



# Configuring Networking Protocols

This chapter describes networking protocol configurations for the Catalyst 4840G SLB switch. It provides initial configuration information so you can get your SLB switch up and running.

For further information about the commands used in this chapter, refer to the command reference publications in the Cisco IOS documentation set and to Appendix A, “Command Reference.”

This chapter includes the following sections:

- Supported IP Routing Protocols, page 8-1
- Configuring IP Routing, page 8-2



**Note**

You are at Step 6 in the suggested process for configuring the Catalyst 4840G SLB switch. See the “Switch Configuration Steps” section on page 2-1. By now you have set up the hardware and are ready to proceed with configuring networking protocols.

## Supported IP Routing Protocols

The Catalyst 4840G SLB switch supports the routing protocols described in this section. For more information on these routing protocols, refer to the Cisco IOS *Network Protocols Configuration Guide*.

### Routing Information Protocol

Routing Information Protocol (RIP) is a distance-vector, intradomain routing protocol. RIP works well in small, homogeneous networks. However, in larger, more complex internetworks it has many limitations, such as a maximum hop count of 15, lack of support for variable-length subnet masks (VLSMs), inefficient use of bandwidth, and slow convergence.

### Open Shortest Path First

Open Shortest Path First (OSPF) is a standards-based IP routing protocol designed to overcome the limitations of IP RIP. Because OSPF is a link-state routing protocol, it sends link-state advertisements (LSAs) to all other routers within the same hierarchical area. Information on the attached interfaces and their metrics is used in OSPF LSAs. As routers accumulate link-state information, they use the Shortest Path First (SPF) algorithm to calculate the shortest path to each node. Additional OSPF features include equal-cost multipath routing and routing based on the upper-layer type of service (ToS) requests.

OSPF employs the concept of an *area*, which is a grouping of contiguous OSPF networks and hosts. OSPF areas are logical subdivisions of OSPF autonomous systems whose internal topology is hidden to routers outside the area. Areas allow an additional level of hierarchy different from that provided by IP network classes, and they can be used to aggregate routing information and mask the details of a network. These features make OSPF particularly scalable to large networks.

## Interior Gateway Routing Protocol

Interior Gateway Routing Protocol (IGRP) is a distance vector interior-gateway routing protocol. Distance vector routing protocols call for each other to send all or a portion of its routing table in a routing update message at regular intervals to each of its neighboring routers. As routing information proliferates through the network, routers can calculate distance to all the nodes within the internetwork. IGRP uses a combination of metrics: internetwork delay, bandwidth, reliability, and load are all factored into the routing decision.

## Enhanced Interior Gateway Routing Protocol

Enhanced Interior Gateway Routing Protocol (EIGRP) is an enhanced version of IGRP that combines the advantages of link-state protocols with distance vector protocols. EIGRP incorporates the Diffusing Update Algorithm (DUAL). EIGRP includes features such as fast convergence, variable-length subnet masks, partial bounded updates, and multiple network-layer support. When a network topology change occurs, EIGRP checks its topology table for a suitable new route to the destination. If such a route exists in the table, EIGRP updates the routing table instantly.

EIGRP saves bandwidth by sending routing updates only when routing information changes. The updates contain only information about the link that changed, not the entire routing table. EIGRP also takes into consideration the available bandwidth when determining the rate at which it transmits updates.

## Configuring IP Routing

IP routing is enabled by default on the Catalyst 4840G SLB switch. Configure the interface with these addresses:

- Network address
- Subnetwork address
- IP subnet mask

These global configurations are also required:

- Select a routing protocol, such as the Enhanced Interior Gateway Routing Protocol (EIGRP) or the Routing Information Protocol (RIP).
- Assign IP network numbers without specifying subnet values.

To configure routing to run on a Fast Ethernet interface, perform this task:

	Command	Purpose
Step 1	SLB-Switch(config)# <b>interface fastethernet</b> <i>interface_number</i> SLB-Switch(config-if)#	Enter Ethernet interface configuration mode to configure a particular Fast Ethernet interface.
Step 2	SLB-Switch(config-if)# <b>ip address</b> <i>ip-address subnet-mask</i>	Assign an IP address and subnet mask to the interface.
Step 3	SLB-Switch(config-if)# <b>exit</b> SLB-Switch(config)#	Exit interface configuration mode and step back one level to global configuration mode.
Step 4	SLB-Switch(config)# <b>router rip</b> SLB-Switch(config-router)#	Define RIP as the routing protocol and start the RIP routing process.
Step 5	SLB-Switch(config-router)# <b>network</b> <i>network-number</i>	Specify a directly connected network based on the Network Information Center (NIC) network number—not a subnet number or individual address. The routing process associates interfaces with the appropriate addresses and begins processing packets on the specified network.
Step 6	SLB-Switch(config-router)# <b>exit</b> SLB-Switch(config)#	Return to global configuration mode.
Step 7	SLB-Switch(config)# <b>router igrp</b> <i>autonomous-system-number</i> SLB-Switch(config-router)#	Define IGRP as the IP routing protocol and enter the autonomous system number to which this switch belongs.
Step 8	SLB-Switch(config-router)# <b>network</b> <i>network-number</i>	Define the directly connected networks that run IGRP.
Step 9	SLB-Switch(config-router)# <b>exit</b> SLB-Switch(config)#	Return to global configuration mode.
Step 10	SLB-Switch(config)# <b>router eigrp</b> <i>autonomous-system-number</i> SLB-Switch(config-router)#	Define EIGRP as the IP routing protocol and enter the autonomous system number to which this SLB switch belongs.
Step 11	SLB-Switch(config-router)# <b>network</b> <i>network-number</i>	Define the directly connected networks that run EIGRP.  The network number is the number of the network that is advertised by this SLB switch.
Step 12	SLB-Switch(config-router)# <b>exit</b> SLB-Switch(config)#	Return to global configuration mode.
Step 13	SLB-Switch(config)# <b>router ospf</b> <i>process-id</i> SLB-Switch(config-router)#	Define OSPF as the IP routing protocol.  The process ID identifies a unique OSPF router process. This number is internal to the SLB switch only; the process ID does not have to match the process IDs on other routers.

	Command	Purpose
Step 14	SLB-Switch(config-router)# <b>network</b> <i>network-address wildcard-mask area area-id</i>	Assign an interface to a specific area: <ul style="list-style-type: none"> <li>• The network address is the address of directly connected networks or subnets.</li> <li>• The wildcard mask is an inverse mask used to compare a given address with interface addressing to determine whether OSPF will use this interface.</li> <li>• The area parameter identifies the interface as belonging to an area.</li> <li>• The area ID specifies the area associated with the network address.</li> </ul>
Step 15	SLB-Switch(config-router)# <b>end</b> SLB-Switch#	Return to privileged EXEC mode.
Step 16	SLB-Switch# <b>copy system:running-config</b> <b>nvrnram:startup-config</b>	Save your configuration changes to NVRAM.

## Verifying IP Operation

Once IP routing is configured, you can monitor and troubleshoot the protocol operation by performing these tasks:

Command	Purpose
SLB-Switch# <b>show ip protocol</b>	Display values about routing timers and network information associated with the entire router. Use this information to identify a router that is suspected of delivering bad router information.
SLB-Switch# <b>show ip route</b>	Display the contents of the IP routing table. The routing table contains entries for all known networks and subnetworks, and contains a code that indicates how that information was learned.
SLB-Switch# <b>show ip interfaces</b>	Display the status and global parameters associated with an interface. Cisco IOS software automatically enters a directly connected route in the routing table if the interface is one through which a protocol can send and receive packets. Such an interface is marked “up.” If the interface is unusable, it is removed from the routing table.
SLB-Switch# <b>debug ip rip</b>	Display RIP routing updates as the updates are sent and received.
SLB-Switch# <b>debug lss ipucast</b> { <b>events</b>   <b>errors</b>   <b>reload</b> }	Display updates sent to the interface module for the IP switching control layer.