

# Dell™ PowerConnect™ 27XX Systems User's Guide

## Notes, Notices, and Cautions



**NOTE:** A NOTE indicates important information that helps you make better use of your computer.



**NOTICE:** A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.



**CAUTION:** A CAUTION indicates a potential for property damage, personal injury, or death.

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Models **PC2708, PC2716, PC2724, PC2748**

**October 2006**

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## Introduction

This *User's Guide* contains the information needed for installing, configuring and maintaining the PowerConnect 2708, PowerConnect 2716, PowerConnect 2724, and PowerConnect 2748 Web-managed Gigabit Ethernet switches.

These switches can be used to connect workstations and other network devices, such as:

- Servers
- Hubs (Wireless LAN Access Points)
- Routers

The PowerConnect devices are primarily for the Small Office/Home Office (SOHO) that require high performance edge connectivity. These PowerConnect devices are ideal for the small to medium business that requires high performance network connectivity along with advanced web management features. The PowerConnect management features are designed to minimize administrative management effort, while enhancing and improving network traffic control.

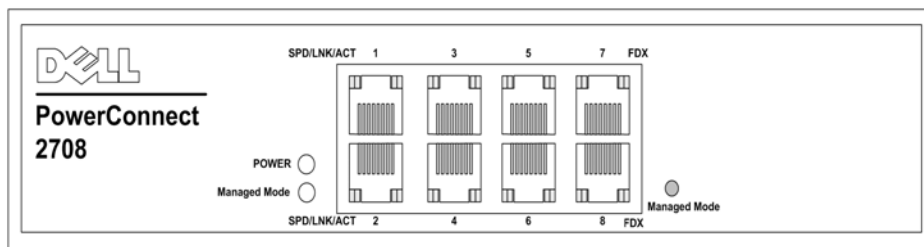
## System Description

This section describes the hardware configurations of the PowerConnect 2708, PowerConnect 2716, PowerConnect 2724, and PowerConnect 2748. The switches are managed by Dell's OpenManage Switch Administrator.

### 8 1-Gigabit Ethernet Ports

The following figure illustrates the PowerConnect 2708 front panel.

**Figure 1-1. PowerConnect 2708 Front Panel**

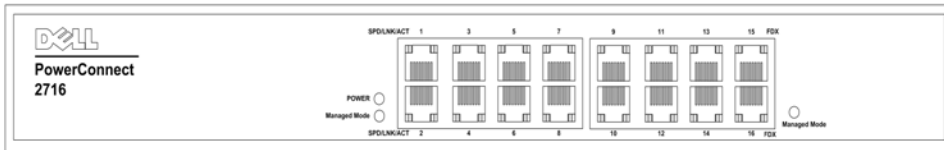


The PowerConnect 2708 switch supports 8 GbE copper ports.

## 16 1-Gigabit Ethernet Ports

The following figure illustrates the PowerConnect 2716 front panel.

**Figure 1-2. PowerConnect 2716 Front Panel**

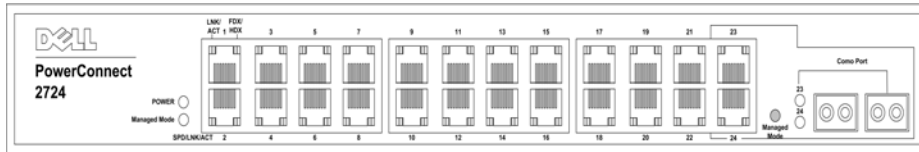


The PowerConnect 2716 switch supports 16 GbE copper ports.

## 24 1-Gigabit Ethernet Ports + 2 SFP Combo ports

The following figure illustrates the PowerConnect 2724 front panel.

**Figure 1-3. PowerConnect 2724 Front Panel**



The PowerConnect 2724 switch supports 24 GbE copper ports and has two SFP combo ports (1000BASE-SX or 1000BASE-LX).

## 48 1-Gigabit Ethernet Ports

The following figure illustrates the PowerConnect 2748 front panel.

**Figure 1-4. PowerConnect 2748 Front Panel**





# Features

## General Features

### Head of Line Blocking Prevention

Head of Line (HOL) blocking results in traffic delays and frame loss caused by traffic competing for the same egress port resources. HOL blocking queues packets, and the packets at the head of the queue are forwarded before packets at the end of the queue. By default, the device is configured so that the HOL blocking prevention mechanism is active at all times, except when QoS (Quality of Service), Flow Control or Back Pressure is active on a port where the HOL blocking prevention mechanism is disabled on the whole system.

### Management Modes

- **Unmanaged Mode** — Operates independent of user-configuration. The switch does not have an IP address, nor is there a web management interface and thus cannot be managed. This is the system default. From Unmanaged Mode, when the Managed Mode button is pressed, the switch enters Managed Mode with the default IP address of 192.168.2.1.
- **Managed Mode** — Provides switch management through a web interface, and maintains the device configuration through power cycles. From Managed Mode, when the Managed Mode button is pressed, the switch enters Unmanaged Mode.
- **Secure Mode (PowerConnect 2748 only)** — Secure Mode works by the user configuring the switch in Managed Mode and then enabling Secure Mode. Once enabled, it prevents users from making any further configuration changes to the switch. This is done by removing the IP address to the switch so that it becomes inaccessible. In Secure Mode the switch retains configuration through power cycles just like Managed Mode. To use Secure Mode, the user puts the switch in Managed Mode, configures the switch as desired, and then switches to Secure Mode via the web interface. To exit Secure Mode, the user presses the Managed Mode button. From Secure Mode when the Managed Mode button is pressed, the switch enters Managed Mode default configuration with the default IP address of 192.168.2.1.

### Back Pressure Support

On half-duplex links, the receiving port prevents buffer overflows by occupying the link so that it is unavailable for additional incoming traffic. The user may enable or disable this feature on a per-port basis. The default status on all ports is set to **OFF**. However, this applies to links operating at Half Duplex only.

### **Auto Negotiation**

Auto negotiation allows an Ethernet switch to advertise modes of operation. The auto negotiation function provides the means to exchange information between two Ethernet switches that share a point-to-point link segment, and to automatically configure both Ethernet switches to take maximum advantage of their transmission capabilities. Port advertisement allows the system administrator to configure the port speeds advertised.

### **Jumbo Frames Support**

Jumbo frames are frames with an MTU (Maximum Transmission Unit) size of up to 10K bytes. The Jumbo Frames Support feature, utilizes the network optimally by transporting the same data using less frames.

The main benefits of this facility are reduced transmission overhead and reduced host processing overhead. Jumbo frames are used for server-to-server transfers.

### **AutoMDI/MDIX Support**

The switch automatically detects whether the cable connected to an RJ-45 port is crossed or straight through.

Standard wiring for end stations is Media-Dependent Interface (MDI) and the standard wiring for hubs and switches is known as Media-Dependent Interface with Crossover (MDIX).

Auto MDI/MDIX works on 10/100/1000BASE-T Ethernet ports. This feature is automatically enabled for the entire system and cannot be turned off by the user.

### **Flow Control Support (IEEE802.3X)**

On Full Duplex links (FDX), the flow control mechanism allows the receiving side to signal to the sending side that transmission must be halted temporarily, in order to prevent buffer overflows.

### **Virtual Cable Testing (VCT)**

VCT technology provides the mechanism to detect and report potential cabling issues, such as cable opens and cable shorts on copper links.

Cable analysis is available on Copper Cables (10BASE-T/100BASE-T/1000BASE-T), and is only done when the link is down. When the system initiates a cable-testing operation, upon explicit user action, the following parameters are detected:

- Cable Type and Status
- Cable Length
- Fault-Distance

## **MAC Address Supported Features**

### **MAC Address Capacity Support**

The PowerConnect 2708, 2716, and 2724 switches support a total of 8K MAC addresses, and the PowerConnect 2748 supports a total of 16K MAC addresses.

### **Auto-Learning MAC Addresses**

The switch enables MAC address auto-learning from incoming packets. The MAC addresses are stored in the Bridging Table.

### **Automatic Aging for MAC Addresses**

MAC addresses from which no traffic is received for a given period of time are aged out. This prevents the Bridging Table from overflowing.

### **Managed and Secure Modes VLAN-aware MAC-based Switching**

In Managed or Secure mode, the switch system always performs VLAN-aware bridging. Classic bridging (IEEE802.1D) is not performed (where frames are forwarded based only on their destination MAC address). However, a similar functionality may be configured for untagged frames. Addresses are associated with ports by learning them from the incoming frames source address.

### **Unmanaged Mode Classic Bridging**

In Unmanaged Mode, the switch performs classic bridging. Frames are forwarded based on their destination MAC address only, regardless of the VLAN tag.

## **Layer 2 Features**

### **Port Mirroring**

The port mirroring mechanism monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from a monitored port to a monitoring port. Users can specify which target port receives copies of all traffic passing through one or more source ports.

### **Storm Control**

Storm Control enables limiting the amount of Multicast and Broadcast frames accepted and forwarded by the switch. When Layer 2 frames are forwarded, Broadcast and Multicast frames are flooded to all ports on the relevant VLAN. All nodes connected to these ports accept and attempt to process these frames, thus placing load on both the network links and the host operating system.

## **VLAN Supported Features**

### **VLAN Support**

VLANs are collections of switching ports that comprise a single broadcast domain. Packets are classified as belonging to a VLAN based on either the VLAN tag or based on a combination of the ingress port and package contents. Packets sharing common attributes can be grouped in the same VLAN.

### **Port Based Virtual LANs (VLANs)**

Port-based VLANs classify incoming packets to VLANs based on their ingress port.

### **Link Aggregation**

The PowerConnect 2708/2716/2724/2748 switches support up to six aggregated links. Each of the six aggregated links may be defined with up to four member ports to form a single Link Aggregated Group (LAG).

The benefits of this facility are:

- Fault tolerance protection from physical link disruption
- Higher bandwidth connections
- Improved bandwidth granularity
- High bandwidth server connectivity

A LAG is composed of ports with the same speed set to full-duplex operation.

### **BootP and DHCP Clients**

DHCP (Dynamic Host Configuration Protocol) enables additional setup parameters to be received from a network server upon system startup. DHCP service is an on-going process. DHCP is an extension to BootP.

The BootP client is operational if there is a corrupted or invalid software image. The BootP client then continuously attempts to find a BootP server, by sending BootP requests to all ports on the default VLAN, until a BootP server replies. The information replied is then used to provide the switch system with a TFTP server IP address and a download file name. The switch can then configure these values to the TFTP client and try to download a valid runtime image.

### **Class of Service (CoS) Features**

The PowerConnect 2708/2716/2724/2748 system enables users to define various services for traffic classes of service. The underlying mechanism for supporting bandwidth management and control is based on the use of multiple priority queues for classifying traffic. The switches support four queues per port.

A CoS is defined by the user, whereby packets are related to the same Class of Service. After a packet has been classified, it is assigned to one of the queues. The PowerConnect 2708/2716/2724/2748 system can classify according to IPv4 information (DSCP).

### **Class Of Service 802.1p Support**

The IEEE 802.1p signaling technique is an OSI Layer 2 standard for marking and prioritizing network traffic at the data link/MAC sub-layer. 802.1p traffic is classified and sent to the destination. No bandwidth reservations or limits are established or enforced. The 802.1p is a spin-off of the 802.1Q (VLANs) standard.

## **Ethernet Switch Management Features**

### **Web-Based Management**

With a Web-based management interface, the Ethernet Switches' system can be managed from any Web browser. The system contains an Embedded Web Server (EWS), which serves HTML pages, through which the system can be monitored and configured.

### **TFTP Trivial File Transfer Protocol**

The PowerConnect 2708/2716/2724/2748 switches support software boot image and software download through TFTP.

### **Remote Monitoring**

Remote Monitoring (RMON) is an extension to the Simple Network Management Protocol (SNMP), which provides network traffic statistics. RMON defines current and historical MAC-layer statistics and control objects, allowing real-time information to be captured across the entire network. The switches support one RMON group for Ethernet statistics. The system provides a means to collect the statistics defined in RMON and to view the results, using the Web management interface in the system.

### **Port Default Settings**

The PowerConnect 2708/2716/2724/2748 devices's port default settings are as follows:

| <b>Function</b>                             | <b>Default Setting</b>             |
|---------------------------------------------|------------------------------------|
| Flow Control (user-configurable)            | Off (disabled on ingress)          |
| Backpressure (user-configurable)            | Off (disabled on ingress)          |
| Auto Negotiation Speed (user-configurable)  | Enabled (1000 Mbps)                |
| Auto Negotiation Duplex (user-configurable) | Enabled (Full Duplex)              |
| MDIX (not user-configurable)                | On (relevant to copper ports only) |



# Hardware Description

## Switch Port Configurations

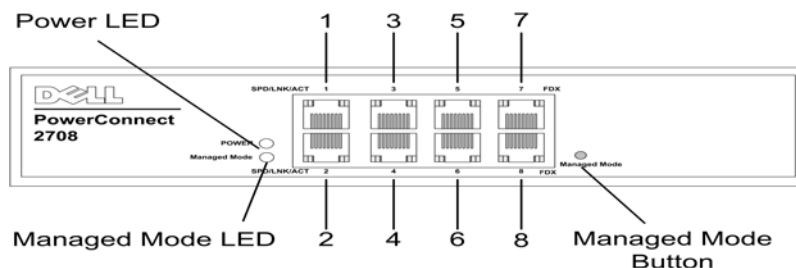
### PowerConnect 2708/2716/2724/2748 Front Panel Port Description

The Dell™ PowerConnect™ 2708, 2716, 2724 and 2748 switches use 10/100/1000BASE-T ports on the front panel for connecting to a network.

The Gigabit Ethernet ports can operate at 10, 100 or 1000 Mbps. These ports support auto-negotiation, duplex mode (Half or Full duplex), and flow control. The combo 1000 Mbps optical ports can only operate at 1000 Mbps, full-duplex mode.

The following figures illustrate the front panels and back panels of the PowerConnect 2708/2716/2724/2748 switches.

**Figure 2-1. PowrConnect 2708 Front Panel**



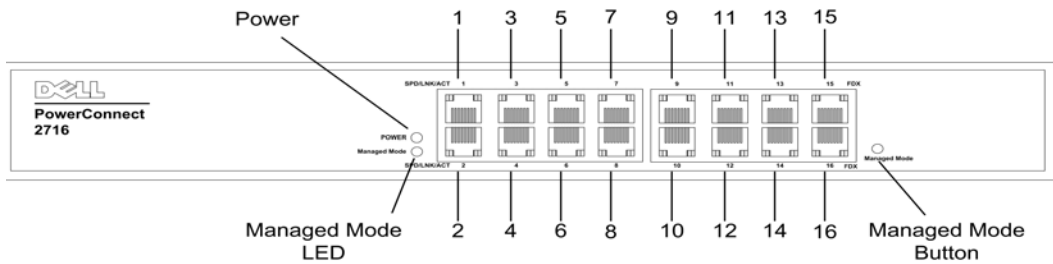
On the front panel there are eight ports which are numbered 1 to 8, top down and left to right. On each port there are LEDs (Light Emitting Diode) to indicate the port status.

On the left side of the front panel is the Managed Mode LED which indicates the Ethernet switch operational status. The Power LED on the front panel indicates whether the device is powered on or not. A Managed Mode push-button, located on the right side on the front panel, restores the device's default settings configuration.

**Figure 2-2. PowerConnect 2708 Back Panel**



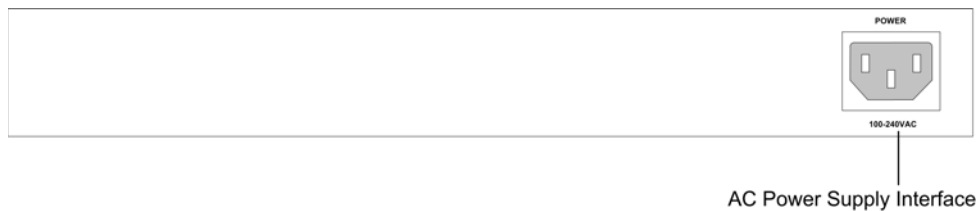
**Figure 2-3. PowerConnect 2716 Front Panel**



On the front panel, there are 16 ports, which are numbered 1 to 16, top down and left to right. On each port there are LEDs to indicate the port status.

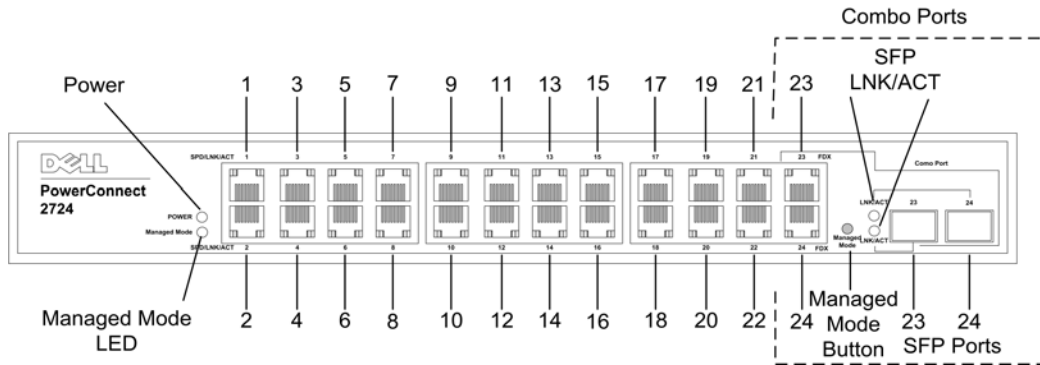
On the left side of the front panel is the Managed Mode LED which indicates the Ethernet switch operational status. The Power LED on the front panel indicates whether the device is powered on or not. A Managed Mode push-button, located on the right side on the front panel, restores the device's default settings configuration.

**Figure 2-4. PowerConnect 2716 Back Panel**





**Figure 2-5. PowerConnect 2724 Front Panel**



On the front panel there are 24 ports which are numbered 1 to 24, top down and left to right. On each port there are LEDs to indicate the port status. There are two SFP (Small Form-Factor Pluggable) ports, designated as ports 23 and 24, for fiber connection. The two combo ports are logical ports with two physical connections:

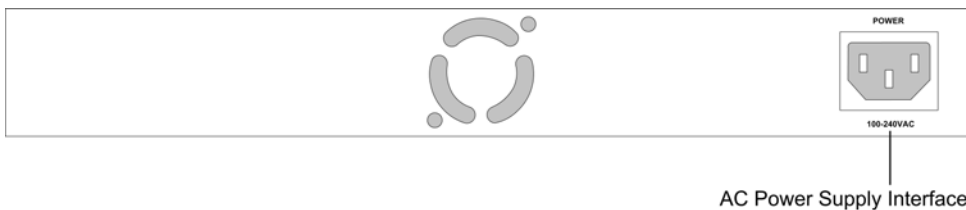
- An RJ-45 connection for Twisted Pair (TP) copper cabling
- An SFP port for swappable optical transceiver, which offers high-speed 1000BASE-SX or 1000BASE-LX connection.

**NOTE:** Only one of the two physical connections of a combo port can be used at any one time. Port features and port controls are determined by the physical connection used. The system automatically detects the media used on a combo port, and utilizes the information in all the control interfaces.

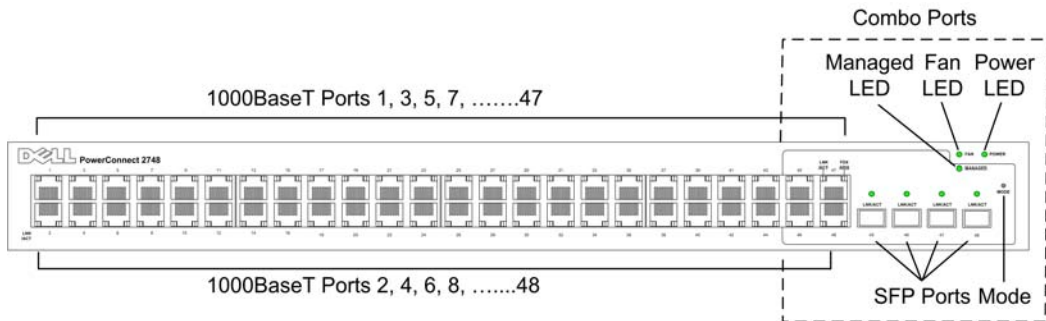
**NOTE:** The system can switch from the RJ-45 to the SFP (or vice versa) without resetting the device. If both RJ-45 and SFP ports are present, the SFP port will be the active port, whereas the RJ-45 port will be disabled.

On the left side of the front panel is the Managed Mode LED which indicates the Ethernet switch operational status. The Power LED on the front panel indicates whether the device is powered on or not. A Managed Mode push-button, located on the far right side on the front panel, restores the device's default settings configuration.

**Figure 2-6. PowerConnect 2724 Back Panel**



**Figure 2-7. PowerConnect 2748 Front Panel**



On the front panel, there are 48 ports, which are numbered 1 to 48, top down and left to right. On each port, there are LEDs to indicate the port status. There are four SFP (Small Form-Factor Pluggable) ports, designated as ports 45, 46, 47 and 48, for fiber connection. The four combo ports are logical ports with two physical connections:

- An RJ-45 connection for Twisted Pair (TP) copper cabling.
- An SFP port for swappable optical transceiver, which offers high-speed 1000BASE-SX or 1000BASE-LX connection.

**NOTE:** Only one of the two physical connections of a combo port can be used at any one time. Port features and port controls are determined by the physical connection used. The system automatically detects the media used on a combo port, and utilizes the information in all the control interfaces.

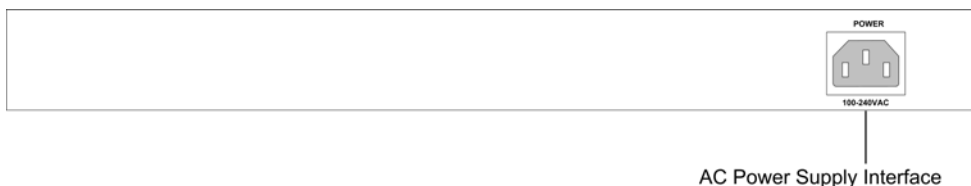
**NOTE:** The system can switch from the RJ-45 to the SFP (or vice versa) without resetting the device. If both RJ-45 and SFP ports are present, the SFP port will be the active port, whereas the RJ-45 port will be disabled.

On the top right side of the front panel is the Managed Mode LED, which indicates the Ethernet switch operational status. The Fan LED indicates the device fan operations status and the Power LED on the front panel indicates whether the device is powered on or not. A Managed Mode push-button, located on the far right side on the front panel, sets the device management mode.

The back panel contains an AC Power Supply Interface.

The following figure illustrates the back panel of the PowerConnect 2748 device.

**Figure 2-8. PowerConnect 2748 Back Panel**



## Physical Dimensions

The PowerConnect 2708 switch has the following physical dimensions:

- Height — 43.2 mm (1.7008 in.)
- Width — 256 mm (10.079 in.)
- Depth — 161.7 mm (6.366 in.)

The PowerConnect 2716 and PowerConnect 2724 switches have the following physical dimensions:

- Height — 43.2 mm (1.7008 in.)
- Width — 330 mm (12.992 in.)
- Depth — 230.50 mm (9.075 in.)

The PowerConnect 2748 switch has the following physical dimensions:

- Height — 43.2 mm (1.70 in.)
- Width — 440 mm (17.32 in.)
- Depth — 255 mm (10.04 in.)

## LED Definitions

The front panel contains LEDs that indicate the status of links, power supply, fan status, and Managed Mode status.

### Power LED

On the PowerConnect 2708/2716/2724/2748 front panel there is a Power LED. The following table describes the Power Supply status LED indications.

**Table 2-1. Power LED Indications**

| LED Color   | Description                  |
|-------------|------------------------------|
| Green Solid | The switch is turned on.     |
| Off         | The switch is not turned on. |

### Managed Mode LED

On the PowerConnect 2708/2716/2724/2748 front panel there is a Managed Mode LED monitoring the switch node as well as indicating diagnostic test results. The following table describes the Managed Mode LED indications.

**Table 2-2. Managed Mode LED Indications**

| LED Color      | Description                                                                      |
|----------------|----------------------------------------------------------------------------------|
| Green Flashing | Indicates diagnostics in progress, firmware loading, or Managed Mode transition. |
| Green Solid    | Indicates the switch is in Managed Mode.                                         |
| Amber Solid    | Diagnostics has failed.                                                          |
| Amber Flashing | No valid image.                                                                  |
| Off            | Indicates Unmanaged mode or Secure mode (2748 only).                             |

### Fan LED (2748 only)

On the PowerConnect 2748 front panel there is a fan LED. The following table describes the fan status LED indications.

**Table 2-3. Fan LED Indications**

| LED Color   | Description                       |
|-------------|-----------------------------------|
| Green Solid | All fans are operating correctly. |
| Red Solid   | One or more fans have failed.     |

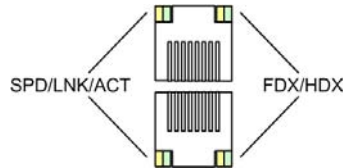
### Port LEDs

#### 10/100/1000BASE-T Port LEDs

Each 10/100/1000BASE-T port has two LEDs. Speed/Link/Activity is indicated on the left LED and the duplex mode is indicated on the right LED.

The following figure illustrates the RJ-45 10/100/1000BASE-T LEDs.

**Figure 2-9. RJ-45 Copper-based 10/100/1000BASE-T LEDs**



The RJ-45 LED indications are described in the following table:

**Table 2-4. RJ-45 Copper based 10/100/ 1000BASE-T LED Indications**

| <b>LED</b> | <b>Color</b>   | <b>Description</b>                                            |
|------------|----------------|---------------------------------------------------------------|
| Left LED   | Green Static   | The port is linked at 1000 Mbps.                              |
|            | Green Flashing | The port is transmitting or receiving data at 1000 Mbps.      |
|            | Amber Static   | The port is linked at either 10 or 100 Mbps.                  |
|            | Amber Flashing | The port is transmitting or receiving data at 10 or 100 Mbps. |
|            | Off            | The port is currently not operating                           |
| Right LED  | Green Static   | The port is currently transmitting in Full Duplex mode.       |
|            | Off            | The port is operating in Half Duplex mode.                    |

### **SFP Port LED**

The following table describes the SFP LED indications.

**Table 2-5. SFP LED Indications**

| <b>LED Color</b> | <b>Description</b>      |
|------------------|-------------------------|
| Green Static     | Link is established.    |
| Green Flashing   | Activity is occurring.  |
| Off              | No link is established. |

### **Managed Mode Button**

The PowerConnect 2708/2716/2724/2748 has a Managed Mode push button on the front panel. The Managed Mode button is for changing between Managed Mode and Unmanaged (or Secure) Mode. After a change from Unmanaged (or Secure) Mode to Managed Mode, the switch restores the configuration values to factory default settings.

From Unmanaged or Secure Mode (2748 only), pressing the Managed Mode button causes:

- Factory default configuration (192.168.2.1) is set as the switch IP address.
- Subnet mask changes to 255.255.255.0
- Graphical User Interface (GUI) login user name changes to **Admin**, and the password is not configured (appears blank), with Read/Write privilege.
- The DHCP client is set off.
- The device is rebooted.

## Switch Ventilation Fan

The PowerConnect 2748 switch has three fans and the PowerConnect 2724 switch has one fan for system ventilation. The PowerConnect 2708 and PowerConnect 2716 devices have no internal fans.

## Cables, Port Connections, and Pinout Information

This section explains the switch physical interfaces, and provides information about cables and port connections. Copper cable diagnostics are supported. High-speed workstations, hubs, routers, or other switches are connected through standard RJ-45 connectors to the switch physical interface ports, located on the front panel. For each device, the supported mode is set to Half Duplex, Full Duplex, and Auto.

### 1000BASE-T Cable Requirements

All Category 5 UTP cables that are used for 100BASE-TX connections also operate with 1000BASE-T, provided if all four wire pairs are connected. However, it is recommended that enhanced Category 5 (Category 5e) cable is used for all critical connections or any new cable installations. The Category 5e specification includes test parameters that are only recommendations for Category 5, and comply with the IEEE 802.3ab standards.

### RJ-45 Connections for 10/100/1000BASE-T Ports

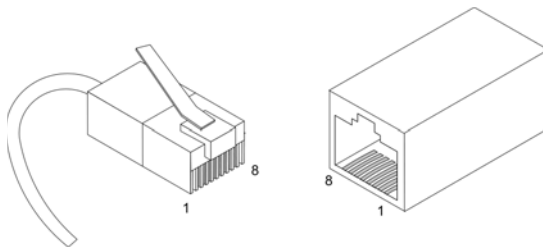
The 10/100/1000BASE-T ports are copper Twisted-Pair ports.

**Table 2-6. Ports, Connectors and Cables**

| Connector | Port/Interface         | Cable |
|-----------|------------------------|-------|
| RJ-45     | 10/100/1000BASE-T Port | Cat.5 |

The following figure illustrates the RJ-45 pin connector pin numbers.

**Figure 2-10. RJ-45 Pin Numbers**



The RJ-45 pin number allocation for the 10/100/1000BASE-T ports is listed in the following table.

**Table 2-7. RJ-45 Pin Number Allocation for 10/100/ 1000BASE-T Ethernet Port**

| Pin No | Function |
|--------|----------|
| 1      | TxRx 1+  |
| 2      | TxRx 1-  |
| 3      | TxRx 2+  |
| 4      | TxRx 2-  |
| 5      | TxRx 3+  |
| 6      | TxRx 3-  |
| 7      | TxRx 4+  |
| 8      | TxRx 4-  |

### SFP Ports

The PowerConnect 2724 switch supports two SFP transceivers combo ports, and the PowerConnect 2748 switch supports four SFP transceivers combo ports for various fiber-based modules (1000BASE-SX or 1000BASE-LX). Only one of the two physical connections of a combo port can be used at any time. The system can switch from the RJ-45 to the SFP (or vice versa) without a system reset. The system automatically detects the media used on a combo port, and utilizes this information in the control interfaces.

PowerConnect 2724 switch supports SFP diagnostics. The optical transceiver provides access to a set of parameters that can be monitored and displayed to the system administrator.



**NOTE:** If both RJ-45 and SFP ports are present, the SFP port will be the active port, whereas the RJ-45 port will be disabled and ignored.

## Pin Connections for SFP Interfaces

**Table 2-8. SFP Pin Connections**

| Pin No | Use                                                            |
|--------|----------------------------------------------------------------|
| 1      | Transmitter ground (common with receiver ground)               |
| 2      | Transmitter fault                                              |
| 3      | Transmitter disable; laser output disabled on high or open.    |
| 4      | Module definition 2; data line for serial ID.                  |
| 5      | Module definition 1; clock line for serial ID.                 |
| 6      | Module definition 0; grounded within the module.               |
| 7      | Rate select; no connection required.                           |
| 8      | Loss of signal indication; logic 0 indicates normal operation. |
| 9      | Receiver ground (common with transmitter ground)               |
| 10     | Receiver ground (common with transmitter ground)               |
| 11     | Receiver ground (common with transmitter ground)               |
| 12     | Receiver inverted data out; AC coupled.                        |
| 13     | Receiver non-inverted data out; AC coupled.                    |
| 14     | Receiver ground (common with transmitter ground)               |
| 15     | Receiver power supply                                          |
| 16     | Transmitter power supply                                       |
| 17     | Transmitter ground (common with receiver ground)               |
| 18     | Transmitter non-inverted data in                               |
| 19     | Transmitter inverted data in                                   |
| 20     | Transmitter ground (common with receiver ground)               |

## Power Connectors

The PowerConnect 2708/2716/2724/2748 switches are powered by using the AC internal power supply.

### Internal Power Supply Connector

The PowerConnect 2708, PowerConnect 2716, PowerConnect 2724 and PowerConnect 2748 switch systems supports a single internal power supply to provide power for switching operations. The internal power supply supports input voltages between 100 and 240 VAC. The AC power connector is located on the back panel of the switch.



# Installing the Dell™ PowerConnect™ 27XX

This chapter contains information about unpacking, installation procedures, and how to make cable and port connections for the PowerConnect 2708, 2716, 2724, and 2748 devices.

## Installation Precautions



**CAUTION:** Before performing any of the following procedures, read and follow the safety instructions located in the *Product Information Guide*.



**CAUTION:** Observe the following points before performing the procedures in this section:

- Observe and follow the service markings. Do not service any Ethernet device except as explained in the system documentation. Opening or removing covers marked with a triangular symbol with a lightning bolt may cause electrical shock. These components are to be serviced by trained service technicians only.
- Ensure that the Ethernet device is not exposed to water.
- Ensure that the Ethernet device is not exposed to radiators or heat sources.
- Do not push foreign objects into the device's hardware enclosure, as it may cause a fire or electric shock.
- Use the Ethernet device only with approved equipment.
- Allow the Ethernet device to cool before removing covers or touching internal equipment.
- Ensure that the airflow around the front, sides, and back of the device chassis is not restricted.

## Overview

The PowerConnect 2708/2716/2724/2748 are standard 1U chassis high, 19-inch rack-mountable devices.

The process of installing the PowerConnect switch consists of both hardware and software instructions. The process consists of physically installing these devices and configuring them.

The switch is delivered from the factory in Unmanaged Mode. If the user wishes to use the switch as an unmanaged switch, they can simply plug the switch in and start using it. No configuration is necessary. If the user wishes to use the switch as a managed switch, they need to change the switch

to Managed Mode. The chapter "Starting and Configuring the Dell™ PowerConnect™ 2708/2716/2724/2748 for Managed Mode Operation" explains how to set the switch to Managed Mode.


## Site Requirements

The PowerConnect 2708/2716/2724/2748 devices can be mounted in a standard equipment rack, placed on a tabletop, or mounted on the wall.

Before installing the unit, verify that the site selected for the device meets the following site requirements:

- **Power** — The device is installed within 1.5 m (5 feet) of a grounded, easily accessible outlet 220/110 VAC, 50/60 Hz. If the device has two power supplies, the site should have two power outlets with different power feeders.
- **General** — Ensure that the power supply is correctly installed.
- **Clearance** — There is adequate frontal clearance for operator access. Allow clearance for cabling, power connections, and ventilation.
- **Cabling** — Cabling is routed to avoid sources of electrical noise such as radio transmitters, broadcast amplifiers, power lines, and fluorescent lighting fixtures.
- **Ambient Requirements** — The ambient unit operating temperature range is 0 to 45C (32 to 113F) at a relative humidity of up to 95%, non-condensing. Verify that water or moisture cannot enter the device case.

## Unpacking

 **NOTE:** Before unpacking the device, inspect the packaging and report any evidence of damage immediately to Dell.

### Safety




 **CAUTION:** Never remove the cover on a power supply or any part that has the following label attached.

Figure 3-1. Caution Label



 **CAUTION:** Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

## Handling Static Sensitive Devices

 **NOTICE:** Static electricity can damage electronic Ethernet switch system. To avoid damage, keep static-sensitive Ethernet switches in their static-protective packages until they are ready to be installed. To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around your person.
- Handle the Ethernet switches carefully, holding it by its edges or its frame.
- Do not leave the Ethernet switches where others can handle and possibly damage the Ethernet switch.
- While the Ethernet switch is still in its static-protective package, touch it to an unpainted electrically grounded metal part for at least two seconds. (This drains static electricity from the package and from your person.)
- Remove the Ethernet switch from its package and install it directly into a rack without setting it down. If it is necessary to set the Ethernet switch down, place it in its static-protective package. Do not place the Ethernet switches on a metal table.
- Take additional care when handling Ethernet switches during cold weather because heating reduces indoor humidity and increases static electricity.


## Package Contents


While unpacking the device, ensure that the following items are included:

- The device
- AC power cable
- Self-adhesive rubber pads (for on-shelf installation)
- Rack-mount kit for installation
- Documentation CD
- *Product Information Guide*

## Unpacking the Device

To unpack the PowerConnect device:

 **NOTE:** Before unpacking the device, inspect the packaging and report any evidence of damage immediately to Dell.

 **NOTE:** An ESD strap is not provided, however it is recommended to wear one for the following procedure.

- 1 Place the box on a clean flat surface.
- 2 Open the box or remove the box top.
- 3 Carefully remove the device from the package and place it on a secure, stable and clean surface.
- 4 Remove all packing material.
- 5 Inspect the device and accessories for damage. Report any damage immediately to Dell.

## Mounting the Device

The following mounting instructions apply to the PowerConnect 2708/2716/2724/2748 devices. There are three device mounting options:

- Installing in a Rack
- Installing on a Flat Surface
- Installing on a Wall

## Installation Precautions

 **CAUTION** Before performing any of the following procedures, read and follow the safety instructions located in your *Product Information Guide*.

 **CAUTION** Observe the following points before performing the procedures in this section:

- Ensure that the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable and/or falling over.
- Ensure that the power source circuits are properly grounded.
- Observe and follow the service markings. Do not service any device except as explained in the system documentation. Opening or removing covers marked with a triangular symbol with a lightning bolt may cause electrical shock. These components are to be serviced by trained service technicians only.
- Ensure that the power cable, extension cable, and/or plug is not damaged.
- Ensure that the device is not exposed to water.
- Ensure that the device is not exposed to radiators and/or heat sources.
- Ensure that the cooling vents are not blocked.
- Do not push foreign objects into the device, as it may cause a fire or electric shock.
- Use the device only with approved equipment.
- Allow the device to cool before removing covers or touching internal equipment.
- Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add together the ampere ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit.
- Do not install the device in an environment where the operating ambient temperature might exceed 40°C (104°F).
- Ensure that the airflow around the front, sides, and back of the device is not restricted.

## Installing the Device

The following mounting instructions apply to all three hardware configurations of PowerConnect 2708, 2716, 2724 and 2748 devices. The section describes how to install a single device as a stand-alone device.

### Installing the Device in a Rack

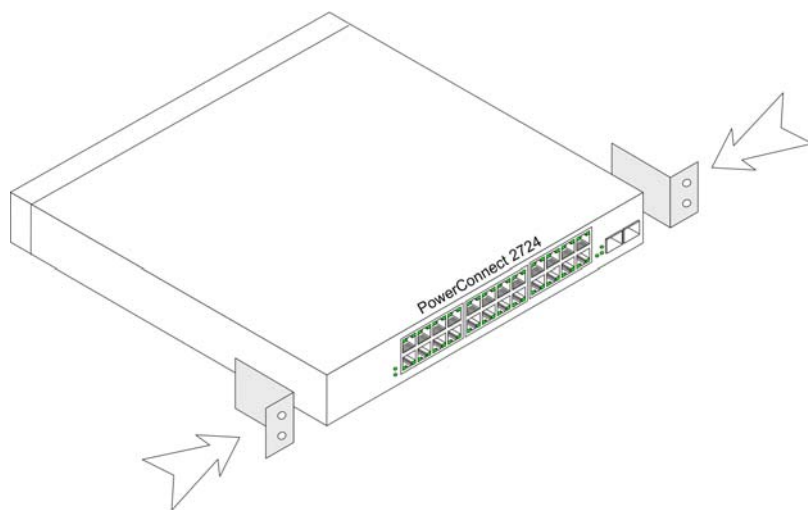
**⚠ CAUTION: Disconnect all cables from the unit before mounting the device in a rack or cabinet.**

**⚠ CAUTION: When mounting multiple devices into a rack, mount the devices from the bottom up.**

To install the device in a rack, perform the following:

- 1 Place the supplied rack-mounting bracket on one side of the device ensuring the mounting holes on the device line up to the mounting holes on the rack mounting bracket. The following figure illustrates where to mount the brackets.

**Figure 3-2. Bracket Installation for Rack Installation**



- 2 Insert the supplied screws into the rack mounting holes and tighten with a screwdriver.
- 3 Repeat the process for the rack-mounting bracket on the other side of the device.
- 4 Insert the unit into the rack, ensuring that the rack-mounting holes on the device line up to the mounting hole on the rack.
- 5 Secure the unit to the rack with the rack screws (not provided). Fasten the lower pair of screws before the upper pair of screws. This ensures that the weight of the unit is evenly distributed during installation. Ensure that the device ventilation holes are not obstructed.

## Installing the Device on a Flat Surface

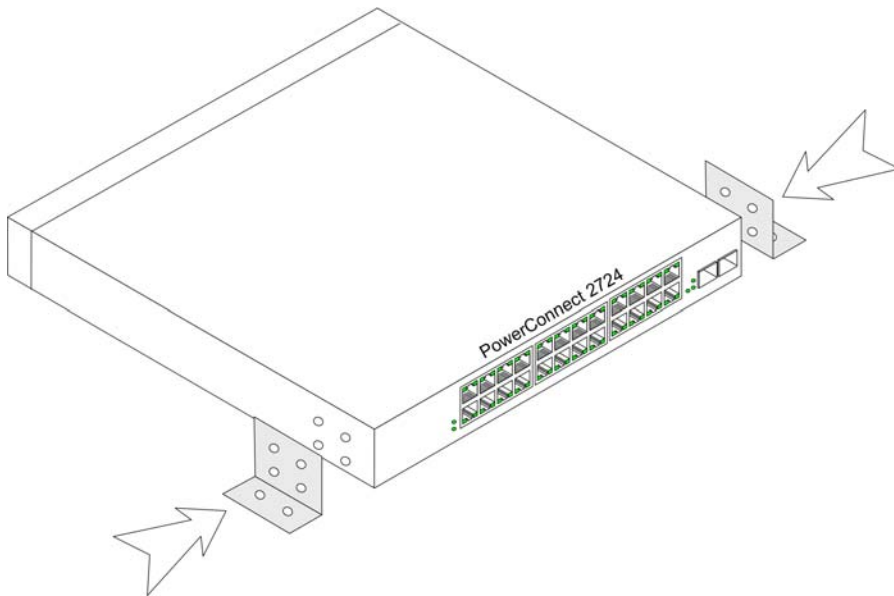
The device can be installed on a flat surface, such as a desk-top, if it is not installed on a rack or on a wall. The surface must be able to support the weight of the device and the device cables.

- 1 Attach the self-adhesive rubber pads (provided with the device) on each marked location on the bottom of the chassis.
- 2 Set the device on a flat surface, while leaving 5.08 cm (2 inches) on each side, and 12.7 cm (5 inches) at the back.
- 3 Ensure that the device has proper ventilation.

## Installing the Device on a Wall

- 1 Place the supplied wall-mounting bracket on one side of the device, ensuring that the mounting holes on the device line up to the mounting holes on the rack-mounting bracket. The following figure illustrates where to mount the brackets.

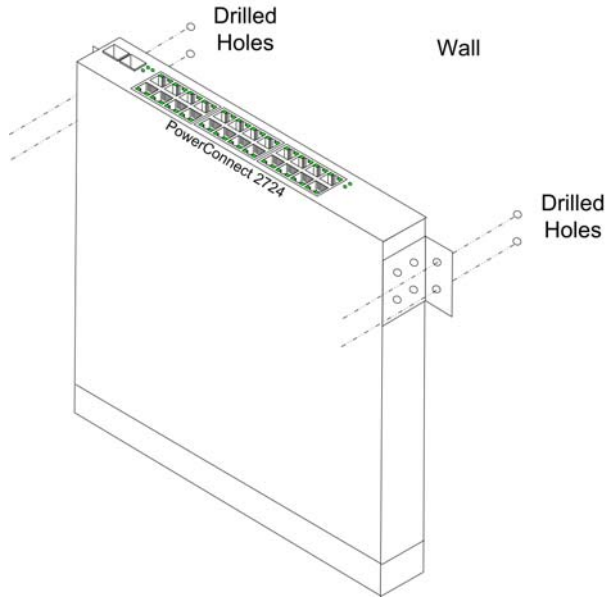
**Figure 3-3. Bracket Installation for Wall Mounting**



- 2 Insert the supplied screws into the rack-mounting holes and tighten with a screwdriver.
- 3 Repeat the process for the wall-mounting bracket on the other side of the device.
- 4 Place the device on the wall in the location where the device is being installed.
- 5 On the wall mark the locations where the screws to hold the device must be prepared.
- 6 On the marked locations, drill the holes and place all plugs (not provided) in the holes.

- 7 Secure the unit to the wall with screws (not provided). Ensure that the ventilation holes are not obstructed.

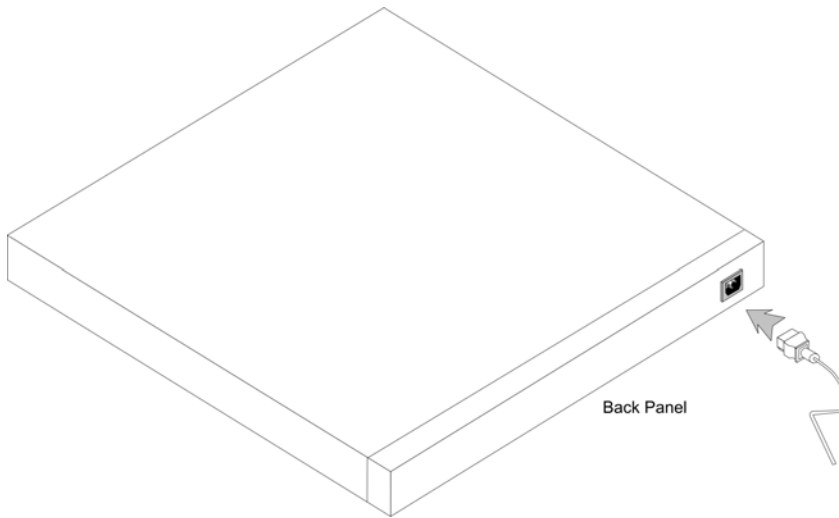
**Figure 3-4. Mounting Device on a Wall**



### **Connecting the Device to AC Power Supply**

- 1 Using a 5-foot (1.5 m) standard power cable with safety ground connected, connect the power cable to the AC connector located on the back panel.


**Figure 3-5. Back Panel Power Connector**




- 2 After connecting the device to a power source, confirm that the device is connected and operating correctly by examining the LEDs on the front panel.

## Connecting the Device to the Network

To connect to an uplink port, use Category 5 Unshielded Twisted-Pair (UTP) cables with RJ-45 connectors at both ends. The RJ-45 ports on the Ethernet switch supports automatic Media-Dependent Interface/Media-Dependent Interface with internal crossover wiring (MDI/MDIX) operation under Auto-Negotiation mode. Standard straight-through twisted-pair cables can be used to connect to any other Ethernet network (systems, servers, switches or routers) that supports auto-negotiation.

 **NOTE:** Do not plug a phone jack connector into an RJ-45 port. This will damage the Ethernet device. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

 **NOTE:** If autonegotiation is turned off on the ports, a straight through cable must be used.


To connect the switch to the network:


- 1 Attach one end of a Twisted-Pair cable to the device's RJ-45 connector and the other end to a switch or server.
- 2 Make sure each Twisted Pair cable does not exceed 100 meters (328 ft.) in length.

As each connection is made, the (green or amber) Link LED corresponding to each port on the device is illuminated indicating that the connection is valid.



# Starting and Configuring the Dell™ PowerConnect™ 27XX

 **NOTE:** Before proceeding, read the release notes for this product. The release notes can be downloaded from [support.dell.com](http://support.dell.com).

 **NOTE:** It is recommended that the most recent revision of the user documentation is obtained from the Dell Support Website at [support.dell.com](http://support.dell.com).

## Viewing Switch Operation

The power-on self-test (POST) runs every time the switch is initialized, and checks hardware components to determine if the device is fully operational before completely booting. If a critical problem is detected, the program flow stops. The boot process runs approximately 10 seconds.

The Managed Mode LED indicates whether POST has passed successfully or failed. When POST completes successfully, the Managed Mode LED indicator is off if in Unmanaged Mode, and solid green if in Managed Mode. When a critical problem is detected, the POST process fails and the Managed Mode LED indicator turns solid amber (PowerConnect 2748). If the process fails in the PowerConnect 2708/2716/2724 switch the Managed Mode LED indicator turns solid red.

## Initial Configuration

The switch is delivered from the factory in Unmanaged Mode. This section describes how to enter Managed Mode and configure the switch. If the user wishes to use the switch as an unmanaged switch, they can simply plug the switch in and start using it. No configuration is necessary.

The PowerConnect device provides you the flexibility of basic network connectivity without significant effort or advanced network connectivity with web-managed features and functionality. If you require basic connectivity and do not want to manage these devices, once you have powered up the device and connected your network cabling you may stop there. If you desire to manage the device, you will need to follow the instructions detailed here in the remaining sections of this chapter.

The initial configuration of the device uses the following assumptions:

- The PowerConnect device was never configured before and it is in the same state as when received.
- The PowerConnect device booted successfully.

The following information must be obtained from the network administrator before configuring the device:

- The IP address to be assigned to the VLAN 1 interface through which the device is to be managed (by default, every port is a member of the VLAN 1 in Managed Mode).
- The IP subnet mask for the network
- The default gateway (next hop router) IP address for configuring the default route.

The system supports Embedded Web Server (EWS), which serves HTML pages through which the device can be monitored and configured. The switch supports the following browsers: Microsoft IE V6.x and higher, and Mozilla. The system internally configures the device according to Web-based input (including menu selections, mouse clicks, etc.).

The device is delivered in Unmanaged Mode. The device must be changed to Managed Mode before it can be configured. To change to Managed Mode, the device must be fully operational in Unmanaged Mode (Managed Mode LED has stopped blinking and is off). Once the Managed Mode LED has stopped blinking, press the Managed Mode button. The switch reboots and the Managed Mode LED blinks for approximately 90 seconds and stays lit. When the Managed Mode LED stays lit, the switch is ready to be configured. The default IP address is 192.168.2.1, the default User Name is 'admin', and the default password is left blank.

The following login screen is displayed when the device is first connected:

**Figure 4-1. Login Screen**



The screenshot shows a login interface with a light blue background. At the top, it says "Log In" followed by a horizontal line and the instruction "Type in Username and Password, then click OK". Below this are two input fields: "User Name" and "Password". The "User Name" field is currently empty. Below the input fields is a button labeled "OK".

- 1 Enter **admin** in the **User Name** field.
- 2 Leave the **Password** field blank (for first time Managed Mode access).
- 3 Click **OK**.

To change User name and Password, see Local User Database.

On first deployment of the device (after the device is initially connected with the default settings), it is advisable to configure the device with new configuration parameters.

To configure the switch with new system-specific parameters, perform the following steps:

- 1 Open the **IP Addressing** window in the EWS.

- 2** Enter the IP address, Subnet Mask and Default Gateway as supplied by the System Administrator.
- 3** Click **Apply Changes**.  
The switch is configured with the updated configuration parameters.



# Using the Dell OpenManage™ Switch Administrator

This section provides an introduction to the Embedded Web Server (EWS), which serves HTML pages through which the user can monitor the switch interface.

## Understanding the Interface

The home page contains a **Tree View** — located on the left side of the home page. The tree view provides an expandable view of the features and their components.

**Figure 5-1. Switch Status**

The screenshot shows the Dell OpenManage Switch Administrator interface. The top navigation bar includes links for Support, Help, About, and Log Out. The main header displays the Dell logo, the version number 10.6.6.28, and the current page title 'Switch Status'. On the left, a tree view lists various configuration options, with 'Switch Status' selected and marked with a '1'. The main content area, titled 'Switch Status', contains a table of configuration details and an 'Apply Changes' button marked with a '2'. There are also 'Print' and 'Refresh' buttons in the top right of the main content area.

|                                  |                          |
|----------------------------------|--------------------------|
| Product Name                     | PowerConnect 2748        |
| Firmware Version                 | 1.0.0.11                 |
| Boot Version                     | 1.0.0.01                 |
| MAC Address                      | 00:00:01:15:13:07        |
| Asset Tag (0-16 Characters)      | <input type="text"/>     |
| Service Tag                      | <input type="text"/>     |
| System Name (1-159 Characters)   | <input type="text"/>     |
| Location Name (1-159 Characters) | <input type="text"/>     |
| Serial Number                    | 15                       |
| System Up Time                   | 0 d 0 h 6 m 53 s         |
| Secure Mode                      | <input type="checkbox"/> |

The following table lists the interface components with their corresponding numbers.

**Table 5-1. Interface Components**

| <b>Component</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                       |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                | The tree view contains a list of the different Ethernet switch features. The functions in the tree view provide a view of all the components under a specific feature.                                                                                                                                                                   |
| 2                | <p>The Ethernet switch view provides information about switch ports, current configuration and status, table information, and feature components.</p> <p>Depending on the option selected, the area at the bottom of the Ethernet switch view displays other Ethernet switch information or dialog boxes for configuring parameters.</p> |
| 3                | The information buttons provide access to information about the Ethernet switch and access to Dell Support.                                                                                                                                                                                                                              |

## Using the OpenManage Switch Administrator Buttons

This section describes the buttons found on the Dell™ PowerConnect™ OpenManage Switch Administrator interface.

### Information Buttons

Information buttons provide access to on-line support and online help, as well as information about the OpenManage Switch Administrator interfaces.

**Table 5-2. Information Buttons**

| Button  | Description                                                                                                                                                                                                                                                                                |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Support | Opens the Dell Support page at <a href="http://support.dell.com">support.dell.com</a> .                                                                                                                                                                                                    |
| Help    | Online help containing information to assist in configuring and managing the Ethernet switch. The online help pages are linked directly to the page currently open. For example, if the <b>IP Addressing</b> page is open, the help topic for that page opens when <b>Help</b> is clicked. |
| About   | Contains the version and build number and Dell copyright information.                                                                                                                                                                                                                      |
| Log Out | Logs out of the application and closes the browser window.                                                                                                                                                                                                                                 |

### PowerConnect Switch Management Buttons

The PowerConnect Switch Management buttons provide an easy method of configuring the switch information. The following table mentions the switch management buttons available.

**Table 5-3. PowerConnect Switch Management Buttons**


| <b>Button</b> | <b>Description</b>                                                     |
|---------------|------------------------------------------------------------------------|
| Apply Changes | Applies changes to the Ethernet Switch.                                |
| Refresh       | Refreshes Ethernet Switch information.                                 |
| Print         | Prints the <b>Network Management System</b> page or table information. |


## Starting the Application

- 1 Open a Web browser.
- 2 Enter the Ethernet Switch IP address (the default IP address is: 192.168.2.1) in the address bar and press <Enter>.

For information about assigning an IP address to the Ethernet Switch, see "**Viewing System IP Address.**"

- 3 When the **Enter Network Password** window opens, enter a user name and password.

 **NOTE:** The Ethernet switch is configured with a default IP address, user login and password. Activating the Managed Mode button recovers the factory default setting (no password). For information about recovering a lost password, see "**Managed Mode Button**".

 **NOTE:** Passwords are both case-sensitive and alphanumeric.

- 4 Click OK.

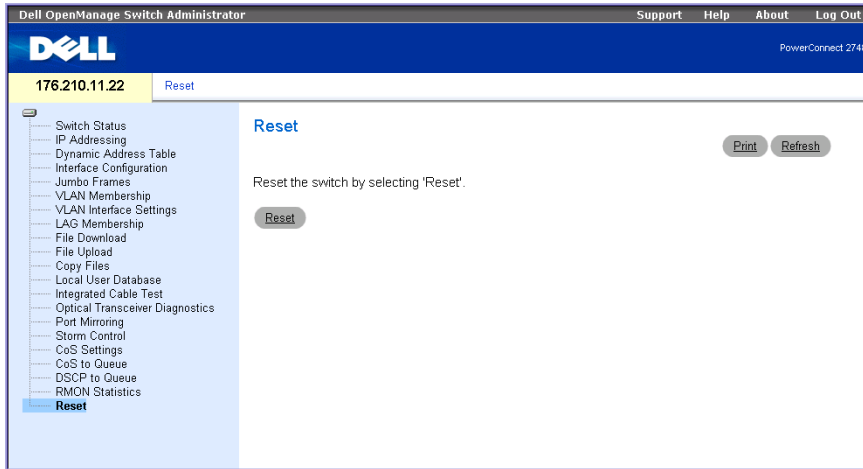
The Dell PowerConnect OpenManage Switch Administrator home page opens.



# Resetting the Device

The Reset page resets the device. To open the Reset page, click **Reset** in the tree view.

**Figure 5-2. Reset**



- 1 Click **Reset**. A confirmation message displays.
- 2 Click **OK**. The device is reset.

# Displaying Configuration on Demand

The EWS shortens user wait time by providing Data Display on Demand. When the system retrieves vast amounts of configuration data, the data is divided into groups. The system administrator can peruse the configuration information by either selecting a specific interface or using the **Previous** and **Next** links.

The following screen displays an example of data display on demand:

**Figure 5-3. Data Display on Demand Example**

## Interface Configuration Table

Refresh

[<<Previous](#) [1](#) [2](#) [3](#) [4](#) [LAG](#) [Next>>](#)

| Interface | Interface Type | Interface Status | CoS | Interface Speed | Duplex Mode | Auto Negotiation | Back Pressure | Flow Control |
|-----------|----------------|------------------|-----|-----------------|-------------|------------------|---------------|--------------|
| 1         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 2         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 3         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 4         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 5         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 6         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 7         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 8         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 9         | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 10        | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |
| 12        | Ethernet       | Up               | d   | 100M            | Full        | Enable           | Enable        | On           |

## Configuring System Information

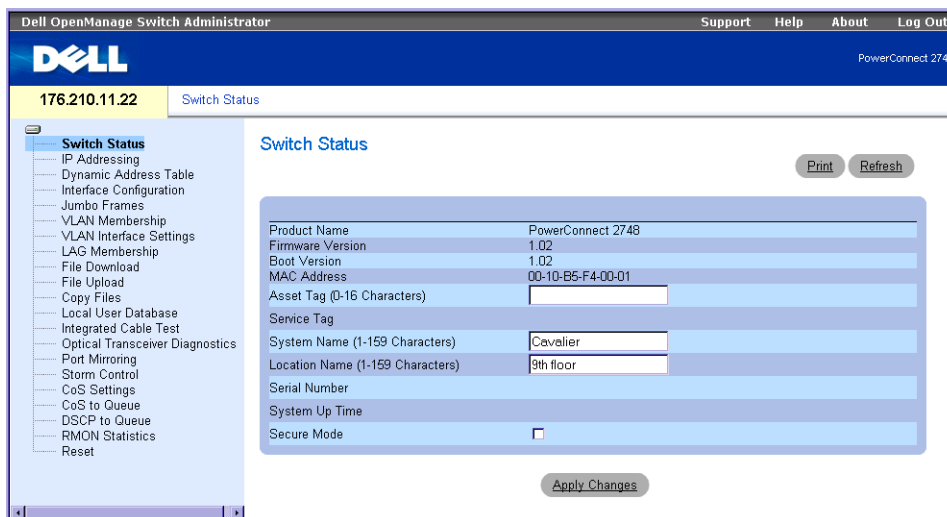
This section provides information for defining system parameters including switch status features, downloading switch software, and modifying switch parameters.

### Defining Switch Information

#### Viewing the Switch Status

The **Switch Status** page contains parameters for configuring and viewing general switch information, including the Product Name, Firmware Version, the system MAC Address, Asset Tag, Service Tag, System Name, Location Name, Serial Number, and System Up Time. To open the page, click **Switch Status** in the tree view.

**Figure 6-1. Switch Status**



**Product Name** — Defines the name of the product.

**Firmware Version** — Defines the version of the product firmware.

**Boot Version** — Displays the current boot version running on the device.

**MAC Address** — Specifies the switch MAC address.

**Asset Tag (0-16 Characters)** — Specifies the user-defined switch reference.

**Service Tag** — The service reference number used when servicing the switch.

**System Name (0-32 Characters)** — Defines the user-defined switch name.

**Location Name (0-32 Characters)** — The location where the system is currently running.

**Serial Number** — Specifies the device's unique serial number, assigned by the manufacturer.

**System Up Time**— Specifies the amount of time since the last switch reset. The system time is displayed in the following format: Days, Hours, Minutes, and Seconds. For example, 41 days, 2 hours, 22 minutes, and 15 seconds.

**Secure Mode (2748 only)** — When checked, enables the secure mode. The default is unchecked (disabled). As soon as **Apply Changes** is clicked, the current configuration will be saved and the device will become Secure and will no longer be able to be configured.

### **Defining Switch Information:**

- 1** Open the **Switch Status** page.
- 2** Define the fields.
- 3** Click **Apply Changes**.

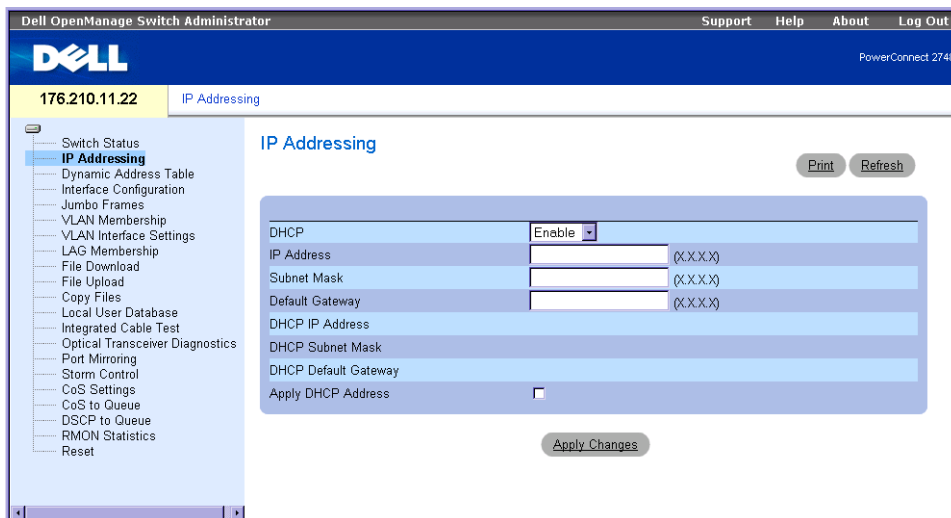
The switch status parameters are defined, and the switch is updated.

### **Viewing System IP Address**

The **IP Addressing** page enables to manually set the static IP Address, Subnet Mask and the device's static Default Gateway Address. When the Dynamic Host Configuration Protocol (DHCP) client is enabled, the switch requests from the DHCP server to assign a dynamic IP Address, Subnet Mask Address, and Default Gateway Address to manage the device. The IP Address, Subnet Mask and Default Gateway are then set dynamically. When the DHCP Address is applied, the switch is configured according to the new IP and Default Gateway addresses received from the DHCP server.

To open the page, click **IP Addressing** in the tree view.

**Figure 6-2. IP Addressing**



**DHCP** — The DHCP client can be enabled to acquire the network configuration dynamically. The DHCP default value is **Disable**. This field enables the DHCP client.

**IP Address** — Specifies the static IP Address currently assigned to the device.

**Subnet Mask**— Specifies the subnet mask of the static IP Address, currently assigned to the device.

**Default Gateway** — Specifies the static Default Gateway Address, currently assigned to the device.

**DHCP IP Address** — Specifies the IP Address received from the DHCP server.


**DHCP Mask** — Specifies the Subnet Mask received from the DHCP server.

**DHCP Default Gateway** — Defines the Default Gateway Address received from the DHCP server.

**Apply DHCP Address** — Activates the IP Address, Subnet Mask Address, and Default Gateway Address, received from the DHCP server.

### Updating Static IP Address


- 1 Open the **IP Addressing** page.
- 2 Verify that the DHCP field is **Disable**.
- 3 Manually enter the IP Address, Subnet Mask and Default Gateway fields.
- 4 Click **Apply Changes**.  
The system Static IP address parameters are applied to the switch.
- 5 Reconnect the device with the new IP Address.

 **NOTE:** The displayed values are not configured to the device.


### Configuring DHCP Client

- 1 Open the **IP Addressing** page.
- 2 Change the DHCP to **Enable**.
- 3 Click **Apply Changes**.

The switch requests from the DHCP server to assign a new dynamic IP Address, Subnet Mask, and Default Gateway Address to manage the device. The dynamic DHCP IP Address, DHCP Subnet Mask, and DHCP Default Gateway Address are displayed.

 **NOTE:** The displayed values are not configured to the device. Record the updated dynamic fields.

- 4 Check the box for **Apply DHCP Address**.

 **NOTE:** The new dynamic **DHCP IP Address**, **DHCP Subnet Mask**, and **DHCP Default Gateway Address** received from the DHCP server are saved and configured in the device only after the **Apply Changes** button is clicked on. A reset-to-Default recovers the device default configuration.

- 5 Click **Apply Changes**.

The new dynamic DHCP Address is configured in the switch.

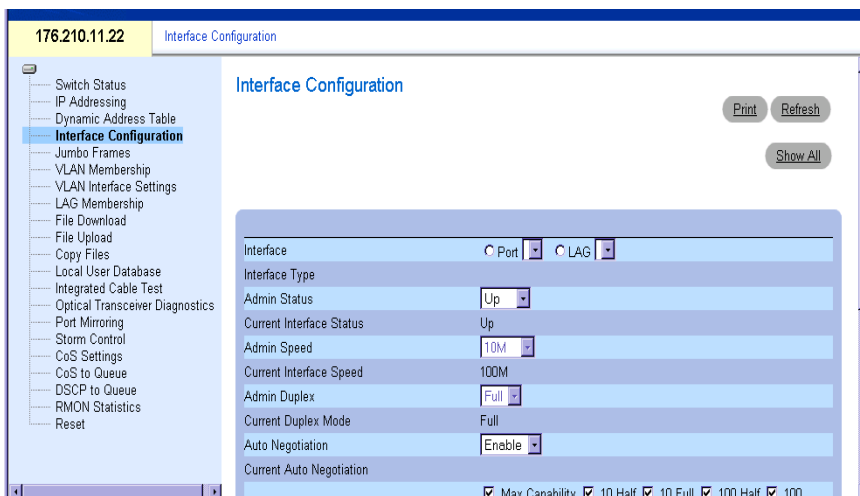
- 6 Enter the new DHCP Address in the Browser address line.

The switch is reconnected to the new DHCP client address.

## Defining Interface Configuration

The **Interface Configuration** page enables the user to set the port parameters, such as port speed, port type, and additional port operational attributes. To open the page, click **Interface Configuration** in the tree view.

**Figure 6-3. Interface Configuration**



**Interface** — The current interface type for a port or a LAG, for which interface parameters are defined.

**Interface Type** — Specifies the port's maximum speed and the port media type, required for the appropriate cable type connection. For example, 100M-Copper or 1000M-Fiber.

**Admin Status** — Enables or disables traffic forwarding through the port. When **Up** is selected, the traffic is forwarded through the port. When **Down** is selected, no traffic is forwarded through the port.

**Current Port Status** — Specifies whether the port is currently operational or non-operational.

**Operational Status** — Indicates the port operational status. The possible field values are:

**Suspended** — Indicates that the port is currently active, and it is currently not transmitting or receiving traffic.

**Active** — Indicates that the port is currently receiving and transmitting traffic.

**Disable** — Indicates that the port is currently disabled and therefore, not receiving or transmitting traffic.

**Admin Speed** — The rate configured for the port. The port type determines what speed setting options are available. Admin Speed can only be designated when auto negotiation is disabled on the configured port.

**Current Port Speed** — The actual synchronized port speed, in bits per second.

**Admin Duplex** — Full Duplex (FDX) indicates that the switch interface supports transmission between the device and another station, in both directions simultaneously. Half Duplex (HDX) indicates that the interface supports transmission between the device and the other station in one direction only at a time.

**Current Duplex Mode** — The synchronized port duplex mode of transmission.

**Auto Negotiation** — Enables Auto Negotiation on the port. This feature is a protocol between two link partners that enables a port to advertise its transmission rate, duplex mode and flow control capacity to its partner (Auto Negotiation has to be enabled on both communicating devices to operate).

**Current Auto Negotiation** — Specifies the current Auto Negotiating status. The possible statuses are **On** or **Off**.

**Admin Advertisement** — Designates the possible parameters of transmission: Max Capability, 10 Mbps at Half Duplex, 10 Mbps at Full Duplex, 100 Mbps at Half Duplex, 100 Mbps at Full Duplex, or 1000 Mbps at Full Duplex.

**Current Advertisement** — Specifies the current advertised port rate and mode of transmission.

**Backpressure** — The Backpressure mechanism makes it possible to avoid a temporary congestion and buffer overflow in the switch, by prohibiting transmission from an input device to the congested output device, when the number of packets in the output device exceeds a given threshold value. The Backpressure mode is used in Half Duplex mode. The receiving port can use backpressure (that is, occupy the link so it becomes unavailable for additional traffic), to temporarily prevent the sending port from transmitting additional traffic. Backpressure can be enabled or disabled by setting the field.

**Current Backpressure** — The current backpressure setting.

**Flow Control** — The Flow Control mechanism enables lower speed devices to communicate with higher speed devices by requesting that the higher speed device refrains from sending packets. Transmission is temporarily halted to prevent buffer overflow. Flow Control can be enabled or disabled by setting this field. Enables or disables flow control, or enables Auto-negotiation of flow control on the port.

**Current Flow Control** — Specifies the current Flow Control setting. The possible statuses are **Enable**, **Disable**, or **Auto Negotiation**.

**MDI/MDIX** — Displays the MDI/MDIX status on the port. Hubs and switches are deliberately wired opposite the way end stations are wired, so that when a hub or switch is connected to an end station, a straight through Ethernet cable can be used, and the pairs are matched up properly. When two hubs or switches are connected to each other, or two end stations are connected to each other, a crossover cable is used to ensure that the correct pairs are connected. The possible field values are:

**MDIX (Media Dependent Interface with Crossover)** — Use for hubs and switches.

**MDI (Media Dependent Interface)** — Use for end stations.



**Auto** — Use to automatically detect the cable type.

**Current MDI/MDIX** — Displays the current MDI/MDIX status of the port.

**LAG** — Specifies if port is a part of a LAG (Link Aggregated Group).


### Configuring the Interface


- 1 Open the **Interface Configuration** page.
- 2 Define the fields.
- 3 Click **Apply Changes**.

The switch port parameters are applied and displayed in the currently updated window.

### Viewing Jumbo Frames

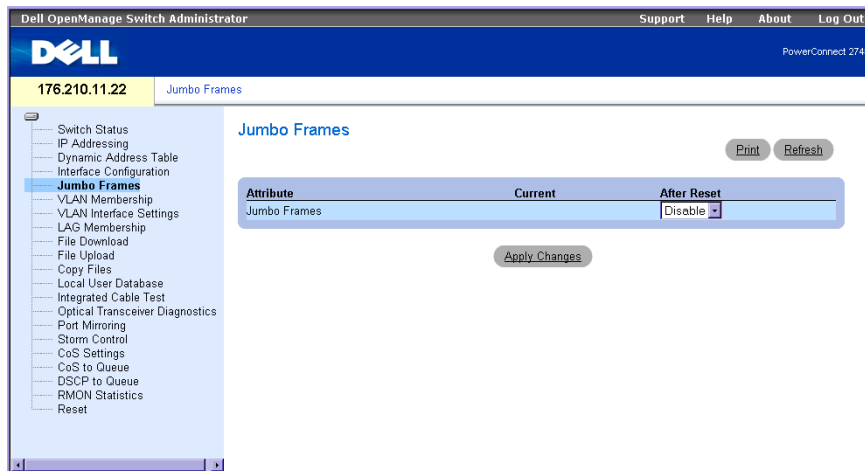
Jumbo Frames transports identical amounts of data in fewer frames. Jumbo frames are accepted at ingress (incoming traffic) and generated at egress (outgoing traffic). This mechanism ensures less overhead, lower processing time, and fewer interruptions. Internal frames may be effected by enabling Jumbo frames.

 **NOTE:** The PowerConnect™2708 switch does not support Jumbo Frames.

 **NOTE:** A change in Jumbo Frames support requires power cycling of the device.

The **Jumbo Frames** page enables or disables the transmission of jumbo packets. To open the page, click **Jumbo Frames** in the tree view.

**Figure 6-4. Jumbo Frames**



**Jumbo Frames** — Enables or disables jumbo frames on the Ethernet switch.

**Current** — Shows what the current status is for Jumbo Frames support.

**After Reset** — Indicates the Jumbo Frames status after the next time the switch is powered on.

### Enabling Jumbo Frames

- 1 Open the **Jumbo Frames** page.
- 2 Select **Enabled** in the **Jumbo Frames** field.
- 3 Click **Apply Changes**.

The Jumbo Frames are enabled on the device after power cycling.

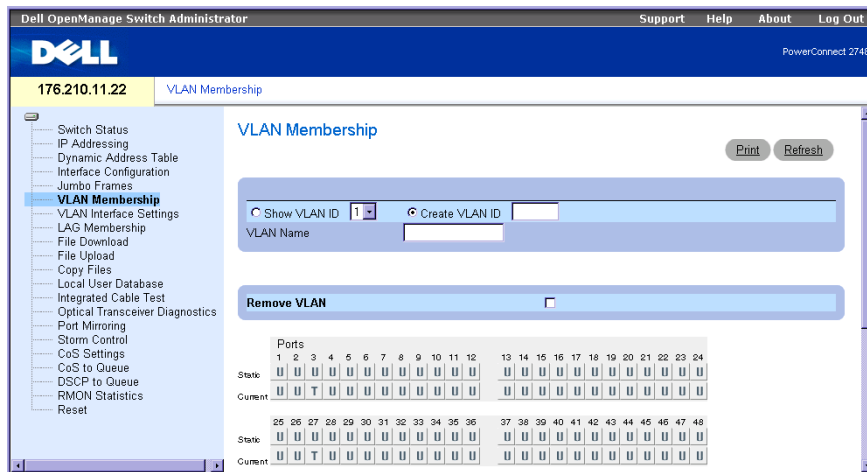
### Creating VLAN Membership

The **VLAN Membership** page contains a port table for assigning ports to VLANs. Ports are assigned VLAN membership by toggling through the Port Control settings.

The **VLAN Membership** page contains fields for defining VLAN groups. The switch supports the mapping of 4094 VLAN IDs up to 64 VLANs.

The **VLAN Membership** page also displays the VLAN ID currently defined and enables to statically create a new VLAN. To open the page, click **VLAN Membership** in the tree view.

**Figure 6-5. VLAN Membership**



Ports can have the following values:

**T** — The interface is a member of a VLAN. All packets forwarded by the interface are tagged. These packets contain VLAN information.

**U** — The interface is a VLAN member. Packets forwarded by the interface are untagged.

**Blank** — The interface is not a VLAN member. Packets associated with the interface are not forwarded.

**Show VLAN ID** — Displays the list of the VLAN IDs as defined in the switch.

**Create VLAN** — Designates the ID of the particular VLAN defined.

**VLAN Name** — Defines a new VLAN in the switch.

**Remove VLAN** — Removes a selected VLAN from the switch.

### **Showing/Creating VLANs**

- 1** Open the **VLAN Membership** page.
- 2** Select **VLAN ID** or **Create VLAN** field.
- 3** Click **Apply Changes**.

The switch **VLAN** change is applied.

### **Removing VLANs**

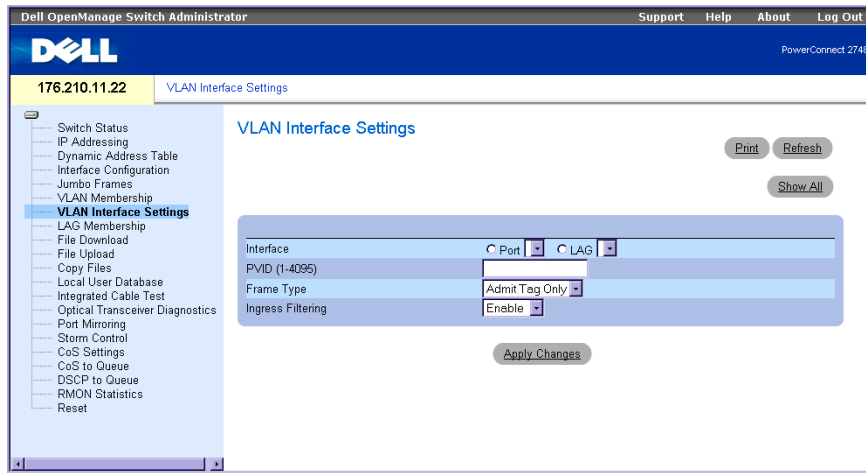
- 1** Open the **VLAN Membership** page.
- 2** Select the VLAN to be removed.
- 3** Click **Apply Changes**.

The **VLAN** is removed from the switch.

### **Defining VLAN Interface Settings**

The **VLAN Interface Settings** page displays the parameters, including Interface type, PVID, Frame Type, and Ingress Filtering. To open the page, click **VLAN Interface Settings** in the tree view.

**Figure 6-6. VLAN Interface Settings**



**Interface** — Indicates the interface number of the port, LAG, or VLAN that is configured on the switch.

**PVID (1-4095)** — Assigns a VLAN ID to untagged packets. The possible field values are 1-4094. VLAN 1 is used as the default VLAN. The default VLAN is only used as a port default VLAN ID (PVID). VLAN 1 cannot be deleted from the system. VLAN 4095 is defined as the discard VLAN, thus the packets classified to this VLAN are dropped. All ports must have a PVID defined; if no other PVID value is configured, the default VLAN's VID will be used.

**Frame Type** — Packet type accepted by the LAG. The possible values are:

**Admit Tag Only** — Only tagged packets are accepted by the interface.

**Admit All** — Tagged and untagged packets are accepted by the interface.

**Ingress Filtering** — Enables or disables incoming filtering by the interface. Ingress filtering discards packets which do not include an ingress port.

### Updating the VLAN Interface Settings

- 1 Open the VLAN Interface Settings page.
- 2 Select the interface (port or LAG)
- 3 Click Apply Changes.

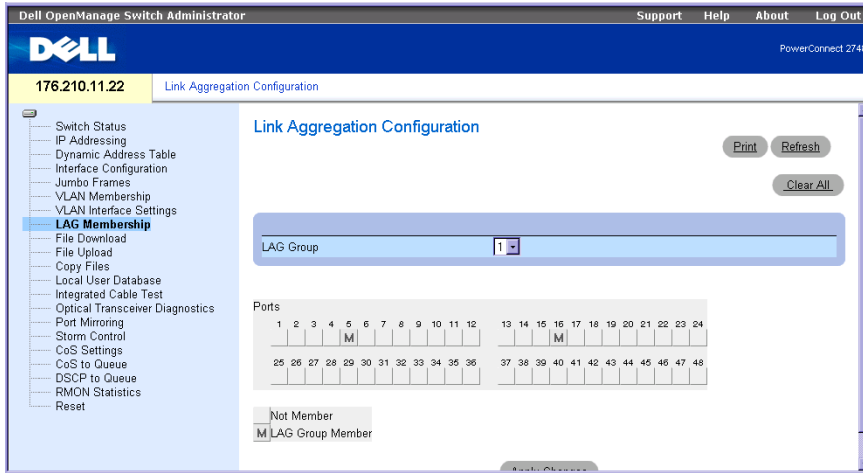
The switch VLAN Port Settings parameter(s) change(s) is applied.

### Configuring LAG Membership

The switch supports six LAGs per system and four ports per LAG. When a port is added to a LAG, it acquires the properties of the LAG.

The LAG Aggregation Configuration page displays the LAGs defined, and the ports aggregated and assigned to them. To open the page, click **LAG Membership** in the tree view.

**Figure 6-7. LAG Aggregation Configuration**



**Ports** — Specifies the port(s) aggregated into the LAG and assigned to which LAG.

**LAG Group** — Adds a port to a LAG and indicates the specific LAG to which the port belongs.

### Adding a Port to a LAG

- 1 Open the **LAG Aggregation Configuration** page.
- 2 Toggle the button under the port number to assign the LAG number
- 3 Click **Apply Changes**.

The port is added to the LAG, and the switch is updated.

## Managing System Files

Use the File Management section to manage switch software, the image file, and the configuration files. Files can be downloaded or uploaded via a TFTP server. This applies to the PowerConnect 2748 switch configuration only.

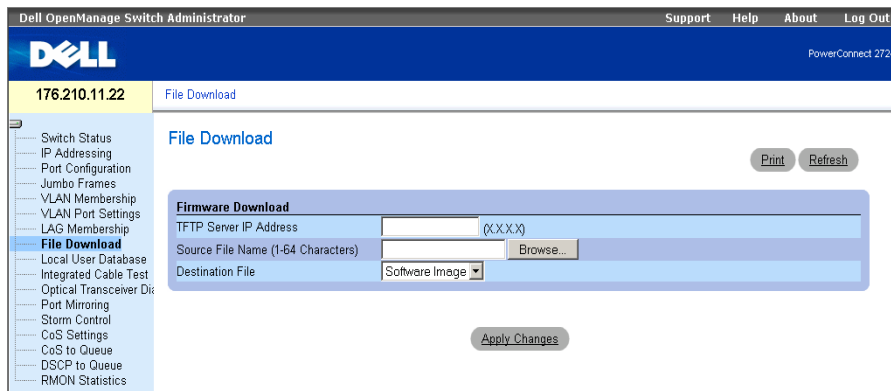
The configuration file structure consists of the following configuration files:

- **Startup Configuration File** — Contains the commands required to reconfigure the device to the same settings as when the device is powered down or rebooted. The Startup file is created by copying the configuration commands from the Running Configuration file or the Backup Configuration file.
- **Running Configuration File** — Contains all Startup file commands, as well as all commands entered during the current session. After the device is powered down or rebooted, all commands stored in the Running Configuration file are lost. During the startup process, all commands in the Startup file are copied to the Running Configuration File and applied to the device. During the session, all new commands entered are added to the commands existing in the Running Configuration file. Commands are not overwritten. To update the Startup file, before powering down the device, the Running Configuration file must be copied to the Startup Configuration file. The next time the device is restarted, the commands are copied back into the Running Configuration file from the Startup Configuration file.
- **Image files** — System file images are saved in two Flash Files called images (Image 1 and Image 2). The active image stores the active copy, while the other image stores a second copy. The device boots and runs from the active image. If the active image is corrupted, the system automatically boots from the non-active image. This is a safety feature for faults occurring during the Software Upgrade process.

## Downloading Files From Server

The **File Download** page contains fields for downloading files from the TFTP server. To open the page, click **File Download** in the tree view.

**Figure 6-8. File Download (PowerConnect 2708, 2716, and 2724 Switch Configuration)**



**TFTP Server IP Address** — The TFTP Server IP Address from which files are downloaded.

**Source File Name (1-64 Characters)** — Specifies which file is downloaded.

**Destination File** — The destination file type to which the file is downloaded. The possible field values are the following:

**Software Image** — Downloads the software image file.

**Boot Code** — Downloads the Boot file.

## Downloading Files from Server

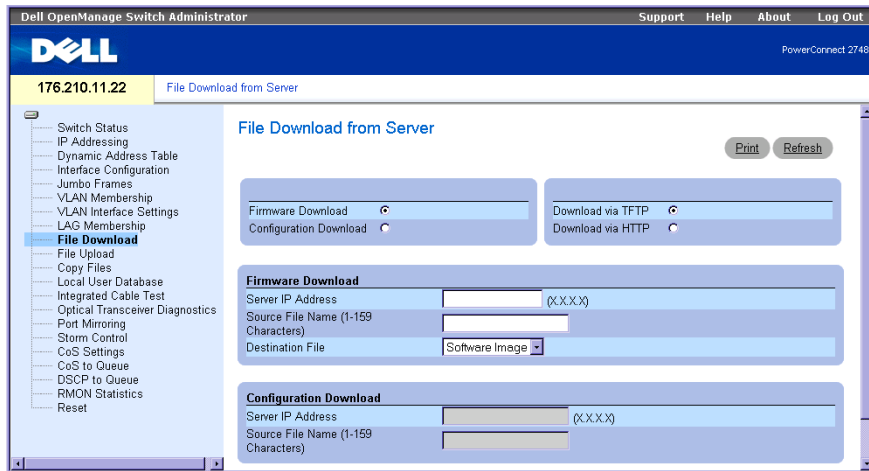
- 1 Open the **File Download** page.
- 2 Define the file type to download.
- 3 Define the fields on the page.
- 4 Click **Apply Changes**.

The software file is downloaded to the switch.

## Downloading Files From Server

The **File Download** page contains fields for downloading files from the TFTP server. This applies to PowerConnect 2748 switch configuration **only**. To open the page, click **File Download** in the tree view.

**Figure 6-9. File Download (PowerConnect 2748 Switch Configuration)**



**Firmware Download** — The Firmware file is downloaded. If **Firmware Download** is selected, the **Configuration Download** fields are grayed out.

**Configuration Download** — The Configuration file is downloaded. If **Configuration Download** is selected, the **Firmware Download** fields are grayed out.

**Download via TFTP** — Enables initiating an image download via the TFTP server.

**Download via HTTP** — Enables initiating an image download via the HTTP protocol.

### **Firmware Download**

**Server IP Address** — The Server IP Address from which the firmware files are downloaded.

**Source File Name (1-159 Characters)**— Indicates the file to be downloaded.

**Destination File Name** — The destination file type to which the file is downloaded. The possible field values are:

**Software Image** — Downloads the image file.

**Boot Code** — Downloads the Boot file



**NOTE:** The image file overwrites the non-active image. It is recommended to designate that the nonactive image will become the active image after reset, and then to reset the device following the download. During the image file download, a dialog box opens which displays the download progress. The window closes automatically when the download is complete.



## Configuration Download

**Server IP Address (1-159 Characters)** — The Server IP Address from which the configuration files are downloaded.

**Source File Name** — Indicates the configuration files to be downloaded.

## Downloading Files from Server

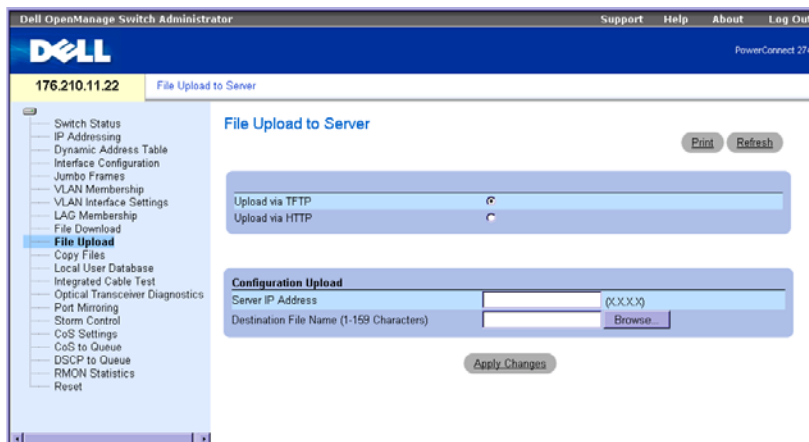
- 1 Open the **File Download** page.
- 2 Define the file type to download.
- 3 Define the fields on the page.
- 4 Click **Apply Changes**.

The software file is downloaded to the switch.

## Uploading Files

The **File Upload to Server** page contains fields for uploading the software from the TFTP server to the device. The image file can also be uploaded from the **File Upload to Server** page. This applies to the PowerConnect 2748 switch configuration only. To open the **File Upload to Server** page, click **File Upload** in the tree view.

**Figure 6-10. File Upload to Server**




**Upload via TFTP** — Enables initiating an image upload via the TFTP server.

**Upload via HTTP** — Enables initiating an image upload using the http protocol.

## Configuration Upload

**Server IP Address** — The Server IP Address to which the Configuration file is uploaded.

**Destination File Name (1-159 Characters)** — Indicates the Configuration file path to which the file is uploaded.

 **NOTE:** This list of user-defined configuration files only appears if the user created backup configuration files. For example, if the user copied the running configuration file to a user-defined configuration file called BACKUP-SITE-1, this list appears on the File Upload to Server page and the BACKUP-SITE-1 configuration file appears in the list.

### Uploading Files

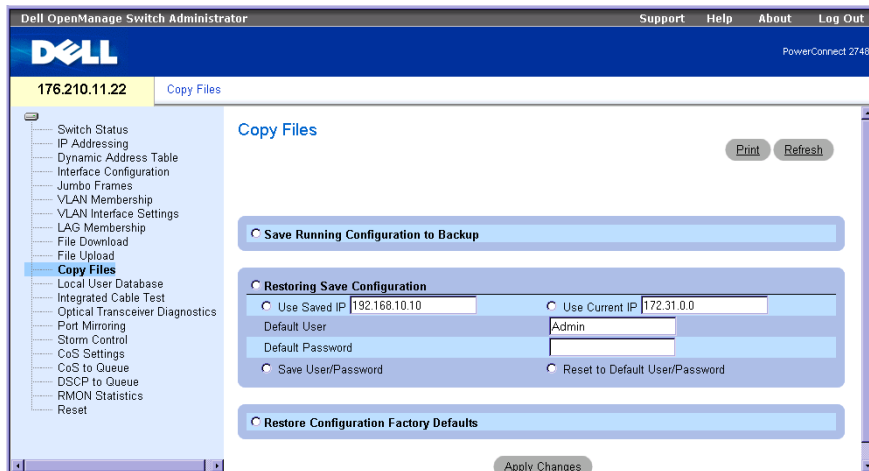
- 1 Open the **File Upload to Server** page.
- 2 Define the file type to upload.
- 3 Define the fields.
- 4 Click **Apply Changes**.

The software is uploaded to the device.

### Copying Files

Files can be copied and deleted from the **Copy Files** page. This applies to PowerConnect 2748 switch configuration only. To open the **Copy Files** page, click **Copy Files** in the tree view.

**Figure 6-11. Copy Files**



**Save Running Configuring to Backup** — When selected, saves the current device configuration to the backup file.

**Restoring Save Configuration** — Restores the previously saved device configuration. The possible field values are:

**Use Saved IP** — Uses the saved IP address for device configuration, when selected.

**Use Current IP** — Uses the current IP address for device configuration, when selected.

**Default User** — Uses the default user for device configuration, when selected.

**Default Password** — Uses the default password for device configuration, when selected.

**Save User/Password** — Saves the currently configured device user and password, when selected.

**Reset to Default User/Password** — Resets the device to the default user and password, when selected.

**Restore Configuration Factory Defaults** — When selected, specifies that the factory configuration default files should be reset. When unselected, maintains the current configuration settings.

### **Copying Files**

- 1** Open the **Copy Files** page.
- 2** Define the **Source** and **Destination** fields.
- 3** Click **Apply Changes**.
- 4** The file is copied, and the device is updated.

### **Restoring Company Factory Default Settings**

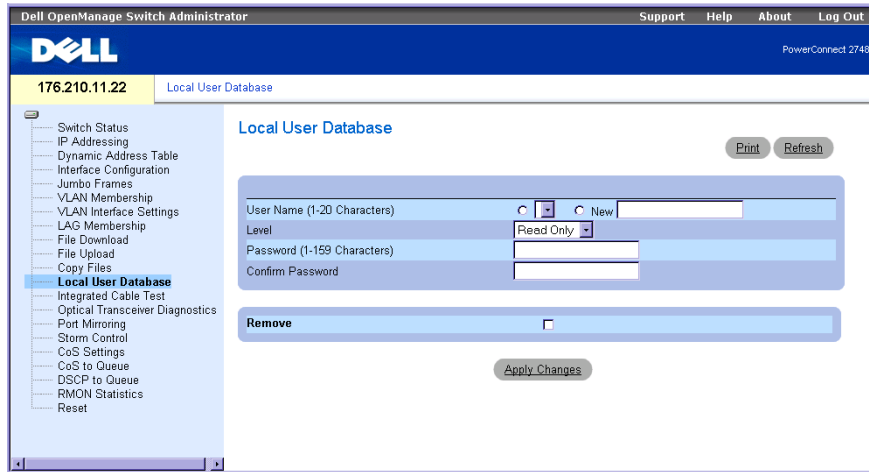
- 1** Open the **Copy Files** page.
- 2** Click **Restore Company Factory Defaults**
- 3** Click **Apply Changes**.

The company factory default settings are restored, and the device is updated.

## Local User Database

The **Local User Database** page contains fields for defining User Names, Passwords and access Level. To open the page, click the **Local User Database** in the tree view.

**Figure 6-12. Local User Database**



**User Name (1-20 Characters)** — Defines a User-defined user name. The Local User Database User Name can be from 1-20 characters long.

**New** — A new User Name to be added to the list.

**Level** — Indicates the User Access Level. Two Access Levels can be defined: Read/Write, and Read Only. For each Access Level, two users can be defined.

**Password (0-32 Characters)** — Defines a User-defined alphanumeric password. Local User Database passwords can be up to 32 characters long. There is no minimum length for the password.

**Confirm Password** — Confirm the user-defined password. The password appears in the \*\*\*\* format.

**Remove** — When checked, removes users from the User Name list.

### Assigning Access Level User Rights

- 1 Open the **Local User Database** page.
- 2 Select a user in the **User Name** selection list.
- 3 Define the relevant fields on the page.
- 4 Click **Apply Changes**.

The User Access rights and password are defined and the switch is updated.

### **Adding a User to the Local User Database**

- 1 Open the **Local User Database** page.
- 2 Select **New** and enter the field.
- 3 Complete the fields for the new user.
- 4 Click **Apply Changes**.

The new user information is saved and the switch is updated.

### **Deleting a User from the Local User Database**

- 1 Open the **Local User Database** page.
- 2 Select **User Name** in the selection list.
- 3 Check the **Remove** box.
- 4 Click **Apply Changes**.

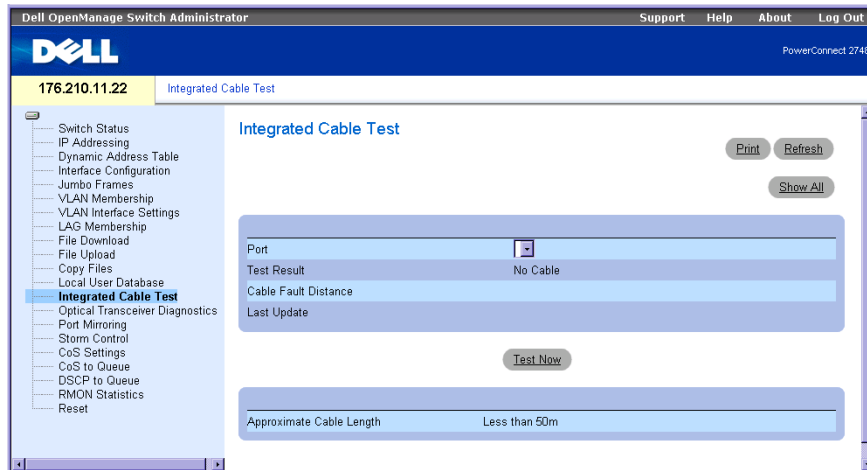
The User Name is removed from the list and the switch is updated.

### **Integrated Cable Test for Copper Cables**

The **Integrated Cable Test** page for copper cables contains fields for performing tests on copper cables. Cable testing provides information about where errors occurred in the cable, the last time the cable test was performed, and the type of cable error that occurred. Running cable diagnostics tests the quality and characteristics of the copper cables attached to a port. Cables up to 120 meters long can be tested. Cables are tested when the ports are in the down state, with the exception of the Approximate Cable Length test.

To open the page, click **Integrated Cable Test** in the tree view.

**Figure 6-13. Integrated Cable Test**



**Port** — The port to which the cable is connected.

**Test Result** — Specifies the cable test results. One of the following results may apply:

**No Cable** — There is no cable connected to the port.

**Open Cable** — The cable is not connected on the other side.

**Short Cable** — A short has occurred in the cable.

**OK** — The cable test passed successfully.

**Cable Fault Distance** — Indicates the distance from the port where the cable error occurred.

**Last Update** — The last time the cable was tested.

**Approximate Cable Length** — The approximate cable length. This test can only be performed when the port is up and operating.

### Running Integrated Cable Test

1 Open the **Integrated Cable Test** page.

2 Select a port to be tested.

The possible test results are either **No Cable** or **Open Cable**.

3 Click **Test Now**.

The copper cable test is performed and the results are displayed on the **Integrated Cable Test for Copper Cables** page.



**NOTE:** The cable length returned is an approximation in the ranges of up to 50 meters, 50m-80m, 80m-110m, 110m-120m, or more than 120m. The deviation may be up to 20 meters.

## Optical Transceivers Diagnostics

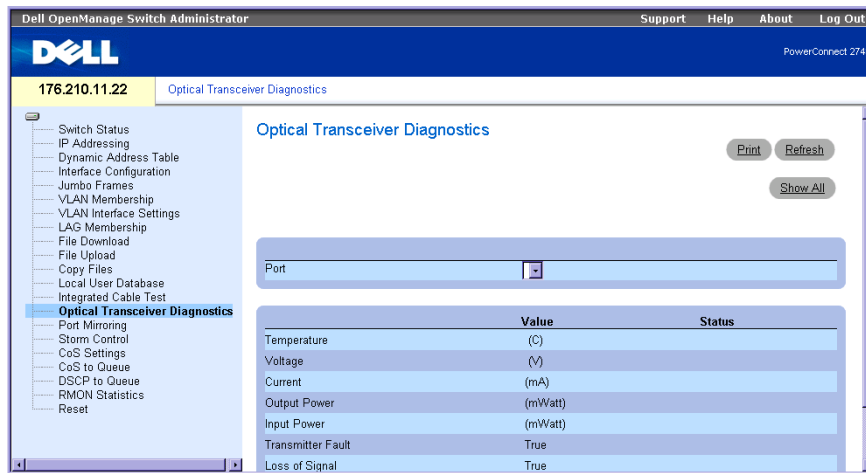
The **Optical Transceivers Diagnostics** page contains fields for performing tests on Fiber Optic cables. The optical transceiver provides access to a set of parameters that can be monitored and displayed to the system administrator.



**NOTE:** The **Optical Transceivers Diagnostics** analysis applies only to PowerConnect 2724 device's SFP ports, which support the digital diagnostic standard SFF-4872.

To open the page, click **Optical Transceivers Diagnostics** in the tree view.

**Figure 6-14. Optical Transceivers Diagnostics**



**Port** — The port on which the cable is tested.

**Temperature** — Internally measured transceiver temperature.

**Voltage** — Internally measured supply voltage.

**Current** — Measured TX bias current.

**Output Power** — Measured TX output power in milliwatts.

**Input Power** — Measured RX power in milliwatts.

**Transmitter Fault** — TX fault

**Loss of Signal** — Indicates if a loss of signal (LOS) occurred in the cable.

**Data Ready** — Indicates that the optical transceiver has achieved power up and data is ready.

### Displaying Optical Transceivers Diagnostics Test Results

- 1 Open the **Optical Transceiver Diagnostics** page.
- 2 Select an optic cable interface to be tested.

- 3 Click show All.

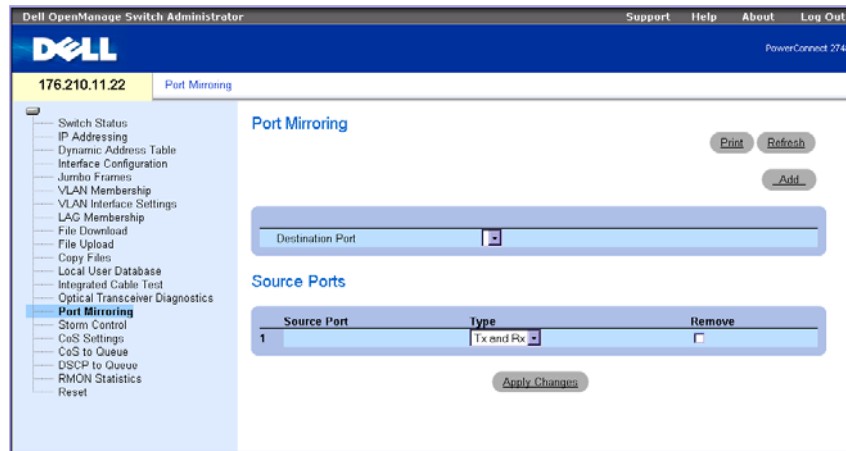
The test is performed and the Optical Transceiver Diagnostics test table opens.

## Port Mirroring

The Port Mirroring mechanism monitors and mirrors the network traffic by forwarding copies of incoming and outgoing packets from monitored ports (up to four ports) to a monitoring port. Port Mirroring can be configured by selecting a specific port to copy all packets, and different ports from which the packets are copied.

The **Port Mirroring** page contains parameters of both source port and the destination port. To open the page, click **Port Mirroring** in the tree view.

**Figure 6-15. Port Mirroring**



**Destination Port** — Designates the port number to which port traffic is copied.

**Source Port** — Designates the port number from which source traffic originates.

**Type** — Indicates whether the source port is Tx, Rx, or both Tx and Rx.

**Status** — Indicates if the port is currently monitored (Active), or not monitored (Ready).

**Remove** — When checked, it indicates that a specific source port is removed. The source port network traffic remains active, but no mirroring session takes place on this port.

### Adding A Port Mirroring Session

- 1 Open the **Port Mirroring** page.
- 2 Enter the relevant fields on the page.
- 3 Click **Apply Changes**.

The parameters of the Port Mirroring session are saved to the switch.



## Enabling Storm Control

When Layer 2 frames are forwarded, Broadcast, Multicast and Unknown Unicast frames are flooded to all ports on the designated VLANs on the switch. When the switch experiences an excessive amount of Broadcast/Multicast/Unknown Unicast frames on network links, Storm Control mechanism controls the amount of frames entering the switch.

The **Storm Control** page is used to configure the settings of packet Storm Control. Storm Control can be enabled or disabled per port. The **Storm Control** page displays the type of packets, and the rate at which packets are received.

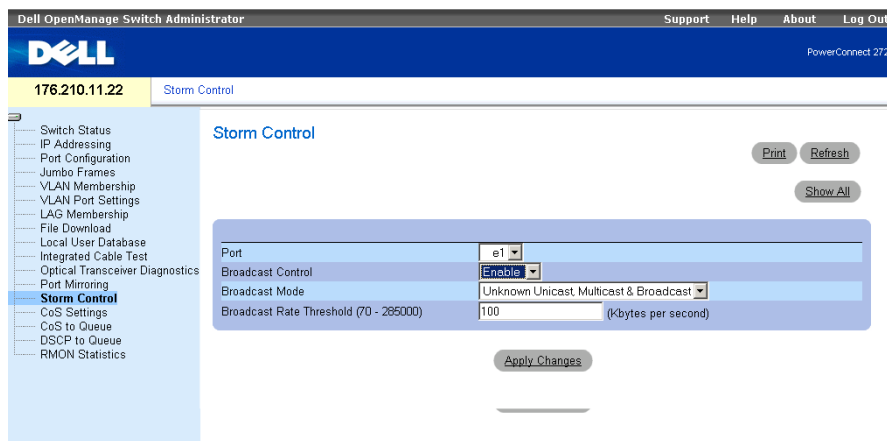
## Configuring Storm Control on the PowerConnect 2708

The PowerConnect 2708 switch measures the incoming Broadcast/Multicast/Unknown Unicast packet rate **per port**, and discards excess packets when the rate exceeds the defined threshold value. In addition to the count definition per port, the Broadcast rate threshold is configured to exclude certain values.

The PowerConnect 2708 switch users can do the following:

- Set the threshold value for Broadcast packets on a **per-port** basis, to prevent Broadcast storms.
- Enable Storm Control **per port**, with limitations based on: Unknown Unicast, Multicast and Broadcast frames, Multicast and Broadcast frames, or Broadcast frames only.

**Figure 6-16. Storm Control (PowerConnect 2708 Configuration)**



**Port** — The port from which the Storm Control is enabled.

**Broadcast Control** — Enables or disables forwarding Broadcast packet types on the switch.

**Broadcast Mode** — Sets the mode of Broadcast Storm Control based on the types of traffic selected. The possible options for types of traffic are Unknown Unicast, Multicast & Broadcast, and Broadcast only.

**Broadcast Rate Threshold (70-285000)** — The rate of Broadcast threshold ranges from 70-285,000 packets per second. The default value is zero.

### Modifying PowerConnect 2708 Storm Control Port Parameters

- 1 Open the Storm Control page.
- 2 Enter the fields.
- 3 Click Apply Changes.

The Storm Control port parameters are saved to the PowerConnect 2708 switch.

### Configuring Storm Control on the PowerConnect 2716/2724

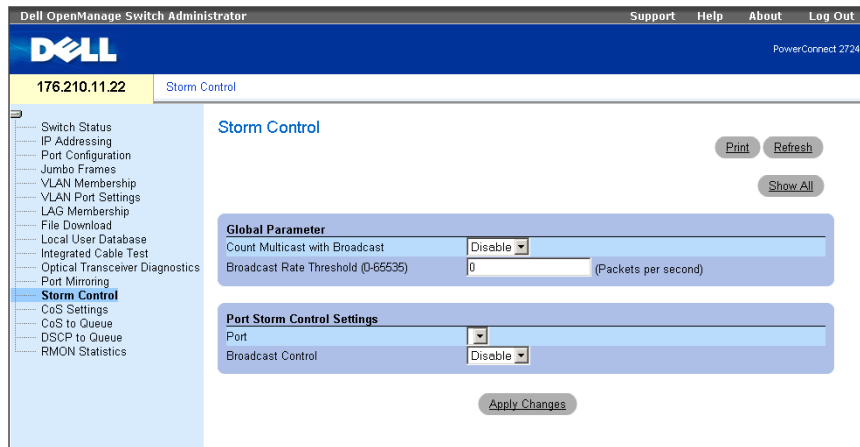
The PowerConnect 2716 and PowerConnect 2724 switches measure the rate of incoming Broadcast/Multicast packets rate separately, **per port** (the same rate is configured globally, per device), and discards excess packets when the rate exceeds the defined threshold value.

The PowerConnect 2716 and PowerConnect 2724 switch users can do the following:

- Set the maximum number of Broadcast/Multicast frames allowed on each port, in terms of number of packets per second.
- Enable or disable packet storm control, on a **per-port** basis.

To open the page, click **Storm Control** in the tree view.

**Figure 6-17. Storm Control (PowerConnect 2716/2724 Switch Configuration)**



**Count Multicast with Broadcast** — Enables counts Broadcast and Multicast traffic. **Disable** counts only Broadcast traffic. The count definition is global for the whole device.

**Broadcast Rate Threshold (0-65535)** — The rate of Broadcast threshold ranges from 0-65,535 packets per second. The default value is 1000.

**Port** — The port from which the storm control is enabled.

**Broadcast Control** — Enables or disables forwarding Broadcast packets on the switch. The default is **Disable**.

### Modifying PowerConnect 2716/2724 Storm Control Port Parameters

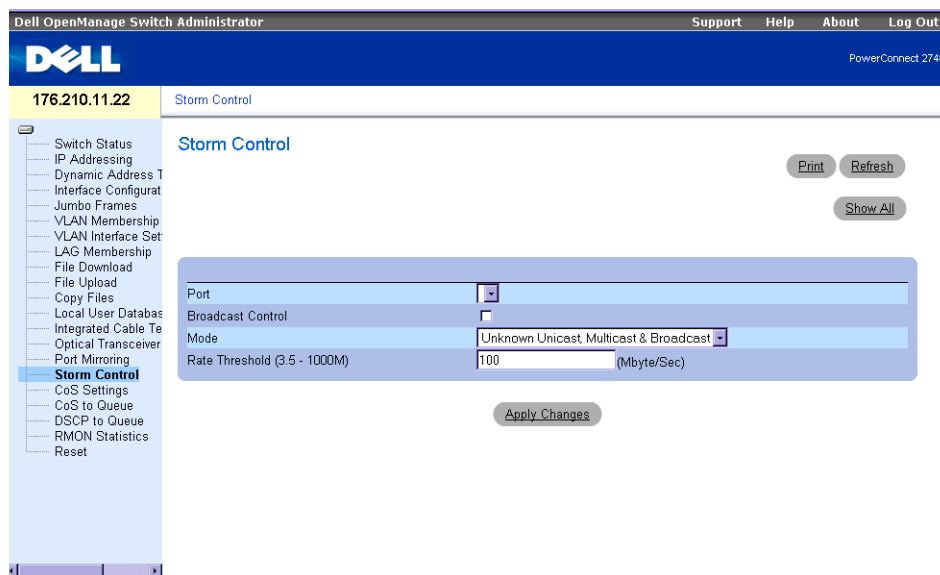
- 1 Open the Storm Control page.
- 2 Enter the fields.
- 3 Click **Apply Changes**.

The Storm Control port parameters are saved to the PowerConnect 2716/2724 switch.

### Configuring Storm Control on the PowerConnect 2748

The following describes Storm Control for PowerConnect 2748:

**Figure 6-18. Storm Control Page (PowerConnect 2748 Switch Configuration)**



**Port** — The port from which the Storm Control is enabled.

**Broadcast Control** — Enables or disables forwarding Broadcast packet types on the switch.

**Mode** — Sets the mode of Broadcast Storm Control based on the types of traffic selected. The possible options for types of traffic are Unknown Unicast, Multicast & Broadcast, and Broadcast only.

**Rate Threshold (3.5K - 1000M)** — The maximum rate (bytes per second) at which unknown packets are forwarded.

The range is 3500 - 1000000.

The default value is 3500.

### **Modifying PowerConnect 2748 Storm Control Port Parameters**

- 1** Open the **Storm Control** page.
- 2** Enter the fields.
- 3** Click **Apply Changes**.

The Storm Control port parameters are saved to the PowerConnect 2748 switch.

# Configuring Quality of Service

This section provides information for defining and configuring Quality of Service (QoS) parameters.

## Quality of Service (QoS) Overview

An implementation example that requires QoS includes certain types of traffic such as Voice, Video, and real-time traffic, which can be assigned a high priority queue, while other traffic can be assigned a lower priority queue. The result is an improved traffic flow for traffic with high demand. The system supports four queues per port. After a packet is classified, it assigned to one of the output queues. QoS Terms:

- **Classification** — Specifies which packet fields are matched to specific values. All packets matching the user-defined specifications are classified together.
- **Action** — Defines traffic management where packets being forwarded are based on packet information and packet field values, such as VLAN priority (VPT) and DSCP (DiffServ Code Point).

### VPT Tag Classification Information

VLAN Priority Tags are used to classify the packets by mapping packets to one of the egress queues. VLAN Priority Tag to queue assignments are user-definable. The table below details the VPT to queue default settings:

**Table 7-1. VPT to Queue Default Settings**

| CoS Value | Forwarding Queue Values |
|-----------|-------------------------|
| 0         | q2 (Best Effort)        |
| 1         | q1 (Lowest Priority)    |
| 2         | q1 (Lowest Priority)    |
| 3         | q2 (Best Effort)        |
| 4         | q3                      |
| 5         | q3                      |
| 6         | q4 (Highest Priority)   |
| 7         | q4 (Highest Priority)   |

Packets arriving untagged are assigned a default VPT value, which is set on a per port basis. The assigned VPT is used to map the packet to the egress queue.

DSCP values can be mapped to priority queues. DSCP mapping is enabled on a per-system basis. The following table contains the default DSCP mapping to egress queue values:

**Table 7-2. DSCP Mapping to Egress Queue Default Values**

| <b>DSCP Value</b> | <b>Forwarding Queue Values</b> |
|-------------------|--------------------------------|
| 0-15              | q1 (Lowest Priority)           |
| 16-31             | q2                             |
| 32-47             | q3                             |
| 48-63             | q4 (Highest Priority)          |

### **CoS Services**

After packets are assigned to a specific egress queue, CoS services can be assigned to the queue(s). Egress queues are configured with a scheduling scheme by one of the following methods:

- **Strict Priority** — Strict Priority (SP) allows the prioritization of mission-critical and time-sensitive traffic over less time-sensitive applications. Thus, ensuring that time-sensitive applications are always forwarded before traffic with lower priority. For example, under Strict Priority, voice over IP traffic is forwarded before FTP or e-mail (SMTP) traffic.
- **Weighted Round Robin** — Ensures that a single application does not dominate the Ethernet switch forwarding capacity. Weighted Round Robin (WRR) forwards entire queues in a Round Robin order. All queues can participate in WRR.

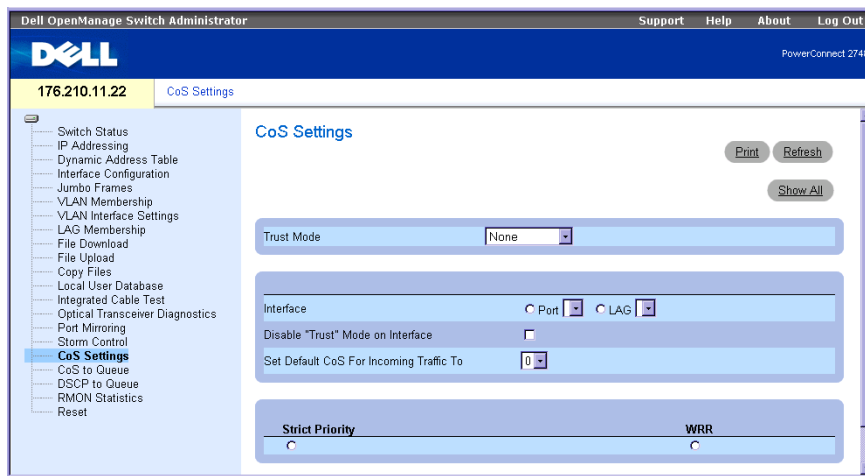
# Defining CoS Settings

Class of Service global parameters are set from the CoS Settings page.

## Configuring QoS Settings

The CoS Settings page contains fields for enabling or disabling CoS. In addition, the Trust mode can be selected. The Trust Mode relies on predefined fields within the packet to determine the egress queue. To open the page, click CoS Settings in the tree view.

Figure 7-1. CoS Settings



**Trust Mode** — Defines which fields within the packet are used to determine the egress queue. When no rules are defined, the traffic containing the predefined CoS or DSCP packet field is mapped according to the selected trust mode. Traffic not containing a predefined packet field is mapped to the best effort queue (q2). The possible Trust Mode field values are:

**None**— All traffic is mapped to the best effort queue (q2).


**CoS** — The egress queue assignment is determined by the IEEE802.1p VLAN priority tag (VPT) or by the default VPT assigned to a port. This is the trust default value.

**DSCP** — The egress queue assignment is determined by the DSCP field.

**Interface** — The specific port or LAG to configure.

**Disable "Trust" Mode on Interface** — Disables Trust mode on the specified interface. This setting overrides the Trust mode configured on the Ethernet switch globally.

**Set Default CoS For Incoming Traffic To** — Sets the default CoS tag value for untagged packets. The CoS tag values are 0-7. The default value is 0.

 **NOTE:** The interface Trust settings overrides the global Trust setting.

**Strict Priority** — Specifies if traffic scheduling is based strictly on the queue priority. This is the default value for queues.

**WRR** — Specifies if traffic scheduling is based on the Weighted Round Robin (WRR) weights to assigned egress queues.

### Configuring the Trust Mode:

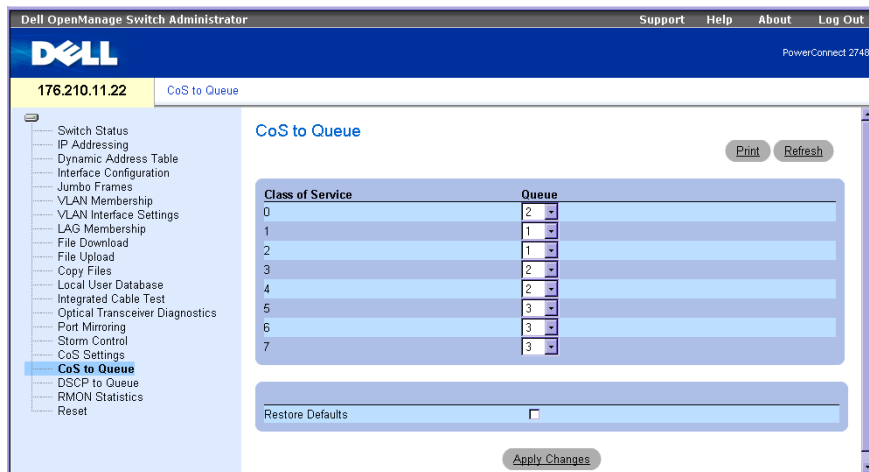
- 1 Open the CoS Settings page.
- 2 Define the Trust Mode field.
- 3 Click Apply Changes.

Trust Mode is enabled on the Ethernet switch.

## Mapping CoS Values to Queues

The Cos to Queue page contains fields for classifying CoS settings to traffic queues. To open the page, click CoS to Queue in the tree view.

**Figure 7-2. CoS to Queue**



**Class of Service** — Specifies the CoS priority tag values, where zero is the lowest and 7 is the highest.

**Queue** — The queue to which the CoS priority is mapped. Four traffic priority queues are supported.

**Restore Defaults** — Restores the Ethernet Switch factory defaults for mapping CoS values to an egress queue.



## Mapping a CoS value to a Queue

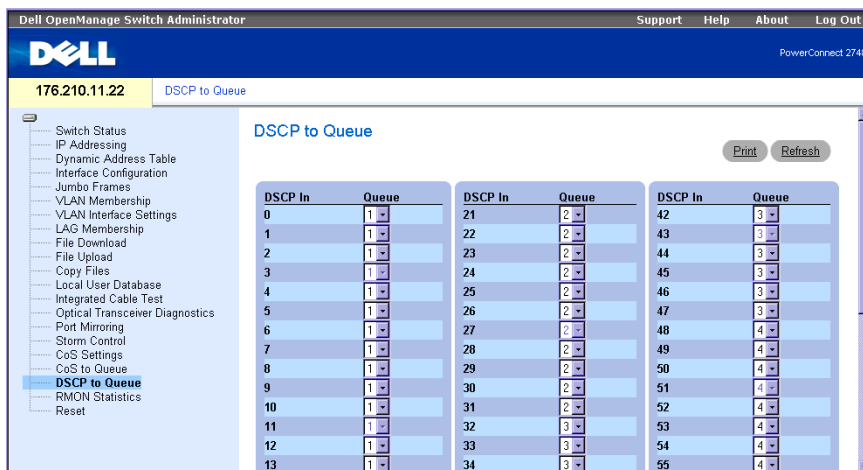
- 1 Open the Cos to Queue page.
- 2 Define the egress queue for each CoS value.
- 3 Click **Apply Changes**.

The CoS value is mapped to an egress queue, and the switch is updated.

## Mapping DSCP Values to Queues

The DSCP to Queue page provides fields for defining egress queue to specific DSCP fields. To open the page, click DSCP to Queue in the tree view.

**Figure 7-3. DSCP to Queue**



**DSCP In** — The values of the DSCP field within the incoming packet.

**Queue** — The queue to which packets with the specific DSCP value is assigned. The values are 1-4, where 1 is the lowest value and 4 is the highest.

### Mapping a DSCP value and assigning priority queue:

- 1 Open the DSCP to Queue page.
- 2 Select a value in the **DSCP In** column.
- 3 Define the **Queue** fields.
- 4 Click **Apply Changes**.


The DSCP is overwritten, and the value is assigned an egress queue.



# Viewing Statistics

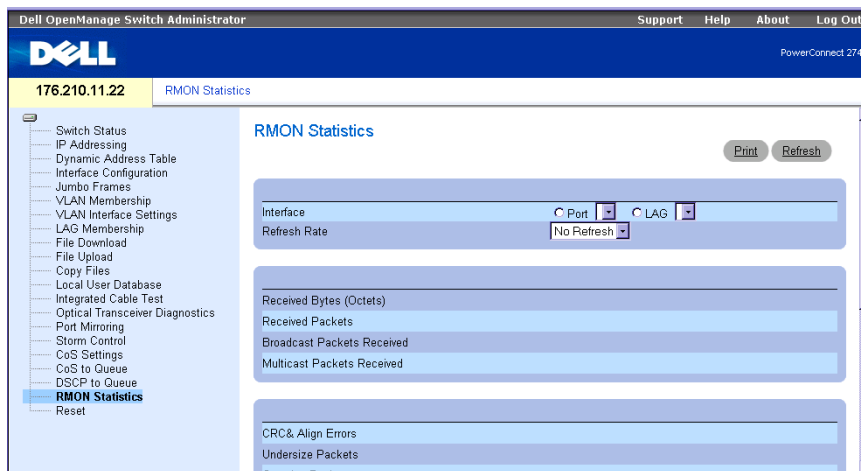
## RMON Statistics

Remote Monitoring (RMON) is an extension to the Simple Network Management Protocol (SNMP) which provides network traffic statistics. RMON defines current and historical MAC-layer statistics and control objects, allowing real-time information to be captured across the entire network. The system provides a means to collect the statistics defined in RMON and to view the results using the Web management interface. There is no SNMP management interface in the system.

 **NOTE:** The PowerConnect™ 2708/2716/2724/2748 devices support one RMON group for Ethernet statistics.

The RMON Statistics page contains links for viewing network information from a remote location. To open, click RMON Statistics in the tree view.

**Figure 8-1. RMON Statistics**



**Interface** — Specifies the port or LAG for which statistics are displayed.

**Refresh Rate** — Amount of time that passes before the statistics are refreshed.

**Drop Events** — Number of dropped events that have occurred on the interface since the system was last reset.

**Received Bytes (Octets)** — Number of octets received on the interface since the system was last reset. This number includes bad packets and FCS octets, but excludes framing bits.

**Received Packets** — Number of packets received on the interface, including bad packets, Multicast and Broadcast packets, since the system was last reset.

**Broadcast Packets Received** — Number of good Broadcast packets received on the interface since the system was last reset. This number does not include Multicast packets.

**Multicast Packets Received** — Number of good Multicast packets received on the interface since the system was last reset.

**CRC & Align Errors** — Number of CRC and Align errors that have occurred on the interface since the system was last reset.

**Undersize Packets** — Number of undersized packets (less than 64 octets) received on the interface since the system was last reset.

**Oversize Packets** — Number of oversized packets (over 1518 octets) received on the interface since the system was last reset.

**Fragments** — Number of fragments (packets with less than 64 octets, excluding framing bits, but including FCS octets) received on the interface since the system was last reset.

**Jabbers** — The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). The allowed range to detect jabber is between 20 ms and 150 ms.

**Collisions** — Number of collisions received on the interface since the system was last reset.

**Frames of xx Bytes** — Number of xx-byte frames received on the interface since the system was last reset.

### **Viewing Interface Statistics**

- 1** Open the **RMON Statistics** page.
- 2** Select an interface type and number in the **Interface** field.

The interface statistics are displayed.

# Glossary

This glossary contains key technical words of interest.

## A

### Auto-negotiation

Allows 10/100 Mbps or 10/100/1000 Mbps Ethernet ports to establish for the following features:

- Duplex/ Half Duplex Mode
- Flow Control
- Speed

## B

### Back Pressure

A mechanism used with Half Duplex mode that enables a port not to receive a message.

### Bandwidth

Bandwidth specifies the amount of data that can be transmitted in a fixed amount of time. For digital switch modules, bandwidth is defined in Bits per Second (bps) or Bytes per Second.

### Bandwidth Assignments

The amount of bandwidth assigned to a specific application, user, or interface.

### Best Effort

Traffic is assigned to the lowest priority queue, and packet delivery is not guaranteed.

### Boot Version

The boot version.

### BootP

Bootstrap Protocol. Enables a workstation to discover its IP address, an IP address of a BootP server on a network, or a configuration file loaded into the boot of a switch module.

### Broadcast Domain

Ethernet switch module sets that receive broadcast frames originating from any Ethernet switch module within a designated set. Routers bind Broadcast domains, because routers do not forward broadcast frames.

### Broadcasting

A method of transmitting packets to all ports on a network.

## **Broadcast Storm**

An excessive amount of broadcast messages simultaneously transmitted across a network by a single port. Forwarded message responses are heaped onto the network, overloading network resources or causing the network to time out.

## **C**

### **Class of Service**

Class of Service (CoS). Class of Service is the 802.1p priority scheme. CoS provides a method for tagging packets with priority information. A CoS value between 0-7 is added to the Layer II header of packets, where zero is the lowest priority and seven is the highest.

## **D**

### **DHCP Client**

An Internet host using DHCP to obtain configuration parameters, such as a network address.

### **DSCP**

DiffServe Code Point (DSCP). DSCP provides a method of tagging IP packets with QoS priority information.

### **Domain**

A group of computers and Ethernet switch modules on a network that are grouped with common rules and procedures.

### **Duplex Mode**

Permits simultaneous transmissions and reception of data. There are two different types of duplex mode:

- **Full DuplexMode** — Permits for bisynchronous communication, for example, a telephone. Two parties can transmit information at the same time.
- **Half DuplexMode** — Permits asynchronous communication, for example, a walkie-talkie. Only one party can transmit information at a time.

## **E**

### **Egress Ports**

Ports from which network traffic is transmitted.

### **End System**

An end user Ethernet switch module on a network.

### **Ethernet**

Ethernet is standardized as per IEEE 802.3. Ethernet is the most common implemented LAN standard. Supports data transfer rates of Mbps, where 10, 100 or 1000 Mbps is supported.

## **F**

### **Flow Control**

Enables lower speed Ethernet switch modules to communicate with higher speed Ethernet switch modules, that is, that the higher speed Ethernet switch module refrains from sending packets.

### **Fragment**

Ethernet packets smaller than 576 bits.

### **Frame**

Packets containing the header and trailer information required by the physical medium.

## **G**

### **Gigabit Ethernet**

Gigabit Ethernet transmits at 1000 Mbps, and is compatible with existing 10/100 Mbps Ethernet standards.

## **H**

### **HOL**

Head of Line. Packets are queued. Packets at the head of the queue are forwarded before packets at the end of the line.

### **Host**

A computer that acts as a source of information or services to other computers.

### **HTTP**

HyperText Transport Protocol. Transmits HTML documents between servers and clients on the internet.

## **I**

### **ICMP**

Internet Control Message Protocol. Allows gateway or destination host to communicate with a source host, for example, to report a processing error.

### **IEEE**

Institute of Electrical and Electronics Engineers. An Engineering organization that develops communications and networking standards.

### **IEEE 802.1p**

Prioritizes network traffic at the data-link/MAC sublayer.

### **IEEE 802.1Q**

Defines the operation of VLAN Bridges that permit the definition, operation, and administration of VLANs within Bridged LAN infrastructures.

## **Ingress Port**

Ports on which network traffic is received.

## **IP**

Internet Protocol. Specifies the format of packets and their addressing method. IP addresses packets and forwards the packets to the correct port.

## **IP Address**

Internet Protocol Address. A unique address assigned to a network Ethernet switch module with two or more interconnected LANs or WANs.

## **J**

### **Jumbo Frames**

Enables transporting the identical data in fewer frames. Jumbo Frames reduce overhead, lower processing time, and ensure fewer interrupts.

## **L**

### **LAG**

Link Aggregated Group. Aggregates ports or VLANs into a single virtual port or VLAN.

For more information on LAGs, see **Defining LAG Membership**.

### **LAN**

Local Area Networks. A network contained within a single room, building, campus or other limited geographical area.

### **Layer 2**

Data Link Layer or MAC Layer. Contains the physical address of a client or server station. Layer 2 processing is faster than Layer 3 processing because there is less information to process.

## **M**

### **MAC Address**

Media Access Control Address. The MAC Address is a hardware specific address that identifies each network node.

### **MAC Address Learning**

MAC Address Learning characterizes a learning bridge, in which the packet's source MAC address is recorded. Packets destined for that address are forwarded only to the bridge interface on which that address is located. Packets addressed to unknown addresses are forwarded to every bridge interface. MAC Address Learning minimizes traffic on the attached LANs.



**MAC Layer**

A sub-layer of the Data Link Control (DTL) layer.

**Managed Mode**

Provides switch management through a web interface, and maintains the device configuration through power cycles.

**Mask**

A filter that includes or excludes certain values, for example parts of an IP address.

**MDI**

Media Dependent Interface. A cable used for end stations.

**MDIX**

Media Dependent Interface with Crossover (MDIX). A cable used for hubs and switches.

**Multicast**

Transmits copies of a single packet to multiple ports.

**P****Packets**

Blocks of information for transmission in packet switched systems.

**PING**

Packet Internet Groper. Verifies if a specific IP address is available. A packet is sent to another IP address and waits for a reply. This utility is essentially a System Administrator's tool used to verify if network connections are intact. PING uses the Internet Control Message Protocol (ICMP) Echo function.

**Port**

Physical ports provide connecting components that allow microprocessors to communicate with peripheral equipment.

**Port Mirroring**

Monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from one port to a monitoring port.

**Port Speed**

Indicates port speed of the port. Port speeds include:

- Ethernet 10 Mbps
- Fast Ethernet 100Mbps
- Gigabit Ethernet 1000 Mbps

**Protocol**

A set of rules that governs how Ethernet switch modules exchange information across networks.

## **Q**

### **QoS**

Quality of Service. QoS allows network managers to decide how and what network traffic is forwarded according to priorities, application types, and source and destination addresses.

## **R**

### **RMON**

Remote Monitoring. Provides network information to be collected from a single workstation.

### **Router**

A Ethernet switch module that connects to separate networks. Routers forward packets between two or more networks. Routers operate at a Layer 3 level.

## **S**

### **Server**

A central computer that provides services to other computers on a network. Services may include file storage and access to applications.

### **SNMP**

Simple Network Management Protocol. Manages LANs. SNMP based software communicates with network Ethernet switch with embedded SNMP agents. SNMP agents gather network activity and Ethernet switch status information, and send the information back to a workstation.

### **Startup Configuration**

Retains the exact switch configuration when the switch module is powered down or rebooted.

### **Subnet**

Sub-network. Subnets are portions of a network that share a common address component. On TCP/IP networks, Ethernet switch modules that share a prefix are part of the same subnet. For example, all Ethernet switch modules with a prefix of 157.100.100.100 are part of the same subnet.

### **Subnet Mask**

Used to mask all or part of an IP address used in a subnet address.

### **Switch**

Filters and forwards packets between LAN segments. Switches support any packet protocol type.

## **T**

### **TCP/IP**

Transmissions Control Protocol. Enables two hosts to communicate and exchange data streams. TCP guarantees packet delivery, and guarantees packets are transmitted and received in the order their sent.

## **TFTP**

Trivial File Transfer Protocol. Uses User Data Protocol (UDP) without security features to transfer files.

## **Trunking**

Link Aggregation. Optimizes port usage by linking a group of ports together to form a single trunk (aggregated groups).

## **U**

### **Unicast**

A form of routing that transmits one packet to one user.

## **V**

### **VLAN**

Virtual Local Area Networks. Logical subgroups with a Local Area Network (LAN) created via software rather than defining a hardware solution.

## **W**

### **WAN**

Wide Area Networks. Networks that cover a large geographical area.

### **Wildcard Mask**

Specifies which IP address bits are used, and which bits are ignored. A wild switch module mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all the bits are important.

For example, if the destination IP address 149.36.184.198 and the wildcard mask is 255.36.184.00, the first two bits of the IP address are used, while the last two bits are ignored.