CHAPTER 16

Configuring Layer 2 Protocol Tunneling

This chapter describes how to configure Layer 2 protocol tunneling on the Catalyst 6500 series switches.

Note

- For complete syntax and usage information for the commands used in this chapter, refer to the *Catalyst Supervisor Engine 32 PISA Cisco IOS Command Reference*, Release 12.2ZY, at this URL:

  http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/ios/12.2ZY/command/reference/cmdref.html
- The WS-X6548-GE-TX, WS-X6548V-GE-TX, WS-X6148-GE-TX, and WS-X6148V-GE-TX switching modules do not support Layer 2 protocol tunneling.

This chapter consists of these sections:

- Understanding How Layer 2 Protocol Tunneling Works, page 16-1
- Configuring Support for Layer 2 Protocol Tunneling, page 16-2

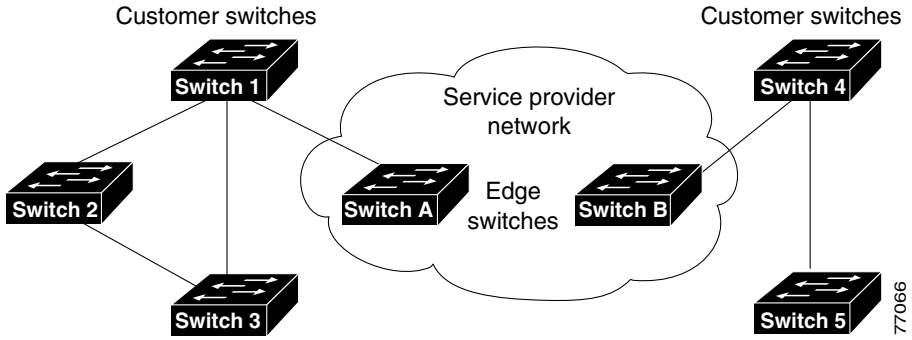
Understanding How Layer 2 Protocol Tunneling Works

Layer 2 protocol tunneling allows Layer 2 protocol data units (PDUs) (CDP, STP, and VTP) to be tunneled through a network. This section uses the following terminology:

- Edge switch—The switch connected to the customer switch and placed on the boundary of the service provider network (see Figure 16-1).
- Layer 2 protocol tunnel port—A port on the edge switch on which a specific tunneled protocol can be encapsulated or deencapsulated. The Layer 2 protocol tunnel port is configured through CLI commands.
- Tunneled PDU—A CDP, STP, or VTP PDU.

Without Layer 2 protocol tunneling, tunnel ports drop STP and VTP packets and process CDP packets. This handling of the PDUs creates different spanning tree domains (different spanning tree roots) for the customer switches. For example, STP for a VLAN on switch 1 (see Figure 16-1) builds a spanning tree topology on switches 1, 2, and 3 without considering convergence parameters based on switches 4 and 5. To provide a single spanning tree domain for the customer, a generic scheme to tunnel BPDUs was created for control protocol PDUs (CDP, STP, and VTP). This process is referred to as Generic Bridge PDU Tunneling (GBPT).

Figure 16-1 Layer 2 Protocol Tunneling Network Configuration



GBPT provides a scalable approach to PDU tunneling by software encapsulating the PDUs in the ingress edge switches and then multicasting them in hardware. All switches inside the service provider network treat these encapsulated frames as data packets and forward them to the other end. The egress edge switch listens for these special encapsulated frames and deencapsulates them; they are then forwarded out of the tunnel.

The encapsulation involves rewriting the destination media access control (MAC) address in the PDU. An ingress edge switch rewrites the destination MAC address of the PDUs received on a Layer 2 tunnel port with the Cisco proprietary multicast address (01-00-0c-cd-cd-d0). The PDU is then flooded to the native VLAN of the Layer 2 tunnel port. If you enable Layer 2 protocol tunneling on a port, PDUs of an enabled protocol are not sent out. If you disable Layer 2 protocol tunneling on a port, the disabled protocols function the same way they were functioning before Layer 2 protocol tunneling was disabled on the port.

Configuring Support for Layer 2 Protocol Tunneling

Note

- Encapsulated PDUs received by an 802.1Q tunnel port are transmitted from other tunnel ports in the same VLAN on the switch.
- Configure jumbo frame support on Layer 2 protocol tunneling ports:
  - See the "Configuring Jumbo Frame Support" section on page 7-10.
  - Take note of the modules listed in the "Configuring Jumbo Frame Support" section that do not support jumbo frames.

To configure Layer 2 protocol tunneling on a port, perform this task:

	Command	Purpose
Step 1	`Router(config)# interface` *type*[1] *slot/port*	Selects the LAN port to configure.
Step 2	`Router(config-if)# switchport`	Configures the LAN port for Layer 2 switching: • You must enter the **switchport** command once without any keywords to configure the LAN port as a Layer 2 interface before you can enter additional **switchport** commands with keywords. • Required only if you have not entered the **switchport** command already for the interface.
Step 3	`Router(config-if)# l2protocol-tunnel [cdp|drop-threshold [`*packets*`|shutdown-threshold [`*packets*`]|stp|vtp]` `Router(config-if)# no l2protocol-tunnel [cdp|drop-threshold|shutdown-threshold|stp|vtp]`	Configures the Layer 2 port as a Layer 2 protocol tunnel port for the protocols specified. Clears the configuration.
Step 4	`Router(config)# end`	Exits configuration mode.
Step 5	`Router# show l2protocol-tunnel [interface` *type*[1] *slot/port*`|summary]`	Verifies the configuration.

1. *type* = **ethernet**, **fastethernet**, **gigabitethernet**, or **tengigabitethernet**

When you configure a Layer 2 port as a Layer 2 protocol tunnel port, note the following information:

- Optionally, you may specify a drop threshold for the port. The drop threshold value, from 1 to 4096, determines the number of packets to be processed for that protocol on that interface in one second. When the drop threshold is exceeded, PDUs for the specified protocol are dropped for the remainder of the 1-second period. If a shutdown threshold is not specified, the value is 0 (shutdown threshold disabled).
- Optionally, you may specify a shutdown threshold for the port. The shutdown threshold value, from 1 to 4096, determines the number of packets to be processed for that protocol on that interface in one second. When the shutdown threshold is exceeded, the port is put in errdisable state. If a shutdown threshold is not specified, the value is 0 (shutdown threshold disabled).

Note Refer to the *Catalyst Supervisor Engine 32 PISA Cisco IOS Command Reference*, Release 12.2ZY for more information about the **l2ptguard** keyword for the following commands:

- **errdisable detect cause**
- **errdisable recovery cause**

This example shows how to configure Layer 2 protocol tunneling and shutdown thresholds on port 5/1 for CDP, STP, and VTP, and verify the configuration:

```
Router# configure terminal
Router(config)# interface fastethernet 5/1
Router(config-if)# switchport
Router(config-if)# l2protocol-tunnel shutdown-threshold cdp 10
Router(config-if)# l2protocol-tunnel shutdown-threshold stp 10
Router(config-if)# l2protocol-tunnel shutdown-threshold vtp 10
Router(config-if)# end
Router# show l2protocol-tunnel summary
```

```
Port   Protocol        Threshold
                       (cos/cdp/stp/vtp)
---------------------------------------
Fa5/1   cdp stp vtp     0/10  /10  /10          down trunk
Router#
```

This example shows how to display counter information for port 5/1:

```
Router# show l2protocol-tunnel interface fastethernet 5/1
Port   Protocol        Threshold           Counters
                       (cos/cdp/stp/vtp)   (cdp/stp/vtp/decap)
---------------------------------------------------------------
Router#
```

This example shows how to clear the Layer 2 protocol tunneling configuration from port 5/1:

```
Router(config-if)# no l2protocol-tunnel shutdown-threshold cdp 10
Router(config-if)# no l2protocol-tunnel shutdown-threshold stp 10
Router(config-if)# no l2protocol-tunnel shutdown-threshold vtp 10
Router(config-if)# no l2protocol-tunnel cdp
Router(config-if)# no l2protocol-tunnel stp
Router(config-if)# no l2protocol-tunnel vtp
Router(config-if)# end
Router# show l2protocol-tunnel summary
Port   Protocol        Threshold
                       (cos/cdp/stp/vtp)
---------------------------------------
Router#
```

This example shows how to clear Layer 2 protocol tunneling port counters:

```
Router# clear l2protocol-tunnel counters
Router#
```