



CHAPTER 22

Configuring Layer 2 Protocol Tunneling

This chapter describes how to configure Layer 2 protocol tunneling in Cisco IOS Release 12.2SX.



Note

- For complete syntax and usage information for the commands used in this chapter, see the Cisco IOS Master Command List, Release 12.2SX, at this URL:
http://www.cisco.com/en/US/docs/ios/mcl/122sxmcl/12_2sx_mcl_book.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.



Tip

For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

This chapter consists of these sections:

- [Understanding Layer 2 Protocol Tunneling, page 22-1](#)
- [Configuring Support for Layer 2 Protocol Tunneling, page 22-2](#)

Understanding Layer 2 Protocol Tunneling

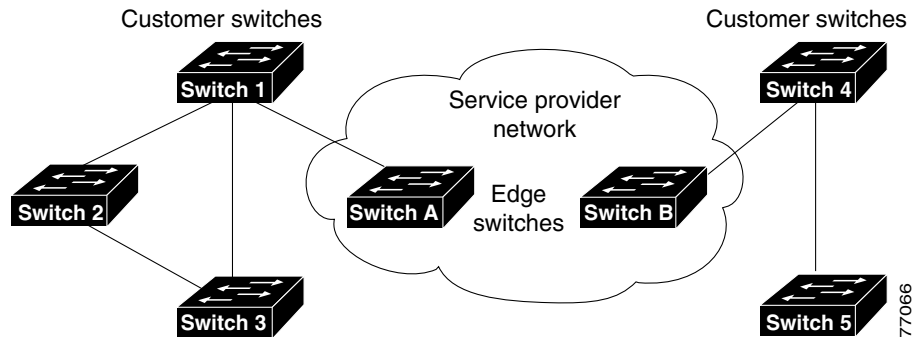
Layer 2 protocol tunneling allows Layer 2 protocol data units (PDUs) (CDP, STP, and VTP) to be tunneled through a network. This section uses the following terminology:

- Edge switch—The switch connected to the customer switch and placed on the boundary of the service provider network (see [Figure 22-1](#)).
- 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 22-1](#)) 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 22-1 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 9-10.
 - 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 <i>type</i> ¹ <i>slot/port</i>	Selects the LAN port to configure.
Step 2	Router(config-if)# switchport	Configures the LAN port for Layer 2 switching. <ul style="list-style-type: none"> 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 lldp stp vtp] Router(config-if)# l2protocol-tunnel drop-threshold {[cdp lldp stp vtp] <i>packets</i> } Router(config-if)# l2protocol-tunnel shutdown-threshold {[cdp lldp stp vtp] <i>packets</i> }	Configures the Layer 2 port as a Layer 2 protocol tunnel port for all protocols or only the specified protocol. (Optional) Configures the port as a Layer 2 protocol tunnel port and sets a drop threshold for all protocols or only the specified protocol. (Optional) Configures the port as a Layer 2 protocol tunnel port and sets a shutdown threshold for all protocols or only the specified protocol.
Step 4	Router(config)# end	Exits configuration mode.
Step 5	Router# show l2protocol-tunnel [interface <i>type</i> ¹ <i>slot/port</i> summary]	Verifies the configuration.

1. *type* = 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 one-second period. If a drop threshold is not specified, the value is 0 (drop 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).
- If you specify both a drop threshold and a shutdown threshold for the port, packets exceeding the drop threshold will not be forwarded but will be counted toward the shutdown threshold.



Note

See the Cisco IOS Master Command List, Release 12.2SX for more information about the **l2ptguard** keyword for the following commands:

- errdisable detect cause**
- errdisable recovery**

This example shows how to configure Layer 2 protocol tunneling and drop 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 400
Router(config-if)# l2protocol-tunnel shutdown-threshold stp 400
Router(config-if)# l2protocol-tunnel shutdown-threshold vtp 400
Router(config-if)# l2protocol-tunnel drop-threshold vtp 200
Router(config-if)# end
Router# show l2protocol-tunnel summary
COS for Encapsulated Packets: 5
Drop Threshold for Encapsulated Packets: 0

Port          Protocol      Shutdown      Drop          Status
              Threshold
              (cdp/lldp/stp/vtp)  (cdp/lldp/stp/vtp)
-----
Fa5/1        -- -- -- 400/----/ 400/ 400 ----/----/----/ 200  down(trunk)

Router#

```

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

```

Router# show l2protocol-tunnel interface fastethernet 5/1
COS for Encapsulated Packets: 5

Port          Protocol Thresholds          Counters
              Shutdown Drop          Encap   Decap   Drop
-----
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 400
Router(config-if)# no l2protocol-tunnel shutdown-threshold stp 400
Router(config-if)# no l2protocol-tunnel shutdown-threshold vtp 400
Router(config-if)# no l2protocol-tunnel drop-threshold vtp 200
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
COS for Encapsulated Packets: 5
Drop Threshold for Encapsulated Packets: 0

Port          Protocol      Shutdown      Drop          Status
              Threshold
              (cdp/lldp/stp/vtp)  (cdp/lldp/stp/vtp)
-----

Router#

```

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

```

Router# clear l2protocol-tunnel counters
Router#

```



Tip

For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html