# Satyrn INDUSTRIAL SWITCHES

## SATYRN M SERIES
## USER MANUAL

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# 1 Getting to Know Your Switch

## *1.1 About the Satyrn M Series Industrial Switch*

The Satyrn M Series are powerful managed industrial switches with many features. These switches can work under wide range of temperatures, in dusty environments and in humid conditions. They can be managed by WEB, TELNET, Console or other third-party SNMP software as well. These switches can also be managed by a useful utility included with Comtrol's Satyrn switches called Satyrn View, a powerful network management software. With Satyrn View's easy-to-use interface, you can easily configure multiple switches at once and then monitor their status.

## *1.2 Software Features*

- The world's fastest Redundant Ethernet Ring (Recovery time < 10ms with up to 250 units)
- Ring Coupling, Dual Homing using Satyrn Ring and standard STP/RSTP/MSTP
- Support for SNMPv1/v2c/v3 & RMON as well as Port base/802.1Q VLAN Network Management
- Event notification by email, SNMP trap and Relay Output
- Web-based, Telnet, Console, and CLI configuration
- Enable/disable ports, MAC based port security
- Port based network access control (802.1x)
- VLAN (802.1Q) to segregate and secure network traffic
- Radius centralized password management
- SNMPv3 encrypted authentication and access security
- Quality of Service (802.1p) for real-time traffic
- VLAN (802.1Q) with double tagging and GVRP supported
- IGMP Snooping for multicast filtering
- Port configuration, status, statistics, mirroring, security
- Remote Monitoring (RMON)

## *1.3 Hardware Features*

- Three redundant DC power inputs ( two on terminal block & one on power jack)
- Wide operating temperature range: -40 to 70°C
- Storage temperature: -40 to 85°C

- Operating humidity: 5% to 95%, non-condensing
- Casing: IP-30
- 10/100Base-T(X) Ethernet port (all models)
- 10/100/1000Base-T(X) Gigabit Ethernet port (M062-EG)
- 100Base-FX Fibre port (M062-EM & M062-ES)
- 10/100/1000Base-X Fibre port (M062-EL & M062-ET)
- 10/100/1000Base-X on SFP port (M062-EQ)
- 10/100/1000BaseX Combo port (M073-EC)
- Console port

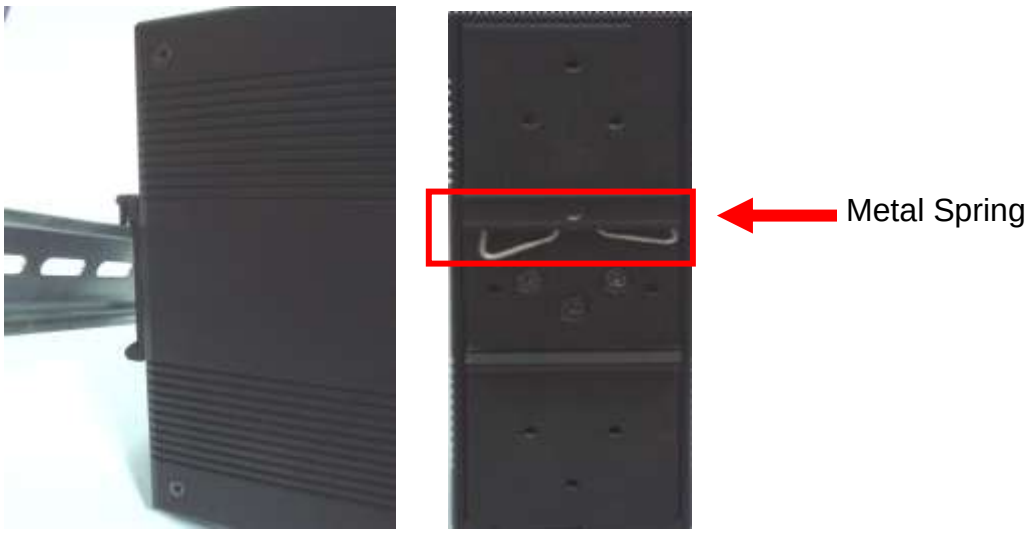
# 2 Hardware Installation

## *2.1 Installing Switch on DIN-Rail*

Each switch has a DIN-Rail kit on its rear panel. The DIN-Rail kit permits the switch to be fixed on a DIN-Rail without difficulty. Note the dimensions of the switch may vary but the principle of fixing remains the same.

## *2.2 Mounting M Series switches on to a DIN-Rail*

Step 1: Tilt the switch upwards and mount the metal spring on to the DIN-Rail.




Step 2: Push the switch downwards toward the DIN-Rail until you hear an audible “click”.

## 3.1 Wall Mounting Installation

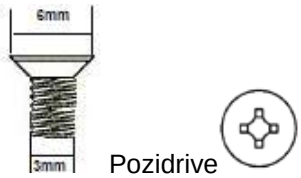
Each switch has an alternative installation option. A wall mount panel is included in the package. The following steps show how to mount the switch on the wall. Note the dimensions of the switch may vary but the principle of fixing remains the same.

### 2.2.1 Mount L Series switches on to a wall

Step 1: Remove the DIN-Rail kit.

Step 2: Take the 6 screws that are included in the package and use them to attach the included wall mount to the switch as the picture shows below:

The screw specifications are shown below in case replacements are needed. In order to avoid damaging the switches, screws that are larger than those included with the M series switches should not be used.

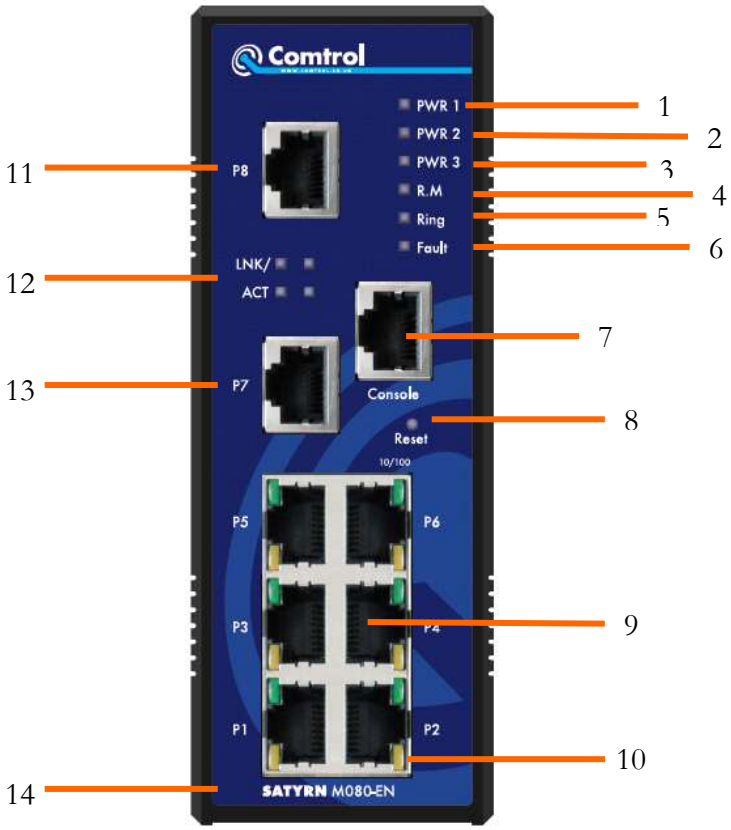



Step 3: Mount the switch with the attached wall mount unit to the wall.

# 3 Hardware Overview

## *3.1 Front Panel*

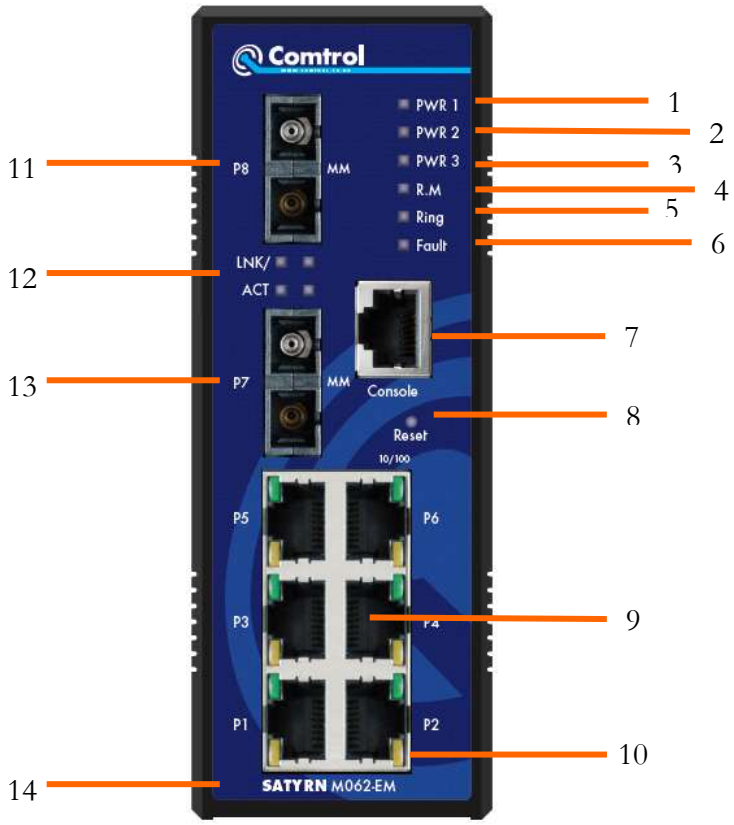
### 3.1.1 Satyrn M080-EN




1. Solid green LED when DC power module 1 active
2. Solid green LED when DC power module 2 active
3. Solid green LED when DC power jack active
4. Solid green LED when this switch is the Ring Master of the Satyrn-Ring.
5. Solid green LED when the Satyrn Ring is enabled
   Slow blinking green LED when there is a problem with the Satyrn-Ring topology
   Fast blinking green LED when the Satyrn-Ring is working properly
6. Solid amber LED if there is a power failure or port failure.
7. Console port (RS-232, RJ45)
8. Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.
9. 10/100Base-T(X) Ethernet ports.

10. LED for Ethernet ports status.
11. 10/100Base-T(X) Ethernet port.
12. LED for Ethernet port status
13. 10/100Base-T(X) Ethernet port.
14. Model name

### 3.1.2 Satyrn M062-EM & M062-ES




1 Solid green LED when DC power module 1 active

2 Solid green LED when DC power module 2 active

3 Solid green LED when DC power jack active

4 Solid green LED when this switch is the Ring Master of the Satyrn-Ring.

5 Solid green LED when the Satyrn Ring is enabled
Slow blinking green LED when there is a problem with the Satyrn-Ring topology
Fast blinking green LED when the Satyrn-Ring is working properly

6 Solid amber LED if there is a power failure or port failure.

7 Console port (RS-232, RJ45)

8 Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.

9 10/100Base-T(X) Ethernet ports.

10 LED for Ethernet ports status.

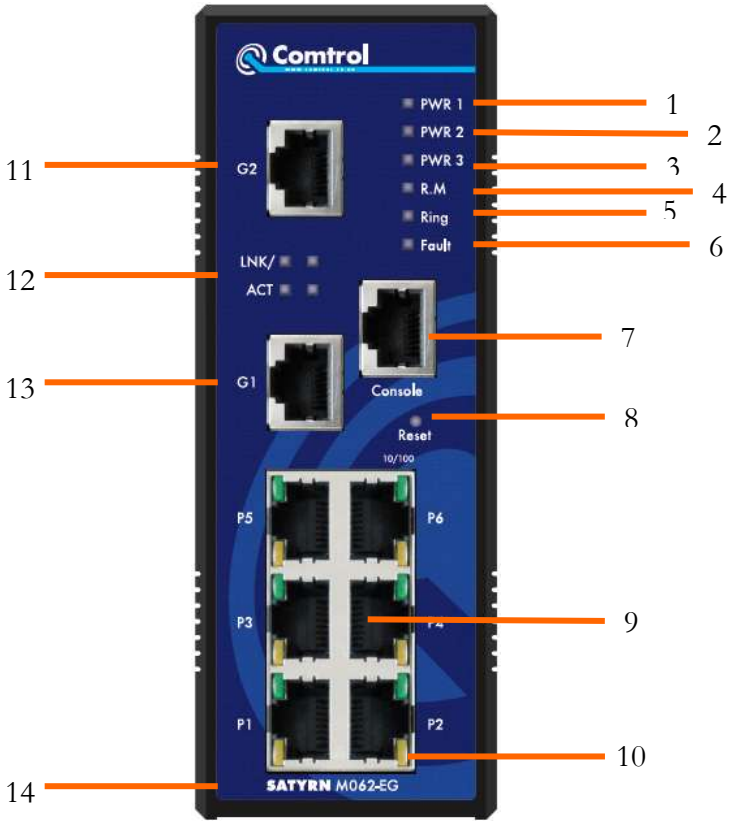
11 100BaseFX fibre port.

12 LNK/ACT LED for fibre port.s

13 100BaseFX fibre port.

14 Model name

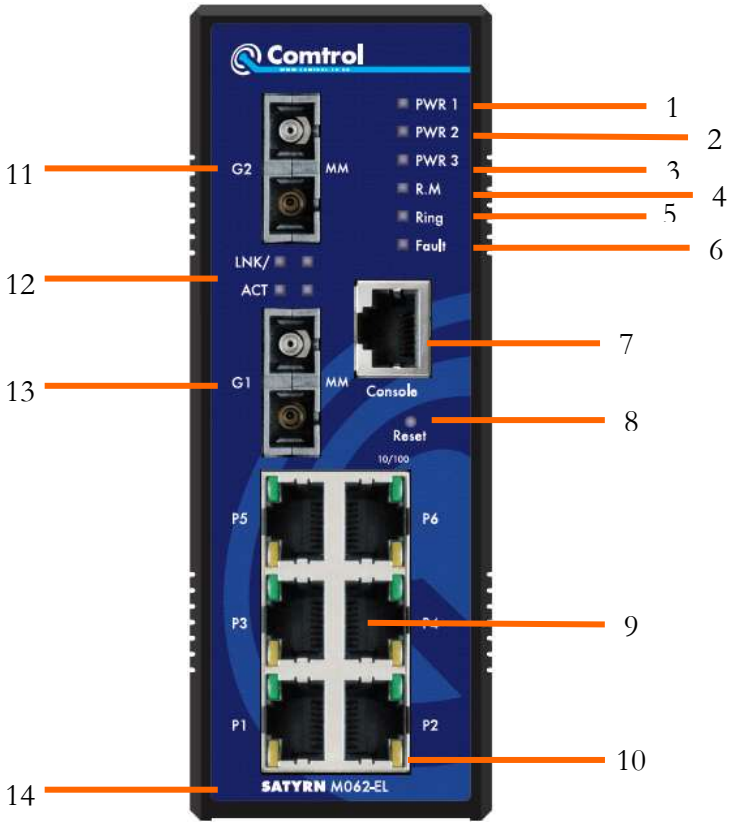
### 3.1.3 Satyrn M062-EG




1. Solid green LED when DC power module 1 active
2. Solid green LED when DC power module 2 active
3. Solid green LED when DC power jack active

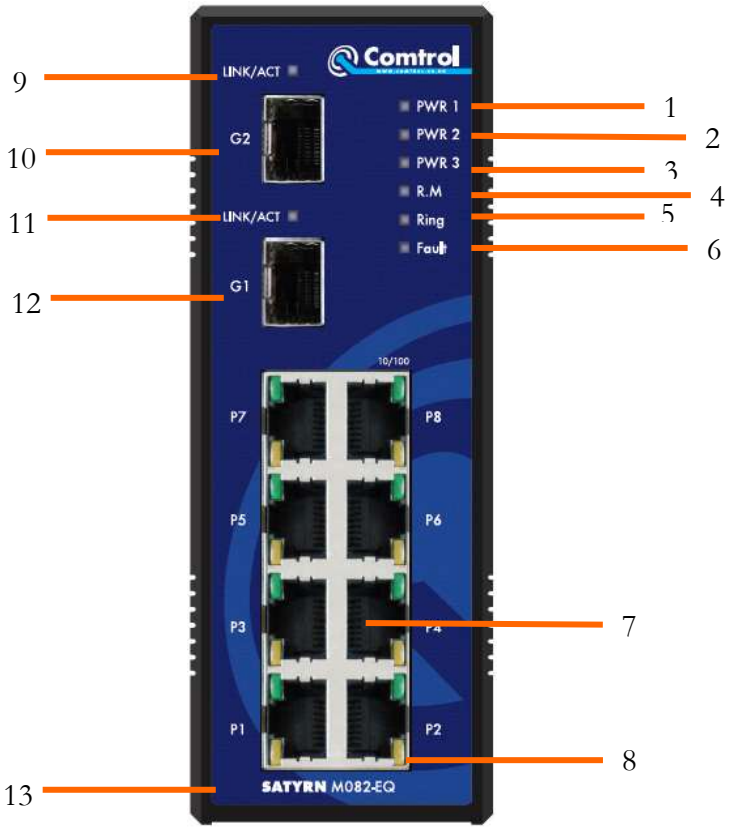
4. Solid green LED when this switch is the Ring Master of the Satyrn-Ring.
5. Solid green LED when the Satyrn Ring is enabled
   Slow blinking green LED when there is a problem with the Satyrn-Ring topology
   Fast blinking green LED when the Satyrn-Ring is working properly
6. Solid amber LED if there is a power failure or port failure. Console port (RS-232, RJ45)
7. Console port (RS-232, RJ45)
8. Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.
9. 10/100Base-T(X) Ethernet ports.
10. LED for Ethernet ports status.
11. 10/100/1000Base-T(X) Ethernet port.
12. LED for 10/100/1000Base-T(X) Ethernet port status
13. 10/100/1000Base-T(X) Ethernet port.
14. Model name

### 3.1.4 Satyrn M062-EL & M062-ET



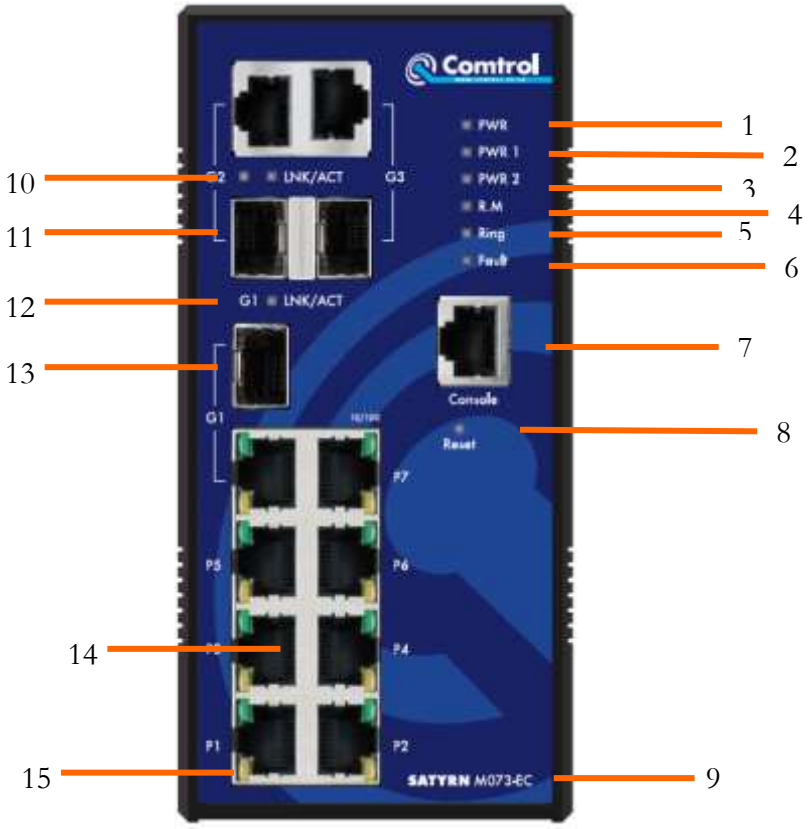
1. Solid green LED when DC power module 1 active
2. Solid green LED when DC power module 2 active
3. Solid green LED when DC power jack active
4. Solid green LED when this switch is the Ring Master of the Satyrn-Ring.
5. Solid green LED when the Satyrn Ring is enabled
   Slow blinking green LED when there is a problem with the Satyrn-Ring topology
   Fast blinking green LED when the Satyrn-Ring is working properly
6. Solid amber LED if there is a power failure or port failure.
7. Console port (RS-232, RJ45)
8. Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.
9. 10/100Base-T(X) Ethernet ports.
10. LED for Ethernet ports status.
11. 1000BaseLX/SX Ethernet port.
12. LED for Fibre port status
13. 1000BaseLX/SX Ethernet port
14. Model name

### 3.1.5 Satyrn M082-EQ




1. Solid green LED when DC power module 1 active
2. Solid green LED when DC power module 2 active
3. Solid green LED when DC power jack active
4. Solid green LED when this switch is the Ring Master of the Satyrn-Ring.
5. Solid green LED when the Satyrn Ring is enabled
   Slow blinking green LED when there is a problem with the Satyrn-Ring topology
   Fast blinking green LED when the Satyrn-Ring is working properly
6. Solid amber LED if there is a power failure or port failure.
7. 10/100Base-T(X) Ethernet ports.
8. LED for Ethernet ports status.
9. LED for SFP Fibre port status
10. 10/100/1000BaseX SFP port.
11. LED for SFP Fibre port status
12. 10/100/1000BaseX SFP port.
13. Model name

### 3.1.6 Satyrn M073 EC




1. Solid green LED when DC power module 1 active
2. Solid green LED when DC power module 2 active
3. Solid green LED when DC power jack active
4. Solid green LED when this switch is the Ring Master of the Satyrn-Ring.
5. Solid green LED when the Satyrn Ring is enabled
   Slow blinking green LED when there is a problem with the Satyrn-Ring topology
   Fast blinking green LED when the Satyrn-Ring is working properly
6. Solid amber LED if there is a power failure or port failure.
7. Console port (RS-232, RJ45)
8. Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.
9. Model name
10. LED for Ethernet port status
11. Gigabit combo ports with SFP and RJ-45 connectors

12. LED for Ethernet ports status.
13. Gigabit combo ports with SFP and RJ-45 connectors
14. 10/100Base-T(X) Ethernet port.
15. LED for Ethernet status

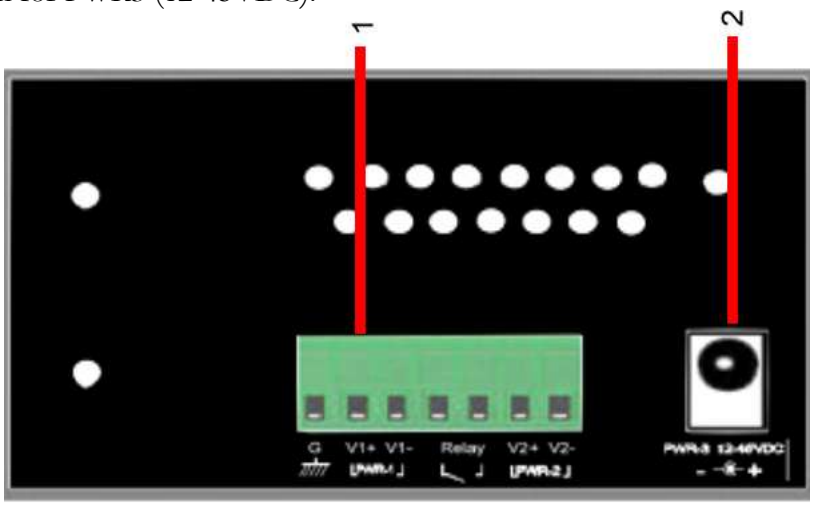
## *3.2 Bottom Panel*

### 3.2.1 M062 Series and M080

The bottom panel components of M062 Series & M080 are shown below:

1. The terminal block includes: PWR1, PWR2 (12-48V DC) and Relay output (1A@24VDC).

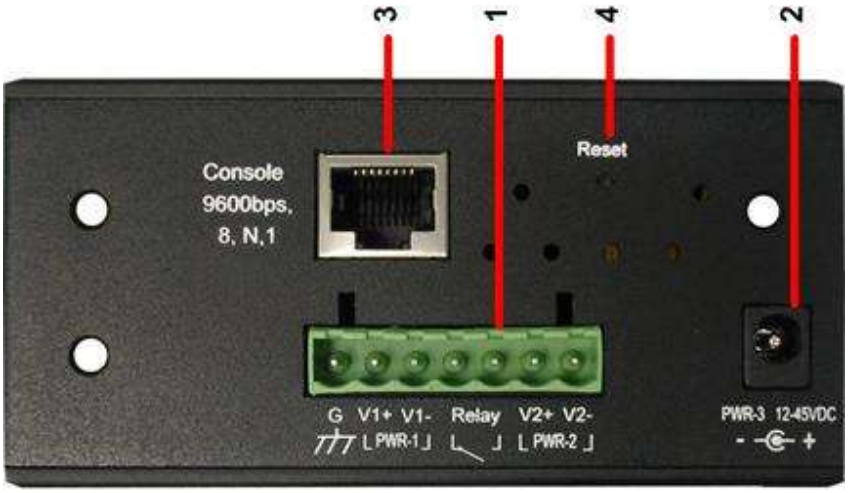
2. Power jack for PWR3 (12-45VDC).




### 3.2.2 M082-EQ

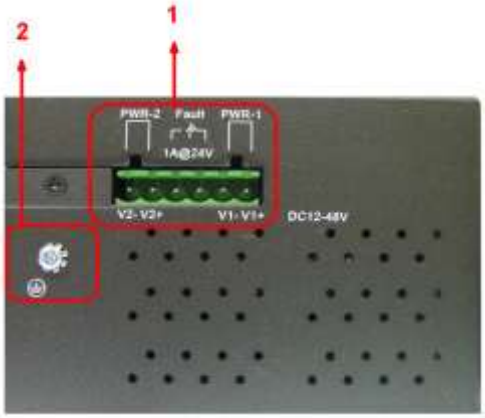
The bottom panel components of the M082-EQ are shown below:

1. Terminal block includes: PWR1, PWR2 (12-48V DC) and Relay output (1A@24VDC).
2. Power jack for PWR3 (12-45VDC).
3. Console port (RS-232, RJ45)
4. Hold down this Reset button for three seconds to reset and hold down five seconds to return to the factory default settings.




### 3.2.3 M073-EC

1. Terminal block includes: PWR1, PWR2 (48V DC) and Relay output (1A@24VDC).
2. Ground

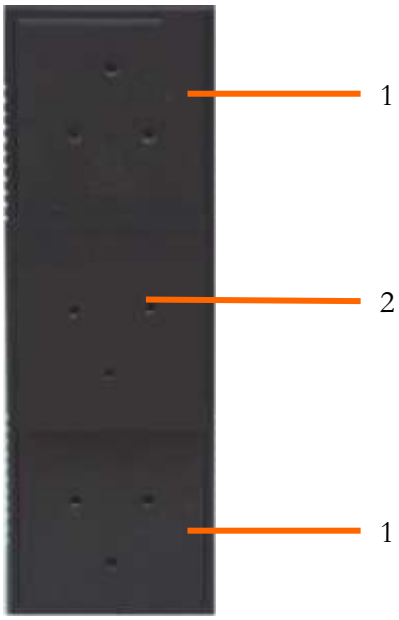


### 3.3 Rear Panel

The components in the rear of Satyrn M Series are shown below:

1. Screw holes for wall mount kit.
2. Screw holes for DIN-Rail kit

Note the dimensions of the switch may vary but the principle of fixing remains the same.




# 4 Cables

### 4.1 Ethernet Cables

All of the M Series Satyrn switches have standard Ethernet ports. Depending on the link type, the switches use CAT 3, 4, 5,5e UTP cables to connect to any other network device. Please refer to the following table for cable specifications.

| Cable | Type | Max. Length | Connector |
|---|---|---|---|
| 10BASE-T | Cat. 3, 4, 5 100-ohm | 100 m (328 ft) | RJ-45 |
| 100BASE-TX | Cat. 5 100-ohm UTP | 100 m (328 ft) | RJ-45 |
| 1000Base-TX | Cat. 5/Cat. 5e 100-ohm UTP | 100 m (328ft) | RJ-45 |

### 4.1.1 100BASE-TX/10BASE-T RJ-45 Pin Assignments

With 100BASE-TX/10BASE-T cable, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data.

| Pin Number | Assignment |
|---|---|
| 1 | TD+ |
| 2 | TD- |
| 3 | RD+ |
| 4 | Not used |
| 5 | Not used |
| 6 | RD- |
| 7 | Not used |
| 8 | Not used |

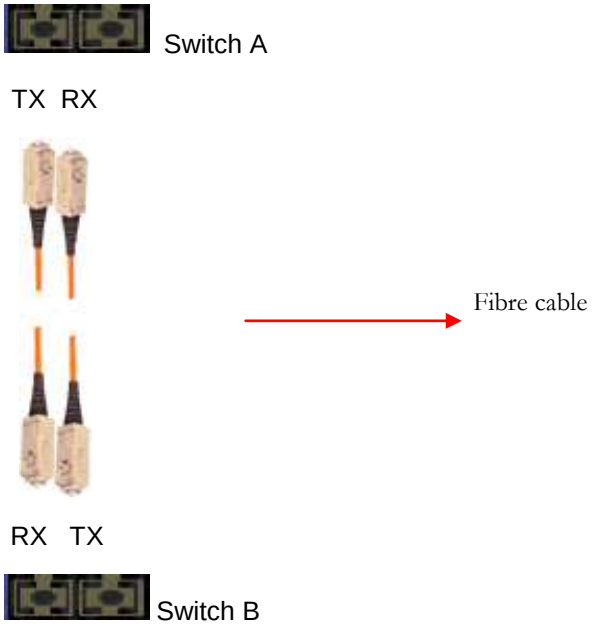
M Series Satyrn switches support auto MDI/MDI-X operation. You can use a straight-through cable to connect the switch to a PC. The following table below shows the 10BASE-T/ 100BASE-TX MDI and MDI-X port pin outs.

| Pin Number | MDI port | MDI-X port |
|---|---|---|
| 1 | TD+(transmit) | RD+(receive) |
| 2 | TD-(transmit) | RD-(receive) |
| 3 | RD+(receive) | TD+(transmit) |
| 4 | Not used | Not used |
| 5 | Not used | Not used |
| 6 | RD-(receive) | TD-(transmit) |
| 7 | Not used | Not used |
| 8 | Not used | Not used |

**Note:** "+" and "-" signs represent the polarity of the wires that make up each wire pair.

## *4.2 Fibres*

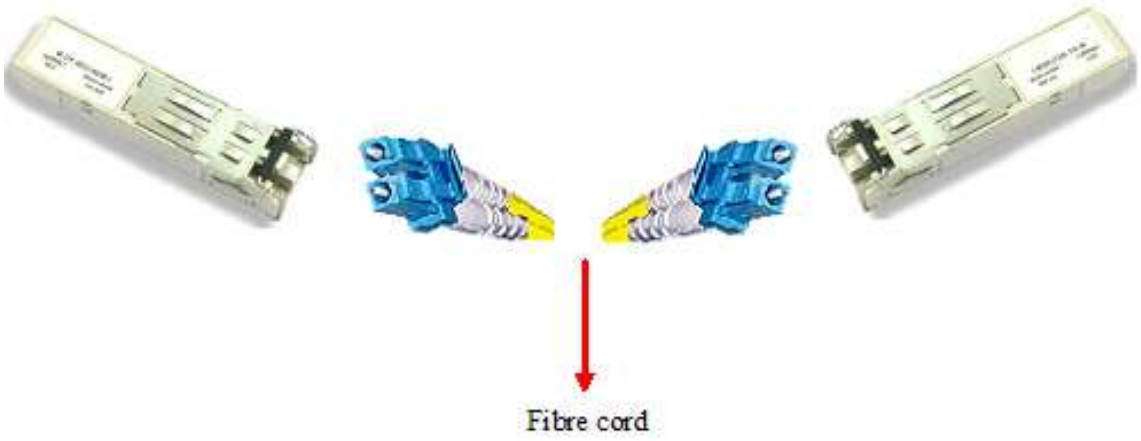
The following models, M062-EM, M062-ES, M062-EL and M062-ET have fibre optic ports. The fibre optic ports are in multi-mode (0 to 2 km, 1310 nm in 50/125 μm, 62.5/125 μm) and single-mode (9/125 μm) with an SC connector. Note that the TX port of Switch A should be connected to the RX port of Switch B.




### 4.3 SFP

The M073-EC model has fibre optic ports with SFP connectors.

Note that the TX port of Switch A should be connected to the RX port of Switch B.




### 4.4 Console Cable

M Series switches can be managed via a console port. The DB-9 to RJ-45 cable is found in the product box. They can be connected to a PC via a RS-232 cable with a DB-9 female connector and the other end (RJ-45 connector) connected to the switch's console port.

# 5 Browser based Management

WARNING! – It is important that, whilst setting up or during firmware upgrade, you do NOT power off the switch.

## *5.1 Configuring the M Series Satyrn switches using a Browser*

This section applies to all of the M Series Satyrn switches. If there is additional information for specific models, this will be clearly stated.

### 5.1.1 About Browser-based Management

An embedded HTML web site resides in flash memory on the CPU board. It contains advanced management features and allows you to manage the switch from anywhere on the network through a standard web browser such as Microsoft Internet Explorer. The browser-based management function supports Internet Explorer 5.0 or higher. It is based on Java applets with an aim to reduce network bandwidth consumption, enhance access speed and provide an easy, useful interface.

**Note:** By default, version IE5.0 or later does not allow Java Applets to open sockets. You will need to explicitly modify the browser settings in order to enable Java applets to use network port.

**Preparing for Browser Management**

The default settings are as follows:

| | |
|---|---|
| IP Address | 192.168.250.250 |
| Subnet Mask | 255.255.255.0 |
| Default Gateway | 192.168.250.1 |
| User Name | comtrol |
| Password | satyrn |

**System Login**

Launch Internet Explorer or another Internet browser.

Type http:// followed by the IP address of the switch (the default IP address is 192.168.250.250) into the address field and then press "Enter".

When the login screen appears, enter the User name and Password (the default User name is comtrol and the default Password is satyrn) into the fields and then press "Enter" or click the OK button.

The main interface of the Browser-based management will appear.


### 5.1.2 System Information

This contains the basic information about the switch, click here from any part of the document to return here.

#### 5.1.2.1 Location Alert

This function helps you physically locate a specific switch by flashing the PWR and Fault lights.

Enable Location Alert switches on the flashing the PWR and Fault lights.

Disable Location Alert switches off the flashing the PWR and Fault lights

### 5.1.3 Basic settings

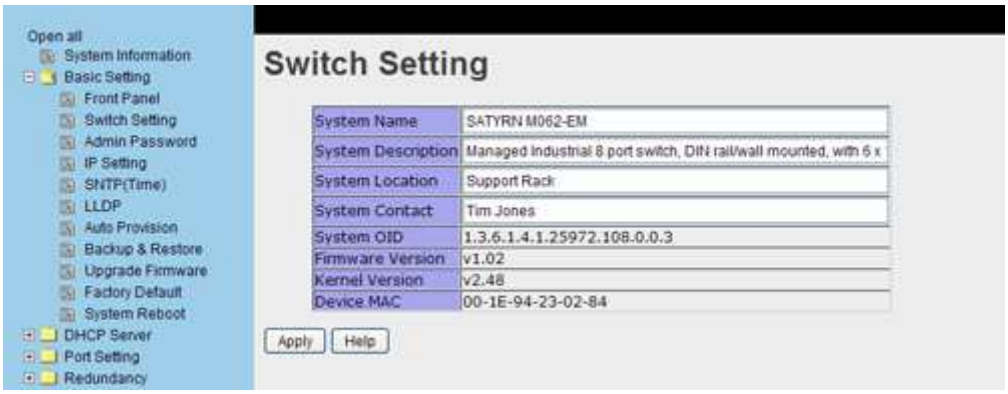
This section allows you to set the basic switch settings, IP address as well as perform various backup, restore, factory default and reboot operations.

#### 5.1.3.1 Front Panel

This returns the switch schematic to view.

#### 5.1.3.2 Switch Setting

This is the standard switch setting interface.




The following table describes the options available.

| Option | Description |
|---|---|
| **System Name** | Assign the switch name here. Maximum length is 64 characters. |
| **System Description** | Displays the switch description. |
| **System Location** | Assign the switch's physical location here. The maximum length is 64 characters. |
| **System Contact** | Enter the name of a contact person or organization. |
| **System OID** | Displays the switch's OID information. |
| **Firmware Version** | Displays the switch's firmware version. |
| **Kernel Version** | Displays the software version of the kernel. |
| **MAC Address** | Displays the default hardware address assigned by the manufacturer. |

### 5.1.3.3 Admin Password

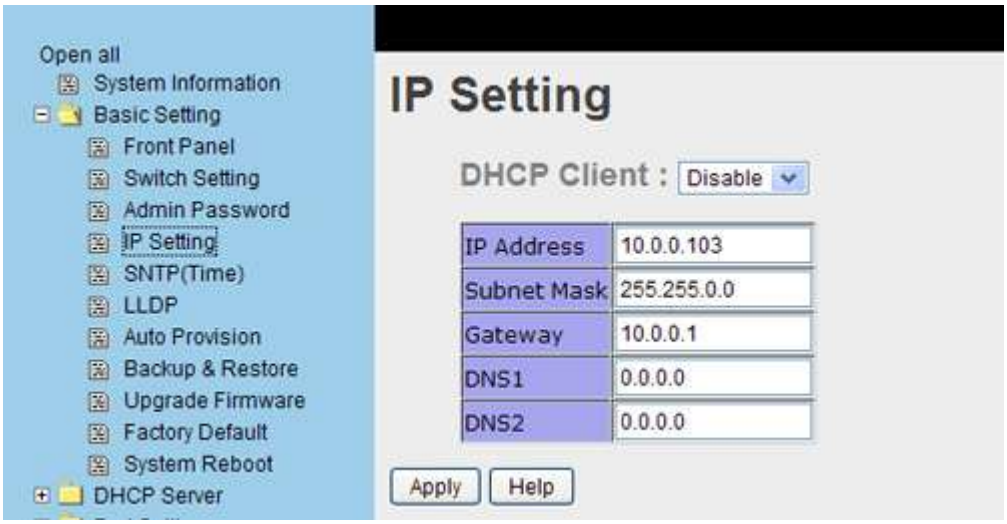
You can change the Browser management login in user name and pass word here.


The following table describes the options available.

| Option | Description |
|---|---|
| **User name** | Enter the new username. (The default is "**comtrol**") |
| **New Password** | Enter the new password. (The default is "**satyrn**") |
| **Confirm password** | Re-type the new password. |
| **Apply** | Click "**Apply**" to save changed configuration settings |

### 5.1.3.4 IP Setting

You can configure the IP Settings and DHCP client function here.

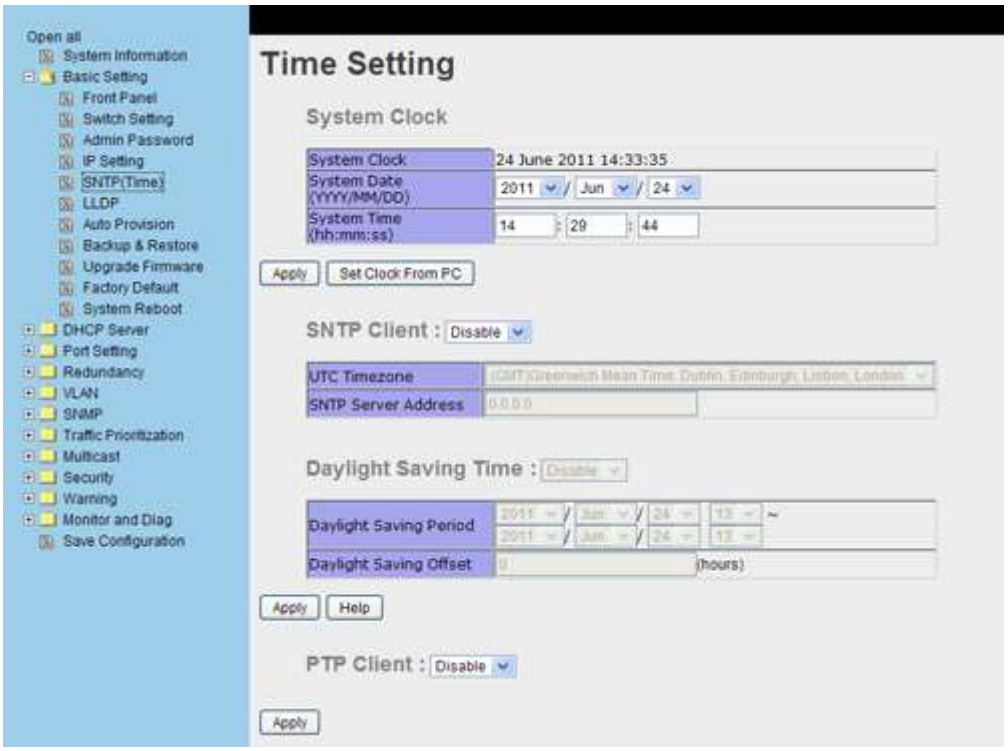



The following table describes the options available.

| Option | Description |
|---|---|
| **DHCP Client** | Enable or disable the DHCP client function. When the DHCP client function is enabled, the switch will be assigned the IP address from the network DHCP server and the default IP address will be replaced by the IP address which the DHCP server has assigned. After clicking the "**Apply**" button, a pop-up dialog will show up to inform you that the DHCP client is enabled. . The current IP will be replaced by the new IP address on the DHCP server. |
| **IP Address** | Assign the IP address used by the network. If the DHCP client function is enabled, you do not need to assign an IP address. The network DHCP server will assign the switch's IP address and it will be displayed in this column. The default IP address is: 192.168.10.1 |
| **Subnet Mask** | Assign the subnet mask of the IP address. If DHCP client function is enabled, you do not need to assign the subnet mask |
| **Gateway** | Assign the switch's network gateway. The default gateway is: 192.168.250.250 |
| **DNS1** | Assign the primary DNS IP address |
| **DNS2** | Assign the secondary DNS IP address |
| **Apply** | Click "**Apply**" to activate the changed configuration. |

### 5.1.3.5 SNTP Configuration

The SNTP (Simple Network Time Protocol) settings allow you to synchronize the switch's clocks over the network.




The following table describes the options available.

| Option | Description |
|---|---|
| **SNTP Client** | Enable or disable SNTP function to obtain the time from the specified SNTP server. |
| **Daylight Saving Time** | Enable or disable the daylight saving time function. When daylight saving time is enabled you need to specify the dates it applies. |
| **UTC Time zone** | Set the switch's time zone. The table at the end of this section lists the different time zones for your reference. |
| **SNTP Server IP Address** | Set the SNTP server's IP address. |
| **Daylight Saving Period** | Set up the Daylight Saving start time and Daylight Saving end time. Note that both will be different every year. |
| **Daylight Saving Offset** | Set up the offset time. |
| **PTP Client** | The Precision Time Protocol (PTP) is a time-transfer protocol that allows precise synchronization of networks. Accuracy within the nanosecond range can be achieved with this protocol when using hardware-generated timestamps. |
| **Apply** | Click "**Apply**" to save the changed configuration settings. |

| Local Time Zone | Conversion from UTC | Time at 12:00 UTC |
|---|---|---|
| November Time Zone | - 1 hour | 11 am |
| Oscar Time Zone | -2 hours | 10 am |
| ADT - Atlantic Daylight | -3 hours | 9 am |
| AST - Atlantic Standard<br>EDT - Eastern Daylight | -4 hours | 8 am |
| EST - Eastern Standard<br>CDT - Central Daylight | -5 hours | 7 am |
| CST - Central Standard<br>MDT - Mountain Daylight | -6 hours | 6 am |
| MST - Mountain Standard<br>PDT - Pacific Daylight | -7 hours | 5 am |
| PST - Pacific Standard<br>ADT - Alaskan Daylight | -8 hours | 4 am |
| ALA - Alaskan Standard | -9 hours | 3 am |
| HAW - Hawaiian Standard | -10 hours | 2 am |
| Nome, Alaska | -11 hours | 1 am |
| CET - Central European<br>FWT - French Winter<br>MET - Middle European<br>MEWT - Middle European Winter<br>SWT - Swedish Winter | +1 hour | 1 pm |
| EET - Eastern European, USSR Zone 1 | +2 hours | 2 pm |
| BT - Baghdad, USSR Zone 2 | +3 hours | 3 pm |
| ZP4 - USSR Zone 3 | +4 hours | 4 pm |
| ZP5 - USSR Zone 4 | +5 hours | 5 pm |
| ZP6 - USSR Zone 5 | +6 hours | 6 pm |
| WAST - West Australian Standard | +7 hours | 7 pm |
| CCT - China Coast, USSR Zone 7 | +8 hours | 8 pm |
| JST - Japan Standard, USSR Zone 8 | +9 hours | 9 pm |
| EAST - East Australian Standard<br>GST<br>Guam Standard, USSR Zone 9 | +10 hours | 10 pm |
| IDLE - International Date Line<br>NZST - New Zealand Standard<br>NZT - New Zealand | +12 hours | Midnight |

### 5.1.3.6 LLDP

The LLDP (Link Layer Discovery Protocol) function allows the switch to advertise its information to other nodes on the network and store the information it receives.


The following table describes the options available.

| Option | Description |
|---|---|
| **LLDP Protocol** | "**Enable**" or "**Disable**" LLDP function. |
| **LLDP Interval** | The interval for resending LLDP frames (default is 30 seconds) |
| **Neighbour Info** | Identifies the switches directly connected to the current switch |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show the help file. |

### 5.1.3.7 Auto Provision

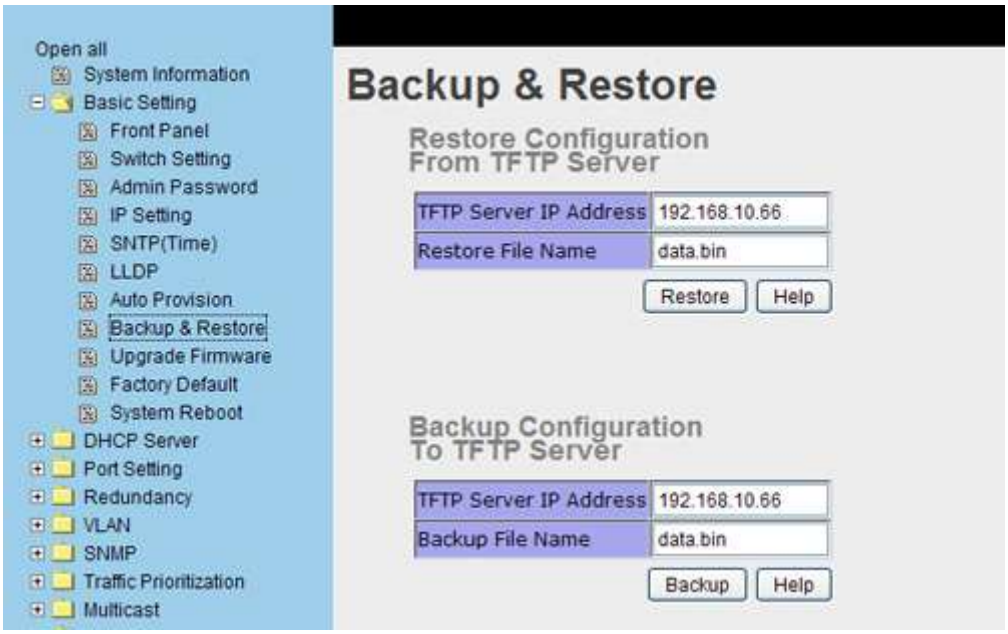
Auto Provision allows you to automatically update the switch firmware. You can put the firmware or a configuration file on a TFTP server. When you subsequently reboot the switch, it will upgrade automatically. Before updating, make sure you have your TFTP server ready and that both the firmware image and configuration file is on the TFTP server.


The following table describes the options available.

| Options | Description |
|---|---|
| **Auto Install Configuration** | Check this box to auto install configuration file on reboot |
| **TFTP Server IP Address** | Enter the TFTP server IP address. |
| **Configuration File Name** | Enter the switch configuration file name |
| **Auto install Firmware** | Check this box to auto install Firmware Image on reboot |
| **Firmware File Name** | Enter the switch file name |

### 5.1.3.8 Backup & Restore

The switch configuration is stored on an EEPROM. This can be backed up to the TFTP server, and then later restored.

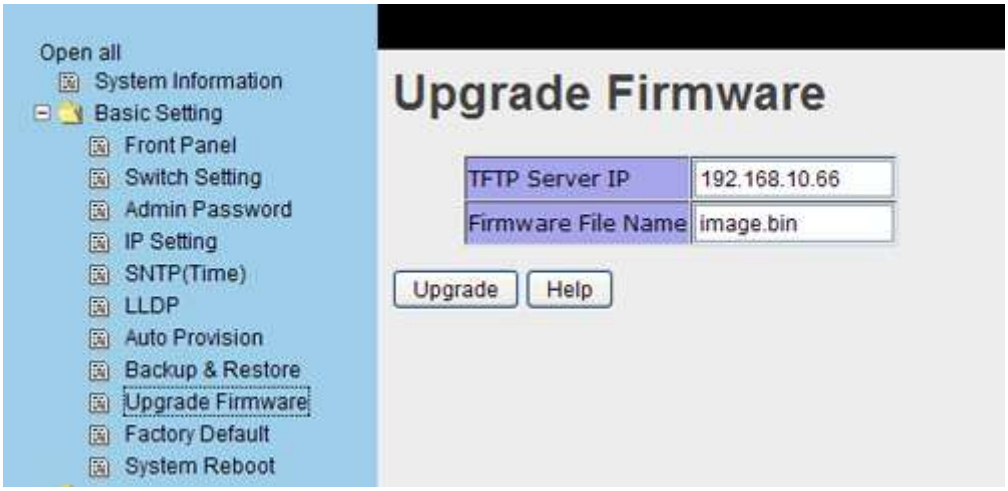


The following table describes the options available.

| Options | Description |
|---|---|
| **TFTP Server IP Address** | Enter the TFTP server IP address. |
| **Restore File Name** | Enter the switch configuration file name |
| **Restore** | Click "**restore**" to restore the saved configuration. |
| **Backup File Name** | Enter the backup file name |
| **Backup** | Click "**backup**" to backup the current configuration. |

### 5.1.3.9 Upgrade Firmware

Upgrade Firmware allows you to update the switch's firmware. Before updating, be sure to have your TFTP server ready and the firmware image available on the TFTP server.



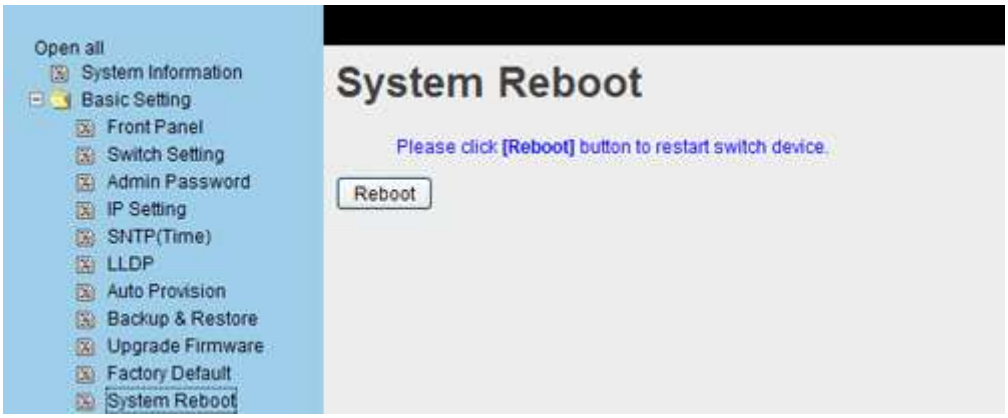

The following table describes the labels in this screen.

| Label | Description |
|---|---|
| **TFTP Server IP** | Enter the TFTP server IP address. |
| **Firmware File Name** | Enter the firmware file name |
| **Upgrade** | Click "**upgrade**" to upgrade the firmware. |

#### 5.1.3.10 Factory Default


Use this function to reset the switch to default configuration. Click the Reset button to restore all configurations to their default values. You can select "**Keep current IP address setting**" and "**Keep current username & password**" to save the current IP and username and password whilst resetting everything else to the factory defaults.

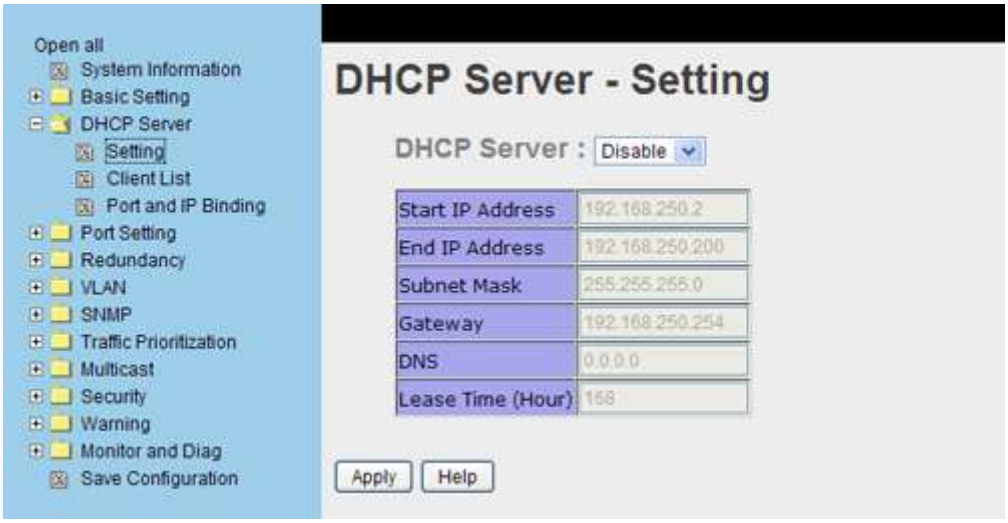
#### 5.1.3.11 System Reboot




### 5.1.4 DHCP Server

The M Series switches can operate as a DHCP server. This sections allows you to select this mode and select various parameters.

### 5.1.4.1 Setting




The following table describes the options available.

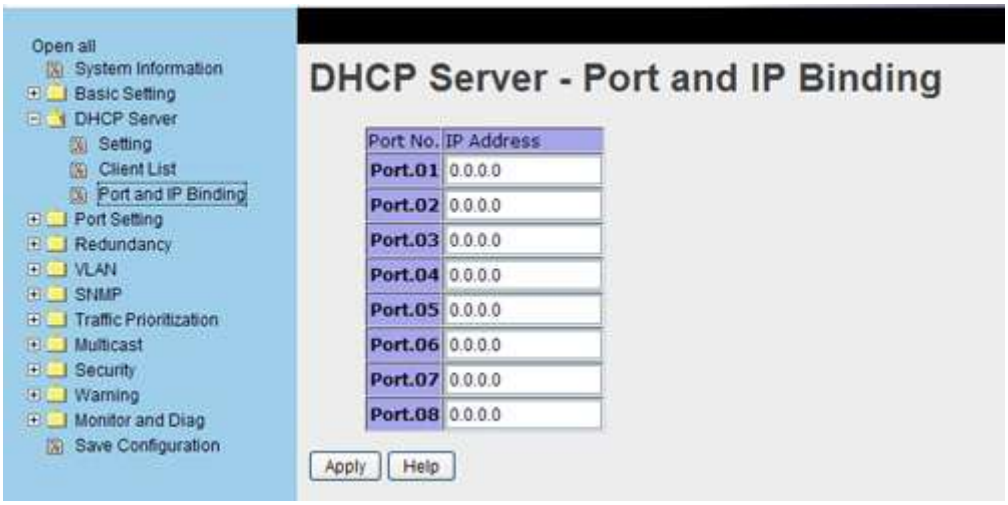
| Option | Description |
|---|---|
| **DHCP Server** | Enable or Disable the DHCP Server function. When enabled, the switch will act as the DHCP server on the local network |
| **Start IP Address** | The lower limit of the dynamic IP address range. The lower IP address is the beginning of the dynamic IP address range. For example, if the dynamic IP address range is from 192.168.1.100 to 192.168.1.200, then 192.168.1.100 will be the start IP address. |
| **End IP Address** | The upper limit of the dynamic IP address range. The highest IP address is the end of the dynamic IP address range. For example, if the dynamic IP address range is from 192.168.1.100 to 192.168.1.200, then 192.168.1.200 will be the End IP address |
| **Subnet Mask** | The subnet mask for the dynamic IP address range. |
| **Gateway** | The network gateway. |
| **DNS** | The Domain Name Server. |
| **Lease Time (Hour)** | The time at which the system will reset the assigned dynamic IP to ensure the IP address is in use. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

### 5.1.4.2 Client List

When the DHCP server function is activated, the system will collect the DHCP client information and display it here.


#### 5.1.4.3 Port and IP binding

You can assign a specific IP address in the assigned dynamic IP range to a specific port. When a device is connecting to the port and requests a dynamic IP assignment, the system will assign the specific IP address allocated to that port.




### 5.1.5 Port Setting

This section enables you to assign specific parameters to each individual port.

#### 5.1.5.1 Port Control

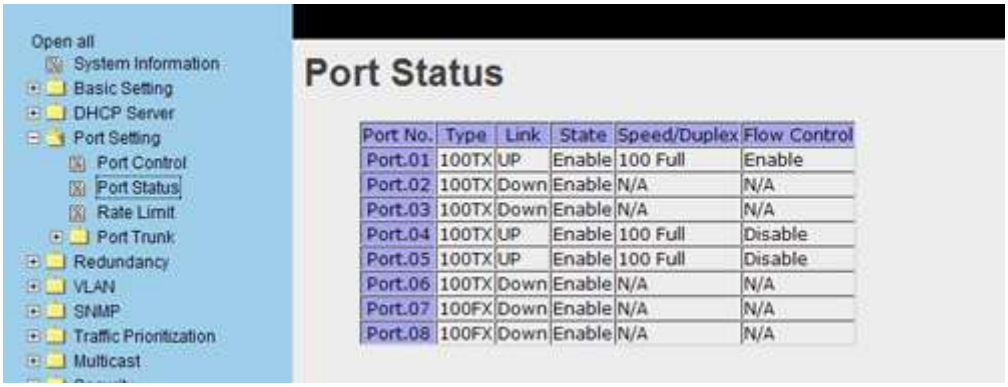
The Port Control function allows you to set the state, speed/duplex, flow control, and security of the individual ports.

The following table describes the options available.

| Option | Description |
|---|---|
| **Port No.** | Port identification number. |
| **State** | Enable or Disable the port. |
| **Speed/Duplex** | Options: Auto-negotiation, 100 full, 100 half, 10 full, 10 half mode. |
| **Flow Control** | Support symmetric and asymmetric mode to avoid packet loss when congestion occurs. |
| **Apply** | Click "**Apply**" to save the changed configuration settings. |

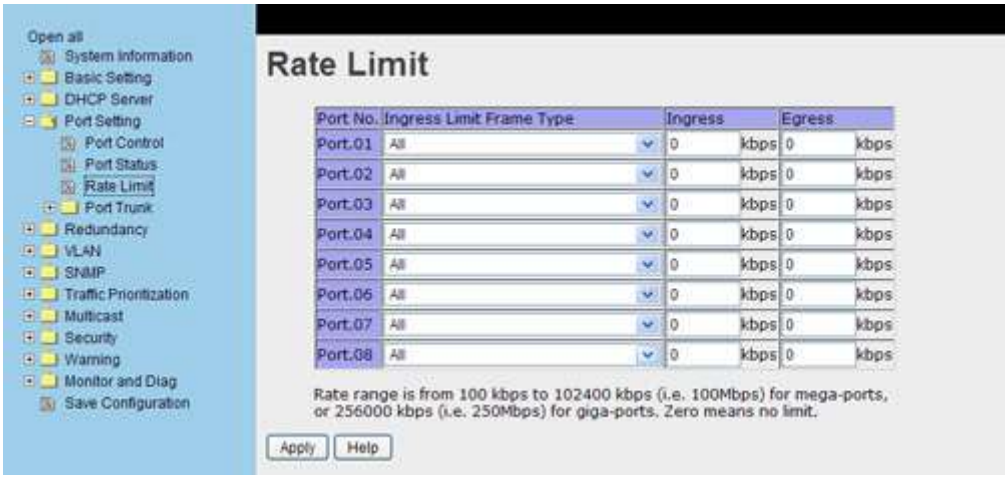
### 5.1.5.2 Port Status

Once the Port Control settings have been made they can then be seen in the Port Status.




### 5.1.5.3 Rate Limit

You can set a limit on the traffic of all ports, including broadcast, multicast and flooded Unicast using this function.. You can distinguish between transmitted and received data and permit different limits to be set on incoming and outgoing traffic.



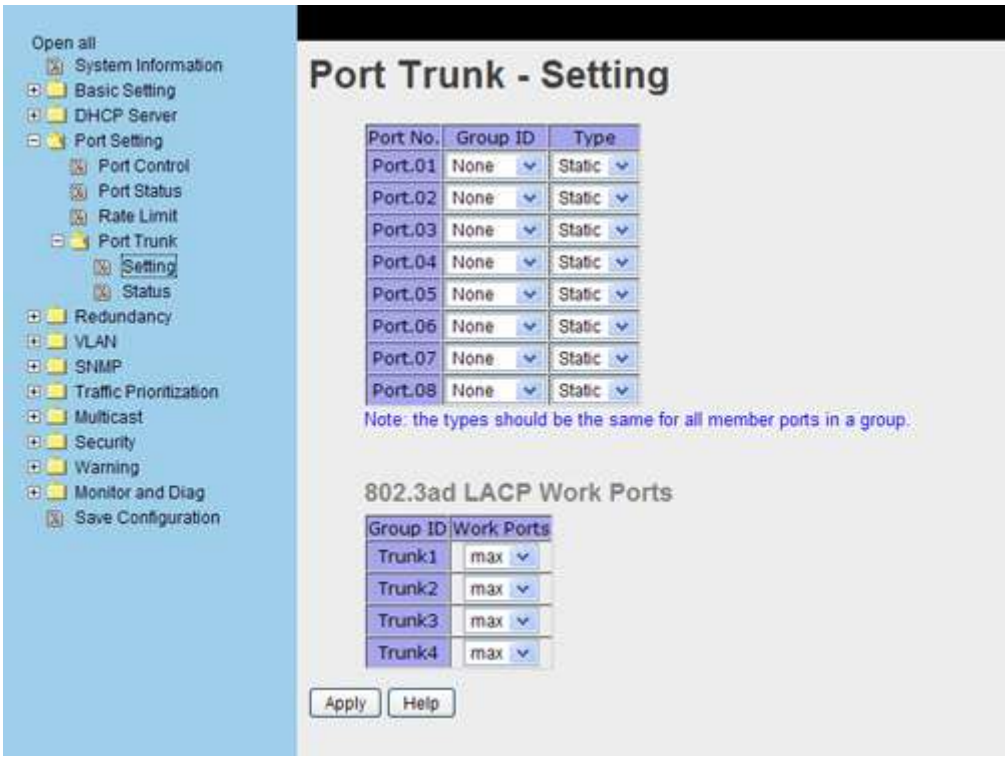
The following table describes the options available.

| Option | Description |
|---|---|
| **Ingress Limit Frame Type** | Options:<br>○ "**all**"<br>○ "**Broadcast only**"<br>○ "**Broadcast/Multicast**"<br>○ "B**roadcast/Multicast/Flooded Unicast**" |
| **Ingress** | The limit on traffic received through the switch port. |
| **Egress** | The limit on traffic transmitted through the switch port. |
| **Apply** | Click "**Apply**" to save the configuration. |

### 5.1.5.4 Port Trunk

**Port Trunk setting**

Static trunk or 802.3ad LACP can be selected to combine several physical links with a logical link in order to increase the bandwidth.



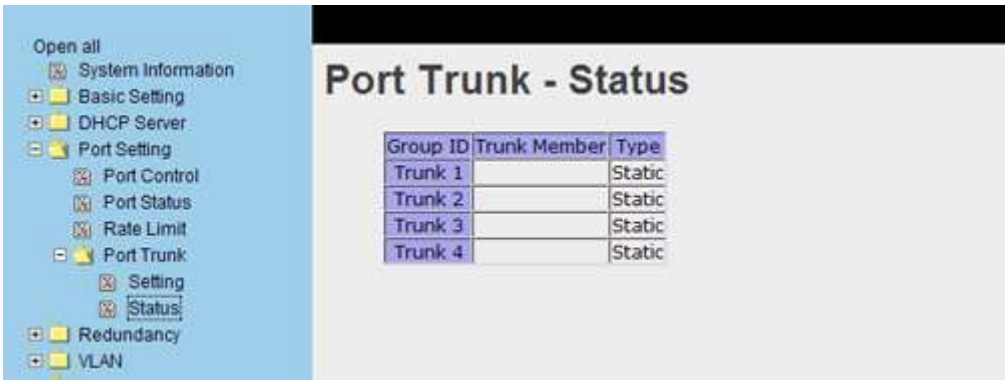

The following table describes the options available.

| Option | Description |
|---|---|
| **Group ID** | Select the port to join a trunk group. |

| | |
|---|---|
| **Type** | Choose between static trunk and 802.3ad LACP. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

**Port Trunk – Status**

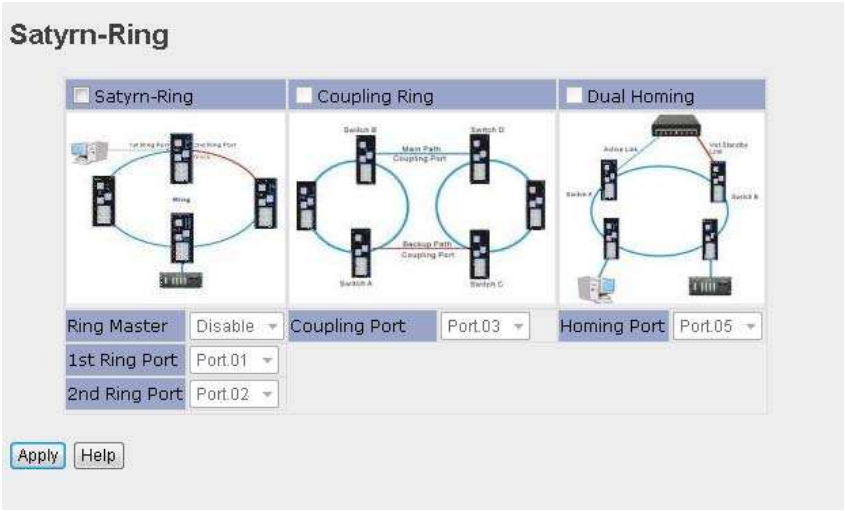
You can check the configuration of port trunk here.




## 5.1.6 Redundancy

### 5.1.6.1 Satyrn-Ring

Satyrn-Ring features one of the most powerful redundant ring technologies in the world. The recovery time of Satyrn-Ring is less than 10 mS over 250 units of connections. This redundancy can reduce unexpected malfunctions caused by changes to the network topology. Satyrn-Ring technology supports three ring topologies for network redundancy: Satyrn-Ring, Coupling Ring and Dual Homing.




The following table describes the options available.

| Option | Description |
|---|---|
| **Satyrn-Ring** | Check box to enable Satyrn-Ring. |

| | |
|---|---|
| **Ring Master** | There should be only one Ring Master in a ring. However if there are two or more switches for which Ring Master is enabled, the switch with the lowest MAC address will serve as the Ring Master and others will serve as Backup Masters. |
| **1st Ring Port** | The Ring Master's primary port. |
| **2nd Ring Port** | The Ring-Master's secondary port. |
| **Coupling Ring** | Check box to enable Coupling Ring. Coupling Ring can be used to divide a big ring into two smaller rings to prevent network topology changes from affecting all the switches.. It is useful for connecting two Satyrn-Rings. |
| **Coupling Port** | Link to Coupling Port of the switch in another ring. A Coupling Ring needs four switches to build active and backup links.<br><br>Set a port as coupling port. The coupled four ports of four switches will be run in active/backup mode. |
| **Control Port** | Link to Control Port of the switch of the same ring. Control Port used to transmit control signals. |
| **Dual Homing** | Check box to enable Dual Homing. By selecting Dual Homing mode, Satyrn-Ring will be connected to normal switches through two RSTP links (ex: backbone Switch). The two links work in active/backup mode and connect each Satyrn-Ring to the normal switches in RSTP mode. |
| **Apply** | Click "**Apply**" to save the changed configuration settings. |

**Note:** Do not set one switch as both a Ring Master and a Coupling Ring at the same time as this will place a heavy load on the network.

#### 5.1.6.2 Satyrn-Open

Satyrn-Open technology can be utilized with proprietary rings from other vendors. Satyrn switches can be added to networks based on other ring technologies and will cooperate with managed switches from other vendors.

Further vendors are being added all the time. Contact Technical Support for an up to date list.

The following table describes the options available.

| Option | Description |
|---|---|
| **Enable** | Enable the Satyrn-Open function. |
| **Vendor** | Select the appropriate vendor for the ring you want to join. |
| **1st Ring Port** | Select the port to connect to the ring |
| **2nd Ring Port** | Select the port to connect to the ring |

An example of a Satyrn-Open connection is shown below.


### 5.1.6.3 Satyrn Link

Satyrn Link allows you to add on network redundancy topology for any backbone network. This enables multiple redundant network rings to combine together and function as a larger more robust network.

Satyrn Link only requires the edge port of the edge switch to be identified with other switches in the ring with Satyrn Link enabled.

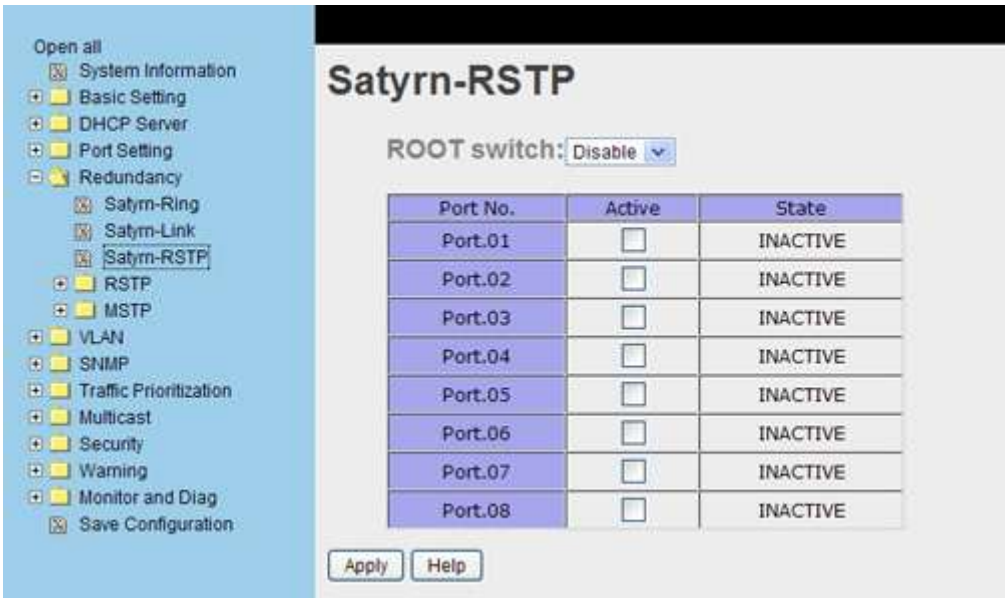
The following table describes the options available.

| Option | Description |
|---|---|
| **Enable** | Enable the Satyrn-Link function. |
| **Uplink Port** | Select the appropriate port for 1st or 2nd uplink port |
| **Edge Port** | Select the port connected to the main riing |
| **Apply** | Apply the selected settings |

### 5.1.6.4 Satyrn-RSTP

Satyrn-RSTP is Comtrol's proprietary redundant ring technology. It is an improvement upon standard STP/RSTP, as the recovery time of Satyrn-RSTP is less than 20ms. Satyrn-RSTP also supports more connection nodes in a ring topology. The key feature is that the individual switches can be set up as either master and backup devices.

The Satyrn-RSTP configuration page is shown below.

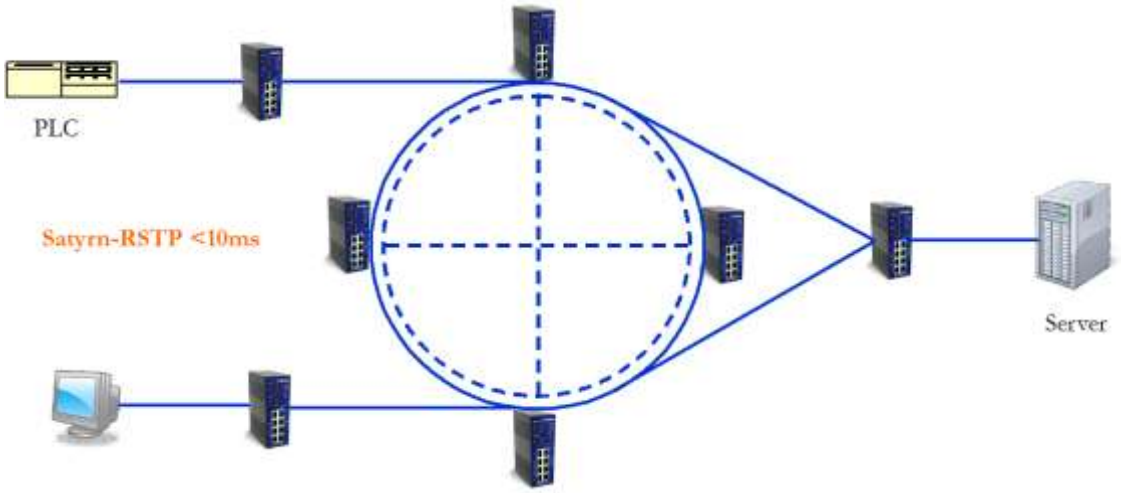



The following table describes the options available.

| Option | Description |
|---|---|
| **ROOT switch** | The switch can be assigned to be the master or backup device. |
| **Port Active** | Select the port |
| **Status** | ○ **INACTIVE -** If the check box is unticked, the port is not involved in the Satyrn-RSTP structure. |

| | |
|---|---|
| | ○ **LINKDOWN:** If the check box is ticked, and the cable is disconnected or the connection is inactive, the state will show as "LINKDOWN".<br>○ **BLOCKING:** The port state is in this state if a switching loop is created.<br>○ **FORWARDING:** The port receives and sends data in normal operation. |
| **Apply** | Apply the selected settings |

An example of Satyrn-RSTP is shown below.

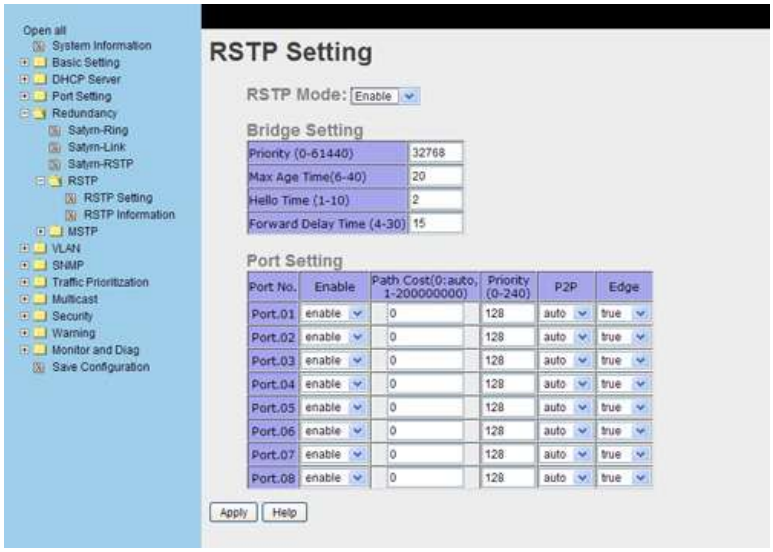



### 5.1.6.5 RSTP

The Rapid Spanning Tree Protocol (RSTP) is an improved variant of the Spanning Tree Protocol. It provides faster spanning tree convergence after a change to the network topology. The system also supports STP and will auto detect connected devices that are running STP or RSTP protocol.

**RSTP Settings**

You can enable or disable the RSTP function, and set the parameters for each port.




The following table describes the options available.

| Option | Description |
|---|---|
| **RSTP mode** | The RSTP function must be enabled before configuring the related parameters. |
| **Priority (0-61440)** | A value used to identify the root bridge. The bridge with the lowest value with the highest priority and is selected as the root. If the value is changed, you must restart the switch. The value must be between 0 and 61440 and be a multiple of 4096. |
| **Max Age (6-40)** | The number of seconds a bridge will wait without receiving Spanning-Tree Protocol configuration messages before reconfiguring. Select a value between 6 and 40. |
| **Hello Time (1-10)** | The time in which the switch sends out a BPDU (Bridge Protocol Data Unit) packet to check current RSTP status. Enter a value between 1 through 10. |
| **Forwarding Delay Time (4-30)** | The number of seconds a port waits before changing from its Rapid Spanning Tree Protocol learning and listening states to the forwarding state. Enter a value between 4 and 30. |
| **Path Cost (1-200000000)** | The cost of the path from the transmitting bridge to the receiving bridge at the specified port. The value must be between 1 and 200000000. |
| **Priority (0-240)** | Select which port should be blocked by setting the LAN priority. The priority must be a value between 0 and 240 and be a multiple of 16. |
| **Admin P2P** | Some of the rapid state transactions that are possible within RSTP are dependent upon whether the port concerned can only be connected to exactly one other bridge (i.e., it is served by a point-to-point LAN segment), or it can be connected to two or more bridges (i.e., it is served by a shared medium LAN segment). This function allows the P2P status of the link to be |

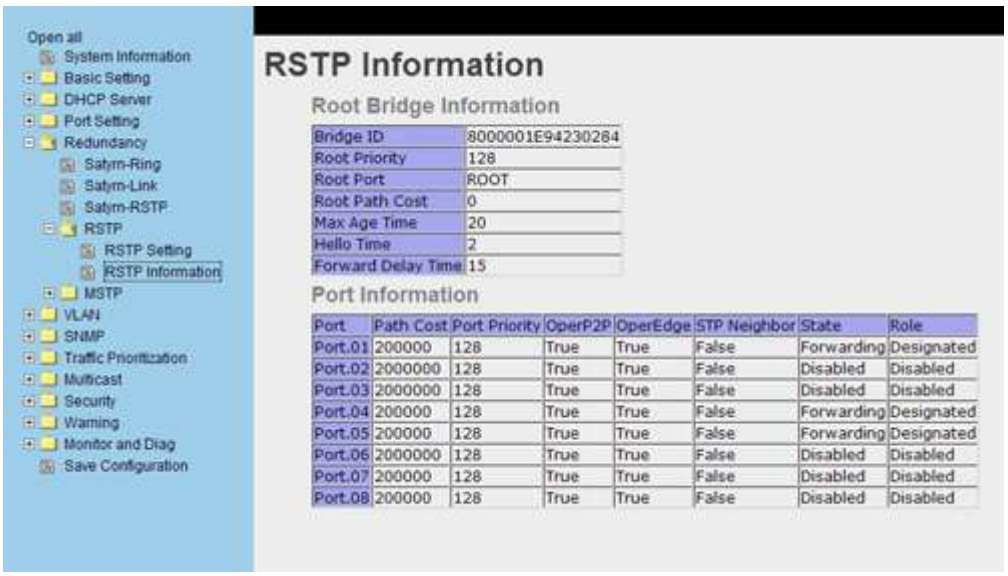
| | |
|---|---|
| | administratively controlled.<br><br>True means P2P is enabled. False means P2P is disabled. |
| **Admin Edge** | The port directly connected to end stations that does not create bridging loop in the network. To configure the port as an edge port, set the port to "**True**". |
| **Admin Non STP** | The port includes the STP mathematic calculation. **True** does not include the STP mathematic calculation. **False** includes the STP mathematic calculation. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

NOTE: Use the following formula to configure the MAX Age, Hello Time, and Forward Delay Time:

2 x (Forward Delay Time value –1) ≥ Max Age value ≥ 2 x (Hello Time value +1)

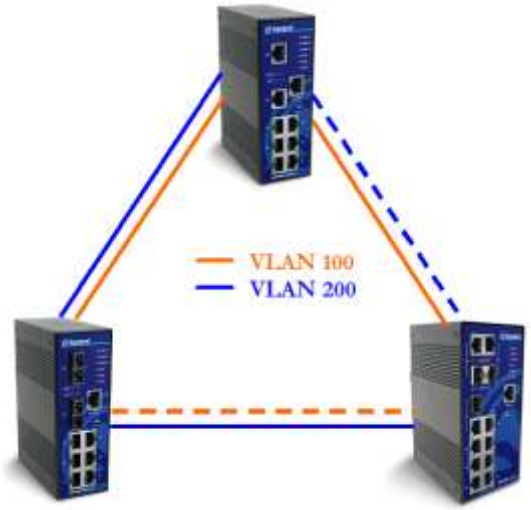
**RSTP Information**

Once the RSTP settings have been made they can then be seen in the RSTP Information.

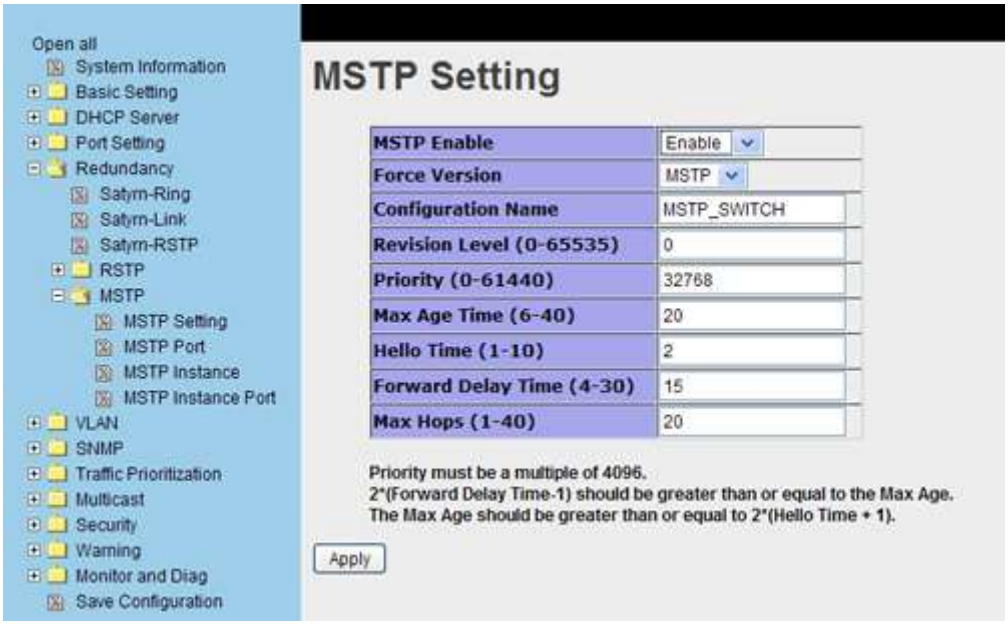



### 5.1.6.6 MSTP

Multiple Spanning Tree Protocol (MSTP) is a standard protocol base on IEEE 802.1s. The function permits several VLANs to be mapped to a reduced number of spanning tree instances because most networks do not require more than a few logical topologies. It supports a load balancing scheme and puts less stress on the CPU than PVST (a proprietary Cisco protocol).




## MSTP Settings



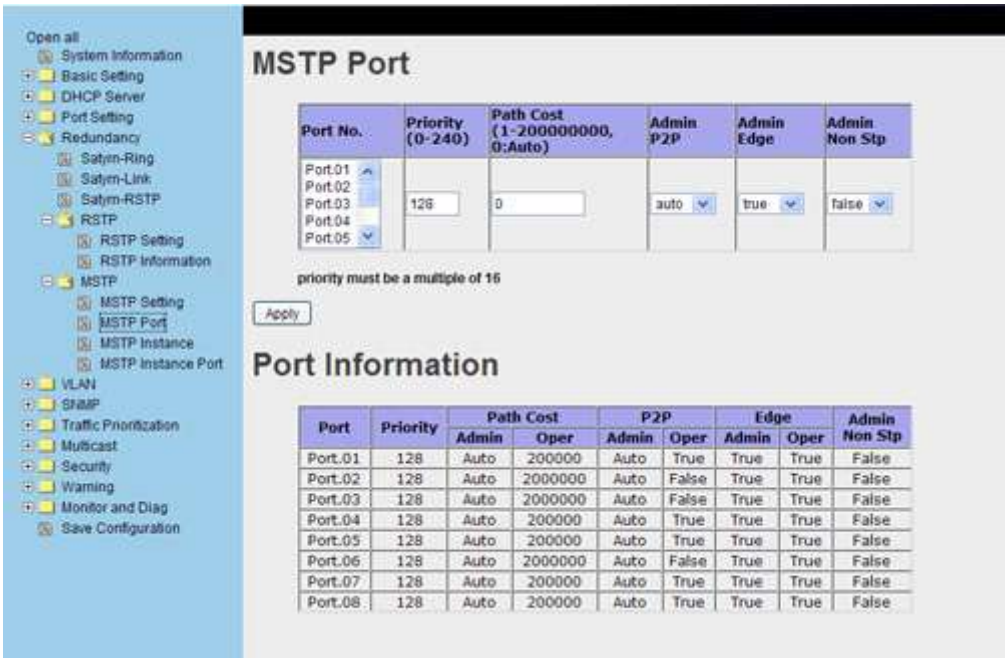

The following table describes the options available.

| Option | Description |
|---|---|
| **MSTP Enable** | The MSTP function must be enabled before configuring the related parameters. |
| **Force Version** | The Force Version function can be used to force a VLAN bridge utilising RSTP to operate in an MSTP-compatible manner. |
| **Configuration Name** | An MST Region must have the same MST configuration name. |
| **Revision Level (0-** | An MST Region must have the same revision level. |

| | |
|---|---|
| **65535)** | |
| **Priority (0-61440)** | A value used to identify the root bridge. The bridge with the lowest value has the highest priority and is selected as the root. If the value is changed, you must restart the switch. The value must be between 0 and 61440 and be a multiple of 4096. |
| **Max Age(6-40)** | The number of seconds a bridge will wait without receiving Spanning-Tree Protocol configuration messages before reconfiguring. The value must be between 6 and 40. |
| **Hello Time (1-10)** | How often the switch sends out the BPDU (Bridge Protocol Data Unit) packet in order to check RSTP current status. The value must be between 1 and 10. |
| **Forwarding Delay Time (4-30)** | The number of seconds a port must wait before changing from a learning/listening state to a forwarding state. The value must be between 4 and 30. |
| **Max Hops (1-40)** | This parameter is in addition to those specified for RSTP. A single value will apply to all Spanning Trees within an MST Region (the CIST and all MSTIs) for which the Bridge is the Regional Root. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

When the information has been entered, details are confirmed in the CIST Root Bridge Information which appears.

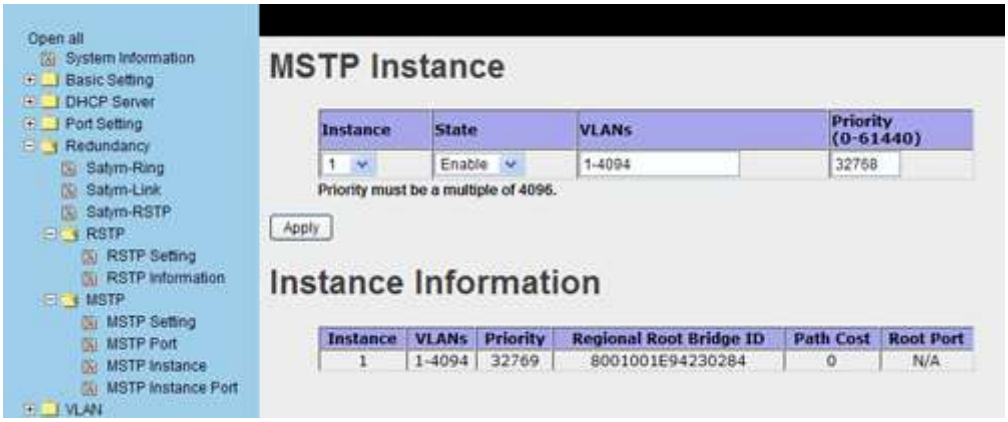
## MSTP Port



The following table describes the options available.

| Option | Description |
|---|---|
| **Port No.** | Selects the port you want to configure. |
| **Priority (0-240)** | Select which port should be blocked by setting the LAN priority. The priority must be a value between 0 and 240 and be a multiple of 16. |
| **Path Cost (1-200000000)** | The cost of the path from the transmitting bridge to the receiving bridge at the specified port. The value must be between 1 and 200000000. |
| **Admin P2P** | Some of the rapid state transactions that are possible within RSTP are dependent upon whether the port concerned can only be connected to exactly one other bridge (i.e., it is served by a point-to-point LAN segment), or it can be connected to two or more bridges (i.e., it is served by a shared medium LAN segment). This function allows the P2P status of the link to be administratively controlled. P2P-enabled equals "**True**". P2P-disabled equals "**False**". |
| **Admin Edge** | The port is directly connected to end stations and cannot create bridging loop in the network. To configure the port as an edge port, set the port to "**True**". |
| **Admin Non STP** | The port includes the STP mathematic calculation. **True** does not include the STP mathematic calculation. **False** includes the STP mathematic calculation. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

## MSTP Instance

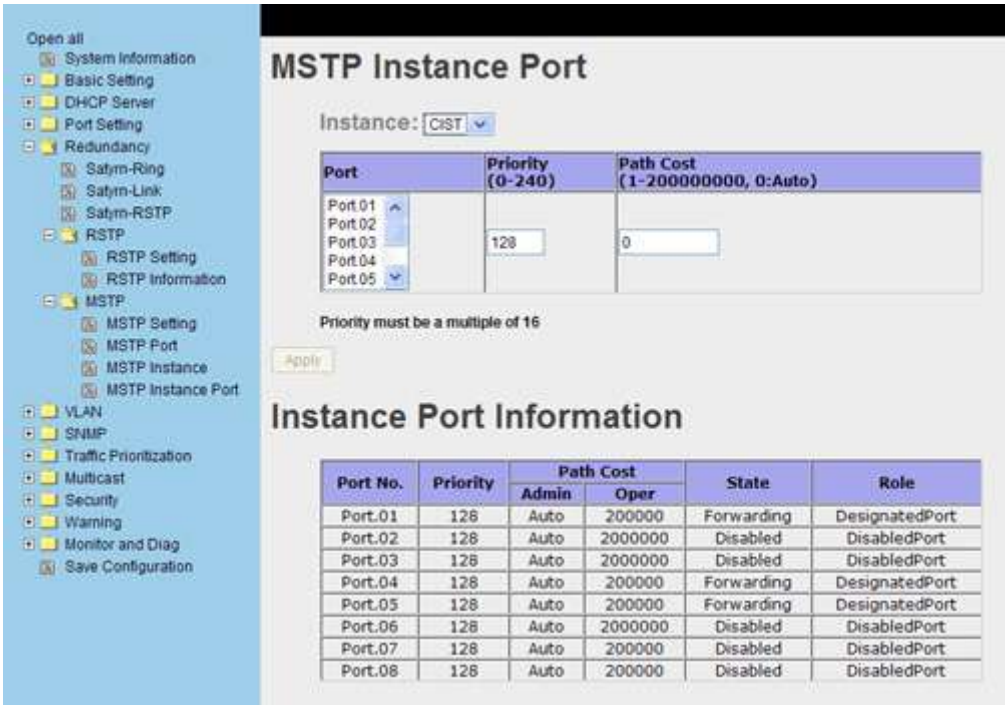



The following table describes the options available.

| Option | Description |
|---|---|
| **Instance** | Set the instance from 1 to 15 |

| | |
|---|---|
| **State** | Enable or disable the instance |
| **VLANs** | Set which VLAN will belong to which instance |
| **Priority (0-61440)** | A value used to identify the root bridge. The bridge with the lowest value has the highest priority and is selected as the root. If the value is changed, you must restart the switch. The value must be between 0 and 61440 and be a multiple of 4096. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

## MSTP Instance Port




The following table describes the options available.

| Option | Description |
|---|---|
| **Instance** | Set the instance's information except when CIST is selected. |
| **Port** | Select the port you want to configure. |
| **Priority (0-240)** | Select which port should be blocked by setting the LAN priority. The priority must be a value between 0 and 240 and be a multiple of 16. |
| **Path Cost (1-200000000)** | The cost of the path from the transmitting bridge to the receiving bridge at the specified port. The value must be between 1 and 200000000. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

### 5.1.7 VLAN

A Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain and allows you to isolate network traffic. Only the members of the same VLAN will receive traffic from the other members. Creating a VLAN from a switch is the logical equivalent of separating a group of network devices. However, all the network devices are still physically plugged into the same switch.

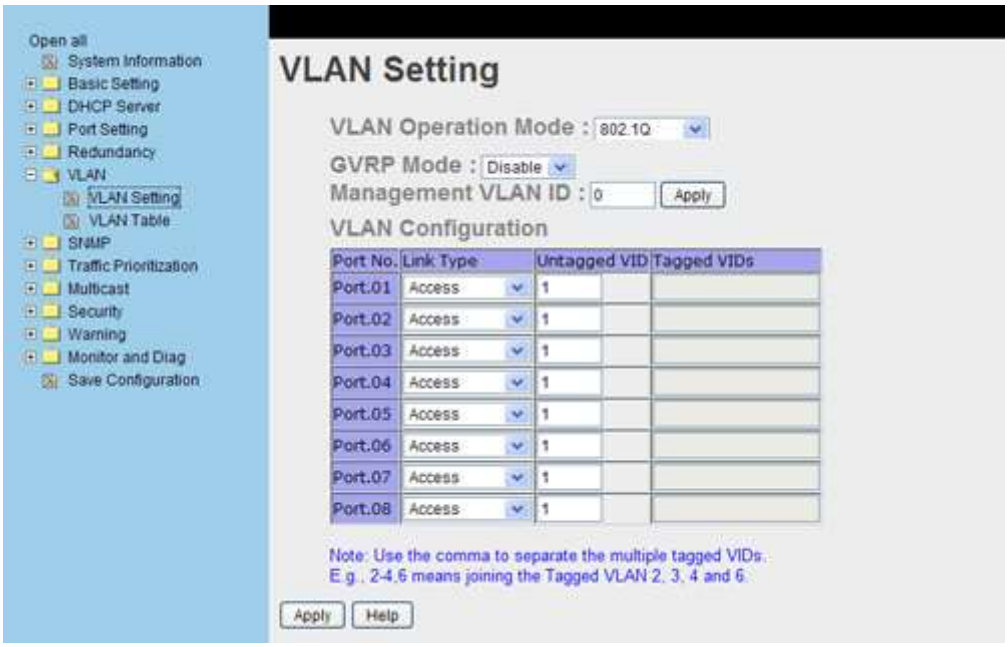
Satyrn M series switches support both port-based and 802.1Q (tagged-based) VLAN. The default configuration of VLAN operation mode is "802.1Q".

#### 5.1.7.1 VLAN Setting

Tagged-based VLAN is an IEEE 802.1Q specification standard and permits the creation of a VLAN across devices from different switch vendors. IEEE 802.1Q VLAN inserts an identification tag into the Ethernet frames. Each tag contains a VLAN Identifier (VID) that identifies the VLAN to which it belongs.

You can create tag-based VLAN with GVRP protocol either enabled or disabled. There are 256 VLAN groups available. With 802.1Q VLAN enabled, all ports on the switch belong to the default VLAN with a VID number 1. The default VLAN cannot be deleted.

GVRP allows automatic VLAN configuration between the switch and the nodes. If the switch is connected to a GVRP-enabled device, when you send a GVRP request to the VID of a VLAN defined on the switch, the switch will automatically add that device to the existing VLAN.




The following table describes the options available.

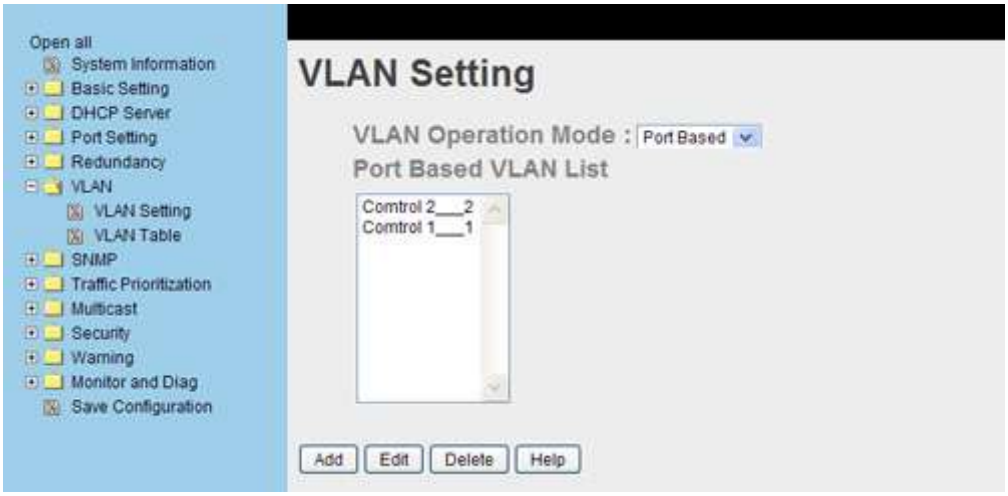
| Option | Description |
|---|---|
| **VLAN Operation Mode** | Configures the VLAN Operation Mode:<br>o Disable<br>o Port Base<br>o 802.1Q |
| **GVRP Mode** | Enable/Disable GVRP function. |
| **Management VLAN ID** | Management VLAN provides the network administrator with a secured VLAN to the management switch. Only the devices in the management VLAN can access the switch. |
| **Link type** | Configures the link type:<br>o **Access Link:** single switch only, permits grouping ports by setting the same VID.<br>o **Trunk Link:** extended application of **Access Link**, permits grouping ports by setting the same VID with 2 or more switches.<br>o **Hybrid Link:** Both **Access Link** and **Trunk Link** are available.<br>o **Hybrid(QinQ) Link:** enable QinQ mode permits the insertion of one more VLAN tag in a original VLAN frame. |
| **Untagged VID** | Sets the port default VLAN ID for untagged devices that connect to the port. The range is 1 to 4094. |
| **Tagged VIDs** | Sets the tagged VIDs to carry different VLAN frames to other switch. |
| **Apply** | Click "**Apply**" to save the configuration. |

#### 5.1.7.2 VLAN Setting – Port Based

Traffic is forwarded to the member ports of the same VLAN group.

**Initial Setup**

Use this to set up the VLAN.

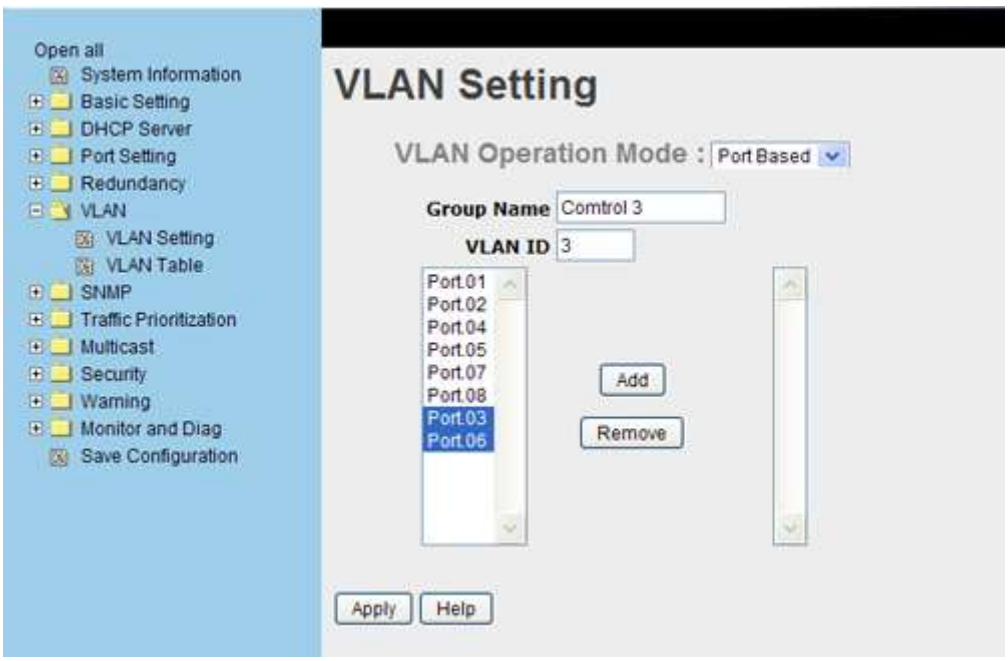



The following table describes the options available.

| Option | Description |
|---|---|
| **Add** | Click "**add**" to enter the VLAN add interface. |
| **Edit** | Edit existing VLAN |
| **Delete** | Delete existing VLAN |
| **Help** | Show help file. |

## VLAN Interface

Use this for details of the VLAN.




The following table describes the options available.

| Option | Description |
|---|---|
| **Group Name** | VLAN name. |
| **VLAN ID** | Specify the VLAN ID |
| **Add** | Select a port to join the VLAN group. |
| **Remove** | Remove a port from the VLAN group |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

#### 5.1.7.3 VLAN Table

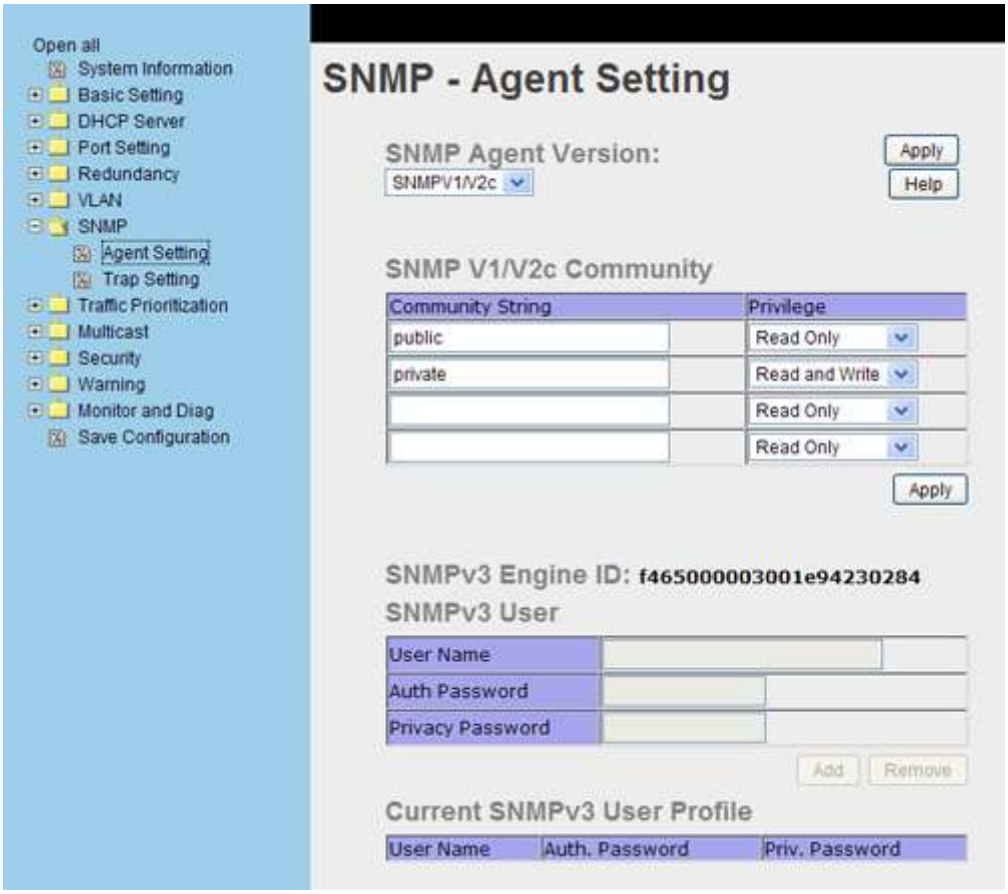
This table shows the results of the settings set in VLAN Setting.


### 5.1.8 SNMP Configuration

Simple Network Management Protocol (SNMP) is the protocol developed to manage nodes (servers, workstations, routers, switches and hubs etc.) on an IP network. SNMP allows network administrators to manage network performance, find and solve network problems, and accommodate for network growth. Network management systems are informed of problems by receiving traps or change notices from network devices that implement SNMP.

#### 5.1.8.1 Agent Setting

You can set SNMP agent-related information with the Agent Setting function.



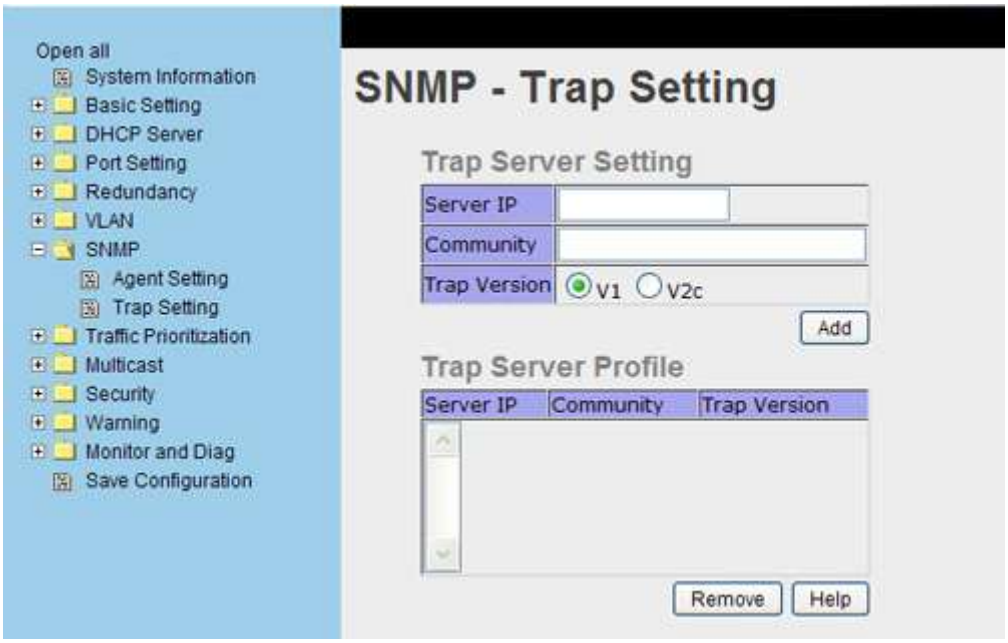

The following table describes the options available.

| Option | Description |
|---|---|
| **SNMP agent Version** | Three SNMP versions are supported<br>o SNMPv1<br>o SNMPv2c<br>o SNMPv3<br>The SNMPv1 and SNMPv2c agents use a community string match for authentication, which means SNMP servers will access objects with read-only or read/write permissions with the community default string public/private.<br><br>SNMPv3 requires an authentication level of MD5 or DES to encrypt data for enhanced data security. |
| **SNMPv1/v2c Community** | SNMP Community should be set for SNMPv1 or SNMPv2c. Four sets of "Community String/Privilege" are supported. Each Community String has a maximum of 32 characters. Leave this box empty to remove the Community String. |
| **SNMPv3User** | If SNMPv3 agent is selected, the SNMPv3 user profile should be set for authentication. The Username is required The Auth Password is encrypted by MD5 and the Privacy Password is encrypted by DES. There are a maximum 8 sets of SNMPv3 User and a maximum of 16 characters for both the Username and Password. |

| | |
|---|---|
| | When SNMPv3 agent is selected, you can:<br>o Input SNMPv3 username only<br>o Input SNMPv3 username and Auth Password<br>o Input SNMPv3 username, Auth Password and Privacy Password, which can be different from Auth Password.<br>To remove a current user profile<br>o Enter SNMPv3 user name you want to remove<br>o Click "**Remove**" button |
| **Current SNMPv3 User Profile** | Shows all the SNMPv3 user profiles. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.8.2 SNMP – Trap Setting

A trap manager is a management station that receives traps, which are system alerts generated by the switch. If no trap manager is defined, no traps will be sent. Create a trap manager by entering the IP address of the station and a community string. To define a management station as a trap manager, enter SNMP community strings and select the SNMP version.

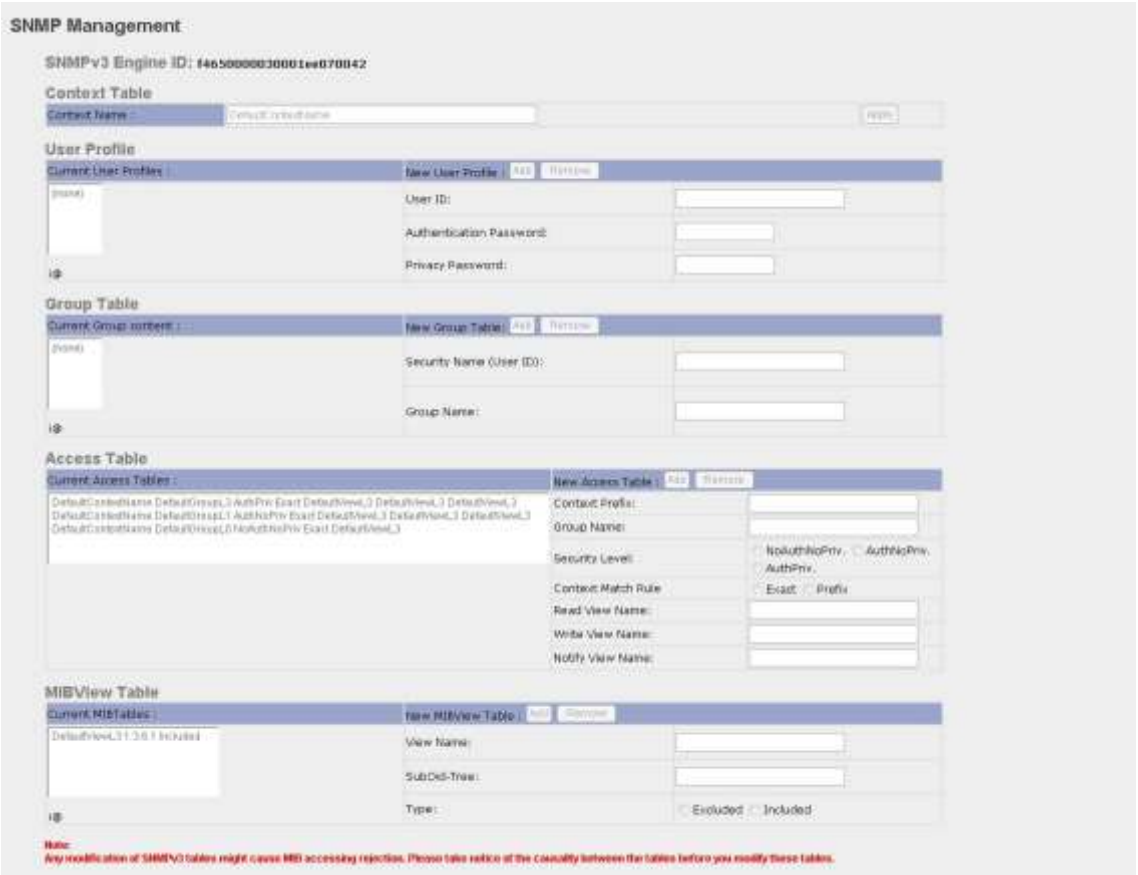


The following table describes the options available.

| Option | Description |
|---|---|
| **Server IP** | The server IP address to receive traps |
| **Community** | Community for authentication |
| **Trap Version** | Trap Version supports V1 and V2c. |
| **Add** | Add trap server profile. |
| **Remove** | Remove trap server profile. |
| **Help** | Show help file. |

#### 5.1.8.3 SNMPv3 Setting

SNMPv3 adds security and remote configuration enhancements to SNMP. Use this section to set the SNMPv3 features.




The following table describes the options available.

| Option | Description |
|---|---|
| Context Table | Configure SNMP v3 context table. Assign the context name of context table. Click "Apply" to change context name |
| User Table | 1. Configure SNMP v3 user table.<br>2. **User ID:** set up the user name.<br>3. **Authentication Password:** set up the authentication password.<br>4. **Privacy Password:** set up the private password.<br>5. Click "Add" to add context name.<br>6. Click "Remove" to remove context name. |
| Group Table | 1. Configure SNMP v3 group table.<br>2. **Security Name (User ID):** assign the user name that you have set up in user table.<br>3. **Group Name:** set up the group name.<br>4. Click "Add" to add context name.<br>5. Click "Remove" to remove context name. |
| Access Table | 1. Configure SNMP v3 access table.<br>2. **Context Prefix:** set up the context name.<br>3. **Group Name:** set up the group.<br>4. **Security Level:** select the access level.<br>5. **Context Match Rule:** select the context match rule.<br>6. **Read View Name:** set up the read view.<br>7. **Write View Name:** set up the write view.<br>8. **Notify View Name:** set up the notify view.<br>9. Click "Add" to add context name.<br>10. Click "Remove" to remove context name. |
| MIBview Table | 1. Configure MIB view table.<br>2. **ViewName:** set up the name.<br>3. **Sub-Oid Tree:** fill the Sub OID.<br>4. **Type:** select the type – exclude or included.<br>5. Click "Add" to add context name. |

| | |
|---|---|
| | 6. Click "Remove" to remove context name. |
| Help | Show help file. |

### 5.1.9 Traffic Prioritisation

Traffic Prioritisation includes 3 modes: port base, 802.1p/COS, and TOS/DSCP. Using the traffic prioritisation function, you can classify the traffic into four classes for different network applications. The Satyrn M series supports 4 priority queues.

#### 5.1.9.1 Traffic Prioritisation Policy

Select the traffic prioritisation policy using this function.

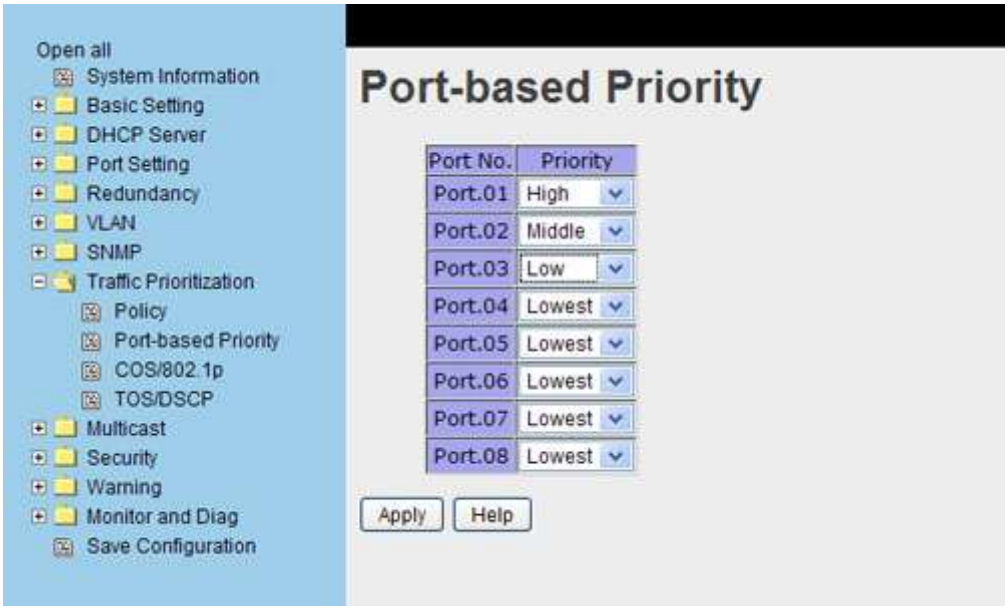

The following table describes the options available.

| Option | Description |
|---|---|
| **QoS Mode** | ○ **Port-base:** the output priority is determined by the entry port<br>○ **COS only:** the output priority is determined by COS only<br>○ **TOS only:** the output priority is determined by TOS only<br>○ **COS first:** the output priority is determined by COS and TOS, but COS first<br>○ **TOS first:** the output priority is determined by COS and TOS, but TOS first. |
| **QoS policy** | ○ **Using the 8,4,2,1 weight fair queue scheme:** the output queues will follow a 8:4:2:1 ratio to transmit packets from the highest to the lowest queue. For example: 8 high queue packets, 4 middle queue packets, 2 low queue packets, and the one lowest queue packets are transmitted in one turn.<br>○ **Use the strict priority scheme:** the packets in the higher queue will always be transmitted first until the higher queue is empty. |

| | |
|---|---|
| **Help** | Show help file. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

### 5.1.9.2 Port Based Priority

Selecting port based priority will provide four levels of priority which can be set here.




The following table describes the options available.

| Option | Description |
|---|---|
| **Port base Priority** | Assign the Port with a priority queue. Four priority queues can be assigned<br>o High<br>o Middle<br>o Low<br>o Lowest |
| **Help** | Show help file. |
| **Apply** | Click "**Apply**" to activate the configurations. |

### 5.1.9.3 COS Based Priority

COS (Class Of Service) is also known as 802.1p. It describes the way in which the output priority of a packet is determined by a user priority field in 802.1Q VLAN tag. Priority values range from 0 to 7. There are four COS priority queue settings: High, Middle, Low, and Lowest.


The following table describes the options available.

| Option | Description |
|---|---|
| **COS/802.1p** | Four priority queues can be assigned<br>o High<br>o Middle<br>o Low<br>Lowest |
| **COS Port Default** | When an entry packet does not have a VLAN tag, a default priority value is assigned on the basis of the entry port. |
| **Help** | Show help file. |
| **Apply** | Click "**Apply**" to save the changed configuration. |

### 5.1.9.4 TOS based Priority

TOS (Type of Service) is a field in the IP header of a packet. This TOS field is also used by Differentiated Services and is called the Differentiated Services Code Point (DSCP). The output priority of a packet can be determined by this field.


The following table describes the options available.

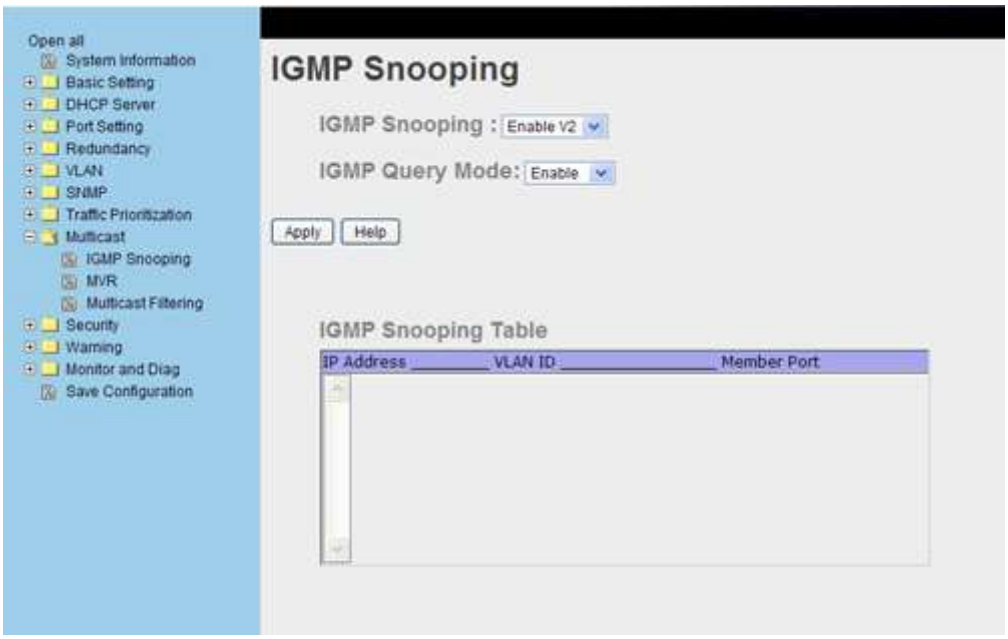
| Option | Description |
|---|---|
| **TOS/DSCP** | The priority values range from 0 to 63.<br>There are four DSCP priority queues: High, Middle, Low, and Lowest. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

## 5.1.10 Multicast

### 5.1.10.1 IGMP Snooping

Internet Group Management Protocol (IGMP) is used by IP hosts to register their dynamic multicast group membership. IGMP has 3 versions, IGMP v1, v2 and v3. Please refer to RFC 1112, 2236 and 3376. IGMP Snooping improves the performance of networks that carry multicast traffic. It provides the ability to prune multicast traffic so that it travels only to the end destinations that require that traffic and reduces the overall amount of traffic on the Ethernet LAN.

Only one switch should be selected to carry out queries in an IGMP application.

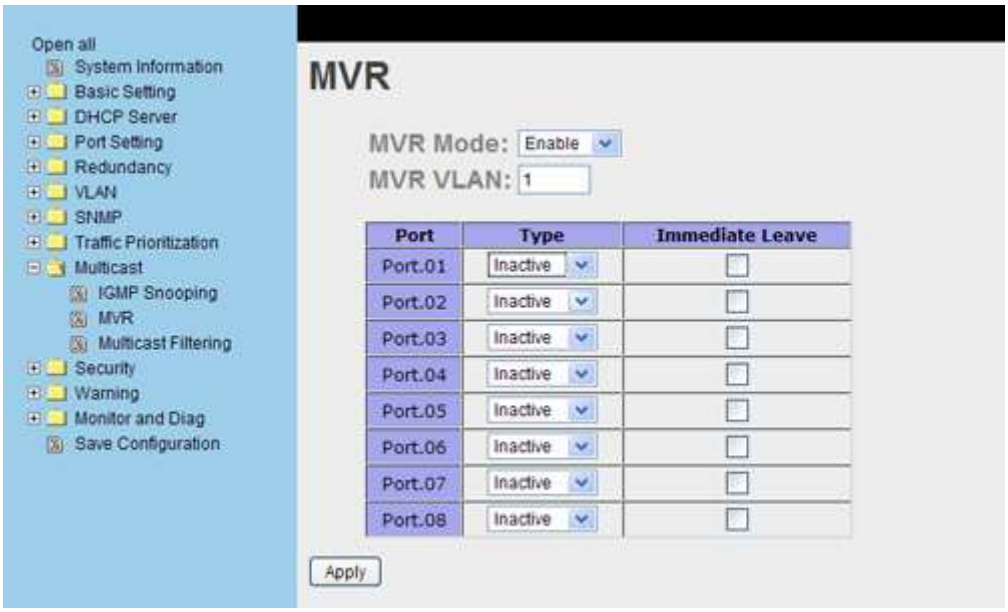



The following table describes the options available.

| Option | Description |
|---|---|
| **IGMP Snooping** | Enable/Disable IGMP snooping. |
| **IGMP Query Mode** | Identifies whether this Switch will make IGMP queries. In "Auto" mode the Switch with the lowest IP address will make queries. |
| **IGMP Snooping Table** | Show current IP multicast list |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.10.2 Multicast VLAN Registration

Multicast VLAN Registration (MVR) allows a port to be a receiver or source of a multicast stream on the network-wide multicast VLAN. A single multicast VLAN can be shared in the network while subscribers remain in separate VLANs. MVR allows multicast streams to be sent to the multicast VLAN with certain VLANs excluded for bandwidth and security reasons.

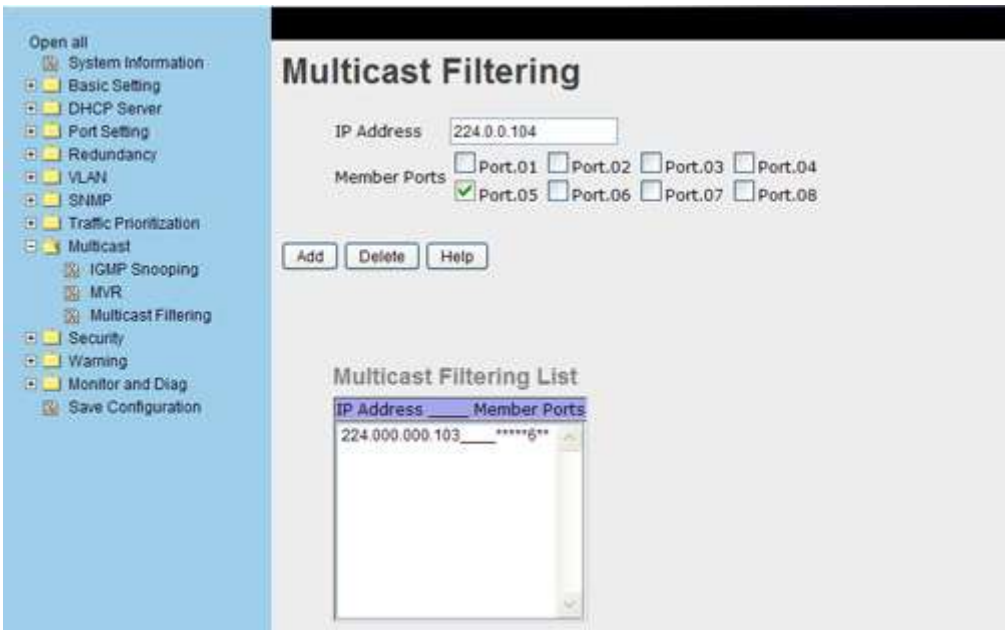



The following table describes the options available.

| Option | Description |
|---|---|
| **MVR Mode** | Enable or disable this feature |
| **MVR VLAN** | The VLAN number |
| **Port** | The port connecting to the VLAN |
| **Type** | o Inactive – MVR not in use<br>o Source – Multicast source<br>o Receiver – Port received Multicast |
| **Apply** | Show help file. |

#### 5.1.10.3 Multicast Filter

Multicast filtering is the system by which end stations will only receive multicast traffic if they are registered to join specific multicast groups. With multicast filtering, network devices will only forward multicast traffic to the ports that are connected to the registered end stations.




The following table describes the options available.

| Option | Description |
|---|---|
| **IP Address** | Assign a multicast group IP address in the range of 224.0.0.0 ~ 239.255.255.255 |
| **Member Ports** | Tick the check box beside the port number to include them as the member ports in the specific multicast group IP address. |
| **Add** | Show current IP multicast list |
| **Delete** | Delete an entry from table |
| **Help** | Show help file. |

### 5.1.11 Security

The Satyrn M Series products have up to six useful functions (depending on the switch) which can enhance the security of the switch. These are Access Control List, IP Security, Port Security, MAC Blacklist, MAC Address Aging, and 802.1x protocol.

### 5.1.11.1 IP Security

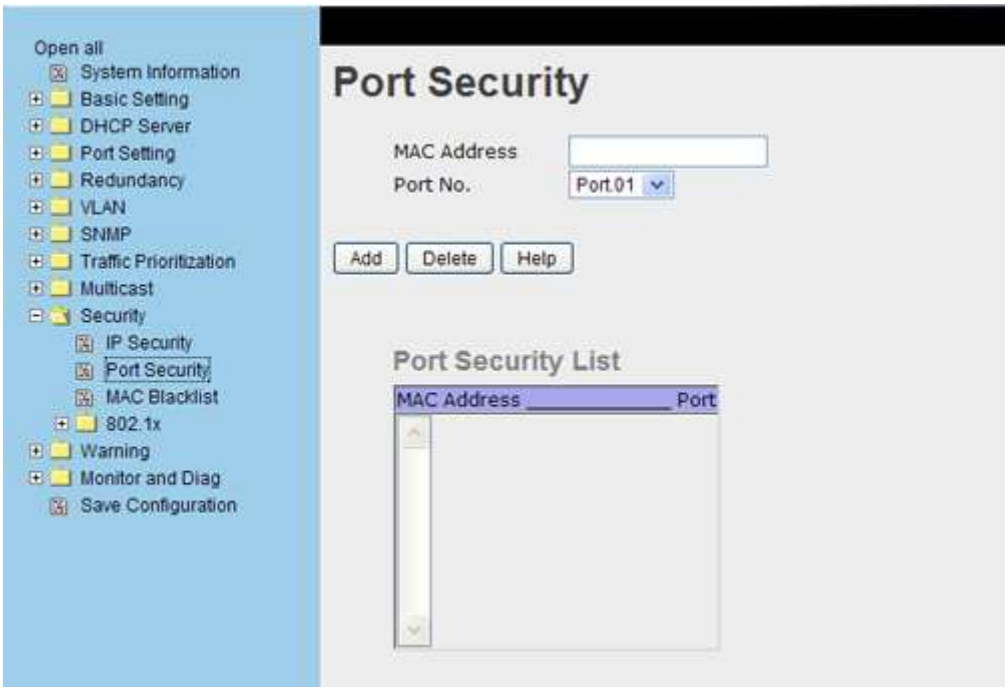
Using IP security you can enable or disable remote management using WEB, Telnet, or SNMP. IP security can also restrict remote management to a list of specific IP addresses. Only these secure IP addresses are permitted to remotely manage the switch.


The following table describes the options available.

| Option | Description |
|---|---|
| **IP security MODE** | Enable or Disable the IP security function. |
| **Enable WEB Management** | Check the box to enable WEB Management. |
| **Enable Telnet Management** | Check the box to enable Telnet Management. |
| **Enable SNMP Management** | Check the box to enable MPSN Management. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.11.2 Port Security

Port Security allows the addition of static MAC addresses to a hardware forwarding database so that if Port Security is enabled on the **Port Control** page, only the frames with MAC addresses in this list will be forwarded, otherwise they will be discarded.

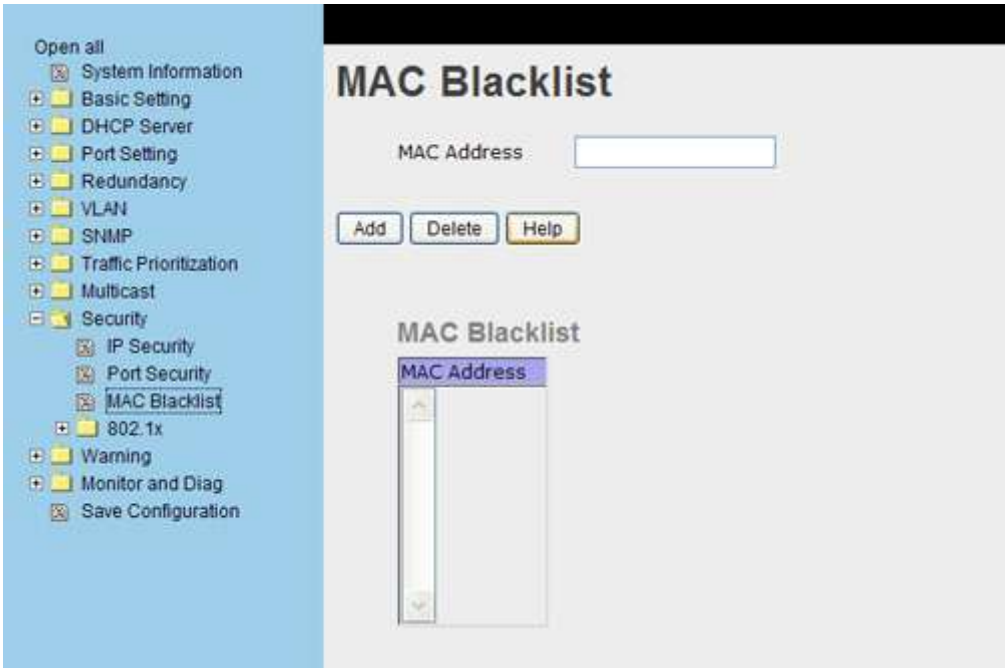



The following table describes the options available.

| Option | Description |
|---|---|
| **MAC Address** | Assign MAC Address to a specific port. |
| **Port No.** | Select the switch port. |
| **Add** | Add a MAC Address and port information. |
| **Delete** | Delete the entry. |
| **Help** | Show help file. |

### 5.1.11.3 MAC Blacklist

MAC Blacklist can prevent traffic being forwarding to a list of specified MAC addresses. Any frames forwarded to MAC addresses in this list will be discarded, so the blacklisted devices will not receive any frames.



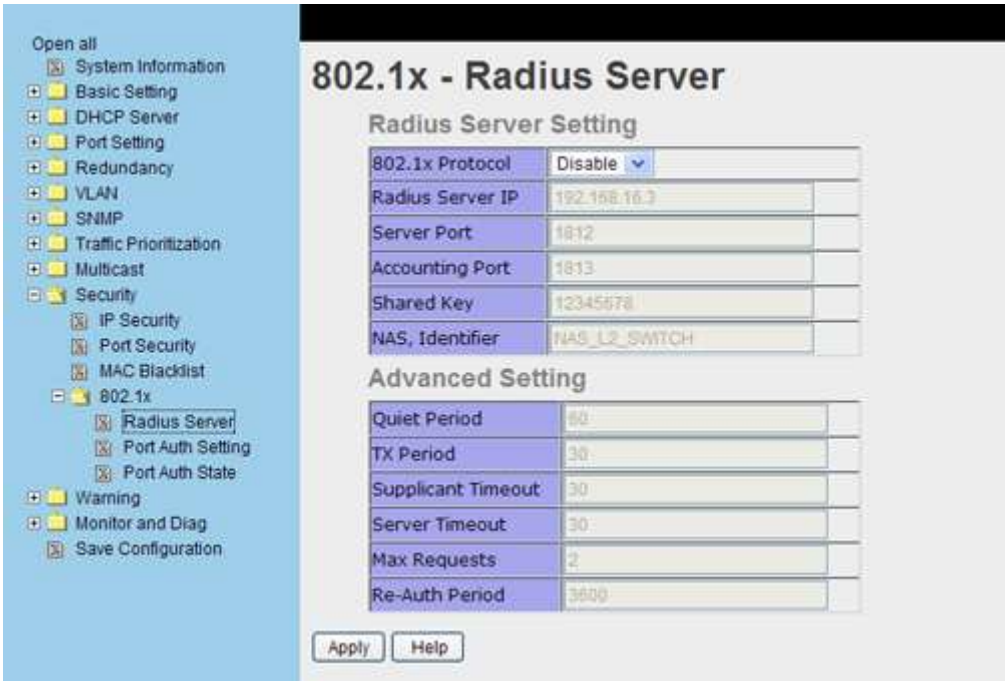

The following table describes the options available.

| Option | Description |
|---|---|
| **MAC Address** | Enter MAC Address to add to the MAC Blacklist. |
| **Port No.** | Select the switch port. |
| **Add** | Add a device to the Blacklist table. |
| **Delete** | Delete the entry. |
| **Help** | Show help file. |

#### 5.1.11.4 802.1x

802.1x makes use of the physical access characteristics of IEEE802 LAN infrastructures in order to provide authentication and authorization of devices attached to a LAN port. Please refer to IEEE 802.1X - Port Based Network Access Control.

## 802.1x - Radius Server




The following table describes the options available.

| Option | Description |
|---|---|
| **Radius Server Setting** | |
| **Radius Server IP** | The IP address of the authentication server. |
| **Server port** | The UDP port number used by the authentication server to authenticate. |
| **Account port** | The UDP destination port for accounting requests to the specified Radius Server. |
| **Shared Key** | The key shared between this switch and authentication server. |
| **NAS, Identifier** | The string used to identify this switch. |
| **Advanced Setting** | |
| **Quiet Period** | The time interval between the last authentication failure and the start of the next authentication attempt. |
| **Tx Period** | The time that the switch must wait for response to an EAP request/identity frame from the client before resending the request. |
| **Supplicant Timeout** | The period of time the switch waits for a supplicant response to an EAP request. |
| **Server Timeout** | The period of time the switch waits for a Radius server response to an authentication request. |
| **Max Requests** | The maximum number of times to retry sending packets to the supplicant. |
| **Re-Auth Period** | The period of time after which connected clients must be re- |

| | |
|---|---|
| | authenticated. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

## 802.1x-Port Authorized Mode

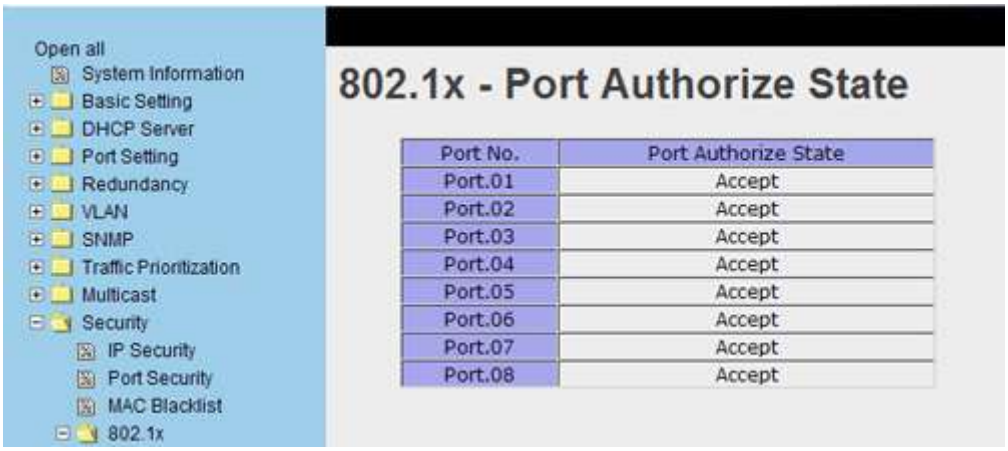
Use this section to set the 802.1x authorized mode for each port.


The following table describes the options available.

| Label | Description |
|---|---|
| **Port Authorized Mode** | ○ **Reject:** force this port to be unauthorized<br>○ **Accept:** force this port to be authorized<br>○ **Authorize:** the state of this port is determined by the outcome of the 802.1x authentication.<br>○ **Disable:** this port will not participate in 802.1x. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

**802.1x-Port Authorized State**

This section shows 802.1x port authorized state set in the previous section.

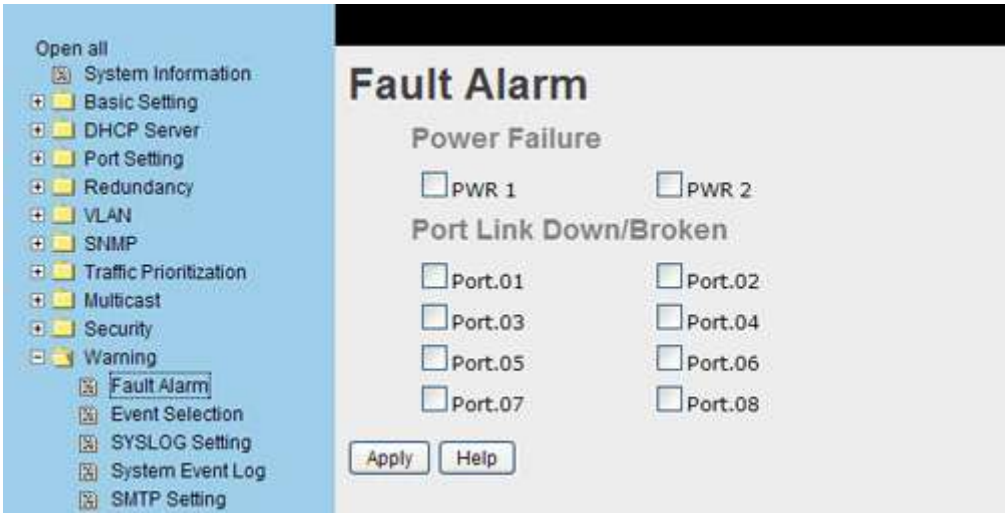



## 5.1.12 Warning

The warning function is very important for managing a switch. You can receive warnings by SYSLOG, email, and Fault Relay. This is used for monitoring the switch status on remote locations. When problems occur, the warning message will be sent to your appointed server, email, or relay fault on the switch panel.

### 5.1.12.1 Fault Alarm

When any selected fault event has taken place, the Fault LED in the switch panel will light up and the electric relay will signal at the same time.



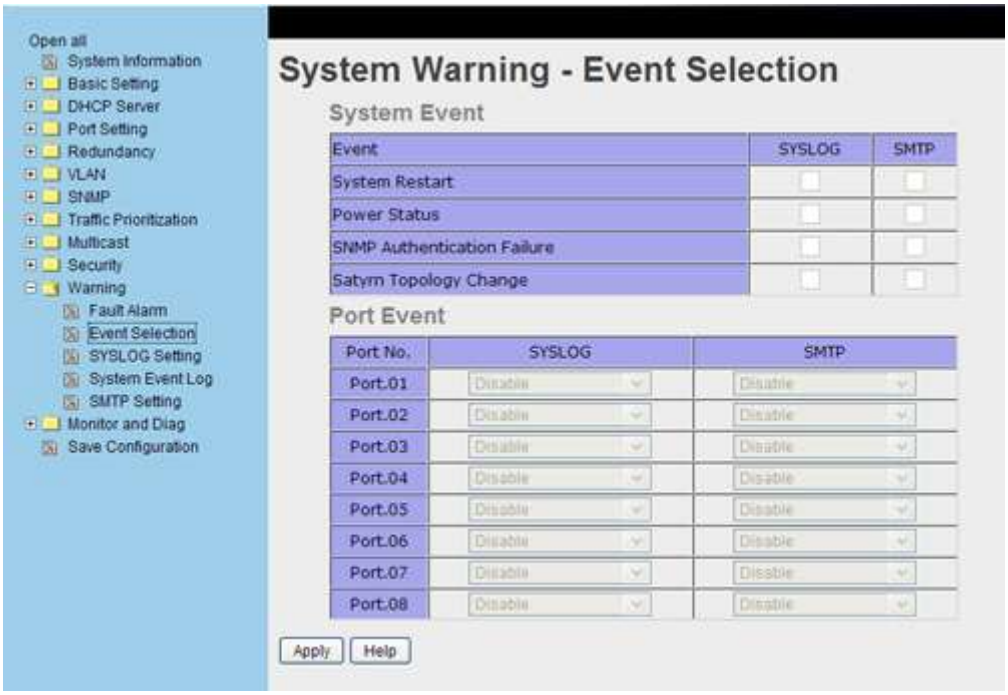

The following table describes the options available.

| Option | Description |
|---|---|
| **Power Failure** | Check the box to monitor PWR 1 or PWR 2. |
| **Port Link Down/Broken** | Check the box to monitor port 1 to port 8. |

| | |
|---|---|
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.12.2 Event Selection

SYSLOG and SMTP are the two warning methods that are supported by the system. Check the corresponding box to enable the system event warning method you wish to activate. Please note that the checkbox cannot be checked when SYSLOG or SMTP are disabled.

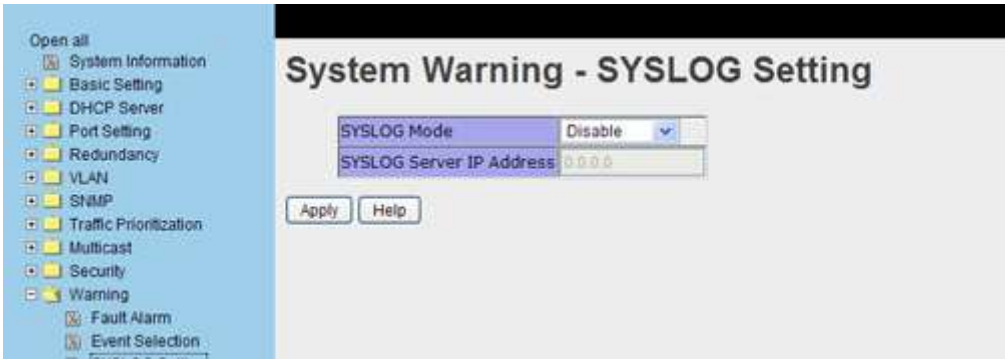



The following table describes the options available.

| Option | Description |
|---|---|
| **System Event** | |
| **System Cold Start** | Alert at system restart |
| **Power Status** | Alert at power up or down |
| **SNMP Authentication Failure** | Alert at SNMP authentication failure. |
| **O-Ring Topology Change** | Alert when O-Ring topology changes. |
| **Port Event**<br><br>**SYSLOG / SMTP event** | ○ Disable<br>○ Link Up<br>○ Link Down<br>○ Link Up & Link Down |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.12.3 SYSLOG Setting

The SYSLOG is a protocol to transmit event notification messages across networks. Please refer to RFC 3164 - The BSD SYSLOG Protocol for more detail.

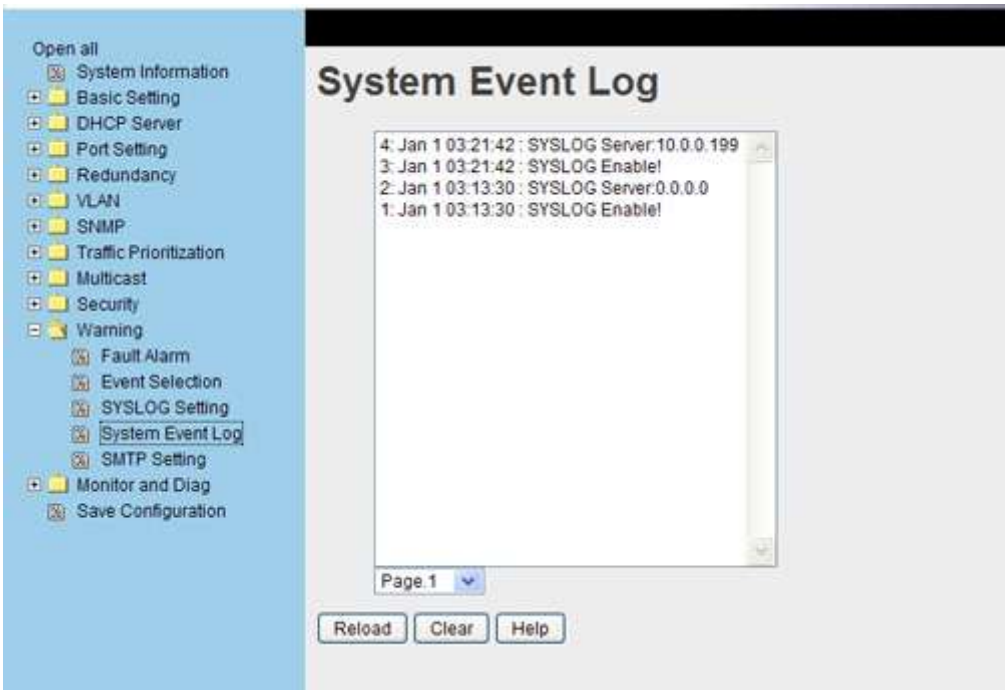



The following table shows the options available.

| Option | Description |
|---|---|
| **SYSLOG Mode** | ○ **Disable:** disable SYSLOG<br>○ **Client Only:** log to local system<br>○ **Server Only:** log to a remote SYSLOG server.<br>○ **Both:** log to both local and remote servers. |
| **SYSLOG Server IP Address** | The remote SYSLOG Server IP address. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.12.4 System Event Log

If the system log client is enabled, the system event logs will appear in this table.




The following table describes the options available.

| Option | Description |
|---|---|
| **Page** | Select the log page. |
| **Reload** | Refresh this page and display the newest event logs. |
| **Clear** | Clear the log. |
| **Help** | Show help file. |

#### 5.1.12.5 SMTP Setting

SMTP is a protocol for email transmission across the Internet. Please refer to RFC 821 - Simple Mail Transfer Protocol for details.

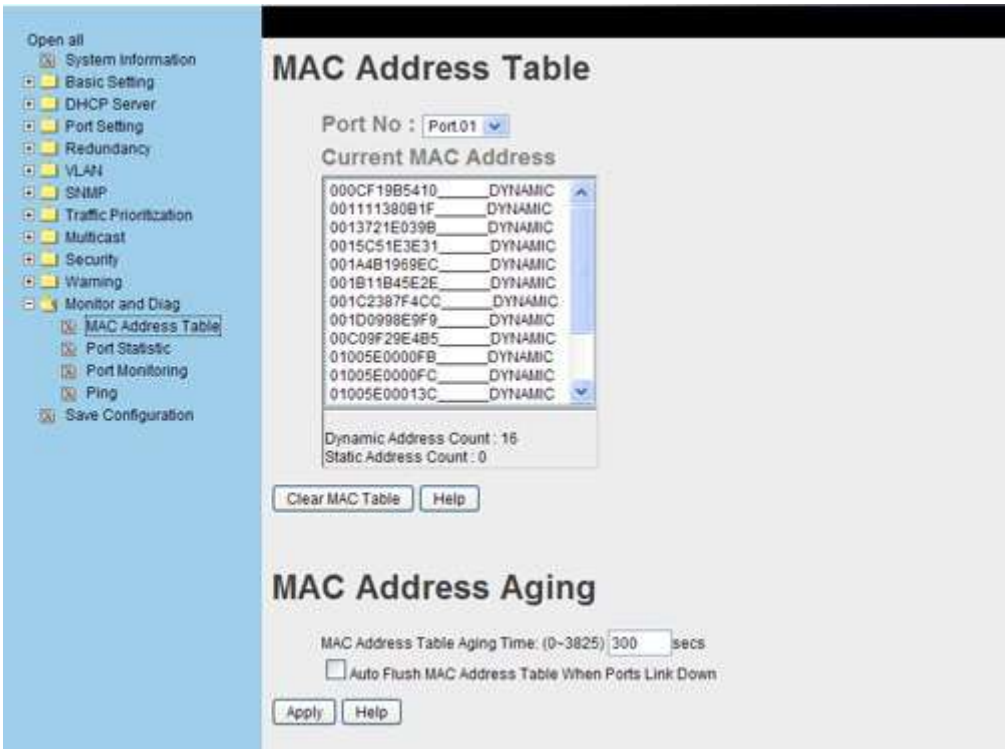

The following table shows the options available.

| Option | Description |
|---|---|
| **E-mail Alarm** | Enable or Disable system warning events sent by email. |
| **Sender E-mail Address** | The SMTP server IP address |
| **Mail Subject** | The Subject of the mail |
| **Authentication** | ○ **Username:** the authentication username<br>○ **Password:** the authentication password<br>○ **Confirm Password:** re-enter password. |
| **Recipient E-mail Address** | The recipient's E-mail address. Up to 6 recipients can be defined. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

## 5.1.13 Monitoring and Diagnostics

#### 5.1.13.1 MAC Address Table

The MAC Address Table is a filtering database that supports queries by the Forwarding Process as to whether a frame received by a specified port with a specified MAC address is to be forwarded through a specific transmission port. Refer to IEEE 802.1 D Sections 7.9 for further details.



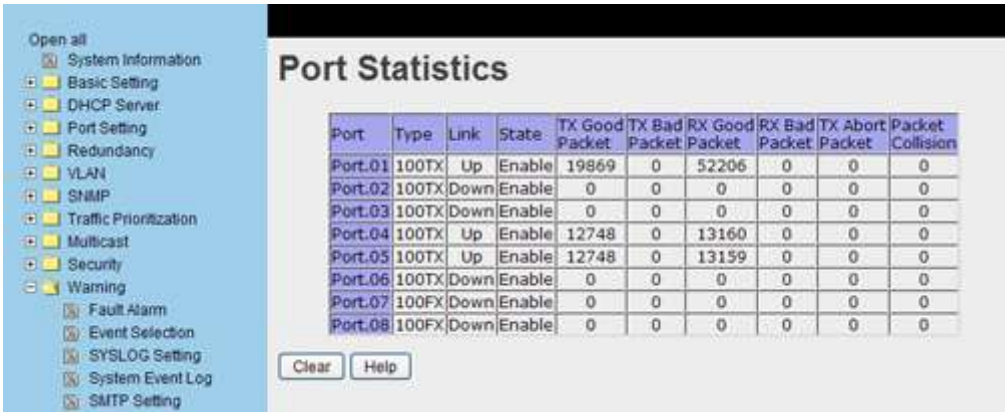

You can set the MAC Address aging timer and when the time expires, unused MAC addresses will be cleared from the MAC table.

The following table describes the options available.

| Option | Description |
|---|---|
| **Port No.** | Show all MAC addresses mapped to a selected port |
| **Clear MAC Table** | Clear all MAC addresses in table |
| **Help** | Show help file. |
| **MAC Address Table Aging Time** | Sets the aging time for the MAC table in seconds. Value must be between 0 and 3825. The default setting is 300 (5 minutes). |
| **Auto Flush MAC Address Table When ports Link Down** | Enable this function to flush the MAC addresses when the ports Link Down |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Help** | Show help file. |

### 5.1.13.2 Port Statistics

Port statistics show several statistics counters for all ports. This could prove useful for initial diagnostics of any problem.




The following table describes the options available.

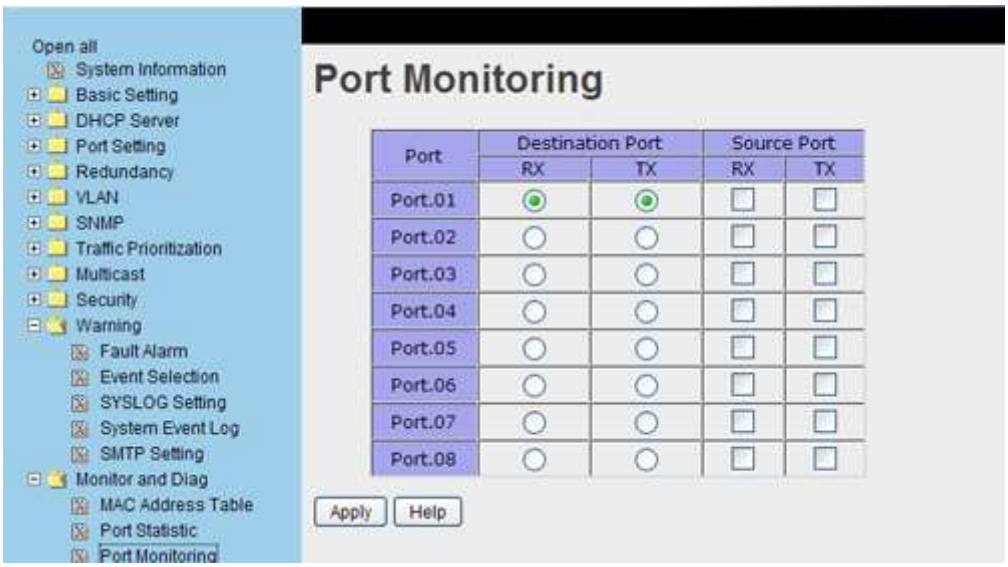
| Option | Description |
|---|---|
| **Type** | The port speed and media type. |
| **Link** | The port link status. |
| **State** | Shows ports enabled or disabled, set by Port Control |
| **TX Good Packet** | The number of good packets sent by this port. |
| **TX Bad Packet** | The number of bad packets sent by this port including undersize (less than 64 octets), oversize, CRC Align errors, fragments and jabber. |
| **RX Good Packet** | The number of good packets received by this port. |
| **RX Bad Packet** | The number of bad packets received by this port including undersize (less than 64 octets), oversize, CRC Align errors, fragments and jabber. |
| **TX Abort Packet** | The number of packets aborted by this port whilst transmitting. |
| **Packet Collision** | The number of times a collision was detected by this port |
| **Packet Dropped** | The number of dropped packets |
| **RX Bcast Packet** | The number of broadcast packets |
| **Rx Mcast packet** | The number of multicast packets |
| **Clear** | Clear all counters. |
| **Help** | Show help file. |

A subset of this information can be obtained from the initial System Information page and clicking on the appropriate port.

### 5.1.13.3 Port Monitoring

The port monitoring function supports TX only, RX only, and both TX/RX monitoring. TX monitoring sends any data that leaves from the checked TX source ports to a selected TX destination port as well. RX monitoring sends any data that arrives at a checked RX

source ports to a selected RX destination port as well as sending the frame where on to its normal destination. If all source ports are unchecked no port monitoring will take place.




The following table describes the options available.

| Option | Description |
|---|---|
| **Destination Port** | This port will receive a copied frame from the source port for monitoring purpose. |
| **Source Port** | The port will be monitored. Check the TX or RX box to monitor it. |
| **TX** | Transmitted frames. |
| **RX** | Received frames. |
| **Apply** | Click "**Apply**" to save the changed configuration. |
| **Clear** | Clear all checked boxes. This disables the port monitoring function. |
| **Help** | Show help file. |

### 5.1.13.4 Ping

The Ping function allows the switch to send ICMP packets in order to detect the remote nodes.


The following table describes the options available.

| Option | Description |
|---|---|
| **IP Address** | Enter the IP address that you want to detect. |
| **Active** | Click the Active button to send ICMP packets |

### 5.1.14 Save Configuration

If any configuration changes, "**Save Configuration**" should be clicked to save the current configuration data to the permanent flash memory. Otherwise, the modified configuration will be lost when power is turned off or the system is reset.


The following table describes the options available.

| Label | Description |
|---|---|
| **Save** | Save all current configurations. |
| **Help** | Show help file. |

# 6 Command Line Interface Management

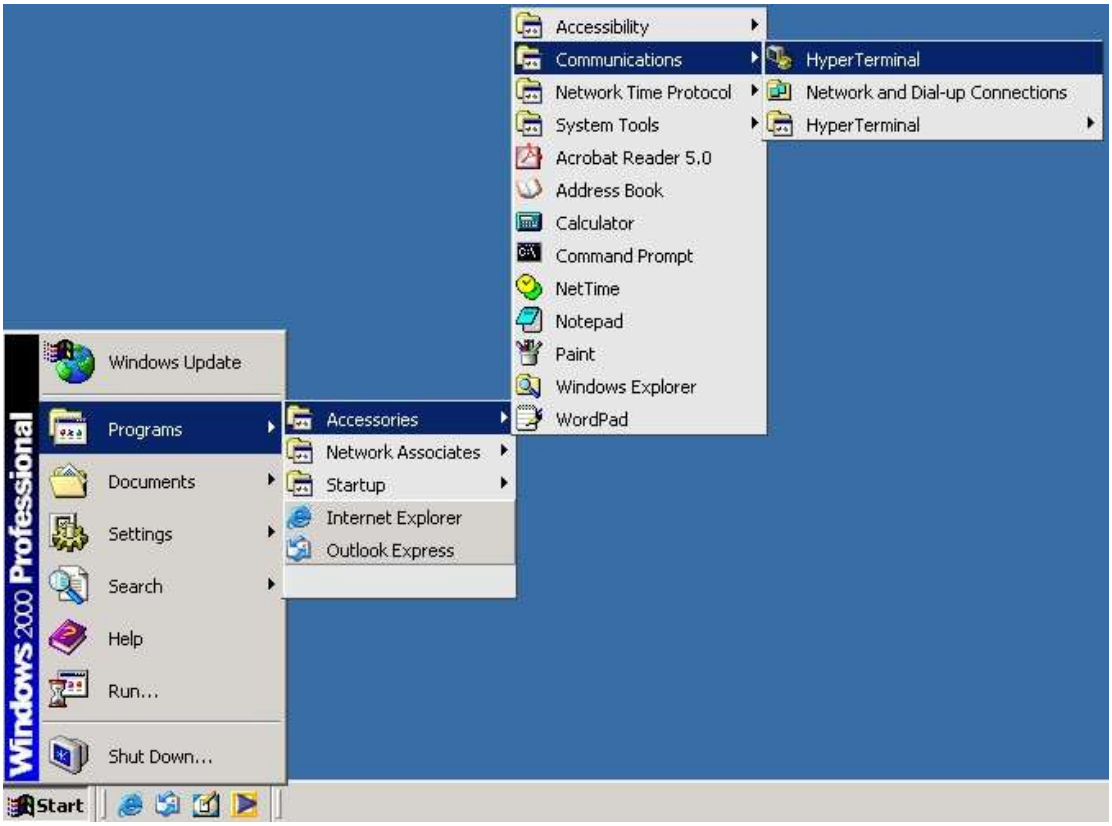
## *6.1 About CLI Management*

The Satyrn M Series switches can not only be managed through a browser based system described in the preceding sections but also via a Command Line Interface (CLI). Either the Serial Console port or Telnet can be used to manage the switch by CLI.

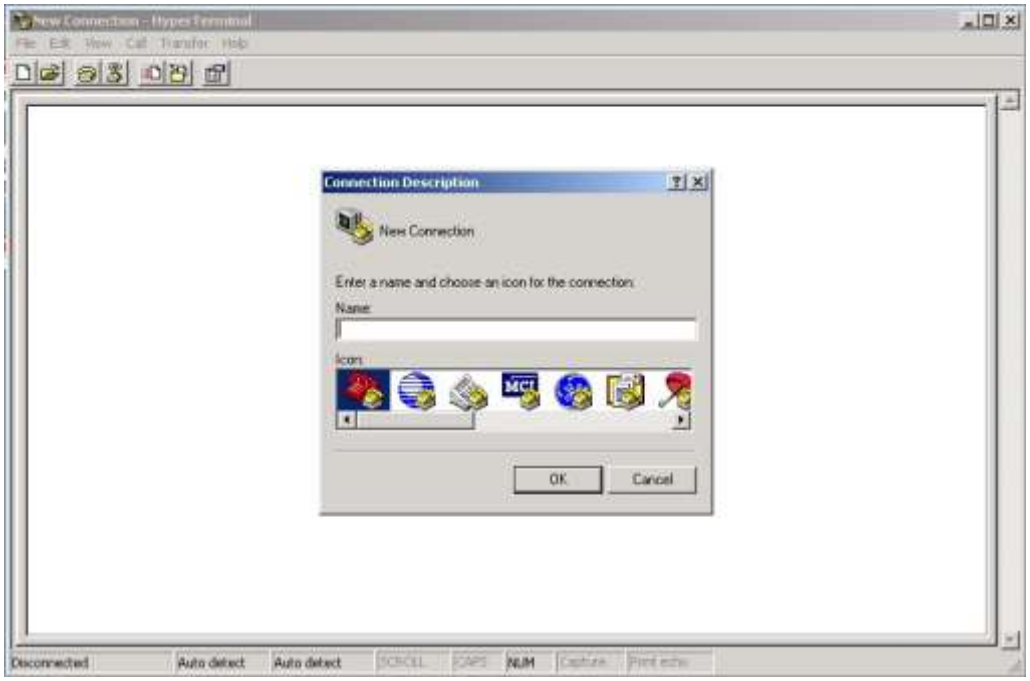
### 6.1.1 RS-232 Serial Console port

An RJ45 to DB9-F serial cable is used to connect the switch's RS-232 port to your computer's COM port. Follow the steps below to access the console via RS-232 serial cable.

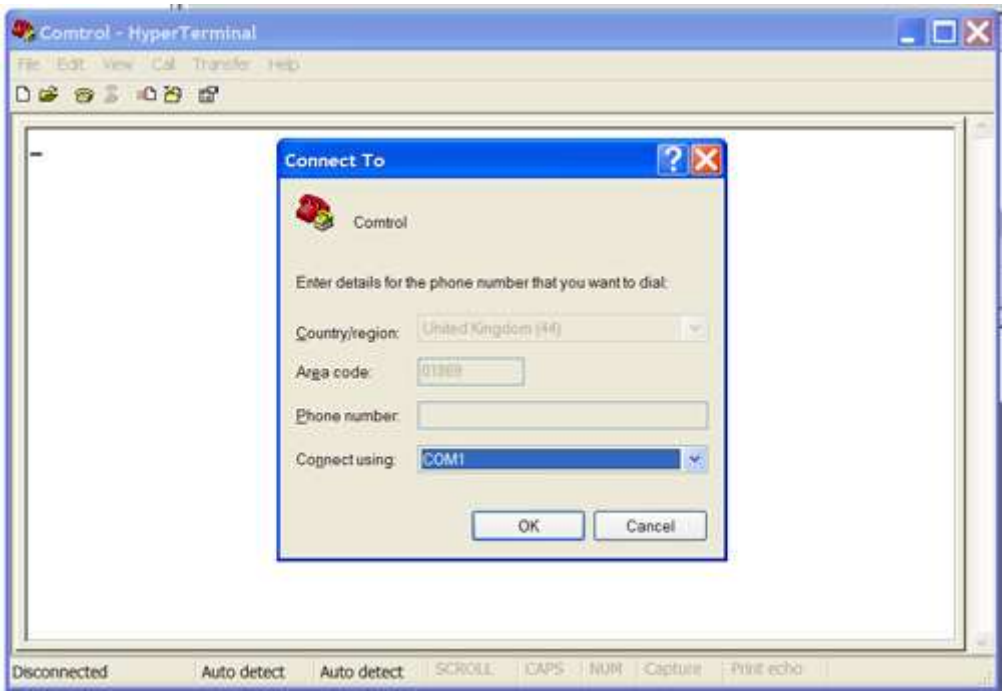
**Step 1** From the Windows desktop, click on Start -> Programs -> Accessories -> Communications -> Hyper Terminal



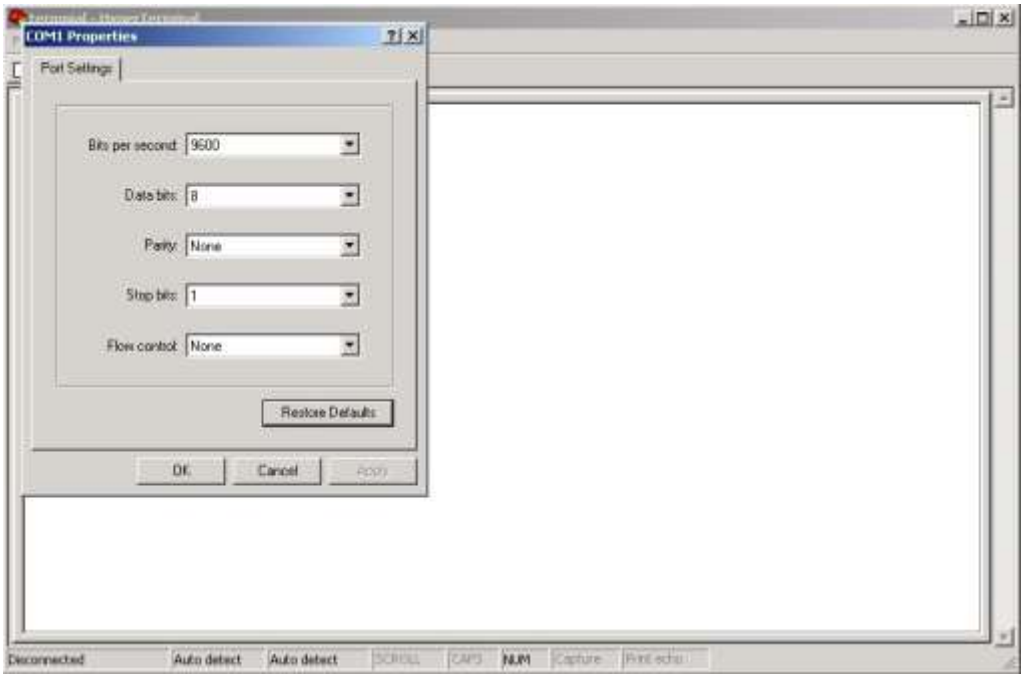

**Step 2** Enter a name for the new connection




**Step 3** Select the COM port number.




**Step 4** The COM port properties setting should be set as follows: 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control.




**Step 5** The console login screen will appear.

Enter the Username and Password. Default is

User name comtrol

Password satyrn

then press "**Enter**".

### 6.1.2 CLI Management by Telnet

Telnet can be used to configure the switch.

The default values are as follows:

| | |
|---|---|
| IP Address | 192.168.250.250 |
| Subnet Mask | 255.255.255.0 |
| Default Gateway | 192.168.250.1 |
| User Name | comtrol |
| Password | satyrn |

Follow the steps below to access the console via Telnet.

**Step 1** Telnet to the IP address of the switch from the Windows "**Run"** command, or from the MS-DOS prompt.

**Step 2** The console login screen will appear.

**Step 3** Enter the Username and Password. Default is

User name comtrol

Password satyrn

then press "**Enter**".

### *6.2 Commands Level*

| Modes | Access Method | Prompt | Exit Method | About This Model |
|---|---|---|---|---|
| User EXEC | Begin a session with your switch. | switch> | Type **logout** or **quit**. | The user command available at the level of user is a subset of those available at the privileged level.<br>Use this mode to<br>• Enter menu mode.<br>• Display system information |
| Privileged EXEC | Enter the **enable** command while in user EXEC mode. | switch# | Type **disable** to exit. | The privileged command is an advanced mode<br>Use this mode to<br>• Display advanced function status<br>• Save configurations |
| Global configuration | Enter the **configure** command while in privileged EXEC mode. | switch(config)# | To exit to privileged EXEC mode, enter **exit** or **end** | Use this mode to configure the parameters that apply to your switch as a whole. |
| VLAN database | Enter the **vlan database** command while in privileged EXEC mode. | switch(vlan)# | To exit to user EXEC mode, enter **exit**. | Use this mode to configure VLAN-specific parameters. |
| Interface | Enter the **interface** command (with a | switch(co | To exit to global | Use this mode to configure parameters for |

| | | | | |
|---|---|---|---|---|
| configuration | specific interface) while in global configuration mode | nfig-if)# | configuration mode, enter **exit**.<br><br>To exit privileged EXEC mode or **end.** | the switch and Ethernet ports. |

## *6.3 Command Level Indicators*

| Mode | Command Level |
|---|---|
| **User EXEC** | E |
| **Privileged EXEC** | P |
| **Global configuration** | G |
| **VLAN database** | V |
| **Interface configuration** | I |

## *6.4 Commands Set List—System Commands Set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **show config** | **E** | Show switch configuration | switch>show config |
| **show terminal** | **P** | Show console information | switch#show terminal |
| **write memory** | **P** | Save the current configuration into permanent memory (flash rom) | switch#write memory |
| **system name**<br><br>**[System Name]** | **G** | Configure system name | switch(config)#system name xxx |
| **system location**<br><br>**[System Location]** | **G** | Set switch system location string | switch(config)#system location xxx |
| **system description**<br><br>**[System Description]** | **G** | Set switch system description string | switch(config)#system description xxx |
| **system contact**<br><br>**[System Contact]** | **G** | Set switch system contact window string | switch(config)#system contact xxx |
| **show system-info** | **E** | Show system information | switch>show system-info |

| | | | |
|---|---|---|---|
| **ip address**<br>**[Ip-address] [Subnet-mask] [Gateway]** | **G** | Configure the switch's IP address. | switch(config)#ip address 192.168.1.1 255.255.255.0 192.168.1.254 |
| **ip dhcp** | **G** | Enable DHCP client function of switch | switch(config)#ip dhcp |
| **show ip** | **P** | Show IP information of switch | switch#show ip |
| **no ip dhcp** | **G** | Disable DHCP client function of switch | switch(config)#no ip dhcp |
| **reload** | **G** | Halt and perform a cold restart | switch(config)#reload |
| **default** | **G** | Restore to default | Switch(config)#default |
| **admin username**<br>**[Username]** | **G** | Changes a login username.<br>(maximum 10 words) | switch(config)#admin username xxxxxx |
| **admin password**<br>**[Password]** | **G** | Specifies a password<br>(maximum 10 words) | switch(config)#admin password xxxxxx |
| **show admin** | **P** | Show administrator information | switch#show admin |
| **dhcpserver enable** | **G** | Enable DHCP Server | switch(config)#dhcpserver enable |
| **dhcpserver lowip**<br>**[Low IP]** | **G** | Configure low IP address for IP pool | switch(config)# dhcpserver lowip 192.168.1.1 |
| **dhcpserver highip**<br>**[High IP]** | **G** | Configure high IP address for IP pool | switch(config)# dhcpserver highip 192.168.1.50 |
| **dhcpserver subnetmask**<br>**[Subnet mask]** | **G** | Configure subnet mask for DHCP clients | switch(config)#dhcpserver subnetmask 255.255.255.0 |
| **dhcpserver gateway**<br>**[Gateway]** | **G** | Configure gateway for DHCP clients | switch(config)#dhcpserver gateway 192.168.1.254 |
| **dhcpserver dnsip**<br>**[DNS IP]** | **G** | Configure DNS IP for DHCP clients | switch(config)# dhcpserver dnsip 192.168.1.1 |
| **dhcpserver leasetime**<br>**[Hours]** | **G** | Configure lease time (in hours) | switch(config)#dhcpserver leasetime 1 |
| **dhcpserver ipbinding**<br>**[IP address]** | **I** | Set the static IP for DHCP clients by port | switch(config)#interface fastEthernet 2<br>switch(config-if)#dhcpserver |

| | | | |
|---|---|---|---|
| | | | ipbinding 192.168.1.1 |
| **show dhcpserver configuration** | **P** | Show configuration of the DHCP server | switch#show dhcpserver configuration |
| **show dhcpserver clients** | **P** | Show client entries of DHCP server | switch#show dhcpserver clinets |
| **show dhcpserver ip-binding** | **P** | Show IP-Binding information of DHCP server | switch#show dhcpserver ip-binding |
| **no dhcpserver** | **G** | Disable the DHCP server function | switch(config)#no dhcpserver |
| **security enable** | **G** | Enable IP security function | switch(config)#security enable |
| **security http** | **G** | Enable the IP security of the HTTP server | switch(config)#security http |
| **security telnet** | **G** | Enable the IP security of the telnet server | switch(config)#security telnet |
| **security ip**<br>**[Index(1..10)] [IP Address]** | **G** | Set the IP security list | switch(config)#security ip 1 192.168.1.55 |
| **show security** | **P** | Show the IP security information. | switch#show security |
| **no security** | **G** | Disable the IP security function | switch(config)#no security |
| **no security http** | **G** | Disable the IP security of the HTTP server | switch(config)#no security http |
| **no security telnet** | **G** | Disable the IP security of the telnet server | switch(config)#no security telnet |

## *6.5 Commands Set List—Port Commands Set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **interface fastEthernet**<br>**[Portid]** | **G** | Choose the port for modification. | switch(config)#interface fastEthernet 2 |
| **duplex**<br>**[full \| half]** | **I** | Use the duplex configuration command to specify the duplex mode of operation for Fast Ethernet. | switch(config)#interface fastEthernet 2<br>switch(config-if)#duplex full |

| | | | |
|---|---|---|---|
| **speed**<br>**[10\|100\|1000\|auto]** | **I** | Use the speed configuration command to specify the speed mode of operation for Fast Ethernet. The speed cannot be set to 1000 if the port is not a gigabit port. | switch(config)#interface fastEthernet 2<br>switch(config-if)#speed 100 |
| **flowcontrol mode**<br>**[Symmetric\|Asymmetric]** | **I** | Use the flow control configuration command on Ethernet ports to control traffic rates during periods of congestion. | switch(config)#interface fastEthernet 2<br>switch(config-if)#flowcontrol mode Asymmetric |
| **no flowcontrol** | **I** | Disable flow control of interface | switch(config-if)#no flowcontrol |
| **security enable** | **I** | Enable security of interface | switch(config)#interface fastEthernet 2<br>switch(config-if)#security enable |
| **no security** | **I** | Disable security of interface | switch(config)#interface fastEthernet 2<br>switch(config-if)#no security |
| **bandwidth type all** | **I** | Set interface ingress limit frame type to “accept all frame” | switch(config)#interface fastEthernet 2<br>switch(config-if)#bandwidth type all |
| **bandwidth type broadcast-multicast-flooded-unicast** | **I** | Set interface ingress limit frame type to “accept broadcast, multicast, and flooded unicast frame” | switch(config)#interface fastEthernet 2<br>switch(config-if)#bandwidth type broadcast-multicast-flooded-unicast |
| **bandwidth type broadcast-multicast** | **I** | Set interface ingress limit frame type to “accept broadcast and multicast frame” | switch(config)#interface fastEthernet 2<br>switch(config-if)#bandwidth type broadcast-multicast |
| **bandwidth type broadcast-only** | **I** | Set interface ingress limit frame type to “only accept broadcast frame” | switch(config)#interface fastEthernet 2<br>switch(config-if)#bandwidth type broadcast-only |
| **bandwidth in**<br>**[Value]** | **I** | Set interface input bandwidth. Rate Range is from 100 kbps to 102400 | switch(config)#interface fastEthernet 2<br>switch(config-if)#bandwidth in 100 |

| | | | |
|---|---|---|---|
| | | kbps or to 256000 kbps for giga ports,<br><br>and zero means no limit. | |
| **bandwidth out**<br><br>**[Value]** | **I** | Set interface output bandwidth. Rate Range is from 100 kbps to 102400 kbps or to 256000 kbps for giga ports,<br><br>and zero means no limit. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#bandwidth out 100 |
| **show bandwidth** | **I** | Show interface bandwidth control | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#show bandwidth |
| **state**<br><br>**[Enable \| Disable]** | **I** | Use the state interface configuration command to specify the state mode of operation for Ethernet ports. Use the disable form of this command to disable the port. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#state Disable |
| **show interface configuration** | **I** | show the interface configuration status | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#show interface configuration |
| **show interface status** | **I** | show interface actual status | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#show interface status |
| **show interface accounting** | **I** | show interface statistic counter | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#show interface accounting |
| **no accounting** | **I** | Clear interface accounting information | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#no accounting |

## 6.6 Commands Set List—Trunk command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **aggregator priority** [1to65535] | G | Set port group system priority | switch(config)#aggregator priority 22 |
| **aggregator activityport** [Port Numbers] | G | Set activity port | switch(config)#aggregator activityport 2 |
| **aggregator group** [GroupID] [Port-list] **lacp** **workp** [Workport] | G | Assign a trunk group with LACP active.<br>[GroupID] :1to3<br>[Port-list]:Member port list, This parameter could be a port range(ex.1-4) or a port list separate by a comma(ex.2, 3, 6)<br>[Workport]: The amount of work ports, this value could not be less than zero or be large than the amount of member ports. | switch(config)#aggregator group 1 1-4 lacp workp 2<br>or<br>switch(config)#aggregator group 2 1,4,3 lacp workp 3 |
| **aggregator group** [GroupID] [Port-list] **nolacp** | G | Assign a static trunk group.<br>[GroupID] :1to3<br>[Port-list]:Member port list, This parameter could be a port range(ex.1-4) or a port list separate by a comma(ex.2, 3, 6) | switch(config)#aggregator group 1 2-4 nolacp<br>or<br>switch(config)#aggreator group 1 3,1,2 nolacp |
| **show aggregator** | P | Show the information of trunk group | switch#show aggregator |
| **no aggregator lacp** [GroupID] | G | Disable the LACP function of trunk group | switch(config)#no aggreator lacp 1 |
| **no aggregator group** [GroupID] | G | Remove a trunk group | switch(config)#no aggreator group 2 |

## 6.7 Commands Set List—VLAN command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **vlan database** | **P** | Enter VLAN configure mode | switch#vlan database |
| **vlan**<br>**[8021q \| gvrp]** | **V** | Set switch VLAN mode. | switch(vlan)# vlanmode 802.1q<br>or<br>switch(vlan)# vlanmode gvrp |
| **no vlan**<br>**[VID]** | **V** | Disable VLAN group (by VID) | switch(vlan)#no vlan 2 |
| **no gvrp** | **V** | Disable GVRP | switch(vlan)#no gvrp |
| **IEEE 802.1Q VLAN** | | | |
| **vlan 8021q port**<br>**[PortNumber]**<br>**access-link untag**<br>**[UntaggedVID]** | **V** | Assign an access link for VLAN by port. Note: if the port belongs to a trunk group, this command cannot be used. | switch(vlan)#vlan 802.1q port 3 access-link untag 33 |
| **vlan 8021q port**<br>**[PortNumber]**<br>**trunk-link tag**<br>**[TaggedVID List]** | **V** | Assign a trunk link for VLAN by port. Note: if the port belong to a trunk group, this command cannot be used. | switch(vlan)#vlan 8021q port 3 trunk-link tag 2,3,6,99<br>or<br>switch(vlan)#vlan 8021q port 3 trunk-link tag 3-20 |
| **vlan 8021q port**<br>**[PortNumber]**<br>**hybrid-link untag**<br>**[UntaggedVID]**<br>**tag**<br>**[TaggedVID List]** | **V** | Assign a hybrid link for VLAN by port. Note: if the port belong to a trunk group, this command cannot be used. | switch(vlan)# vlan 8021q port 3 hybrid-link untag 4 tag 3,6,8<br>or<br>switch(vlan)# vlan 8021q port 3 hybrid-link untag 5 tag 6-8 |
| **vlan 8021q aggreator**<br>**[TrunkID]**<br>**access-link untag**<br>**[UntaggedVID]** | **V** | Assign an access link for VLAN by trunk group | switch(vlan)#vlan 8021q aggreator 3 access-link untag 33 |
| **vlan 8021q aggreator**<br>**[TrunkID]**<br>**trunk-link tag**<br>**[TaggedVID List]** | **V** | Assign a trunk link for VLAN by trunk group | switch(vlan)#vlan 8021q aggreator 3 trunk-link tag 2,3,6,99<br>or<br>switch(vlan)#vlan 8021q aggreator 3 trunk-link tag 3-20 |
| **vlan 8021q aggreator**<br>**[PortNumber]**<br>**hybrid-link untag**<br>**[UntaggedVID]**<br>**tag** | **V** | Assign a hybrid link for VLAN by trunk group | switch(vlan)# vlan 8021q aggreator 3 hybrid-link untag 4 tag 3,6,8<br>or<br>switch(vlan)# vlan 8021q aggreator 3 |

| | | | |
|---|---|---|---|
| [TaggedVID List] | | | hybrid-link untag 5 tag 6-8 |
| **show vlan** [VID]<br>or<br>**show vlan** | **V** | Show VLAN information | switch(vlan)#show vlan 23 |

## *6.8 Commands Set List—Spanning Tree command set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **spanning-tree enable** | **G** | Enable spanning tree | switch(config)#spanning-tree enable |
| **spanning-tree priority** [0to61440] | **G** | Configure spanning tree priority parameter | switch(config)#spanning-tree priority 32767 |
| **spanning-tree max-age** [seconds] | **G** | Use the spanning-tree max-age global configuration command to change the interval between messages the spanning tree receives from the root switch. If a switch does not receive a bridge protocol data unit (BPDU) message from the root switch within this interval, it will recompute the Spanning Tree Protocol (STP) topology. | switch(config)# spanning-tree max-age 15 |
| **spanning-tree hello-time** [seconds] | **G** | Use the spanning-tree hello-time global configuration command to specify the interval between hello bridge protocol data units (BPDUs). | switch(config)#spanning-tree hello-time 3 |
| **spanning-tree forward-time** [seconds] | **G** | Use the spanning-tree forward-time global configuration command to set the forwarding-time for the specified spanning-tree instances. The forwarding time | switch(config)# spanning-tree forward-time 20 |

| | | | |
|---|---|---|---|
| | | determines how long each of the listening and learning states last before the port begins forwarding. | |
| **stp-path-cost**<br>**[1to200000000]** | **I** | Use the spanning-tree cost interface configuration command to set the path cost for Spanning Tree<br><br>Protocol (STP) calculations. In the event of a loop, the spanning tree will consider the path cost when selecting<br><br>an interface to place into the forwarding state. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)#stp-path-cost 20 |
| **stp-path-priority**<br>**[Port Priority]** | **I** | Use the spanning-tree port-priority interface configuration command to configure a port priority that is used when two switches are both positioned as the root switch. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)# stp-path-priority 127 |
| **stp-admin-p2p**<br>**[Auto\|True\|False]** | **I** | Admin P2P of STP priority on this interface. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)# stp-admin-p2p Auto |
| **stp-admin-edge**<br>**[True\|False]** | **I** | Admin Edge of STP priority on this interface. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)# stp-admin-edge True |
| **stp-admin-non-stp**<br>**[True\|False]** | **I** | Admin NonSTP of STP priority on this interface. | switch(config)#interface fastEthernet 2<br><br>switch(config-if)# stp-admin-non-stp False |
| **Show spanning-tree** | **E** | Display a summary of the spanning-tree states. | switch>show spanning-tree |
| **no spanning-tree** | **G** | Disable spanning-tree. | switch(config)#no spanning-tree |

## 6.9 Commands Set List—QoS command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **qos policy** [weighted-fair\|strict] | G | Select QOS policy scheduling | switch(config)#qos policy weighted-fair |
| **qos prioritytype** [port-based\|cos-only\|tos-only\|cos-first\|tos-first] | G | Set QOS priority type | switch(config)#qos prioritytype |
| **qos priority portbased** [Port] [lowest\|low\|middle\|high] | G | Configure Port-based Priority | switch(config)#qos priority portbased 1 low |
| **qos priority cos** [Priority][lowest\|low\|middle\|high] | G | Configure COS Priority | switch(config)#qos priority cos 22 middle |
| **qos priority tos [Priority][lowest\|low\|middle\|high]** | G | Configure TOS Priority | switch(config)#qos priority tos 3 high |
| **show qos** | P | Display the information of QoS configuration | switch>show qos |
| **no qos** | G | Disable QoS function | switch(config)#no qos |

## 6.10 Commands Set List—IGMP command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **igmp enable** | G | Enable IGMP snooping function | switch(config)#igmp enable |
| **Igmp-query auto** | G | Set IGMP query to auto mode | switch(config)#Igmp-query auto |
| **Igmp-query force** | G | Set IGMP query to force mode | switch(config)#Igmp-query force |
| **show igmp configuration** | P | Displays the details of an IGMP configuration. | switch#show igmp configuration |
| **show igmp multi** | P | Displays the details of an IGMP snooping entry. | switch#show igmp multi |
| **no igmp** | G | Disable IGMP snooping function | switch(config)#no igmp |
| **no igmp-query** | G | Disable IGMP query | switch#no igmp-query |

### 6.11 Commands Set List—MAC/Filter Table command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **mac-address-table static hwaddr** [MAC] | I | Configure MAC address table of interface (static). | switch(config)#interface fastEthernet 2<br>switch(config-if)#mac-address-table static hwaddr 000012345678 |
| **mac-address-table filter hwaddr** [MAC] | G | Configure MAC address table(filter) | switch(config)#mac-address-table filter hwaddr 000012348678 |
| **show mac-address-table** | P | Show all MAC address table | switch#show mac-address-table |
| **show mac-address-table static** | P | Show static MAC address table | switch#show mac-address-table static |
| **show mac-address-table filter** | P | Show filter MAC address table. | switch#show mac-address-table filter |
| **no mac-address-table static hwaddr** [MAC] | I | Remove an entry of MAC address table of interface (static) | switch(config)#interface fastEthernet 2<br>switch(config-if)#no mac-address-table static hwaddr 000012345678 |
| **no mac-address-table filter hwaddr** [MAC] | G | Remove an entry of MAC address table (filter) | switch(config)#no mac-address-table filter hwaddr 000012348678 |
| **no mac-address-table** | G | Remove dynamic entry of MAC address table | switch(config)#no mac-address-table |

### 6.12 Commands Set List—SNMP command set

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **snmp agent-mode** [v1v2c \| v3] | G | Select the agent mode of SNMP | switch(config)#snmp agent-mode v1v2c |
| **snmp-server host** [IP address] **community** [Community-string] | G | Configure SNMP server host information and community string | switch(config)#snmp-server host 192.168.10.50 community public trap-version v1<br>(remove)<br>Switch(config)# |

| | | | |
|---|---|---|---|
| **trap-version**<br>[v1\|v2c] | | | no snmp-server host<br>192.168.10.50 |
| **snmp community-strings**<br>[Community-string]<br>**right**<br>[RO\|RW] | **G** | Configure the community string right | switch(config)#snmp community-strings public right RO<br>or<br>switch(config)#snmp community-strings public right RW |
| **snmp snmpv3-user**<br>[User Name]<br>**password**<br>[Authentication Password] [Privacy Password] | **G** | Configure the userprofile for SNMPv3 agent. Privacy password can be left empty. | switch(config)#snmp snmpv3-user test01 password AuthPW PrivPW |
| **show snmp** | **P** | Show SNMP configuration | switch#show snmp |
| **show snmp-server** | **P** | Show specified trap server information | switch#show snmp-server |
| **no snmp community-strings** [Community] | **G** | Remove the specified community. | switch(config)#no snmp community-strings public |
| **no snmp snmpv3-user**<br>[User Name]<br>**password**<br>[Authentication Password] [Privacy Password] | **G** | Remove specified user of SNMPv3 agent. Privacy password can be left empty. | switch(config)# no snmp snmpv3-user test01 password AuthPW PrivPW |
| **no snmp-server host**<br>[Host-address] | **G** | Remove the SNMP server host. | switch(config)#no snmp-server 192.168.10.50 |

## *6.13 Commands Set List—Port Mirroring command set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **monitor rx** | **G** | Set RX destination port of monitor function | switch(config)#monitor rx |
| **monitor tx** | **G** | Set TX destination port of monitor | switch(config)#monitor tx |

| | | | |
|---|---|---|---|
| | | function | |
| **show monitor** | **P** | Show port monitor information | switch#show monitor |
| **monitor**<br>**[RX\|TX\|Both]** | **I** | Configure source port of monitor function | switch(config)#interface fastEthernet 2<br>switch(config-if)#monitor RX |
| **show monitor** | **I** | Show port monitor information | switch(config)#interface fastEthernet 2<br>switch(config-if)#show monitor |
| **no monitor** | **I** | Disable source port of monitor function | switch(config)#interface fastEthernet 2<br>switch(config-if)#no monitor |

## *6.14 Commands Set List—802.1x command set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **8021x enable** | **G** | Use the 802.1x global configuration command to enable 802.1x protocols. | switch(config)# 8021x enable |
| **8021x system radiousip**<br>**[IP address]** | **G** | Use the 802.1x system radious IP global configuration command to change the radious server IP. | switch(config)# 8021x system radiousip 192.168.1.1 |
| **8021x system serverport**<br>**[port ID]** | **G** | Use the 802.1x system server port global configuration command to change the radious server port | switch(config)# 8021x system serverport 1815 |
| **8021x system accountport**<br>**[port ID]** | **G** | Use the 802.1x system account port global configuration command to change the accounting port | switch(config)# 8021x system accountport 1816 |
| **8021x system sharekey**<br>**[ID]** | **G** | Use the 802.1x system share key global configuration command to change the shared key value. | switch(config)# 8021x system sharekey 123456 |

| | | | |
|---|---|---|---|
| **8021x system nasid** [words] | **G** | Use the 802.1x system nasid global configuration command to change the NAS ID | switch(config)# 8021x system nasid test1 |
| **8021x misc quietperiod** [sec.] | **G** | Use the 802.1x misc quiet period global configuration command to specify the quiet period value of the switch. | switch(config)# 8021x misc quietperiod 10 |
| **8021x misc txperiod** [sec.] | **G** | Use the 802.1x misc TX period global configuration command to set the TX period. | switch(config)# 8021x misc txperiod 5 |
| **8021x misc supportimeout** [sec.] | **G** | Use the 802.1x misc supp timeout global configuration command to set the supplicant timeout. | switch(config)# 8021x misc supportimeout 20 |
| **8021x misc servertimeout** [sec.] | **G** | Use the 802.1x misc server timeout global configuration command to set the server timeout. | switch(config)#8021x misc servertimeout 20 |
| **8021x misc maxrequest** [number] | **G** | Use the 802.1x misc max request global configuration command to set the MAX requests. | switch(config)# 8021x misc maxrequest 3 |
| **8021x misc reauthperiod** [sec.] | **G** | Use the 802.1x misc reauth period global configuration command to set the reauth period. | switch(config)# 8021x misc reauthperiod 3000 |
| **8021x portstate** [disable \| reject \| accept \| authorize] | **I** | Use the 802.1x port state interface configuration command to set the state of the selected port. | switch(config)#interface fastethernet 3<br><br>switch(config-if)#8021x portstate accept |

| | | | |
|---|---|---|---|
| **show 8021x** | **E** | Display a summary of the 802.1x properties and also the port sates. | switch>show 8021x |
| **no 8021x** | **G** | Disable 802.1x function | switch(config)#no 8021x |

### *6.15 Commands Set List—TFTP command set*

| Satyrn M series Commands | Level | Description | Defaults<br><br>Example |
|---|---|---|---|
| **backup flash:backup_cfg** | **G** | Save configuration to TFTP. The IP of TFTP server and the file name of image must be specified. | switch(config)#backup flash:backup_cfg |
| **restore flash:restore_cfg** | **G** | Get configuration from TFTP server. The IP of TFTP server and the file name of image must be specified. | switch(config)#restore flash:restore_cfg |
| **upgrade flash:upgrade_fw** | **G** | Upgrade firmware by TFTP. The IP of TFTP server and the file name of image must be specified. | switch(config)#upgrade lash:upgrade_fw |

### *6.16 Commands Set List—SYSLOG, SMTP, EVENT command set*

| Satyrn M series Commands | Level | Description | Example |
|---|---|---|---|
| **systemlog ip**<br><br>**[IP address]** | **G** | Set System log server IP address. | switch(config)# systemlog ip 192.168.1.100 |
| **systemlog mode**<br><br>**[client\|server\|both]** | **G** | Specified the log mode. | switch(config)# systemlog mode both |
| **show systemlog** | **E** | Display system log. | Switch>show systemlog |
| **show systemlog** | **P** | Show system log client and server information. | switch#show systemlog |

| | | | |
|---|---|---|---|
| **no systemlog** | **G** | Disable system log functon. | switch(config)#no systemlog |
| **smtp enable** | **G** | Enable SMTP function. | switch(config)#smtp enable |
| **smtp serverip**<br>**[IP address]** | **G** | Configure SMTP server IP. | switch(config)#smtp serverip 192.168.1.5 |
| **smtp authentication** | **G** | Enable SMTP authentication. | switch(config)#smtp authentication |
| **smtp account**<br>**[account]** | **G** | Configure authentication account. | switch(config)#smtp account User |
| **smtp password**<br>**[password]** | **G** | Configure authentication password. | switch(config)#smtp password |
| **smtp rcptemail**<br>**[Index] [Email address]** | **G** | Configure reciever's email address | switch(config)#smtp rcptemail 1 Alert@test.com |
| **show smtp** | **P** | DisplaySMTP information. | switch#show smtp |
| **no smtp** | **G** | Disable SMTP function | switch(config)#no smtp |
| **event device-cold-start**<br>**[Systemlog\|SMTP\|Both]** | **G** | Set cold start event type. | switch(config)#event device-cold-start both |
| **event authentication-failure**<br>**[Systemlog\|SMTP\|Both]** | **G** | Set authentication failure event type. | switch(config)#event authentication-failure both |
| **event O-Ring-topology-change**<br>**[Systemlog\|SMTP\|Both]** | **G** | Set ring topology changed event type. | switch(config)#event ring-topology-change both |
| **event systemlog**<br>**[Link-UP\|Link-Down\|Both]** | **I** | Set port event for system log. | switch(config)#interface fastethernet 3<br>switch(config-if)#event systemlog both |
| **event smtp**<br>**[Link-UP\|Link-Down\|Both]** | **I** | Set port event for SMTP. | switch(config)#interface fastethernet 3<br>switch(config-if)#event smtp both |
| **show event** | **P** | Show event selection. | switch#show event |
| **no event device-cold-start** | **G** | Disable cold start event type. | switch(config)#no event device-cold-start |
| **no event authentication-** | **G** | Disable authentication | switch(config)#no event |

| | | | |
|---|---|---|---|
| **failure** | | failure event type. | authentication-failure |
| **no event O-Ring-topology-change** | **G** | Disable O-Ring topology changed event type. | switch(config)#no event ring-topology-change |
| **no event systemlog** | **I** | Disable port event for system log. | switch(config)#interface fastethernet 3<br><br>switch(config-if)#no event systemlog |
| **no event smpt** | **I** | Disable port event for SMTP. | switch(config)#interface fastethernet 3<br><br>switch(config-if)#no event smtp |
| **show systemlog** | **P** | Show system log client and server information. | switch#show systemlog |

## *6.17 Commands Set List—SNTP command set*

| **Satyrn M series Commands** | **Level** | **Description** | **Example** |
|---|---|---|---|
| **sntp enable** | **G** | Enable SNTP function. | switch(config)#sntp enable |
| **sntp daylight** | **G** | Enable daylight saving time. This command can't be applied if SNTP function is inactive. | switch(config)#sntp daylight |
| **sntp daylight-period**<br>**[Start time] [End time]** | **G** | Set period of daylight saving time. This command can't be applied if SNTP function is inactive.<br><br>Parameter format:<br><br>[yyyymmdd-hh:mm] | switch(config)# sntp daylight-period 20060101-01:01 20060202-01-01 |
| **sntp daylight-offset**<br>**[Minute]** | **G** | Set offset of daylight saving time. This command can't be applied if SNTP function is inactive. | switch(config)#sntp daylight-offset 3 |
| **sntp ip**<br>**[IP]** | **G** | Set SNTP server IP. This command can't be applied if SNTP function is inactive. | switch(config)#sntp ip 192.169.1.1 |
| **sntp timezone** | **G** | Set timezone index. Use "show sntp timzezone" command | switch(config)#sntp timezone 22 |

| | | | |
|---|---|---|---|
| [Timezone] | | to obtain more information about index number. | |
| **show sntp** | **P** | Show SNTP information. | switch#show sntp |
| **show sntp timezone** | **P** | Show index number of time zone list. | switch#show sntp timezone |
| **no sntp** | **G** | Disable SNTP function. | switch(config)#no sntp |
| **no sntp daylight** | **G** | Disable daylight saving time. | switch(config)#no sntp daylight |

## *6.18 Commands Set List—Satyrn-Ring command set*

| IES-3000 series Commands | Level | Description | Example |
|---|---|---|---|
| **Ring enable** | **G** | Enable Satyrn-Ring. | switch(config)# ring enable |
| **Ring master** | **G** | Enable ring master. | switch(config)# ring master |
| **Ring couplering** | **G** | Enable couple ring. | switch(config)# ring couplering |
| **Ring dualhoming** | **G** | Enable dual homing. | switch(config)# ring dualhoming |
| **Ring ringport** [1st Ring Port] [2nd Ring Port] | **G** | Configure 1st/2nd Ring Port. | switch(config)# ring ringport 7 8 |
| **Ring couplingport** [Coupling Port] | **G** | Configure Coupling Port. | switch(config)# ring couplingport 1 |
| **Ring controlport** [Control Port] | **G** | Configure Control Port. | switch(config)# ring controlport 2 |
| **Ring homingport** [Dual Homing Port] | **G** | Configure Dual Homing Port. | switch(config)# ring homingport 3 |
| **show Ring** | **P** | Show Satyrn-Ring information. | switch#show ring |
| **no Ring** | **G** | Disable Satyrn-Ring. | switch(config)#no ring |
| **no Ring master** | **G** | Disable ring master. | switch(config)# no ring master |
| **no Ring couplering** | **G** | Disable couple ring. | switch(config)# no ring couplering |
| **no Ring dualhoming** | **G** | Disable dual homing. | switch(config)# no ring dualhoming |

# Technical Specifications

| | |
|---|---|
| **Technology** | |
| Ethernet Standards | 802.3 - 10Base-T,<br>802.3u - 100Base-TX, 100Base-FX,<br>802.3z - 1000Base-LX/SX<br>802.3ab - 1000Base-TX,<br>802.3ad - Link Aggregation Control Protocol<br>802.3x - Flow Control<br>802.1D - Spanning Tree Protocol<br>802.1p - Class of Service,<br>802.1Q - VLAN Tagging<br>802.1w - Rapid Spanning Tree Protocol,<br>802.1X - Authentication<br>802.1ad - VLAN QinQ<br>802.1AB - LLDP<br>802.1s - MSTP |
| MAC addresses | 8192 |
| Priority Queues | 4 |
| Flow Control | IEEE 802.3x Flow Control and Back-pressure |
| Processing | Store-and-Forward |
| **Interface** | |
| RJ45 Ports | 10/100Base-T(X), Auto MDI/MDI-X |
| Giga Fibre Ports | 1000 Base-X (SC Connector)<br>Multi-Mode:<br>0 to 550m, 850 nm (50/125 µm to 62.5/125 µm)<br>Single-Mode:<br>0 to 10km, 1310 nm (9/125 µm) |
| Giga Ports | 10/100/1000 Base-T(X), Auto MDI/MDIX |
| Fibre Ports | 100 Base-FX (SC Connector)<br>Multi-Mode: |

| | |
|---|---|
| | 0 to 2 km, 1310 nm (50/125 µm to 62.5/125 µm)<br>Single-Mode:<br>0 to 30km, 1310 nm (9/125 µm) |
| SFP | 2 x 100/1000 Base-X(LC Connector) |
| LED Indicators | Per Unit : Power x 3(Green)<br>RJ45 Ports:<br>Per Port : Link/Activity(Green/Blinking Green), Full duplex(Amber)<br>Giga/Fibre Ports:<br>Per Port : Activity(Green), Link (Amber)<br>SFP Ports:<br>Per Port : Link/Activity (Green) |
| **Power Requirements** | |
| Power Input Voltage | PWR1/2: 12 to 48VDC in 7-pin Terminal Block<br>PWR3: 12 to 45VDC in Power Jack |
| Reverse Polarity Protection | Present at terminal block |
| Power Consumption | M073-EC – 12 Watts<br>M082-EQ – 9 Watts<br>M062-EM – 9 Watts<br>M062-ES – 9 Watts<br>M080-EN – 5 Watts<br>M062-EG – 8 Watts<br>M062-EL – 7 Watts<br>M062-ET – 7 Watts |
| **Environmental** | |
| Operating Temperature | -40 to 70 $^{o}$C |
| Storage Temperature | -40 to 85 $^{o}$C |
| Operating Humidity | 5% to 95%, non-condensing |
| **Mechanical** | |
| Dimensions(W x D x H) | 52 mm(W) x 106 mm(D) x 144 mm(H)<br>M082-EQ, M062-EM, M062-ES, M080-EN, M062-EG, M062-EL,M062-ET<br><br>74 mm(W) x 109 mm(D) x 154 mm(H)<br>M073-EC |

| | |
|---|---|
| Casing | IP-30 protection |
| **Regulatory Approvals** | |
| Regulatory Approvals | FCC Part 15, CISPER (EN55022) class A |
| EMS | EN61000-4-2 (ESD)<br>EN61000-4-3 (RS)<br>EN61000-4-4 (EFT)<br>EN61000-4-5 (Surge)<br>EN61000-4-6 (CS)<br>EN61000-4-8<br>EN61000-4-11 |
| Shock | IEC 60068-2-27 |
| Free Fall | IEC 60068-2-32 |
| Vibration | IEC 60068-2-6 |
| **Warranty** | 5 years |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