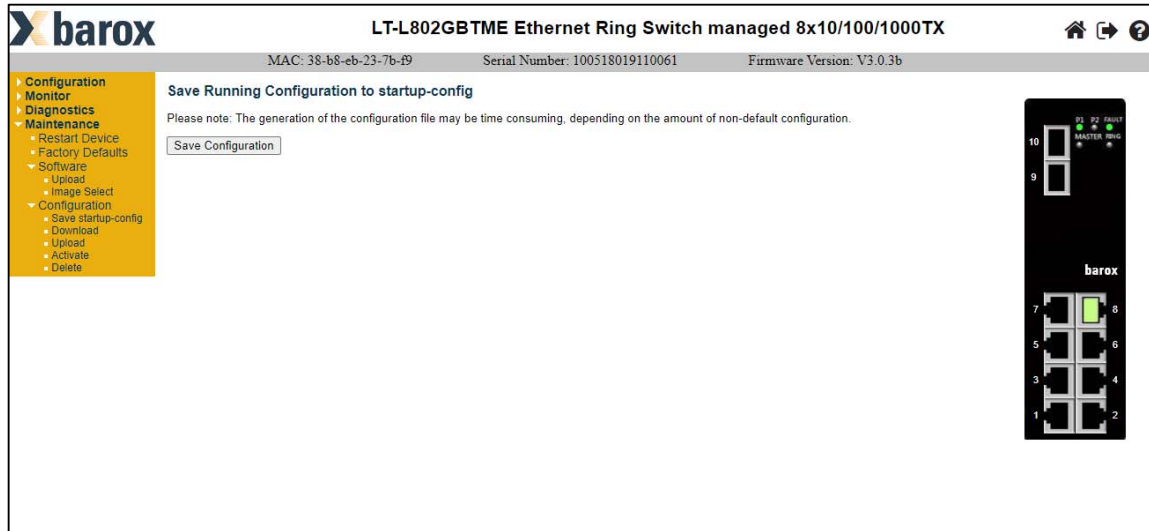
Syslog Level: Informational

Save    Reset



### 3.7. Save running configuration on the switch

1. Go to *Maintenance > Configuration > Save startup-config*.
2. Save the running configuration as startup configuration by clicking the *Save Configuration* button.



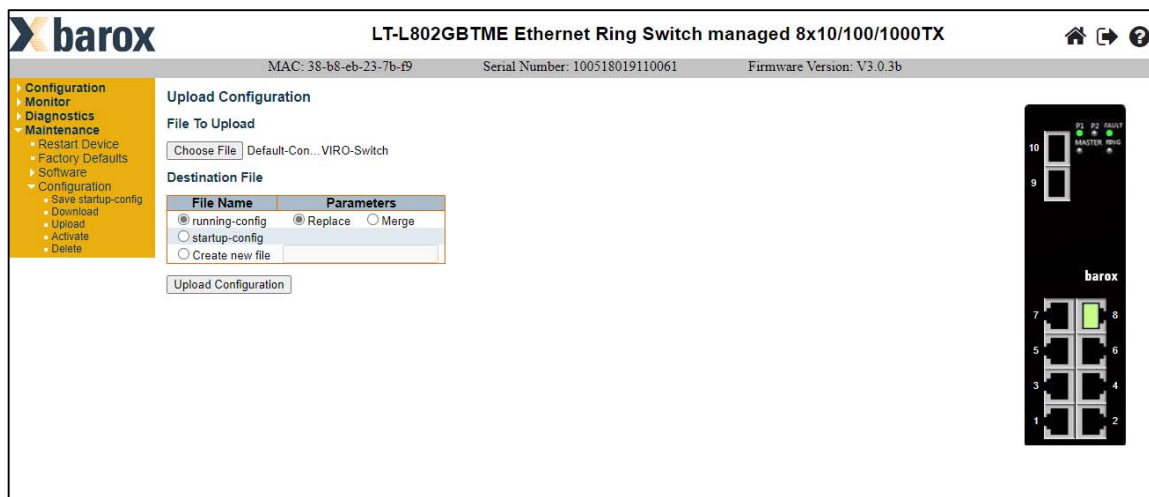
### 3.8. Upload and download the configuration

#### Upload a configuration file

1. Go to *Maintenance > Configuration > Upload*.
2. Click on *Choose File* and select a configuration file.
3. Select under *Destination File* the following:
  - File Name > running-config
  - Parameters > Replace
4. Click on the *Upload Configuration* button.

#### Notice!

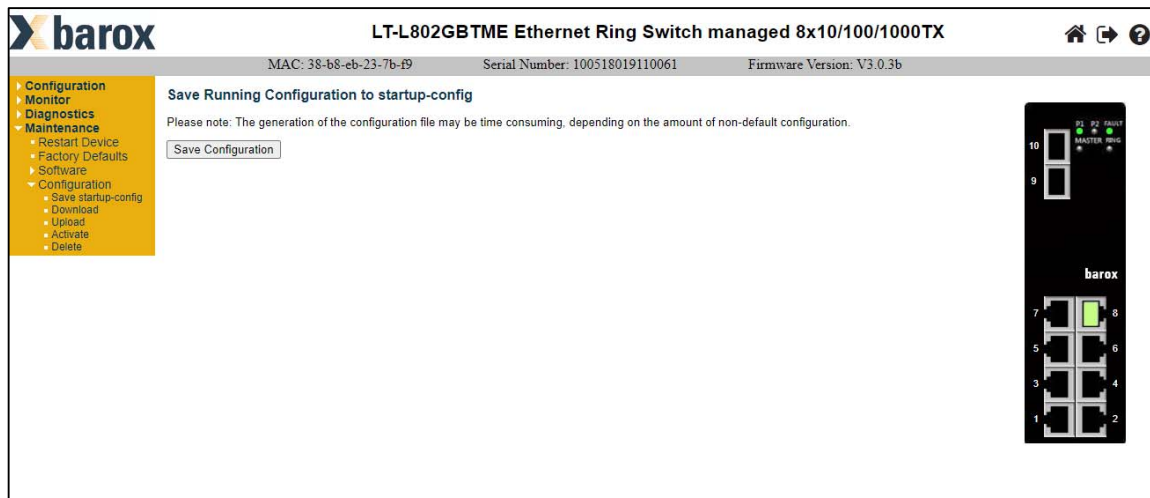
A notification will show that the configuration is activated.



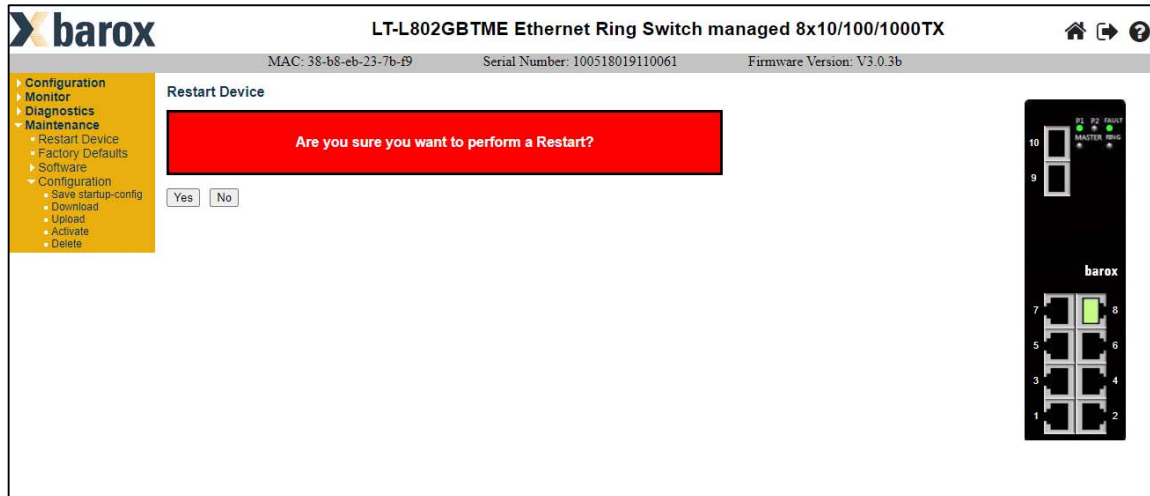
5. Go to *Maintenance > Configuration > Save startup-config*.
6. Click on the *Save Configuration* button.

**Notice!**

The running configuration will be saved as startup-config.

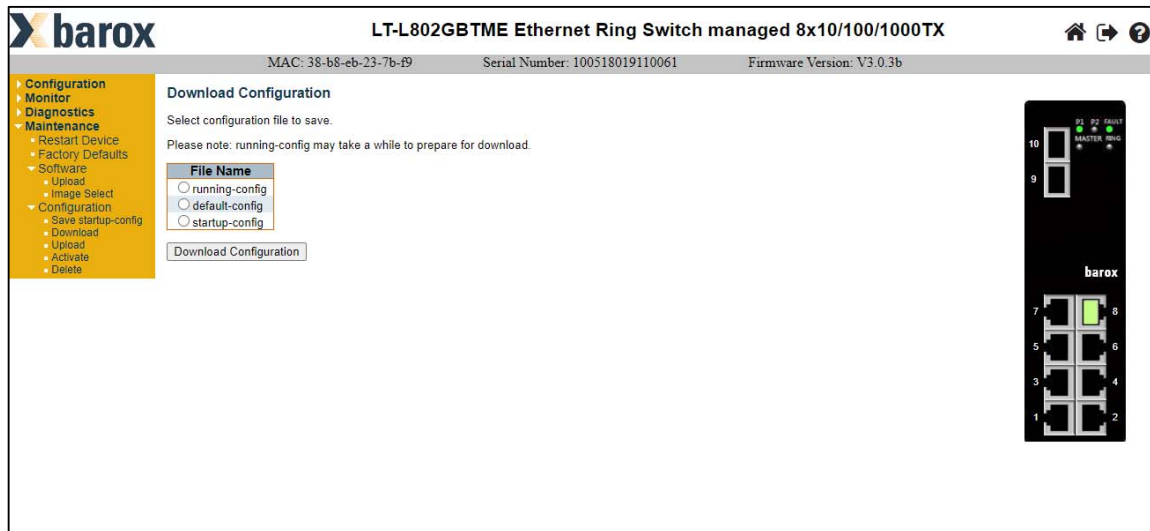


7. Go to *Maintenance > Restart Device*.
8. Click on the *Yes* button.



### Download the configuration to a PC

1. Go to *Maintenance > Configuration > Download*.
2. Select which configuration file to download on your PC.
3. Click the *Download Configuration* button to download the configuration file on your PC.

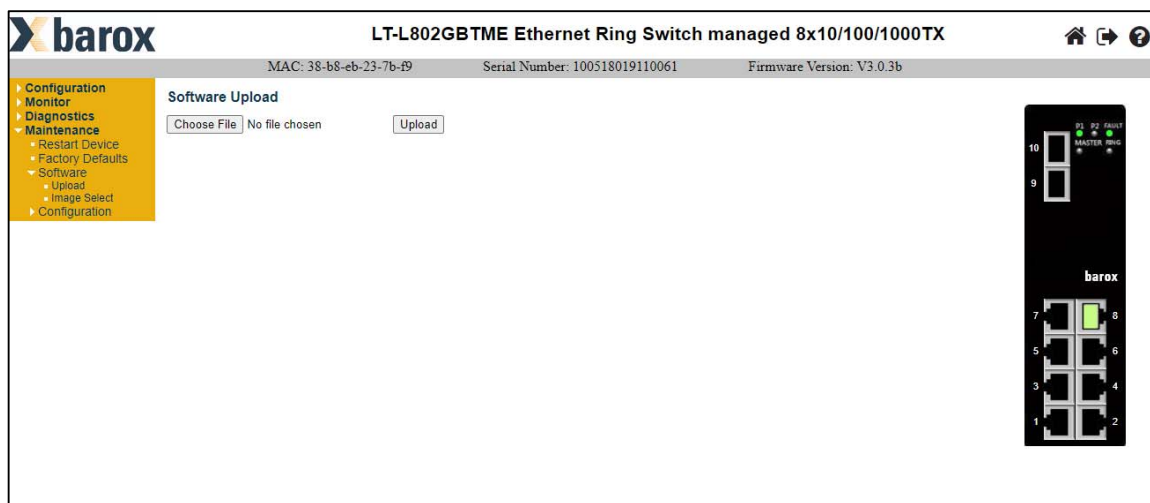


## 4. Firmware update

1. Check the *Firmware Version* in the grey bar on the top of the window.
2. If an update is necessary go to *Maintenance > Software > Upload*.
3. Click on *Choose File*, select a firmware and click *Upload*.
4. After the firmware is uploaded, a page announces that the firmware update is initiated. The switch will restart, when the firmware update is finished.

### Notice!

Please use correct firmware v3.0.3b and check the Barox LT-L802GBTME manual for more details about firmware and boot loader updating.



## 5. Reset the switch to factory defaults

There are two options to reset the configuration of the switch:

**Option 1:** Press the recessed RESET button on the switch until the fault LED flashes alternately red and green (about 5 seconds).

Notice!

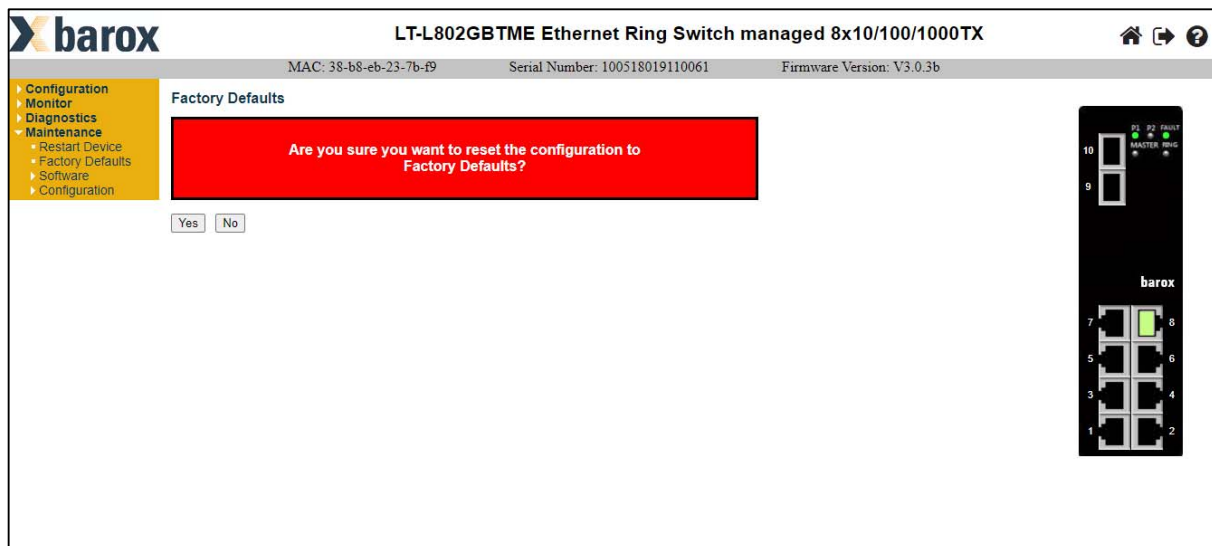
The switch will restart and load the factory default configuration.



**Option 2:** Go to *Maintenance > Factory Defaults* and press the Yes button.

Notice!

The new configuration is available immediately. No restart is necessary and the IP configuration is retained.



## 6. PC network settings

For the configuration of a new Barox LT-L802GBTME switch, assign an IP address from the 192.168.1.1 to 192.168.1.253 range and subnet mask 255.255.255.0 to your PC network interface.

Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

Obtain an IP address automatically

Use the following IP address:

IP address: 192 . 168 . 1 . 19

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

Validate settings upon exit

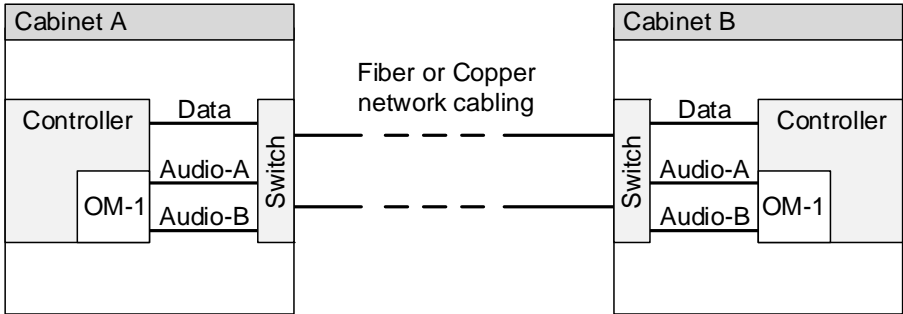
Advanced...

OK Cancel

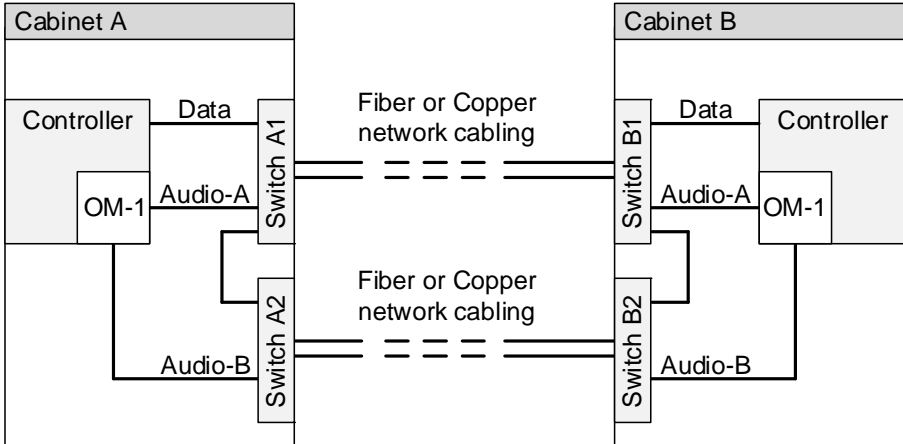
## 7. Redundant Network Setup

If redundant cabling between racks is required, there are three different ways to realize this:

### Redundant network setup with RSTP configured switches (single ring)



### Redundant network setup with RSTP configured switches (double ring)



Notice!  
If using a double ring, it is necessary to make a connection between the two rings in each cabinet.

## 8. Switch Specification

The switch for a PAVIRO system needs to fulfill the following specifications:

Feature	Standard	Description
1Gbit full duplex copper ports	IEEE802.3	Standard for Dante. Switch latency is maximal 10µs with 1 Gbit.
1Gbit full duplex fiber optic ports (SFP modules)	IEEE802.3	Needed for distances > 100m.
Switch has to be manageable (via web browser or at least by telnet/serial console)	n.a.	Switch needs to be configurable.
Energy Efficient Ethernet (EEE) deactivateable	IEEE 802.3az	Most implementations of EEE (also known as Green Ethernet) cause problems because of implementation flaws. A good implementation should work but does not save energy since the Precision Time Protocol (PTP) synchronization avoids this. Therefore it must be possible to disable EEE (this is not possible with unmanaged switches).
Wire speed switching	n.a.	If package switching is managed by software, variable latency can occur. This can cause network streaming problems which must be avoided.
Full Quality of Service (QoS) through differentiated services (DiffServ) on all Ports and on Backplane. QoS with a minimum of 4 queues and strict priority packet scheduling	DiffServ QoS	We recommend to use DiffServ (DSCP) QoS with priorities for 4 queues. Quality of Service (QoS) enables for prioritizing the transfer of specific data. Configuring the QoS as recommended by Dante on a network switch, give Dante clock synchronization (PTP) top priority and give audio data the next highest priority over background data traffic. This will ensure Dante audio streaming performance, when control data over the same network is transferred. This ensures that control data still goes through when transferring massive amounts of audio data.
Rapid Spanning Tree (RSTP) support	IEEE802.1d-2004	To allow the creation of loops for redundancy (e.g. ring topology).
Fault contact	EN54-16	Required for connection and switch supervision.
Redundant power supply option	n.a.	Minimum requirement is one 24V DC input (redundancy is ensured via the backup power supply / charger of the PAVIRO system).
MAC table >1000	n.a.	Recommended to avoid the switch starts broadcasting unicast packets because it runs out of space.
VLAN support (optional)	IEEE 802.1Q (tagged) or port based	Recommended for non EN54-16 systems to separate PAVIRO data from other traffic.