

# Appendix A: Configuration Examples

This Appendix provides some configuration examples for the PowerConnect 2708/2716/2724 devices installed in the Enterprise Network.

The following configuration scenarios are described:

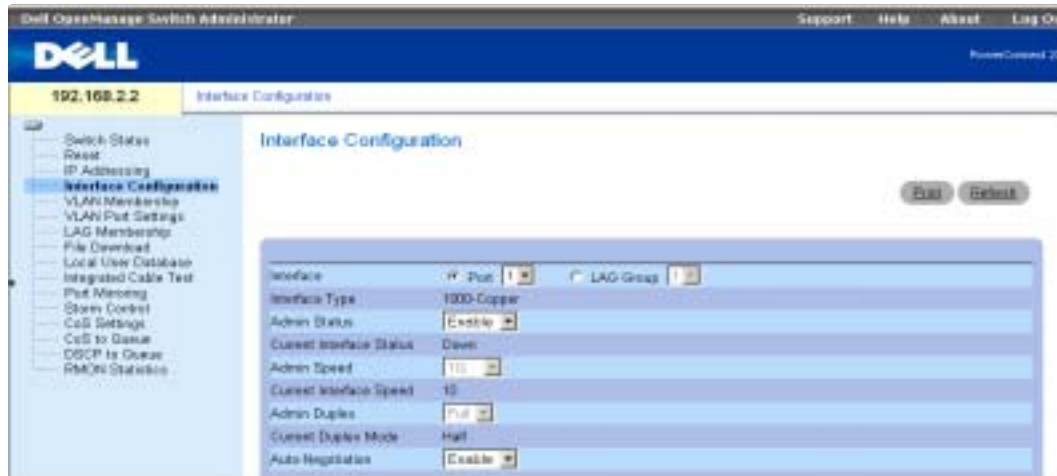
- Configuring Interface Parameters
- Creating VLAN Membership
- Configuring VLAN Port Settings
- Configuring LAG Membership
- Downloading Software File
- Configuring Port Mirroring
- Configuring Storm Control
- Configuring CoS Priority Queues

## Configuring Interface Parameters

The Interface Configuration screen enables the user to set the various interface parameters, interface type and additional operational attributes. In the following example, Port 1 is configured as 1000Mbps Copper interface type, as maximum speed and interface media type. The appropriate cable type connection is RJ-45 1 Gigabit connection.

The Admin Status is Enabled, therefore traffic is forwarded through the port. The Current Interface Speed is 10 Mbps as the actual synchronized interface speed. The Admin Duplex mode is Full Duplex (FDX), supporting transmission in both directions, while the Current Duplex Mode is configured at Half Duplex (HDX), supporting transmission between the device and the other station in one direction only. Auto-Negotiation is Enabled, Backpressure is set at Disable, and Flow Control is set at Disable.

**Figure 9-1. Interface Configuration**



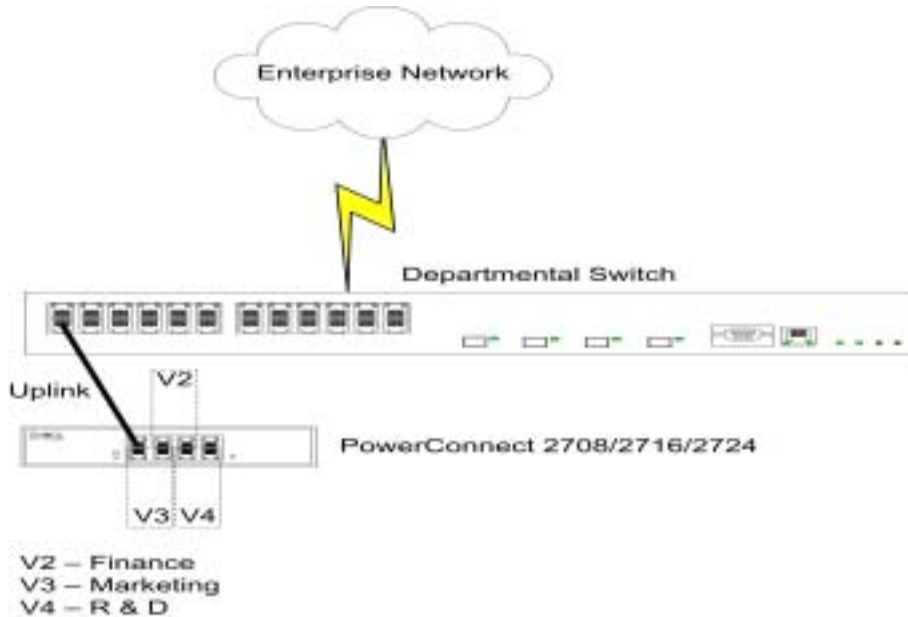
## VLANs

VLANs are logical subgroups within a Local Area Network (LAN) that combine user stations and network devices into a single broadcast domain, regardless of the physical LAN segment to which they are attached.

VLANs allow network traffic to flow more efficiently within subgroups. VLANs managed through software reduce the amount of time network changes, additions, and moves are implemented. Port-based VLANs are comprised of a set of ports that make up a Layer 2 broadcast domain.

The following figure illustrates the concept of VLANs in the Enterprise Network. In this example, Finance, Marketing and R&D departments are configured as three distinct VLANs in the enterprise, designated as VLAN #2, VLAN#3 and VLAN#4, respectively.

**Figure 9-2. Port-Based VLANs in the Enterprise**



### **Creating VLAN Membership**

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 a combination of the ingress port and packet contents. Packets sharing common attributes can be grouped in the same VLAN.

VLAN tagging provides a method of transferring VLAN information between VLAN groups. VLAN tagging attaches a 4-byte tag to packet headers. The VLAN tag indicates to which VLAN the packet belongs. VLAN tags are attached to the packets by either the end station or by the network device. VLAN tags also contains VLAN network priority information.

VLAN membership is used to partition traffic into several mutually exclusive broadcast domains. VLAN membership facilitates greater security and pre-defined access levels of user groups in separate departments.

The VLAN Membership Web Management page contains fields for defining VLAN groups. The device supports the mapping of 4094 VLAN IDs to 64 VLANs. All ports must have a defined PVID. If no other value is configured the default VLAN PVID is used. VLAN ID #1 is the default VLAN, and cannot be deleted from the system.

The VLAN Membership screen enables the user to select an existing VLAN, create a new VLAN with port numbers, create a new VLAN port membership, or remove an existing VLAN.

VLAN Membership ports can be defined as Untag Egress packets, Tag Egress packets, or they can be defined as Not Member.

**Figure 9-3. VLAN Membership**

### Defining VLAN Port Settings

The VLAN Port Settings screen enables the user to configure information for a specific port in a LAG. In the following example, port #2 in LAG Group 1, has the Frame Type as Admit All, and Ingress Filtering is Disabled.

The following screen shows the specific status information relevant to a specific port, and global status information relevant to all ports.

**Figure 9-4. VLAN Port Settings**



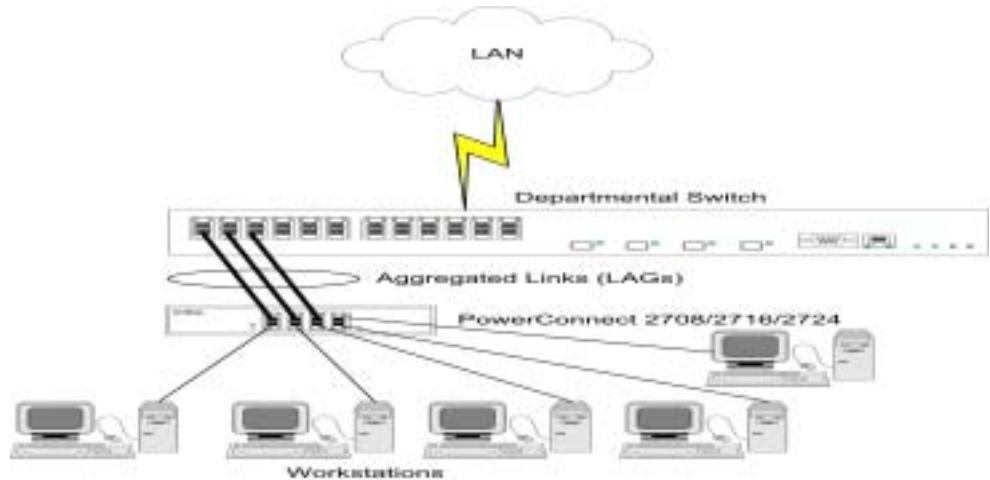
## LAGs

A Link Aggregated Group (LAG) is composed of ports with the same speed, set to full-duplex operation. Up to six Aggregated Links may be defined, each with up to four member ports, to form a single Link Aggregated Group (LAG). This enables:

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

With the departmental PowerConnect 2708/2716/2724 switches installed, network redundancy and improved traffic performance are facilitated. The PowerConnect device serves to connect the departmental groups of users to another switch that is located on another floor. In addition, LAGs are used to ensure that a backup, in case one line is disabled.

The following figure illustrates the concept of Aggregated Links in the switch.

**Figure 9-5. LAGs in the PowerConnect Departmental Switch**

### Aggregating Ports

Link Aggregation optimizes port usage by linking a group of ports together to form a single LAG (aggregated group). Aggregating ports multiplies the bandwidth between the devices, increases port flexibility, and provides link redundancy.

Consider the following when aggregating ports:

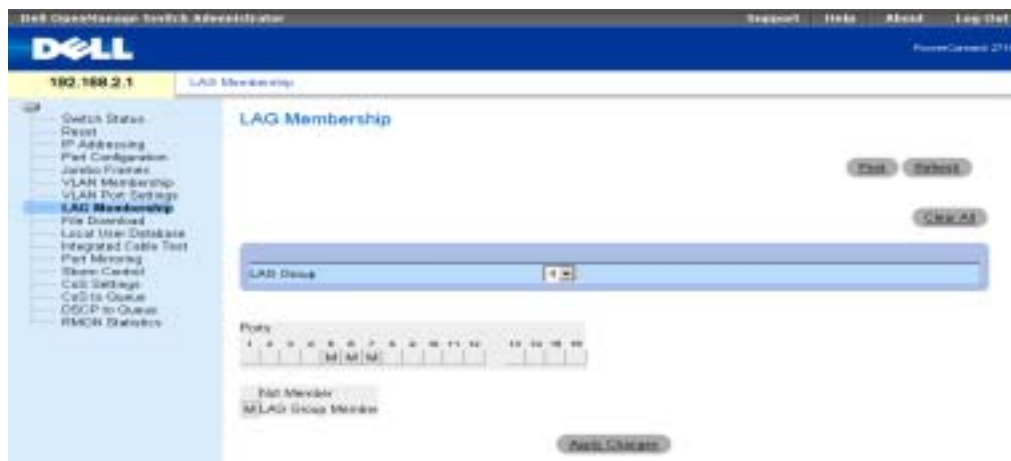
- Link Aggregation is allowed between two devices only.
- All ports within a LAG must be the same media type.
- A VLAN is not configured on the port.
- The port is not assigned to a different LAG.
- An available MAC address exists which can be assigned to a port.
- Auto-negotiation mode is not configured on the port.
- The port is in full-duplex mode.
- All ports in the LAG have the same ingress filtering and tagged modes.
- All ports in the LAG have the same back pressure and flow control modes.
- All ports in the LAG have the same priority.
- All ports in the LAG have the same transceiver type.
- The device supports up to six LAGs, and up to four ports in each LAG.

Ports added to a LAG do not their individual port configuration. When ports are removed from the LAG, the original port configuration is applied to the ports. The device considers an Aggregated Link a single logical port.

## Configuring LAG Membership

The following screen shows an example of Link Aggregation configuration, whereby LAG Group 4 consists of member ports 5, 6, and 7.

Figure 9-6. LAG Membership



## Downloading Files from Server

The File Download screen enables the user to configure and update Software Image files or BootP Image files in the PowerConnect 2708/2716/2724 devices.

The TFTP Server IP Address specifies the location from which files are downloaded. The File Name specifies the file to be downloaded. The Destination File can be either the Software Image file, or the Boot Code image.

**NOTE:** The TFTP Server application can be either downloaded from Internet public domains, or purchased from software vendors.

**Figure 9-7. File Download**

## Port Mirroring

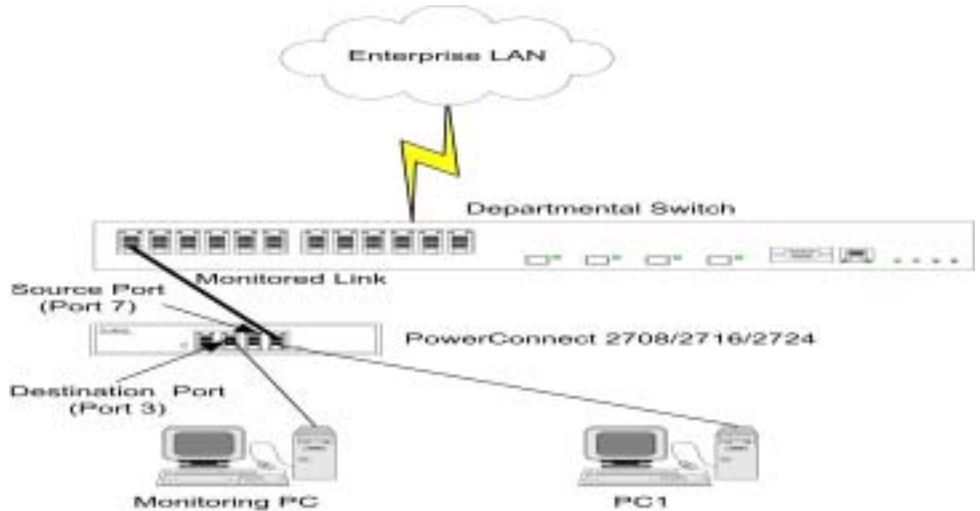
PowerConnect 2708/2716/2724 support port mirroring functionality. Port Mirroring allows traffic to be copied from one port to another port. Port mirroring monitors and mirrors network traffic by forwarding copies of incoming and outgoing packets from a monitored port to a monitoring port. The user can specify which target port receives copies of all traffic passing through a specified source port.

The Port Mirroring feature enables the Network Administrator to perform network monitoring and debugging, detecting and troubleshooting network traffic problems, faulty NICs, and isolating communication problems in the network.

The following figure illustrates the concept of Port Mirroring. In this example, port 7 is the Source Port in the device, and port 3 is the Destination port. In this scheme, the Destination Port monitors and copies all incoming and outgoing traffic on the Source Port. The Network Administrator can connect to port 3 a sniffer or some other network traffic analyzer.

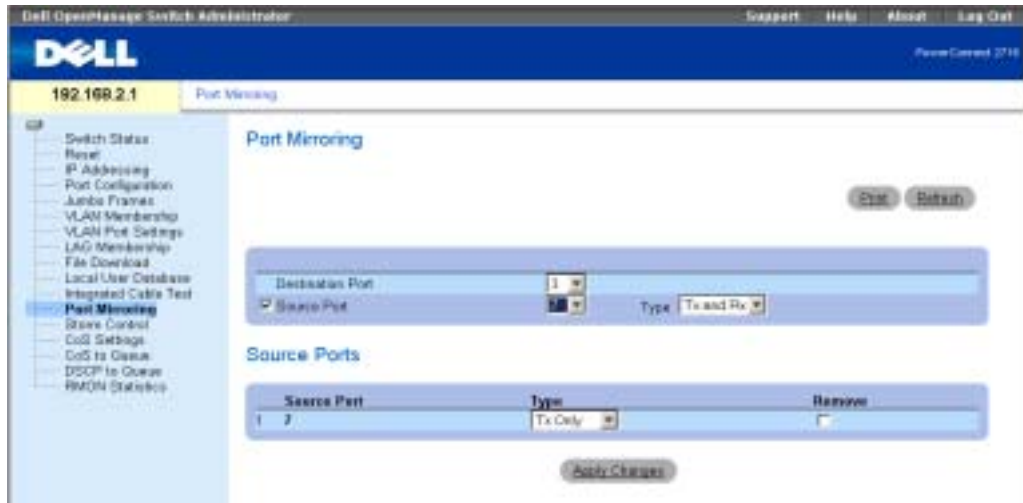


Figure 9-8. Port Mirroring Setup with Departmental Switch



In the following screen, the Destination Port is configured as port 3, and the Source Port as port 7. The type of traffic to be monitored is configured as Tx (Transmit) and Rx (Receive). The user can elect to add/remove ports to be mirrored and monitored on the network, as required.

Figure 9-9. Port Mirroring



# Storm Control

## Enabling Storm Control

The Storm Control mechanism is useful when a faulty Network Interface Card (NIC), or Broadcast or Multicast frames cause network flooding, beyond the threshold rate limit. When Layer 2 frames are forwarded, Broadcast and Multicast frames cause flooding to all ports on the relevant VLAN. This occupies bandwidth, and loads all nodes connected on all ports.

The Network Administrator moderates the network traffic by setting the threshold so as to limit, or disables the Storm Control operation, therefore limiting the amount of Multicast and Broadcast frames accepted and forwarded by the PowerConnect 2708/2716/2724 device.

In the example shown in the following screen, the Broadcast Rate Threshold is configured to 1000 packets per second. Count Multicast with Broadcast is Enabled, and Broadcast Control is Enabled.

**NOTE:** The threshold rate limit is defined by the Network Administrator, according to the characteristics of the network to be monitored, and the applications running on the network.

**NOTE:** The Storm Control screen below applies to the PowerConnect 2716 and PowerConnect 2724 devices.

**Figure 9-10. Storm Control**



## Configuring Class of Service (CoS)

The underlying mechanism of Class of Service (CoS) is the concept of queues. After packets are assigned to a specific egress queue, CoS services can be assigned to the queue(s). The PowerConnect 2708/2716/2724 system supports four queues per port for service priorities, where queue 0 is the lowest priority and queue 3 is the highest priority. For each logical group of priorities defined by the user, two priority levels are defined.

Egress queues are configured with a scheduling scheme by one of the following methods:

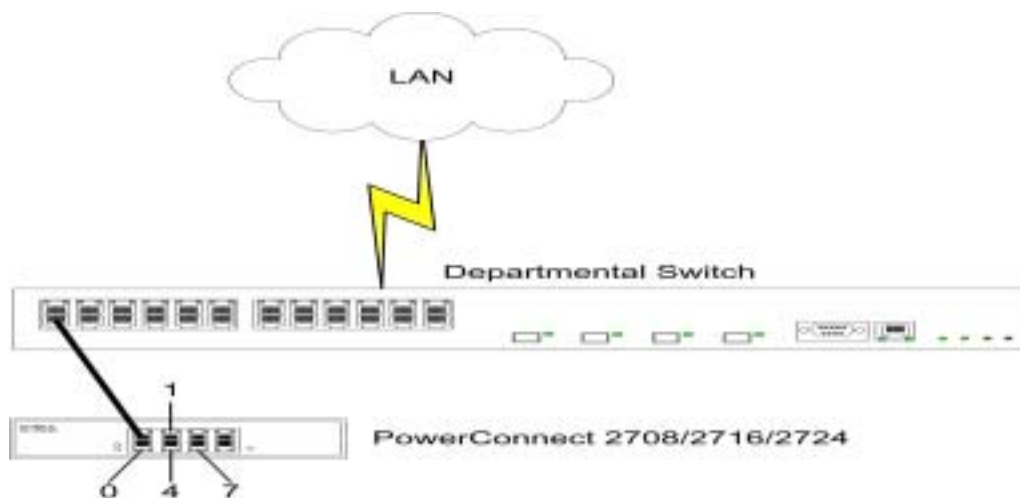
**Strict Priority** — Ensures that time-sensitive applications are always forwarded. Strict Priority (SP) allows the prioritization of mission-critical, time-sensitive traffic over less time-sensitive applications. For example, under Strict Priority, voice over IP traffic can be prioritized so the IP traffic is forwarded before FTP or e-mail traffic.

**Weighted Round Robin** — Ensures that a single application does not dominate the device forwarding capacity. Weighted Round Robin (WRR) forwards entire queues in a Round Robin order. All queues can participate in WRR, with expect SP queues. SP queues are serviced before WRR queues. If the traffic flow is minimal, and SP queues do not occupy the whole bandwidth allocated to a port, the WRR queues can share the bandwidth with the SP queues.

Ensuring the remaining bandwidth is distributed according to the weight ratio. If WRR is selected, the following weights are assigned to the queues: 1, 2, 4, 8.

The following figure illustrates the concept of CoS priority queues managed by the device. In this scenario, priorities are assigned to untagged incoming packets, per port.

**Figure 9-11. CoS Priority Queues**



The common prioritization mechanisms implemented in the PowerConnect device are Class of Service (CoS), according to IEEE802.1p, and DSCP (DiffServe Code Point) for IP traffic. CoS reduces flow complexity by mapping multiple flows into eight classes of service. These classes are set in the VPT (VLAN Priority Tag) 4-byte field tag, added to the packet by either a station or networking device. The device provides mapping of CoS classes to 4 priority queues per port (values are 1 to 4, where 1 is the lowest value, and 4 is the highest). For untagged packets service priority class can be assigned per port. The service class value in the VPT always overrides the service priority class defined per port.

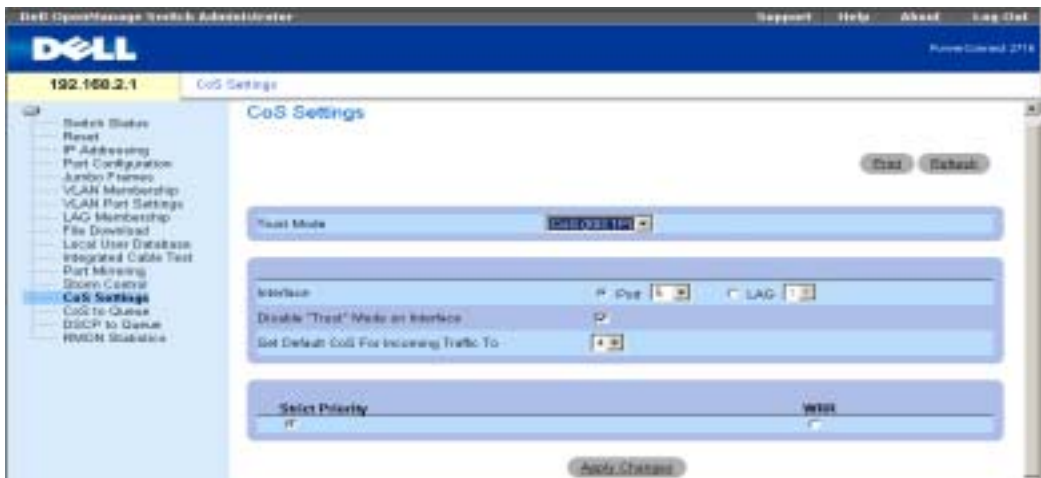
DSCP provides a method of prioritizing IP packets, and indicates the service level desired in the network. Incoming IP packets arrive with a DSCP value and are mapped to four priority queues, based on the priority DSCP value assigned to them. The values are 1 to 4, where 1 is the lowest value and 4 is the highest.

Via the CoS Setting screen, the user can assign priority to untagged packets through configuring the ports. This screen contains fields for enabling or disabling CoS.

The CoS global parameters are configured via the CoS Settings screen. The Trust Mode relies on predefined fields within the packet that determine the egress queue. The possible values for Trust Mode are None (traffic is mapped to best effort queue q2), CoS (default value), and DSCP.

In the following example, for the configured Interface Port 5, the Trust Mode is configured as CoS (determined by IEEE802.1p) —this is the Trust Mode default value. Disable "Trust" Mode on Interface is checked— this setting overrides the Trust Mode on the Ethernet globally.

**Figure 9-12. CoS Settings**



## Mapping CoS Values to Queues

In the following screen, CoS values are mapped to an egress queue. CoS priority tag values are zero as the lowest, and 7 as the highest. There are four traffic priority queues supported.

When Restore Defaults box is checked, the device's factory default settings for mapping CoS values are restored.

**Figure 9-13. CoS to Queue**



### Mapping DSCP Values to Queues

The following screen shows DSCP In incoming traffic and the priority queues (1 to 4) assigned to them.

**Figure 9-14. DSCP to Queues**



