



## Configuring Apollo Domain

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The Apollo Domain routing protocol is the native-mode networking protocol for Apollo workstations. This chapter describes how to configure Apollo Domain routing and provides configuration examples. For a complete description of the Apollo Domain commands discussed in this chapter, refer to the “Apollo Domain Commands” chapter in the *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference* publication. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the [“Identifying Supported Platforms”](#) section in the “Using Cisco IOS Software” chapter.



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**Note**

The Apollo Domain networking protocol will no longer be offered after Cisco IOS Release 12.2. Information about this protocol will not appear in future releases of the Cisco IOS software documentation set.

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**Note**

Not all Cisco access servers support the Apollo Domain protocol. For more information, refer to the release notes for the current Cisco IOS release.

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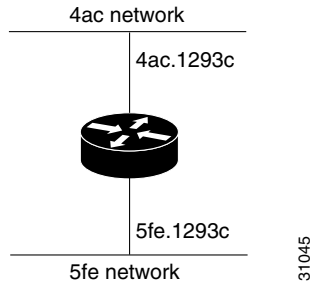
## Apollo Domain Addresses

Apollo Domain network addresses are 32-bit quantities represented in hexadecimal numbers in the format *network.host*. Each host has a single address that is used for all its network connections.

The network number is a 12-bit number, expressed in hexadecimal, that identifies a physical network. Network numbers must be unique throughout an Apollo Domain internetwork.

The host number is a 20-bit quantity expressed in hexadecimal. An Apollo Domain host can have interfaces on more than one physical network (Ethernet, Domain Token Ring, serial line, and so on).

For the network address 5fe.1293c in [Figure 2](#), 5fe identifies a physical network and 1293c identifies a host.

**Figure 2** Apollo Domain Addresses

## Apollo Domain Configuration Task List

To configure Apollo Domain routing, perform the tasks in the following sections:

- [Configuring Apollo Domain Routing](#) (Required)
- [Controlling Access to the Apollo Domain Network](#) (Optional)
- [Tuning Apollo Domain Network Performance](#) (Optional)
- [Configuring Apollo Domain over WANs](#) (Optional)
- [Monitoring the Apollo Domain Network](#) (Optional)

See the “Apollo Domain Configuration Examples” section at the end of this chapter for configuration examples.

## Configuring Apollo Domain Routing

You configure Apollo Domain routing by first enabling it on the router and then configuring it on each interface.

To configure the Apollo Domain routing protocol, perform the tasks in the following sections:

- [Enabling Apollo Domain Routing](#) (Required)
- [Enabling Apollo Domain Routing on an Interface](#) (Required)
- [Enabling Concurrent Routing and Bridging](#) (Optional)

## Enabling Apollo Domain Routing

To enable Apollo Domain routing, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>apollo routing</b> host	Enables Apollo Domain routing.

For an example of how to enable Apollo Domain routing, see the “[Apollo Domain Routing Example](#)” section at the end of this chapter.

## Enabling Apollo Domain Routing on an Interface

To enable Apollo Domain routing on an interface, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# Router(config-if)# <b>apollo network number</b>	Enables Apollo Domain routing on an interface.

For an example of how to enable Apollo Domain routing, see the “[Apollo Domain Routing Example](#)” section at the end of this chapter.

## Enabling Concurrent Routing and Bridging

You can route Apollo Domain on some interfaces and transparently bridge it on other interfaces simultaneously. To enable this type of routing, you must enable concurrent routing and bridging. To configure an interface for concurrent routing and bridging, you use the **bridge crb** command to enable concurrent routing and bridging on the router.



### Note

When Apollo Domain routing protocol is enabled, fast switching of Apollo packets is not supported. Therefore, in most cases, configuring an interface for bridging can provide enhanced packet transfer performance.

To enable concurrent routing and bridging, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>bridge crb</b>	Enables concurrent routing and bridging.

## Controlling Access to the Apollo Domain Network

To control access to Apollo Domain networks, you create access lists and then apply them to individual interfaces. Apollo Domain access lists control access based on a range of network numbers. The conditions defined in access lists are applied to outgoing routed packets.

Remember the following when you configure Apollo Domain network access control:

- Access list entries are evaluated in the order you enter them, and the first matching entry is used. To improve performance, place the most commonly matched entries near the beginning of the access list.
- An implicit *deny everything* entry is defined at the end of an access list unless you include an explicit *permit everything* entry at the end of the list.
- All new entries to an existing list are placed at the end of the list. You cannot add an entry to the middle of a list. Consequently, if you have previously included an explicit *permit everything* entry, new entries will never be scanned. The solution is to delete the access list and retype it with the new entries.

To create an access list, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>apollo access-list</b> <i>access-list-name</i> {deny   permit} [ <i>firstnet-</i> ] <i>lastnet.host</i> [ <i>wildcard-mask</i> ]	Creates an Apollo Domain access list.

To apply an access list to an interface and activate it on that interface, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# <b>apollo access-group</b> <i>access-list-name</i>	Applies an access list name to an interface.

For an example of creating and applying an access list, see the “[Access List Example](#)” section at the end of this chapter.

To display the filters defined on an interface, use the **show apollo interface** command.

## Tuning Apollo Domain Network Performance

To tune Apollo Domain network performance, perform one or more of the following tasks:

- [Configuring Static Routes](#) (Optional)
- [Setting Routing Table Update Timers](#) (Optional)
- [Setting the Maximum Paths](#) (Optional)

### Configuring Static Routes

Cisco IOS software uses metrics to determine the best path over which packets should be sent. However, you may want to add static routes to the routing table to explicitly specify paths to certain destinations. Static routes always override any paths determined by metrics.

Be careful when assigning static routes. When links associated with static routes are lost, traffic may stop being forwarded, or traffic may be forwarded to a nonexistent destination, even though an alternative path might be available.

To add a static route to Cisco IOS software routing table, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>apollo route</b> <i>destination-network network.host</i>	Adds a static route to the routing table.

## Setting Routing Table Update Timers

You can set how often the entries in the routing table are updated. Note, however, that you should set this interval only in a configuration in which all routers are Cisco routers.

To set how often the entries in the routing table are updated, use the following command in interface configuration mode:

Command	Purpose
Router(config-if)# <b>apollo update-time</b> <i>interval</i>	Sets the interval after which the routing table should be updated.

For an example of setting routing table update timers, see the “[Routing Table Update Timer Example](#)” section at the end of this chapter.

## Setting the Maximum Paths

You can set the maximum number of equal-cost, parallel paths to a destination. (Note that when paths have differing costs, Cisco IOS software chooses lower-cost routes in preference to higher-cost routes.) The software distributes output on a packet-by-packet basis in round-robin fashion. That is, the first packet is sent along the first path, the second packet along the second path, and so on. If the final path is reached before all packets are sent, the next packet is sent to the first path, the next to the second path, and so on. This round-robin scheme is used regardless of whether fast switching is enabled.

Limiting the number of equal-cost paths can save memory on routers with limited memory or very large configurations. Additionally, in networks with a large number of multiple paths and systems with limited ability to cache out-of-sequence packets, performance might suffer when traffic is split between many paths.

To set the maximum number of paths, use the following command in global configuration mode:

Command	Purpose
Router(config)# <b>apollo maximum-paths</b> <i>paths</i>	Sets the maximum number of equal-cost paths to a destination.

For an example of setting the maximum number of equal-cost, parallel paths to a destination, see the section “[Apollo Domain Routing Example](#)” later in this chapter.

## Configuring Apollo Domain over WANs

You can configure Apollo Domain over X.25 networks by configuring the appropriate address mappings as described in the “Configuring X.25 and LAPB” chapter in the *Cisco IOS Wide-Area Networking Configuration Guide*.

## Monitoring the Apollo Domain Network

To monitor an Apollo Domain network, use one or more of the following commands in EXEC mode:

Command	Purpose
Router> <b>show apollo arp</b>	Lists the entries in the Apollo Domain Address Resolution Protocol (ARP) table.
Router> <b>show apollo interface</b> [ <i>type number</i> ]	Displays the status of the Apollo Domain interfaces configured in Cisco IOS software and the parameters configured on each interface.
Router> <b>show apollo route</b> [ <i>network</i> ]	Lists the entries in the Apollo Domain routing table.
Router> <b>show apollo traffic</b>	Displays information about the Apollo Domain packets sent and received.

## Apollo Domain Configuration Examples

For help in configuring Apollo Domain routing, use the configuration examples in the following sections:

- [Apollo Domain Routing Example](#)
- [Access List Example](#)
- [Routing Table Update Timer Example](#)

### Apollo Domain Routing Example

The following example shows how to configure Apollo Domain routing on a router with two Ethernet interfaces. The first set of commands does the following:

- Enables the Apollo Domain routing protocol.
- Assigns an Apollo Domain network address.
- Assigns network numbers to two Ethernet interfaces.

The second set of commands does the following:

- Assigns the router whose host number is 23d5a to handle all traffic routed over network 35.
- Allows traffic to be routed over a maximum of four paths.
- Sets the timer to update the routing table for Ethernet interface 0 every 40 seconds.

Create an access list called doc that denies access to networks 2a through 2f, and apply this access list to Ethernet interface 1. In this example, packets destined for these networks that are sent out Ethernet interface 1 will be blocked.

```
apollo routing 23d5a
interface ethernet 0
  apollo network 5f
interface ethernet 1
  apollo network 4e
!
apollo route 35 23d5a
apollo maximum-paths 4
```

```
interface ethernet 0
  apollo update-time 40
  apollo access-list doc deny 2a-2f
interface ethernet 1
  apollo access-group doc
```

## Access List Example

The following example shows how to create an Apollo Domain access list and applies it to Ethernet interface 0. In this example, the first line denies access to networks 3a through 3f, the second line denies access to the host 5fe.1293.c, and the third line permits access to all other networks and hosts. The access list conditions will be applied to all routed packets going out Ethernet interface 0.

```
apollo access-list eng deny 3a-3f.0 ffff
apollo access-list eng deny 5fe.1293c
apollo access-list eng permit -1.0 ffff
!
interface ethernet 0
  apollo access-group eng
```

## Routing Table Update Timer Example

The following example shows how to set the update timers on two interfaces in the router. The update timer granularity would be 20 seconds, because this is the lowest value specified.

```
interface serial 0
  apollo update-time 40
interface ethernet 0
  apollo update-time 20
interface ethernet 1
  apollo update-time 25
```

