



Cisco IOS IEEE 802.1Q Support

Feature Summary

With the introduction of the Cisco IOS IEEE 802.1Q Support feature, Cisco IOS now supports 802.1Q VLAN encapsulation, in addition to the currently supported ISL and IEEE 802.10 SDE encapsulations. VLANs can now be implemented using 802.1Q encapsulation among switches that support this standard. IEEE 802.1Q support is currently available for Fast Ethernet interfaces.

Benefits

VLANs can now be implemented with Cisco IOS platforms in environments where the IEEE 802.1Q encapsulation standard is required.

Platforms

This feature is supported on these platforms:

- Cisco 1710 router
- Cisco 1751 router
- Cisco 2600 series
- Cisco 3600 series
- Cisco 4000-M series (Cisco 4000-M, 4500-M, 4700-M)
- Cisco 7200 series
- RSP1 Cisco 7505
- RSP2 Cisco 7507 and Cisco 7513
- RSP4 Cisco 7505, Cisco 7507, Cisco 7513, and Cisco 7576

Supported MIBs and RFCs

None.

Configuration Tasks

You can configure routing between any number of VLANs in your network. This section documents the configuration tasks for each protocol supported with IEEE 802.1Q encapsulation. The basic process is the same, regardless of the protocol being routed. It involves

- Enabling the protocol on the router.
- Enabling the protocol on the interface.
- Defining the encapsulation format as IEEE 802.1Q.
- Customizing the protocol according to the requirements for your environment.

The configuration processes documented in this feature guide include the following:

- Configure AppleTalk Routing over IEEE 802.1Q
- Configure IP Routing over IEEE 802.1Q
- Configure IPX Routing over IEEE 802.1Q

Configure AppleTalk Routing over IEEE 802.1Q

AppleTalk can be routed over virtual LAN (VLAN) subinterfaces using the IEEE 802.1Q VLAN encapsulation protocol. AppleTalk Routing provides full-feature Cisco IOS software AppleTalk support on a per-VLAN basis, allowing standard AppleTalk capabilities to be configured on VLANs.

To route AppleTalk over IEEE 802.1Q between VLANs, you need to customize the subinterface to create the environment in which it will be used. Perform these tasks in the order in which they appear:

- Enable AppleTalk Routing
- Define the VLAN Encapsulation Format
- Configure AppleTalk on the Subinterface

Enable AppleTalk Routing

To enable AppleTalk routing on IEEE 802.1Q interfaces, use this command in global configuration mode:

Command	Purpose
appletalk routing [eigrp <i>router-number</i>]	Enable AppleTalk routing globally.

Define the VLAN Encapsulation Format

To define the VLAN encapsulation format as IEEE 802.1Q, use the following commands in interface configuration mode:

Step	Command	Purpose
1	interface fastethernet <i>slot/port.subinterface-number</i>	Specify the subinterface the VLAN will use.
2	encapsulation dot1q <i>vlan-identifier</i>	Define the encapsulation format as IEEE 802.1Q (dot1q), and specify the VLAN identifier.

Configure AppleTalk on the Subinterface

After you enable AppleTalk globally and define the encapsulation format, you need to enable it on the subinterface by specifying the cable range and naming the AppleTalk zone for each interface. To enable the AppleTalk protocol on the subinterface, use the following commands in interface configuration mode:

Step	Command	Purpose
1	appletalk cable-range <i>cable-range</i> [<i>network.node</i>]	Assign the AppleTalk cable range and zone for the subinterface.
2	appletalk zone <i>zone-name</i>	Assign the AppleTalk zone for the subinterface.

Configure IP Routing over IEEE 802.1Q

IP routing over IEEE 802.1Q extends IP routing capabilities to include support for routing IP frame types in VLAN configurations using the IEEE 802.1Q encapsulation.

To route IP over IEEE 802.1Q between VLANs, you need to customize the subinterface to create the environment in which it will be used. Perform these tasks in the order in which they appear:

- Enable IP Routing
- Define the VLAN Encapsulation Format
- Assign IP Address to Network Interface

Enable IP Routing

IP routing is automatically enabled in the Cisco IOS software for routers. To reenabling IP routing if it has been disabled, use the following command in global configuration mode:

Command	Purpose
ip routing	Enable IP routing on the router.

Once you have IP routing enabled on the router, you can customize the characteristics to suit your environment. If necessary, refer to the IP configuration chapters in the *Network Protocols Configuration Guide, Part 1* for guidelines on configuring IP.

Define the VLAN Encapsulation Format

To define the encapsulation format as IEEE 802.1Q, use the following commands in interface configuration mode:

Step	Command	Purpose
1	interface fastethernet <i>slot/port.subinterface-number</i>	Specify the subinterface on which IEEE 802.1Q will be used.
2	encapsulation dot1q <i>vlanid</i>	Define the encapsulation format as IEEE 802.1Q (dot1q), and specify the VLAN identifier

Assign IP Address to Network Interface

An interface can have one primary IP address. To assign a primary IP address and a network mask to a network interface, use the following command in interface configuration mode:

Command	Purpose
ip address <i>ip-address mask</i>	Set a primary IP address for an interface.

A mask identifies the bits that denote the network number in an IP address. When you use the mask to subnet a network, the mask is then referred to as a *subnet mask*.

Configure IPX Routing over IEEE 802.1Q

IPX Routing over IEEE 802.1Q VLANs extends Novell NetWare routing capabilities to include support for routing Novell Ethernet_802.3 encapsulation frame types in VLAN configurations. Users with Novell NetWare environments can configure Novell Ethernet_802.3 encapsulation frames to be routed using IEEE 802.1Q encapsulation across VLAN boundaries.

To configure Cisco IOS software on a router with connected VLANs to exchange IPX Novell Ethernet_802.3 encapsulated frames, perform these tasks in the order in which they appear:

- Enable NetWare Routing
- Define the VLAN Encapsulation Format
- Configure NetWare on the Subinterface

Enable NetWare Routing

To enable IPX routing on IEEE 802.1Q interfaces, use the following command in global configuration mode:

Command	Purpose
ipx routing [<i>node</i>]	Enable IPX routing globally.

Define the VLAN Encapsulation Format

To define the encapsulation format as IEEE 802.1Q, use the following commands in interface configuration mode:

Step	Command	Purpose
1	interface fastethernet <i>slot/port.subinterface-number</i>	Specify the subinterface on which IEEE 802.1Q will be used.
2	encapsulation dot1q <i>vlan-identifier</i>	Define the encapsulation format as IEEE 802.1Q and specify the VLAN identifier.

Configure NetWare on the Subinterface

After you enable NetWare globally and define the VLAN encapsulation format, you may need to enable the subinterface by specifying the NetWare network number. Use this command in interface configuration mode:

Command	Purpose
<code>ipx network <i>network</i></code>	Specify the IPX network number.

Configuration Examples

This section provides configuration examples for each of the protocols described in this feature guide. It includes these examples:

- Configure AppleTalk Routing over IEEE 802.1Q
- Configure IP Routing over IEEE 802.1Q
- Configure IPX Routing over IEEE 802.1Q

Configure AppleTalk over IEEE 802.1Q

This configuration example shows AppleTalk being routed on VLAN 100.

```
!
appletalk routing
!
interface fastethernet 4/1.100
 encapsulation dot1q 100
 appletalk cable-range 100-100 100.1
 appletalk zone eng
!
```

Configure IP over IEEE 802.1Q

This configuration example shows IP being routed on VLAN 101.

```
!
ip routing
!
interface fastethernet 4/1.101
 encapsulation dot1q 101
 ip addr 10.0.0.11 255.0.0.0
!
```

Configure IPX over IEEE 802.1Q

This configuration example shows IPX being routed on VLAN 102.

```
!
ipx routing
!
interface fastethernet 4/1.102
 encapsulation dot1q 102
 ipx network 100
!
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command references.

- **encapsulation dot1q**

encapsulation dot1q

Use the **encapsulation dot1q** subinterface command to enable IEEE 802.1Q encapsulation of traffic on a specified subinterface in virtual LANs. IEEE 802.1Q is a standard protocol for interconnecting multiple switches and routers, and for defining VLAN topologies.

encapsulation dot1q *vlan-id*

Syntax Description

vlan-id Virtual LAN identifier. The allowed range is 1 to 1000

Default

Disabled

Command Mode

Subinterface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(1)T.

IEEE 802.1Q encapsulation is configurable on Fast Ethernet interfaces.

Example

The following example encapsulates VLAN traffic using the IEEE 802.1Q protocol for VLAN 100:

```
interface fastethernet 4/1.100
 encapsulation dot1q 100
```

Related Commands

encapsulation isl
encapsulation sde

