Configuring Voice Interfaces

This chapter describes how to configure voice interfaces for the Catalyst 4500 series switches.

This chapter includes the following major sections:

Note For complete syntax and usage information for the switch commands used in this chapter, refer to the *Catalyst 4500 Series Switch Cisco IOS Command Reference* and related publications at this location:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios124/124cr/index.htm.

Overview of Voice Interfaces

Catalyst 4500 series switches can connect to a Cisco 7960 IP phone and carry IP voice traffic. If necessary, the switch can supply electrical power to the circuit connecting it to the Cisco 7960 IP phone.

Because the sound quality of an IP telephone call can deteriorate if the data is unevenly sent, the switch uses quality of service (QoS) based on IEEE 802.1p class of service (CoS). QoS uses classification and scheduling to transmit network traffic from the switch in a predictable manner. See Chapter 30, "Configuring Quality of Service," for more information on QoS.

You can configure the Cisco 7960 IP phone to forward traffic with an 802.1p priority. You can use the CLI to configure a Catalyst 4500 series switch to honor or ignore a traffic priority assigned by a Cisco 7960 IP phone.

The Cisco 7960 IP phone contains an integrated three-port 10/100 switch. The ports are dedicated connections as described below:

- Port 1 connects to the Catalyst 4500 series switch or other device that supports voice-over-IP.
- Port 2 is an internal 10/100 interface that carries the phone traffic.
- Port 3 connects to a PC or other device.

Figure 31-1 shows one way to configure a Cisco 7960 IP phone.

Figure 31-1 Cisco 7960 IP Phone Connected to a Catalyst 4500 Series Switch

Cisco IP Phone Voice Traffic

You can configure an access port with an attached Cisco IP Phone to use one VLAN for voice traffic and another VLAN for data traffic from a device attached to the phone. You can configure access ports on the switch to send Cisco Discovery Protocol (CDP) packets that instruct an attached phone to send voice traffic to the switch in any of these ways:

- In the voice VLAN tagged with a Layer 2 CoS priority value
- In the access VLAN tagged with a Layer 2 CoS priority value
- In the access VLAN, untagged (no Layer 2 CoS priority value)

Note In all configurations, the voice traffic carries a Layer 3 IP precedence value (the default is 5 for voice traffic and 3 for voice control traffic).

Cisco IP Phone Data Traffic

The switch can also process tagged data traffic (traffic in IEEE 802.1Q or IEEE 802.1p frame types) from the device attached to the access port on the Cisco IP Phone (see Figure 31-1). You can configure Layer 2 access ports on the switch to send CDP packets that instruct the attached phone to configure the phone access port in one of these modes:

- In trusted mode, all traffic received through the access port on the Cisco IP Phone passes through the phone unchanged.
- In untrusted mode, all traffic in IEEE 802.1Q or IEEE 802.1p frames received through the access port on the Cisco IP Phone receive a configured Layer 2 CoS value. The default Layer 2 CoS value is 0. Untrusted mode is the default.

Note Untagged traffic from the device attached to the Cisco IP Phone passes through the phone unchanged, regardless of the trust state of the access port on the phone.

Configuring a Port to Connect to a Cisco 7960 IP Phone

Because a Cisco 7960 IP phone also supports connection to a PC or another device, an interface connecting a Catalyst 4500 series switch to a Cisco 7960 IP phone can carry a mix of voice and data traffic.

There are three configurations for a port connected to a Cisco 7960 IP phone:

- All traffic is transmitted according to the default CoS priority of the port. This is the default.

- Voice traffic is given a higher priority by the phone (CoS priority is always 5), and all traffic is in the same VLAN.
- Voice and data traffic are carried on separate VLANs.

To configure a port to instruct the phone to give voice traffic a higher priority and to forward all traffic through the 802.1Q native VLAN, perform this task:

	Command	Purpose
Step 1	`Switch# configure terminal`	Enters configuration mode.
Step 2	`Switch(config)# interface {fastethernet | gigabitethernet} slot/port`	Specifies the interface to configure.
Step 3	`Switch(config-if)# switchport voice vlan dot1p`	Instructs the switch to use 802.1p priority tagging for voice traffic and to use VLAN 1 (default native VLAN) to carry all traffic.
Step 4	`Switch(config-if)# end`	Returns to privileged EXEC mode.
Step 5	`Switch# show interface {fastethernet | gigabitethernet} slot/port switchport`	Verifies the port configuration.

Configuring Voice Ports for Voice and Data Traffic

Because voice and data traffic can travel through the same voice port, you should specify a different VLAN for each type of traffic. You can configure a switch port to forward voice and data traffic on different VLANs.

Note For information on configuring sticky port security on voice VLANs, see the Configuring Port Security on Voice Ports, page 33-22.

Note For information on using 802.1X with voice VLANs, see the "Using 802.1X with Voice VLAN Ports" section on page 32-18.

To configure a port to receive voice and data traffic from a Cisco IP Phone on different VLANs, perform this task:

	Command	Purpose
Step 1	`Switch# configure terminal`	Enters configuration mode.
Step 2	`Switch(config)# interface {fastethernet | gigabitethernet} slot/port`	Specifies the interface to configure.
Step 3	`Switch(config-if)# switchport mode access`	Configures the interface as an access port. The voice VLAN is active only on access ports.
Step 4	`Switch(config-if)# switchport voice vlan vlan_num`	Instructs the Cisco IP phone to forward all voice traffic through a specified VLAN. The Cisco IP phone forwards the traffic with an 802.1p priority of 5.
Step 5	`Switch(config-if)# switchport access vlan data_vlan_num`	Configures the access VLAN (the data VLAN) on the port

	Command	Purpose
Step 6	`Switch(config-if)# end`	Returns to privileged EXEC mode.
Step 7	`Switch# show interface {fastethernet | gigabitethernet} slot/port switchport`	Verifies the configuration.

In the following example, VLAN 1 carries data traffic, and VLAN 2 carries voice traffic. In this configuration, you must connect all Cisco IP phones and other voice-related devices to switch ports that belong to VLAN 2.

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface fastEthernet 3/1
Switch(config-if)# switchport mode access
Switch(config-if)# switchport voice vlan 2
Switch(config-if)# switchport access vlan 3
Switch(config-if)# end
Switch# show interfaces fastEthernet 3/1 switchport
Name: Fa3/1
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Administrative Trunking Encapsulation: negotiate
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 3 (VLAN0003)
Trunking Native Mode VLAN: 1 (default)
Administrative Native VLAN tagging: enabled
Voice VLAN: 2 (VLAN0002)
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Unknown unicast blocked: disabled
Unknown multicast blocked: disabled
Appliance trust: none
Switch#
```

Overriding the CoS Priority of Incoming Frames

A PC or another data device can connect to a Cisco 7960 IP phone port. The PC can generate packets with an assigned CoS value. You can also use the switch CLI to override the priority of frames arriving on the phone port from connected devices, and you can set the phone port to accept (trust) the priority of frames arriving on the port.

To override the CoS priority setting received from the non-voice port on the Cisco 7960 IP phone, perform this task:

	Command	Purpose
Step 1	`Switch# configure terminal`	Enters configuration mode.
Step 2	`Switch(config)# interface {fastethernet | gigabitethernet} slot/port`	Specifies the interface to configure.
Step 3	`Switch(config-if)# [no] qos trust extend cos 3`	Sets the phone port to override the priority received from the PC or the attached device and forward the received data with a priority of 3. Use the **no** keyword to return the port to its default setting.
Step 4	`Switch(config-if)# end`	Returns to privileged EXEC mode.
Step 5	`Switch# show interface {fastethernet | gigabitethernet} slot/port switchport`	Verifies the change.

Configuring Power

The Catalyst 4500 series switch senses if it is connected to a Cisco 7960 IP phone. The Catalyst 4500 series switch can supply Power over Ethernet (PoE) to the Cisco 7960 IP phone if there is no power on the circuit. The Cisco 7960 IP phone can also be connected to an AC power source and supply its own power to the voice circuit. If there is power on the circuit, the switch does not supply it.

You can configure the switch not to supply power to the Cisco 7960 IP phone and to disable the detection mechanism. For information on the CLI commands that you can use to supply PoE to a Cisco 7960 IP phone, see Chapter 11, “Configuring Power over Ethernet.”