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Layer 2 Protocol Tunneling

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**Note**

- For complete syntax and usage information for the commands used in this chapter, see these publications:
http://www.cisco.com/en/US/products/ps11846/prod_command_reference_list.html
 - Cisco IOS Release 15.4SY supports only Ethernet interfaces. Cisco IOS Release 15.4SY does not support any WAN features or commands.
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**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

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Prerequisites for Layer 2 Protocol Tunneling

None.

Restrictions for Layer 2 Protocol Tunneling

None.

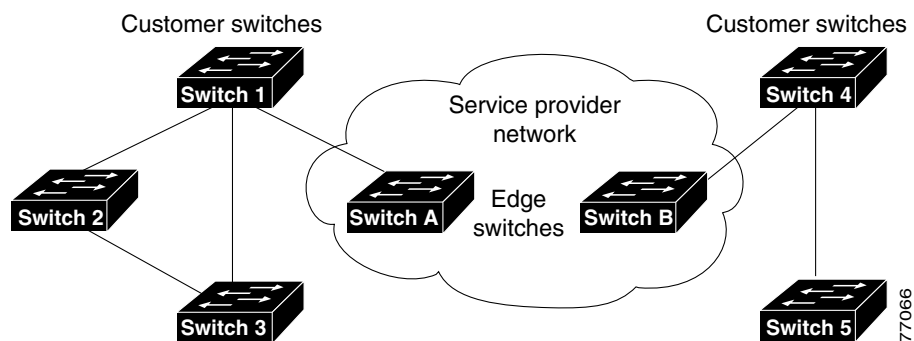
Information About Layer 2 Protocol Tunneling

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 30-1](#)).
- 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 30-1](#)) 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 30-1 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 enabled on the port.

Default Settings for Layer 2 Protocol Tunneling

None.

How to Configure 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 10-6.
 - 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 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]	Configures the Layer 2 port as a Layer 2 protocol tunnel port for all protocols or only the specified protocol.
Step 4	Router(config-if)# l2protocol-tunnel drop-threshold {[cdp lldp stp vtp] <i>packets</i> }	(Optional) Configures the port as a Layer 2 protocol tunnel port and sets a drop threshold for all protocols or only the specified protocol.
Step 5	Router(config-if)# l2protocol-tunnel shutdown-threshold {[cdp lldp stp vtp] <i>packets</i> }	(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 6	Router(config-if)# no lldp transmit	(Required on PE ports) Disables LLDP. Note CDP is automatically disabled.
Step 7	Router(config)# end	Exits configuration mode.

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**

The commands support the **l2ptguard** keyword:

- **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 gigabitethernet 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)# no lldp transmit
Router(config-if)# end
Router# show l2protocol-tunnel summary
COS for Encapsulated Packets: 5
Drop Threshold for Encapsulated Packets: 0
```

Port	Protocol	Shutdown Threshold	Drop Threshold	Status
		(cdp/lldp/stp/vtp)	(cdp/lldp/stp/vtp)	
Gi5/1	-- -- -- --	400/----/ 400/ 400	----/----/----/ 200	down(trunk)

```
Router#
```

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

```
Router# show l2protocol-tunnel interface gigabitethernet 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)# lldp transmit
Router(config-if)# end
Router# show l2protocol-tunnel summary
COS for Encapsulated Packets: 5
Drop Threshold for Encapsulated Packets: 0
```

Port	Protocol	Shutdown Threshold	Drop Threshold	Status

```
(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

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