CHAPTER 4

Configuring Interfaces

This chapter describes the basic interface configuration for the Layer 3 switch router to help you get your Layer 3 switch router up and running. For more information about the Cisco IOS commands used in this chapter, refer to the *Cisco IOS Command Reference* publication. This chapter contains the following sections:

Note You are at Step 3 in the suggested process for configuring your Layer 3 switch router (see the "Suggested Process for Configuring the Layer 3 Switch Routers" section on page 2-1). You should have already initially configured your Layer 3 switch router before proceeding with configuring interfaces.

Understanding the Interface Configuration

The Layer 3 switch router's main function is to relay packets from one data link to another. To do that, the characteristics of the interfaces through which the packets are received and sent must be defined. Interface characteristics include, but are not limited to, IP address, address of the port, data encapsulation method, and media type.

Many features are enabled on a per-interface basis. Interface configuration mode contains commands that modify the interface operation, for example, of an Ethernet port. When you enter the **interface** command, you must specify the interface type and number.

The following general guidelines apply to all physical and virtual interface configuration processes:

- Each interface must be configured with an IP address and an IP subnet mask.
- The virtual interfaces supported by Cisco Layer 3 switch routers include subinterfaces.

  A subinterface is a mechanism that allows a single physical interface to support multiple logical interfaces or networks—that is, several logical interfaces or networks can be associated with a single physical interface. Configuring multiple virtual interfaces, or subinterfaces, on a single physical interface allows greater flexibility and connectivity on the network.

Layer 3 interfaces have both a Media Access Control (MAC) address and an interface port ID. The Layer 3 switch router keeps track of these designators and uses them to route traffic.

Media Access Control Address

Every port or device that connects to a network needs a MAC address. Other devices in the network use MAC addresses to locate specific ports in the network and to create and update routing tables and data structures.

Tips To find MAC addresses for a device, enter the **show interfaces** command.

Interface Port ID

The interface port ID designates the physical location of the Layer 3 interface within the Layer 3 switch router. This is the name that you use to identify the interface when configuring it. The system software uses interface port IDs to control activity within the Layer 3 switch router and to display status information. Interface port IDs are not used by other devices in the network; they are specific to the individual Layer 3 switch router and its internal components and software.

On the Catalyst 2948G-L3 switch router, the port IDs for the 48 Fast Ethernet interfaces are Fast Ethernet 1 through 48 and the port IDs for the 2 Gigabit Ethernet interfaces are Gigabit Ethernet 49 and 50. You can use abbreviations such as f1 through f48 to configure the 48 Fast Ethernet interfaces and g49 or g50 to configure the 2 Gigabit Ethernet interfaces on the Catalyst 2948G-L3 switch router.

Similarly on the Catalyst 4908G-L3 switch router, the port IDs for the 8 Gigabit Ethernet interfaces are Gigabit Ethernet 1 through 8. On the Catalyst 4908G-L3 switch router use gi1 as the abbreviation to configure Gigabit Ethernet interface 1 instead of g1.

Note If you use the abbreviated form of Gigabit Ethernet to configure the Gigabit Ethernet 1 interface on the Catalyst 4908G-L3 switch router, use gi1 as the port ID instead of g1.

You can enter Cisco IOS **show** commands to display information about a specific interface, or all the interfaces, in the Layer 3 switch router.

Instructions for Configuring Interfaces

The following general configuration instructions apply to all interfaces. Before you configure interfaces, be sure to have the interface network (IP or IPX) addresses and the corresponding subnet mask information. If you do not have this information, contact your network administrator.

To configure an interface, perform the following steps:

Step 1 Enter the **configure** EXEC command at the privileged EXEC prompt to enter global configuration mode.

```
Router> enable
Password:
Router# configure terminal
Router(config)#
```

Step 2 Enter the **interface** command, followed by the interface type (for example, Fast Ethernet or Gigabit Ethernet) and its interface port ID (see the "Interface Port ID" section on page 4-2).

For example, to configure a Gigabit Ethernet port, enter this command:

```
Router(config)# interface gigabitethernet number
```

Step 3 Follow each **interface** command with the interface configuration commands required for your particular interface.

The commands you enter define the protocols and applications that will run on the interface. The commands are collected and applied to the **interface** command until you enter another **interface** command, a command that is not an interface configuration command, or you enter **end** to return to privileged EXEC mode.

Step 4 Check the status of the configured interface by entering the EXEC **show** commands.

```
Router# show interface gigabitethernet 49
Gigabit Ethernet49 is up, line protocol is up
Hardware is xpif_port, address is 0050.3e7b.e907 (bia 0050.3e7b.e907)
Internet address is 11.0.0.2/8
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
Full-duplex, 1000Mb/s, GBIC connected, Force link-up
ARP type:ARPA, ARP Timeout 04:00:00
Last input 03:27:17, output never, output hang never
Last clearing of "show interface" counters never
Queueing strategy:fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
945 packets input, 320796 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 watchdog, 927 multicast
0 input packets with dribble condition detected
943 packets output, 319527 bytes, 0 underruns(0/0/0)
0 output errors, 0 collisions, 0 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
```

Understanding Layer 3 Switching Interfaces

Layer 3 switch routers support Fast Ethernet and Gigabit Ethernet interfaces. This section provides some examples of configurations for both interface types.

To configure an IP address on either a Fast Ethernet interface or a Gigabit Ethernet interface starting in global configuration mode, perform this task:

	Command	Purpose
Step 1	Router(config)# **interface** *type number* Router(config-if)#	Enter interface configuration mode to configure either the Gigabit Ethernet interface or the Fast Ethernet interface.
Step 2	Router(config-if)# **ip address** *ip-address subnet-mask*	Enter the IP address and IP subnet mask to be assigned to the interface.
Step 3	Router(config-if)# **no shutdown**	Enable the interface.

	Command	Purpose
Step 4	Router(config-if)# **exit** Router(config)#	Return to global configuration mode. Repeat Steps 1 to 3 to configure the other interfaces on the Layer 3 switch router.
Step 5	Router(config)# **end** Router#	Return to privileged EXEC mode.
Step 6	Router# **copy running-config startup-config**	Save configuration changes to NVRAM.

Tips Before you configure interfaces, be sure to have the interface network (IP or IPX) addresses and the corresponding subnet mask information. If you do not have this information, contact your network administrator.

Configuring the Fast Ethernet Interfaces (Catalyst 2948G-L3)

Note The Catalyst 4908G-L3 switch router does not have Fast Ethernet interfaces.

To configure autonegotiation on a Fast Ethernet interface, perform the following task beginning in global configuration mode:

Note The default setting for the negotiation mode is **auto** for the Fast Ethernet and Gigabit Ethernet interfaces.

	Command	Purpose
Step 1	Router(config)# **interface fastethernet** *number* Router(config-if)#	Enter interface configuration mode to configure the Fast Ethernet interface.
Step 2	Router(config)# **ip address** *ip-address subnet-mask* Router(config-if)#	Enter the IP address and IP subnet mask to be assigned to the interface.
Step 3	Router(config-if)# [**no**] **speed** [**10** | **100** | **auto**]	Configure the transmission speed for 10 or 100 Mbps. If you set the speed for **auto**, you enable autonegotiation on the system—the Layer 3 switch router matches the speed and duplex mode of the partner node.
Step 4	Router(config-if)# [**no**] **duplex** [**full** | **half** | **auto**]	Configure for full or half duplex.
Step 5	Router(config-if)# **no shutdown**	Enable the interface.

	Command	Purpose
Step 6	Router(config-if)# **end** Router#	Return to privileged EXEC mode.
Step 7	Router# **copy running-config startup-config**	Save your configuration changes to NVRAM.

The following example demonstrates initially configuring a Fast Ethernet interface with an IP address and autonegotiated speed and duplex:

```
Router(config)# interface fastethernet 1
Router(config-if)# ip address 10.1.2.4 255.0.0.0
Router(config-if)# speed auto
Router(config-if)# duplex auto
Router(config-if)# end
Router# copy running-config startup-config
```

Configuring the Gigabit Ethernet Interfaces

To configure autonegotiation on a Gigabit Ethernet interface, perform the following task beginning in global configuration mode:

Note The default setting for the negotiation mode is **auto** for the Gigabit Ethernet and Fast Ethernet interfaces. The Gigabit Ethernet port always operates at 1000 Mbps in full-duplex mode.

	Command	Purpose
Step 1	Router# **interface gigabitethernet** *number* Router#(config-if)#	Enter interface configuration mode to configure the Gigabit Ethernet interface.
Step 2	Router#(config-if)# [**no**] **negotiation auto**	Set negotiation mode to **auto**. The Gigabit Ethernet port attempts to negotiate the link with the partner port. The partner port should have the same configuration. When you set the Gigabit Ethernet interface to **no negotiation auto**, the port forces the link up no matter what the partner port setting is.
Step 3	Router#(config-if)# **no shutdown**	Enable the interface.
Step 4	Router#(config-if)# **exit** Router#(config)#	Return to global configuration mode. Repeat Steps 1 to 3 to configure the other Gigabit Ethernet interfaces.
Step 5	Router#(config)# **end** Router#	Return to privileged EXEC mode.
Step 6	Router# **copy running-config startup-config**	Save configuration changes to NVRAM.

The following example demonstrates initially configuring a Gigabit Ethernet interface with autonegotiation and an IP address:

```
Router(config)# interface gigabitethernet 49
Router(config-if)# negotiation auto
Router(config-if)# no shutdown
Router(config-if)# ip address 10.1.2.3 255.0.0.0
Router(config-if)# end
Router# copy running-config startup-config
```

Monitoring Operations on the Fast Ethernet and Gigabit Ethernet Interfaces

To verify the settings after you have configured Fast Ethernet or Gigabit Ethernet interfaces, enter the **show interface** command.

The following output from the **show interface** command displays the Fast Ethernet interface's status and global parameters and includes port speed and duplex operation:

```
Router# show interface fastethernet 1
FastEthernet1 is up, line protocol is up
Hardware is epif_port, address is 0030.40d6.4c07 (bia 0030.40d6.4c07)
Internet address is 172.20.52.10/27
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
Auto-duplex, Auto Speed, 100BaseTX
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output never, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 1 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
363371 packets input, 27266668 bytes, 0 no buffer
Received 492 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 watchdog, 356363 multicast
0 input packets with dribble condition detected
9559 packets output, 4617122 bytes, 0 underruns(0/0/0)
0 output errors, 0 collisions, 0 interface resets
0 babbles, 0 late collision, 0 deferred
0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
```

The following output from the **show interface** command displays the Gigabit Ethernet interface's status and global parameters and includes port speed and duplex operation:

```
Router# show interface gigabitethernet 1
GigabitEthernet1 is up, line protocol is up
Hardware is xpif_port, address is 0030.40d6.4d07 (bia 0030.40d6.4d07)
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
Full-duplex, 1000Mb/s, 1000Base-SX, Auto-negotiation
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:17, output never, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/475, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
234 packets input, 81432 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
```

```
watchdog, 234 multicast
0 input packets with dribble condition detected
231 packets output, 79899 bytes, 0 underruns(0/0/0)
0 output errors, 0 collisions, 0 interface resets
babbles, 0 late collision, 0 deferred
lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out
```