



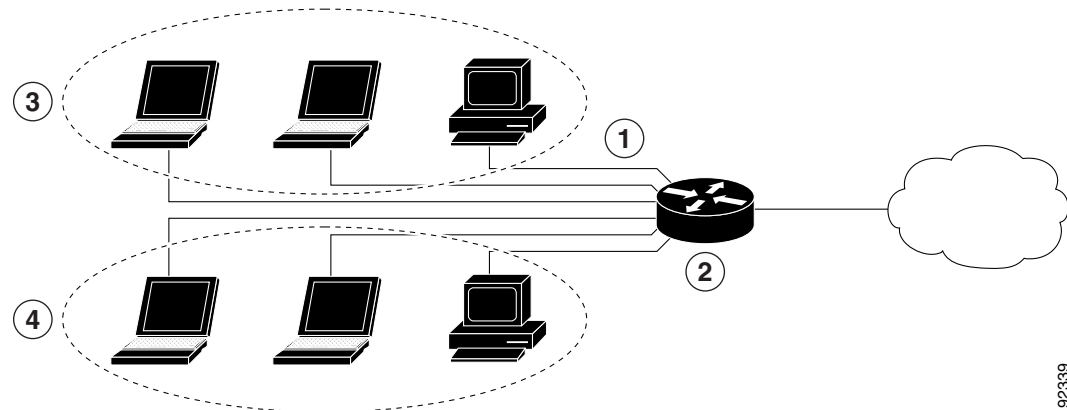
CHAPTER 15

Configuring a LAN with DHCP and VLANs

The Cisco 860 and Cisco 880 series Integrated Services Routers (ISRs) support clients on both physical LANs and VLANs. The routers can use the Dynamic Host Configuration Protocol (DHCP) to enable automatic assignment of IP configurations for nodes on these networks.

Figure 15-1 shows a typical deployment scenario with two physical LANs connected by the router and two VLANs.

Figure 15-1 Physical and Virtual LANs with DHCP Configured on the Cisco Router



92339

1	Fast Ethernet LAN (with multiple networked devices)
2	Router and DHCP server—Cisco 860 and 880 series access router—connected to the Internet
3	VLAN 1
4	VLAN 2

DHCP

DHCP, which is described in RFC 2131, uses a client/server model for address allocation. As an administrator, you can configure your Cisco 800 series router to act as a DHCP server, providing IP address assignment and other TCP/IP-oriented configuration information to your workstations. DHCP frees you from having to manually assign an IP address to each client.

When you configure a DHCP server, you must configure the server properties, policies, and DHCP options.

**Note**

Whenever you change server properties, you must reload the server with the configuration data from the Network Registrar database.

VLANs

The Cisco 860 and 880 series access routers support four Fast Ethernet ports on which you can configure VLANs.

VLANs enable networks to be segmented and formed into logical groups of users, regardless of the user's physical location or LAN connection.

Configuration Tasks

Perform the following tasks to configure this network scenario:

- [Configure DHCP](#)
- [Configure VLANs](#)

**Note**

The procedures in this chapter assume you have already configured basic router features as well as PPPoE or PPPoA with NAT. If you have not performed these configurations tasks, see [Chapter 3, “Basic Router Configuration,”](#) [Chapter 13, “Configuring PPP over Ethernet with NAT,”](#) and [Chapter 14, “Configuring PPP over ATM with NAT”](#) as appropriate for your router.

Configure DHCP

To configure your router for DHCP operation, perform these steps, beginning in global configuration mode:

SUMMARY STEPS

1. **ip domain name** *name*
2. **ip name-server** *server-address1* [*server-address2...server-address6*]
3. **ip dhcp excluded-address** *low-address* [*high-address*]
4. **ip dhcp pool** *name*
5. **network** *network-number* [*mask* | *prefix-length*]
6. **import all**
7. **default-router** *address* [*address2...address8*]
8. **dns-server** *address* [*address2...address8*]
9. **domain-name** *domain*
10. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	ip domain name <i>name</i> Example: Router(config)# ip domain name smallbiz.com Router(config)#	Identifies the default domain that the router uses to complete unqualified hostnames (names without a dotted-decimal domain name).
Step 2	ip name-server <i>server-address1</i> [<i>server-address2...server-address6</i>] Example: Router(config)# ip name-server 192.168.11.12 Router(config)#	Specifies the address of one or more Domain Name System (DNS) servers to use for name and address resolution.
Step 3	ip dhcp excluded-address <i>low-address</i> [<i>high-address</i>] Example: Router(config)# ip dhcp excluded-address 192.168.9.0	Specifies IP addresses that the DHCP server should not assign to DHCP clients. This example excludes the router address.
Step 4	ip dhcp pool <i>name</i> Example: Router(config)# ip dhcp pool dpool1 Router(config-dhcp)#	Creates a DHCP address pool on the router and enters DHCP pool configuration mode. <ul style="list-style-type: none"> The <i>name</i> argument can be a string or an integer.
Step 5	network <i>network-number</i> [<i>mask</i> <i>prefix-length</i>] Example: Router(config-dhcp)# network 10.10.0.0 255.255.255.0 Router(config-dhcp)#	Defines the subnet number (IP) address for the DHCP address pool, optionally including the mask.
Step 6	import all Example: Router(config-dhcp)# import all Router(config-dhcp)#	Imports DHCP option parameters into the DHCP portion of the router database.
Step 7	default-router <i>address</i> [<i>address2...address8</i>] Example: Router(config-dhcp)# default-router 10.10.10.10 Router(config-dhcp)#	Specifies up to eight default routers for a DHCP client.
Step 8	dns-server <i>address</i> [<i>address2...address8</i>] Example: Router(config-dhcp)# dns-server 192.168.35.2 Router(config-dhcp)#	Specifies up to 8 DNS servers available to a DHCP client.

	Command or Action	Purpose
Step 9	domain-name <i>domain</i> Example: Router(config-dhcp)# domain-name cisco.com Router(config-dhcp)#	Specifies the domain name for a DHCP client.
Step 10	exit Example: Router(config-dhcp)# exit Router(config)#	Exits DHCP configuration mode, and enters global configuration mode.

Configuration Example

The following configuration example shows a portion of the configuration file for the DHCP configuration described in this chapter.

```
ip dhcp excluded-address 192.168.9.0
!
ip dhcp pool dpool1
  import all
  network 10.10.0.0 255.255.255.0
  default-router 10.10.10.10
  dns-server 192.168.35.2
  domain-name cisco.com
!
ip domain name smallbiz.com
ip name-server 192.168.11.12
```

Verify Your DHCP Configuration

Use the following commands to view your DHCP configuration.

- **show ip dhcp import**—Displays the optional parameters imported into the DHCP server database.
- **show ip dhcp pool**—Displays information about the DHCP address pools.
- **show ip dhcp server statistics**—Displays the DHCP server statistics, such as the number of address pools and bindings.

```
Router# show ip dhcp import
Address Pool Name: dpool1
```

```
Router# show ip dhcp pool
Pool dpool1 :
  Utilization mark (high/low)      : 100 / 0
  Subnet size (first/next)         : 0 / 0
  Total addresses                   : 254
  Leased addresses                  : 0
  Pending event                    : none
  1 subnet is currently in the pool :
  Current index      IP address range      Leased addresses
  10.10.0.1         10.10.0.1      - 10.10.0.254    0
```

```
Router# show ip dhcp server statistics
```

```

Memory usage          15419
Address pools         1
Database agents       0
Automatic bindings    0
Manual bindings       0
Expired bindings      0
Malformed messages    0
Secure arp entries    0

Message              Received
BOOTREQUEST          0
DHCPDISCOVER         0
DHCPRREQUEST         0
DHCPCDECLINE         0
DHCPRELEASE          0
DHCPIFORM            0

Message              Sent
BOOTREPLY            0
DHCPOFFER            0
DHCPACK              0
DHCPCNAK             0
Router#

```

Configure VLANs

To configure VLANs on your router, perform these steps, beginning in global configuration mode:

SUMMARY STEPS

1. `vlan vlan_id`
2. `exit`

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>vlan <i>vlan_id</i></code> Example: Router(config)# <code>vlan 2</code>	Adds VLANs, with identifiers ranging from 1-4094.
Step 2	<code>exit</code> Example: Router(config)# <code>exit</code>	Updates the VLAN database, propagates it throughout the administrative domain, and returns to privileged EXEC mode.

Assign a Switch Port to a VLAN

To assign a switch port to a VLAN, perform these steps, beginning in global configuration mode:

SUMMARY STEPS

1. **interface** *switch port id*
2. **switchport access vlan** *vlan-id*
3. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	interface <i>switch port id</i> Example: Router(config)# interface FastEthernet 2 Router(config-if)#	Specifies the switch port that you assign to the VLAN.
Step 2	switchport access vlan <i>vlan-id</i> Example: Router(config-if)# switchport access vlan 2 Router(config-if)#	Assigns a port to the VLAN.
Step 3	end Example: Router(config-if)# end Router#	Exits interface mode and returns to privileged EXEC mode.

Verify Your VLAN Configuration

Use the following commands to view your VLAN configuration.

- **show**—Entered from VLAN database mode. Displays summary configuration information for all configured VLANs.
- **show vlan-switch**—Entered from privileged EXEC mode. Displays detailed configuration information for all configured VLANs.

```
Router# vlan database
Router(vlan)# show

VLAN ISL Id: 1
  Name: default
  Media Type: Ethernet
  VLAN 802.10 Id: 10001
  State: Operational
  MTU: 1500
  Translational Bridged VLAN: 1002
  Translational Bridged VLAN: 1003

VLAN ISL Id: 2
  Name: VLAN0002
  Media Type: Ethernet
  VLAN 802.10 Id: 10002
  State: Operational
  MTU: 1500

VLAN ISL Id: 3
  Name: red-vlan
  Media Type: Ethernet
  VLAN 802.10 Id: 10003
  State: Operational
  MTU: 1500

VLAN ISL Id: 1002
  Name: fddi-default
  Media Type: FDDI
  VLAN 802.10 Id: 101002
  State: Operational
  MTU: 1500
  Bridge Type: SRB
  Translational Bridged VLAN: 1
  Translational Bridged VLAN: 1003

VLAN ISL Id: 1003
  Name: token-ring-default
  Media Type: Token Ring
  VLAN 802.10 Id: 101003
  State: Operational
  MTU: 1500
  Bridge Type: SRB
  Ring Number: 0
  Bridge Number: 1
  Parent VLAN: 1005
  Maximum ARE Hop Count: 7
  Maximum STE Hop Count: 7
  Backup CRF Mode: Disabled
  Translational Bridged VLAN: 1
  Translational Bridged VLAN: 1002

VLAN ISL Id: 1004
  Name: fddinet-default
  Media Type: FDDI Net
  VLAN 802.10 Id: 101004
  State: Operational
  MTU: 1500
  Bridge Type: SRB
  Bridge Number: 1
  STP Type: IBM

VLAN ISL Id: 1005
  Name: trnet-default
```

```

Media Type: Token Ring Net
VLAN 802.10 Id: 101005
State: Operational
MTU: 1500
Bridge Type: SRB
Bridge Number: 1
STP Type: IBM

```

```
Router# show vlan-switch
```

VLAN Name	Status	Ports
1 default	active	Fa0, Fa1, Fa3
2 VLAN0002	active	Fa2
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	1002	1003
2	enet	100002	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	1	1003
1003	tr	101003	1500	1005	0	-	-	srb	1	1002
1004	fdnet	101004	1500	-	-	1	ibm	-	0	0
1005	trnet	101005	1500	-	-	1	ibm	-	0	0