
# Configuring VLANs

This chapter describes how to configure your bridge to operate with the VLANs set up on your wired LAN. These sections describe how to configure your bridge to support VLANs:

# Understanding VLANs

A VLAN is a switched network that is logically segmented, by functions, project teams, or applications rather than on a physical or geographical basis. For example, all workstations and servers used by a particular workgroup team can be connected to the same VLAN, regardless of their physical connections to the network or the fact that they might be intermingled with other teams. You use VLANs to reconfigure the network through software rather than physically unplugging and moving devices or wires.

A VLAN can be thought of as a broadcast domain that exists within a defined set of switches. A VLAN consists of a number of end systems, either hosts or network equipment (such as bridges and routers), connected by a single bridging domain. The bridging domain is supported on various pieces of network equipment such as LAN switches that operate bridging protocols between them with a separate group for each VLAN.

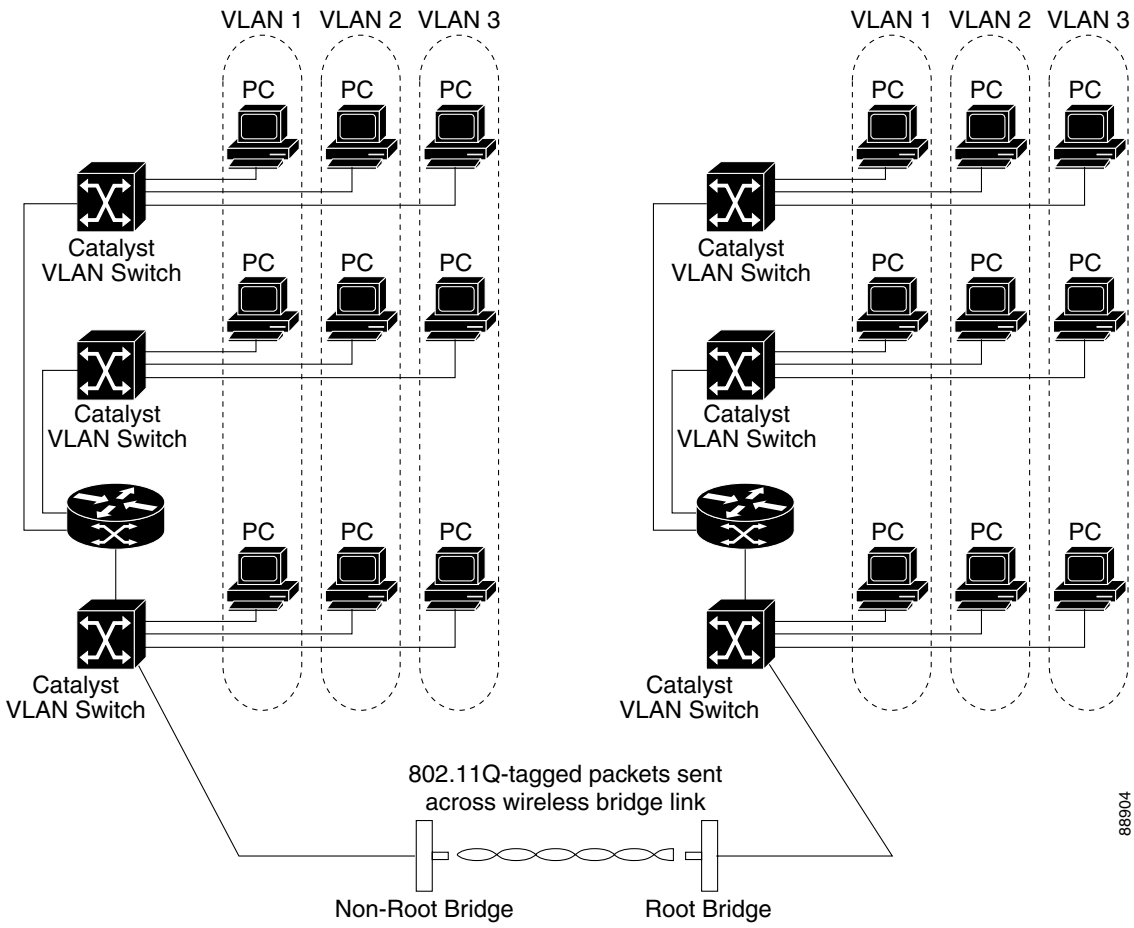
VLANs provide the segmentation services traditionally provided by routers in LAN configurations. VLANs address scalability, security, and network management. You should consider several key issues when designing and building switched LAN networks:

- LAN segmentation
- Security
- Broadcast control
- Performance
- Network management
- Communication between VLANs

You extend VLANs into a wireless LAN by adding IEEE 802.11Q tag awareness to the bridge. VLAN 802.1Q trunking is supported between root and non-root bridges through the bridges' primary SSID.

Figure 12-1 shows two bridges sending 802.11Q-tagged packets between two LAN segments that use logical VLAN segmentation.

*Figure 12-1 Bridges Connecting LAN Segments Using VLANs*




# Related Documents

These documents provide more detailed information pertaining to VLAN design and configuration:

- *Cisco IOS Switching Services Configuration Guide.* Click this link to browse to this document: http://www.cisco.com/en/US/docs/ios/12_2/switch/configuration/guide/fswtch_c.html
- *Cisco Internetwork Design Guide.* Click this link to browse to this document: http://www.cisco.com/en/US/docs/internetworking/design/guide/idg4.html
- *Cisco Internetworking Technology Handbook.* Click this link to browse to this document: http://www.cisco.com/en/US/docs/internetworking/technology/handbook/ito_doc.html
- *Cisco Internetworking Troubleshooting Guide.* Click this link to browse to this document: http://www.cisco.com/en/US/docs/internetworking/troubleshooting/guide/tr1901.html

# Incorporating Wireless Bridges into VLANs

The basic wireless components of a VLAN consist of two or more bridges communicating using wireless technology. The bridge is physically connected through a trunk port to the network VLAN switch on which the VLAN is configured. The physical connection to the VLAN switch is through the bridge's Ethernet port.

In fundamental terms, the key to configuring a bridge to connect to a specific VLAN is by configuring its SSID to recognize that VLAN. Since VLANs are identified by a VLAN ID, it follows that if the SSID on a bridge is configured to recognize a specific VLAN ID, a connection to the VLAN is established.

The bridge supports only one SSID. You should assign the SSID to the native VLAN.

# Configuring VLANs

These sections describe how to configure VLANs on your bridge:

- Configuring a VLAN, page 12-4
- Viewing VLANs Configured on the Bridge, page 12-7

# Configuring a VLAN

Configuring your bridge to support VLANs is a five-step process:

1. Create subinterfaces on the radio and Ethernet interfaces.
2. Enable 802.1q encapsulation on the subinterfaces and assign one subinterface as the native VLAN.
3. Assign a bridge group to each VLAN.
4. (Optional) Enable WEP on the native VLAN.
5. Assign the bridge's SSID to the native VLAN.

This section describes how to assign an SSID to a VLAN and how to enable a VLAN on the bridge radio and Ethernet ports. For detailed instructions on assigning authentication types to SSIDs, see Chapter 10, "Configuring Authentication Types."

Beginning in privileged EXEC mode, follow these steps to assign an SSID to a VLAN and enable the VLAN on the bridge radio and Ethernet ports:

| | Command | Purpose |
|---|---|---|
| Step 1 | **configure terminal** | Enter global configuration mode. |
| Step 2 | **interface dot11radio0.x** | Create a radio subinterface and enter interface configuration mode for the subinterface. |
| Step 3 | **encapsulation dot1q** *vlan-id* [**native**] | Enable a VLAN on the subinterface.<br>(Optional) Designate the VLAN as the native VLAN. On many networks, the native VLAN is VLAN 1. |

| | Command | Purpose |
|---|---|---|
| **Step 4** | **bridge-group** *number* | Assign the subinterface to a bridge group. You can number your bridge groups from 1 to 255.<br>**Note** When you enter the **bridge-group** command, the bridge enables the subinterface to be ready to participate in STP when you enter the **bridge** *n* **protocol ieee** command. See Chapter 8, "Configuring Spanning Tree Protocol," for complete instructions on enabling STP on the bridge. |
| **Step 5** | **exit** | Return to global configuration mode. |
| **Step 6** | **interface fastEthernet0.x** | Create an Ethernet subinterface and enter interface configuration mode for the subinterface. |
| **Step 7** | **encapsulation dot1q** *vlan-id* [**native**] | Enable a VLAN on the subinterface.<br>(Optional) Designate the VLAN as the native VLAN. On many networks, the native VLAN is VLAN 1. |
| **Step 8** | **bridge-group** *number* | Assign the subinterface to a bridge group. You can number your bridge groups from 1 to 255. |
| **Step 9** | **exit** | Return to global configuration mode. |
| **Step 10** | **interface dot11radio 0** | Enter interface configuration mode for the radio interface. |
| **Step 11** | **ssid** *ssid-string* | Create an SSID and enter SSID configuration mode for the new SSID. The SSID can consist of up to 32 alphanumeric characters. SSIDs are case sensitive. You can create only one SSID on the bridge.<br>**Note** You use the **ssid** command's authentication options to configure an authentication type for each SSID. See Chapter 10, "Configuring Authentication Types," for instructions on configuring authentication types. |
| **Step 12** | **vlan** *vlan-id* | Assign the SSID to the native VLAN. |
| **Step 13** | **infrastructure-ssid** | Designate the SSID as the infrastructure SSID. The root bridge allows associations only from non-root bridges that use this SSID. |

| | Command | Purpose |
|---|---|---|
| Step 14 | **encryption** [**vlan** *vlan-id*] **mode wep** {**optional** [**key-hash**] \| **mandatory** [**mic**] [**key-hash**]} | (Optional) Enable WEP and WEP features on the native VLAN.<br>• (Optional) Select the VLAN for which you want to enable WEP and WEP features.<br>• Set the WEP level and enable TKIP and MIC. If you enter **optional**, another bridge can associate to the bridge with or without WEP enabled. You can enable TKIP with WEP set to optional but you cannot enable MIC. If you enter **mandatory**, other bridges must have WEP enabled to associate to the bridge. You can enable both TKIP and MIC with WEP set to mandatory.<br>**Note** You can enable encryption for each VLAN, but the bridge uses only the encryption on the native VLAN. For example, if the native VLAN encryption is set to 128-bit static WEP, that is the only encryption method used for traffic between the root and non-root bridge. |
| Step 15 | **exit** | Return to interface configuration mode for the radio interface. |
| Step 16 | **end** | Return to privileged EXEC mode. |
| Step 17 | **copy running-config startup-config** | (Optional) Save your entries in the configuration file. |

This example shows how to:

- Enable the VLAN on the radio and Ethernet ports as the native VLAN
- Name an SSID
- Assign the SSID to a VLAN

```
BR# configure terminal
BR(config)# interface dot11radio0.1
BR(config-subif)# encapsulation dot1q 1 native
BR(config-subif)# bridge group 1
BR(config-subif)# exit
BR(config)# interface fastEthernet0.1
BR(config-subif)# encapsulation dot1q 1 native
BR(config-subif)# bridge group 1
BR(config-subif)# exit
BR(config)# interface dot11radio0
BR(config-if)# ssid batman
BR(config-ssid)# vlan 1
BR(config-ssid)# infrastructure-ssid
BR(config-ssid)# end
```

# Viewing VLANs Configured on the Bridge

In privileged EXEC mode, use the **show vlan** command to view the VLANs that the bridge supports. This is sample output from a **show vlan** command:

```
Virtual LAN ID:  1 (IEEE 802.1Q Encapsulation)

   vLAN Trunk Interfaces:  Dot11Radio0
FastEthernet0
Virtual-Dot11Radio0

 This is configured as native Vlan for the following interface(s) :
Dot11Radio0
FastEthernet0
Virtual-Dot11Radio0

   Protocols Configured:   Address:              Received:        Transmitted:
        Bridging        Bridge Group 1             201688                  0
        Bridging        Bridge Group 1             201688                  0
        Bridging        Bridge Group 1             201688                  0

Virtual LAN ID:  2 (IEEE 802.1Q Encapsulation)

   vLAN Trunk Interfaces:  Dot11Radio0.2
FastEthernet0.2
Virtual-Dot11Radio0.2

   Protocols Configured:   Address:              Received:        Transmitted:
```