Configuring DHCP Enhancements for Edge-Session Management

The DHCP Enhancements for Edge-Session Management feature provides the capability of simultaneous service by multiple Internet Service Providers (ISPs) to customers using one network infrastructure. The end-user customer may change ISPs at any time.

The DHCP enhancements evolved out of the Service Gateways (SGs) requirement to receive information from the DHCP server about when client DISCOVER packets (session initiation) are received, when an address has been allocated to a client, and when a client has released a DHCP lease or the lease has expired (session termination).

Module History

This module was first published on March 29, 2005, and last updated on February 27, 2006.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all features. To find information about feature support and configuration, use the "Feature Information for DHCP Enhancements for Edge-Session Management" section on page 20.

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Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Information About DHCP Enhancements for Edge-Session Management

To configure the DHCP Enhancements for Edge-Session Management feature, you should understand the following concepts:

DHCP Servers and Relay Agents

DHCP provides a framework for passing configuration information dynamically to hosts on a TCP/IP network. A DHCP client is an Internet host using DHCP to obtain configuration parameters such as an IP address.

A DHCP relay agent is any host that forwards DHCP packets between clients and servers. Relay agents are used to forward requests and replies between clients and servers when they are not on the same physical subnet. Relay agent forwarding is distinct from the normal forwarding of an IP router, where IP datagrams are switched between networks somewhat transparently. By contrast, relay agents receive DHCP messages and then generate a new DHCP message to send on another interface.

For more information, refer to the DHCP modules in the *Cisco IOS IP Addressing Services Configuration Guide*, Release 12.4.

On-Demand Address Pool Management

An On-Demand Address Pool (ODAP) is used to centralize the management of large pools of addresses and simplifies the configuration of large networks. ODAP provides a central management point for the allocation and assignment of IP addresses.

When a Cisco router is configured as an ODAP manager, pools of IP addresses are dynamically increased or reduced in size depending on the address utilization level. The ODAP manager is supported by centralized Remote Authentication Dial-In User Service (RADIUS) or DHCP servers and is configured to request an initial pool of addresses from either the RADIUS or DHCP server.

The ODAP manager controls IP address assignment and will allocate additional IP addresses as necessary. This method of address allocation and assignment optimizes the use of available address space and simplifies the configuration of medium and large-sized networks.

For more information, see the "Configuring the DHCP Server On-Demand Address Pool Manager" module.

Design of the DHCP Enhancements for Edge-Session Management Feature

With the DHCP Enhancements for Edge-Session Management feature, a DHCP server and relay agent are separate, but closely coupled. The basic design of the feature encompasses two types of configuration at the edge of an ISP network as follows:

- DHCP server and an SG that are co-resident (in the same device)
- DHCP relay agent and an SG that are co-resident

DHCP Server Co-Resident with the SG

With this configuration, the DHCP server is in the same device as the SG and allocates addresses from locally configured address pools or acquires a subnet of addresses to allocate from some other system in the network. There are no changes to the server address allocation function to support the configuration.

This configuration enables the DHCP server to notify the SG that it has received a broadcast sent by the end-user DHCP client. The SG passes the MAC address and other information to the DHCP server. The SG also passes a class name (for example, the name of the ISP), which is used by the DHCP server to match a pool-class definition.

Lease-state notifications are always made by the DHCP server to the SG, because the information is already present.

Note The local configuration may also be performed by an ODAP that acquires subnets for the address pools from another DHCP server or a RADIUS server.

DHCP Relay Agent Co-Resident with the SG

With this configuration, the relay agent is in the same device as the SG and intercedes in DHCP sessions to appear as the DHCP server to the DHCP client. As the server, the relay agent may obtain enough information about the DHCP session to notify the SG of all events (for example, lease termination).

Appearing to be the DHCP server is performed by using the DHCP functionality that is currently in use on unnumbered interfaces. This functionality enables the relay agent to substitute its own IP address for the server.

The packet is passed by the relay agent to the DHCP server and the SG is notified of the receipt. Following the notification, an inquiry is made by the relay agent to the SG about which DHCP class name to use. Then, the packet is passed by the relay agent to the selected DHCP server.

The end-user DHCP client MAC address and other pertinent information is passed to the SG. The SG returns the DHCP class name to use when matching a DHCP pool if the SG is configured to do so. If the DHCP relay agent is not acting as a server, it relays the packet to the DHCP server.

Note An address pool may have one DHCP class defined to specify one central DHCP server to which the relay agent passes the packet, or it may have multiple DHCP classes defined to specify a different DHCP server for each client.

Benefits of the DHCP Enhancements for Edge-Session Management

The benefits of the DHCP Enhancements for Edge-Session Management feature are as follows:

- Allows the full DHCP server system to be located farther inside the network, while only running a relatively simple DHCP relay agent at the edge.
- Simplifies the DHCP configuration at the edge.

- Allows all DHCP server administration to occur closer to the middle of the network on one centralized DHCP server, or on separate DHCP servers (one for each ISP).
- Allows each ISP full control over all DHCP options and lease times.
- Allows both the DHCP server and client configurations to be used on the same edge system simultaneously.

How to Configure DHCP Enhancements for Edge-Session Management

This section contains the following procedures:

Configuring the DHCP Address Pool and a Class Name

Perform this task to configure a DHCP server that assigns addresses from an address pool for a specific class name that has been assigned by an SG that is co-resident with the DHCP server at the edge.

If a DHCP server is resident in the same device as an SG and both are at the edge, a class name and address pool should be configured. In this case, the DHCP server notifies an SG of a DISCOVER broadcast received from a client and the SG returns a class name. The returned class name designates an address range of an address pool. The DHCP server sends the MAC address and IP address of the incoming interface or the specified relay-agent address to the SG.

Note If the DHCP server has its address pools defined locally or retrieves the subnets from ISP DHCP servers or AAA servers using ODAP, additional DHCP server configuration on behalf of the SG is not required.

If dynamic allocation of the address pool is required using ODAP, the **origin** command is specified.

Prerequisites

The specification of the class name is required in the DHCP address-pool configuration and in the SG system itself to designate each DHCP client class name. A default class name should be configured if a user does not have one.

Each address pool should be associated with one or more DHCP classes (address-provider ISPs). When the DHCP client selects an ISP, the selection becomes the class name designated by the SG.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *name*

4. **origin** {**dhcp** | **file** *url*}
5. **network** *network-number* [*mask* | *prefix-length*]
6. **class** *class-name*
7. **address range** *start-ip end-ip*
8. Repeat Steps 3, 5, and 6.
9. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool`	Configures a DHCP address pool on a Cisco IOS DHCP server and enters DHCP pool configuration mode. The *name* argument is the name of the pool and may either be a symbolic string (such as engineering) or an integer (such as 0).
Step 4	**origin** {**dhcp** | **file** *url*} **Example:** `Router(dhcp-config)# origin dhcp`	(Optional) Configures an address pool as an On-Demand Address Pool (ODAP) or static mapping pool. The argument and keywords are as follows:
Step 5	**network** *network-number* [*mask* | *prefix-length*] **Example:** `Router(dhcp-config)# network 10.10.0.0 255.255.0.0`	Configures the subnet number and mask for a DHCP address pool on a Cisco IOS DHCP server. The arguments are as follows: • *network-number*—The IP address of the DHCP address pool. Use this argument if ODAP is not the IP address assignment method. • *mask*—(Optional) The bit combination that renders which portion of the address of the DHCP address pool refers to the network or subnet and which part refers to the host. • *prefix-length*—(Optional) The number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).

	Command or Action	Purpose
Step 6	**class** *class-name* **Example:** `Router(dhcp-config)# class abc-pool`	Associates a class with a DHCP address pool and enters DHCP pool-class configuration mode. The *class-name* argument is the name of the class. It should match the DHCP address pool name. Repeat this step to specify a default class name if required by the SG.
Step 7	**address range** *start-ip end-ip* **Example:** `Router(config-dhcp-pool-class)# address range 10.10.5.0 10.99.99.99`	(Optional) Configures an IP address range from which the DHCP server would allocate the IP addresses. If an SG returned an IP address that is not configured, no action is taken. This step enables the allocation of an address from a range for the class name specified in the previous step. **Note** The **address range** command cannot be used with a relay pool that is configured with the **relay destination** command. Further, if no address range is assigned to a class name, the address is specified with the **network** command.
Step 8	Repeat Steps 3, 5, and 6.	If there is an interface configured with multiple subnets and different ISPs, repeat this step to match the number of subnets. See the "Multiple DHCP Pools and Different ISPs Configuration: Example" section on page 17.
Step 9	**exit** **Example:** `Router(config-dhcp-pool-class)# exit`	Exits to DHCP pool configuration mode.

Configuring a Relay Pool with a Relay Source and Destination

Perform this task to configure a relay pool when the DHCP relay and SG are resident in the same device at the edge, and all end users will obtain addresses from one pool. This task replaces the IP helper-address interface configuration.

If the SG notifies the relay agent that DHCP session notifications are required for a particular DHCP client, the relay agent will retain enough information about the DHCP session to notify the SG of all events (for example, lease termination). The relay intercedes DHCP sessions and assumes the role of the DHCP server. The IP address configuration becomes a dynamically changing value depending on the DHCP client information and the SG device policy information.

Restrictions

If a relay agent is interceding in DHCP sessions and assuming the role of the DHCP server, the use of DHCP authentication is not possible.

SUMMARY STEPS

1. **enable**
2. **configure terminal**

3. **ip dhcp pool** *name*
4. **update arp**
5. **relay source** *ip-address subnet-mask*
6. **relay destination** [**vrf** *vrf-name* | **global**] *ip-address*
7. **accounting** *method-list-name*
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool`	Configures a DHCP address pool on a Cisco IOS DHCP server and enters DHCP pool configuration mode. The *name* argument is the name of the pool and may either be a symbolic string (such as engineering) or an integer (such as 0). More than one name may be configured.
Step 4	**update arp** **Example:** `Router(dhcp-config)# update arp`	(Optional) Configures secure and dynamic Address Resolution Protocol (ARP) entries in the ARP table to their corresponding DHCP bindings. **Note** If the system is allocating an address from an address pool, it will add secure ARP. If the system is relaying a packet using an address pool, it will also add secure ARP.
Step 5	**relay source** *ip-address subnet-mask* **Example:** `Router(dhcp-config)# relay source 10.0.0.0 255.0.0.0`	Configures the relay source. The *ip-address* and *subnet-mask* arguments are the IP address and subnet mask for the relay source. **Note** This command is similar to the **network** command in a normal DHCP network pool, because it restricts the use of the address pool to packets arriving on the interface whose configured IP address and mask matches the relay source configuration.

	Command or Action	Purpose
Step 6	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(dhcp-config)# relay destination 10.5.5.0`	Configures the IPv4 address of a remote DHCP server to which DHCP client packets are sent. The arguments and keywords are as follows: • **vrf**—(Optional) Virtual routing and forwarding (VRF). The *vrf-name* argument is the name of the VRF associated with the relay destination IP address. • **global**—(Optional) Global IP address. Use the this keyword when the relay agent is in the global address space and the relay source is in a VRF. • *ip-address*—IP address of the relay destination. **Note** When using the **relay destination** command, the *ip-address* argument is assumed to be in the same VRF as the address pool under which the command was configured. If the relay destination IP address is in a different VRF, or in the global address space, then the **vrf** *vrf-name* or **global** keywords need to be specified.
Step 7	**accounting** *method-list-name* **Example:** `Router(dhcp-config)# accounting RADIUS-GROUP1`	(Optional) Enables DHCP accounting if the specified server group is configured to run RADIUS accounting. • AAA and RADIUS must be enabled before DHCP accounting will operate. • The example configures DHCP accounting START and STOP messages to be sent if RADIUS-GROUP1 is configured as a start-stop group. STOP messages will only be sent if RADIUS-GROUP1 is configured as a stop-only group. See "Configuring DHCP Services for Accounting and Security" module for more information on DHCP accounting.
Step 8	**exit** **Example:** `Router(dhcp-config)# exit`	Exits to global configuration mode.

Configuring a Relay Pool for a Remote DHCP Server

Perform this task to use an SG-supplied class name when selecting the remote DHCP server in a configured relay pool, which is used to specify how DHCP client packets should be relayed. Multiple configurations of relay targets may appear in a pool-class definition in which case all addresses are used for relay purposes.

Restrictions

The **relay source** command cannot be used with the **network** command or **origin** command since those commands implicitly designate the incoming interface and are used to define a different type of pool. It associates the relay only with an interface in the same way that the **ip helper-address** command does by its presence as an interface configuration command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *name*
4. **relay source** *ip-address subnet-mask*
5. **relay destination** [**vrf** *vrf-name* | **global**] *ip-address*
6. **accounting** *method-list-name*
7. **class** *class-name*
8. **relay target** [**vrf** *vrf-name* | **global**] *ip-address*
9. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool`	Configures a DHCP address pool on a Cisco IOS DHCP server and enters DHCP pool configuration mode. The *name* argument is the name of the pool and may either be a symbolic string (such as engineering) or an integer (such as 0). You may specify more than one DHCP address pool.
Step 4	**relay source** *ip-address subnet-mask* **Example:** `Router(dhcp-config)# relay source 10.0.0.0 255.0.0.0`	Configures the relay source. The *ip-address* and *subnet-mask* arguments are the IP address and subnet mask for the relay source. **Note** This command is similar to the **network** command in a normal DHCP network pool, because it restricts the use of the address pool to packets arriving on the interface whose configured IP address and mask matches the relay source configuration.

	Command or Action	Purpose
Step 5	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(dhcp-config)# relay destination 10.5.5.0`	Configures the IPv4 address of a remote DHCP server to which DHCP client packets are sent. The arguments and keywords are as follows: • **vrf**—(Optional) Virtual routing and forwarding (VRF). The *vrf-name* argument is the name of the VRF associated with the relay destination IP address. • **global**—(Optional) Global IP address. Use the this keyword when the relay agent is in the global address space and the relay source is in a VRF. • *ip-address*—IP address of the relay destination. **Note** When using the **relay destination** command, the *ip-address* argument is assumed to be in the same VRF as the address pool under which the command was configured. If the relay destination IP address is in a different VRF, or in the global address space, then the **vrf** *vrf-name* or **global** keywords need to be specified.
Step 6	**accounting** *method-list-name* **Example:** `Router(dhcp-config)# accounting RADIUS-GROUP1`	(Optional) Enables DHCP accounting if the specified server group is configured to run RADIUS accounting. • AAA and RADIUS must be enabled before DHCP accounting will operate. • The example configures DHCP accounting START and STOP messages to be sent if RADIUS-GROUP1 is configured as a start-stop group. STOP messages will only be sent if RADIUS-GROUP1 is configured as a stop-only group. See "Configuring DHCP Services for Accounting and Security" module for more information on DHCP accounting.
Step 7	**class** *class-name* **Example:** `Router(dhcp-config)# class abc-pool`	Associates a class with a DHCP address pool and enters DHCP pool-class configuration mode. The *class-name* argument is the name of the class. You may configure more than one class name.

	Command or Action	Purpose
Step 8	**relay target** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-dhcp-pool-class)# relay target 10.0.0.0`	Configures the relay target IP address. The arguments and keywords are as follows: • **vrf**—(Optional) Virtual routing and forwarding (VRF). The *vrf-name* argument is the name of VRF associated with the relay target IP address and more than one target may be specified. • **global**—(Optional) Global IP address space. • *ip-address*—IP address of the relay target. More than one target IP address may be specified. **Note** This command specifies the destination for the relay function in the same manner as the **ip helper-address** command. **Note** When using the **relay target** command, the *ip-address* argument is assumed to be in the same VRF as the address pool under which the command was configured. If the relay target IP address is in a different VRF, or in the global address space, then the **vrf** *vrf-name* or **global** keywords need to be specified.
Step 9	**exit** **Example:** `Router(config-dhcp-pool-class)# exit`	Exits to DHCP pool configuration mode.

Configuring Other Types of Relay Pools

This section contains the following procedures:

- Configuring Relay Information for an Address Pool, page 11 (required)
- Configuring Multiple Relay Sources for a Relay Pool, page 13 (required)

Configuring Relay Information for an Address Pool

Perform this task to configure relay information for an address pool. In this configuration, the SG sends one class name that results in the DISCOVER packet being relayed to a server at the IP address configured using the **relay target** command. If the SG sends a class name that is not configured as being associated with the address pool, then no action is taken.

Restrictions

Specifying the **address range** command and **relay target** command in a pool-class definition is not possible, because this would allocate an address and relay for the same packet.

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **ip dhcp pool** *name*
4. **network** *network-number* [*mask* | *prefix-length*]
5. **class** *class-name*
6. **relay target** [**vrf** *vrf-name* | **global**] *ip-address*
7. **exit**
8. Repeat Steps 5 through 7 for each DHCP class you need to configure.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool`	Configures a DHCP address pool on a Cisco IOS DHCP server and enters DHCP pool configuration mode. The *name* argument is the name of the pool and may either be a symbolic string (such as engineering) or an integer (such as 0).
Step 4	**network** *network-number* [*mask* | *prefix-length*] **Example:** `Router(dhcp-config)# network 10.0.0.0 255.0.0.0`	Configures the subnet number and mask for a DHCP address pool on a Cisco IOS DHCP server. The arguments are as follows: • *network-number*—The IP address of the DHCP address pool. • *mask*—(Optional) The bit combination that renders which portion of the address of the DHCP address pool refers to the network or subnet and which part refers to the host. • *prefix-length*—(Optional) The number of bits that comprise the address prefix. The prefix is an alternative way of specifying the network mask of the client. The prefix length must be preceded by a forward slash (/).
Step 5	**class** *class-name* **Example:** `Router(dhcp-config)# class abc-pool`	Associates a class with a DHCP address pool and enters DHCP pool-class configuration mode. The *class-name* argument is the name of the class. More than one class name may be configured. **Note** If no relay target or address range is configured for a DHCP pool class name, the DHCP pool configuration is used as the class by default.

	Command or Action	Purpose
Step 6	**relay target** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-dhcp-pool-class)# relay target 10.0.0.0`	Configures the relay target IP address. The arguments and keywords for the **relay target** command are as follows: • **vrf**—(Optional) Virtual routing and forwarding (VRF). The *vrf-name* argument is the name of VRF associated with the relay target IP address and more than one target may be specified. • **global**—(Optional) Global IP address space. • *ip-address*—IP address of the relay target. More than one target IP address may be specified. **Note** When using the **relay target** command, the *ip-address* argument is assumed to be in the same VRF as the address pool under which the command was configured. If the relay target IP address is in a different VRF, or in the global address space, then the **vrf** *vrf-name* or **global** keywords need to be specified.
Step 7	**exit** **Example:** `Router(config-dhcp-pool-class)# exit`	Exits to DHCP pool configuration mode.
Step 8	Repeat Steps 5 through 7 for each DHCP class you need to configure.	—

Configuring Multiple Relay Sources for a Relay Pool

Perform this task to configure multiple relay sources for a relay pool. The configuration is similar to configuring an IP helper address on multiple interfaces. Pools are matched to the IP addresses on an incoming interface in the order in which the interfaces display when the **show running-config** command is used. Once a relay is found or an address allocation is found, the search stops.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address** *ip-address mask* [**secondary**]
5. **exit**
6. **ip dhcp pool** *name*
7. **relay source** *ip-address subnet-mask*
8. **relay destination** [**vrf** *vrf-name* | **global**] *ip-address*
9. **accounting** *method-list-name*
10. Repeat Steps 6 and 7 for each configured DHCP pool.
11. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet1`	Configures an interface and enters interface configuration mode. The arguments are as follows:
Step 4	**ip address** *ip-address mask* [**secondary**] **Example:** `Router(config-if)# ip address 10.0.0.0 255.0.0.0`	Sets a primary or secondary IP address for an interface.
Step 5	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.
Step 6	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool1`	Configures a DHCP address pool on a DHCP server and enters DHCP pool configuration mode. The *name* argument is the name of the pool and may either be a symbolic string (such as engineering) or an integer (such as 0). More than one pool may be assigned.
Step 7	**relay source** *ip-address subnet-mask* **Example:** `Router(dhcp-config)# relay source 10.0.0.0 255.0.0.0`	Configures the relay source. The *ip-address* and *subnet-mask* arguments are the IP address and subnet mask for the relay source. **Note** This command is similar to the **network** command in a normal DHCP network pool, because it restricts the use of the address pool to packets arriving on the interface whose configured IP address and mask matches the relay source configuration.

	Command or Action	Purpose
Step 8	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(dhcp-config)# relay destination 10.5.5.0`	Configures the IPv4 address of a remote DHCP server to which DHCP client packets are sent. The arguments and keywords are as follows: • **vrf**—(Optional) Virtual routing and forwarding (VRF). The *vrf-name* argument is the name of the VRF associated with the relay destination IP address. • **global**—(Optional) Global IP address. Use the this keyword when the relay agent is in the global address space and the relay source is in a VRF. • *ip-address*—IP address of the relay destination. **Note** When using the **relay destination** command, the *ip-address* argument is assumed to be in the same VRF as the address pool under which the command was configured. If the relay destination IP address is in a different VRF, or in the global address space, then the **vrf** *vrf-name* or **global** keywords need to be specified.
Step 9	**accounting** *method-list-name* **Example:** `Router(dhcp-config)# accounting RADIUS-GROUP1`	(Optional) Enables DHCP accounting if the specified server group is configured to run RADIUS accounting. • AAA and RADIUS must be enabled before DHCP accounting will operate. • The example configures DHCP accounting START and STOP messages to be sent if RADIUS-GROUP1 is configured as a start-stop group. STOP messages will only be sent if RADIUS-GROUP1 is configured as a stop-only group. See "Configuring DHCP Services for Accounting and Security" module for more information on DHCP accounting.
Step 10	Repeat Steps 6 and 7 for each configured DHCP pool.	—
Step 11	**exit** **Example:** `Router(dhcp-config)# exit`	Exits to global configuration mode.

Configuration Examples for DHCP Enhancements for Edge Session Management

This section provides the following configuration examples:

DHCP Address Range and Class Name Configuration: Example

The following example shows how to configure an address range for a particular network and class name for a DHCP pool.

```
ip dhcp pool abc-pool
 network 10.10.0.0 255.255.0.0
 class abc-pool
  address range 10.10.5.0 10.10.5.99
```

DHCP Server Co-Resident with SG Configuration: Example

In the following example, the ISPs are ABC and DEF companies. The ABC company has its addresses assigned from an address pool that is dynamically allocated using ODAP. The DEF company has its customer addresses assigned from the address pool 10.100.0.0/16. Customers not associated with any ISP will have an address allocated from the address pool 10.1.0.0/16 and the lease time is set to 10 minutes.

```
!Interface configuration

interface ethernet1
 ip address 10.20.0.1. 255.255.0.0
 ip address 10.1.0.1 255.255.0.0 secondary
 ip address 10.100.0.1 255.255.0.0 secondary

!Address pool for ABC customers

ip dhcp pool abc-pool
 network 20.1.0.0 255.255.0.0
 class abc
!
!Address pool for DEF customers

ip dhcp pool def-pool
 network 10.100.0.0 255.255.0.0
 class def

!Address pool for customers without an ISP

ip dhcp pool temp
 network 10.1.0.0 255.255.0.0
 lease 0 0 10
 class default
```

DHCP Relay Agent Co-Resident with SG Configuration: Example

In the following example, there are two ISPs: abcpool and defpool. The abcpool ISP and its customers are allowed to have addresses in the ranges 10.1.0.0/16 and 30.1.0.0/16 and are relayed to the DHCP server at 10.55.10.1. The defpool ISP and its customers are allowed to have addresses in the ranges 20.1.0.0/16 and 40.4.0.0/16 and are relayed to the DHCP server at 12.10.2.1.

```
!Address ranges:
```

```
interface ethernet1
 ip address 10.1.0.0 255.255.0.0
 ip address 10.2.0.0 255.255.0.0 secondary

interface ethernet2
 ip address 10.3.0.0 255.255.0.0
 ip address 10.4.0.0 255.255.0.0 secondary

!Address pools for abcpool1 and abcpool2:

ip dhcp pool abcpool1
 relay source 10.1.0.0 255.255.0.0
 class abcpool
  relay target 10.5.10.1

!Address pool for abcpool2:

ip dhcp pool abcpool2
 relay source 10.1.0.0 255.255.0.0
 class abcpool
  relay target 10.55.10.1

!Address pools for defpool1 and defpool2:

ip dhcp pool defpool1
 relay source 10.1.0.0 255.255.0.0
 class defpool
  relay target 10.10.2.1

ip dhcp pool defpool2
 relay source 10.4.0.0 255.255.0.0
 class defpool
  relay target 10.10.2.1
```

Multiple DHCP Pools and Different ISPs Configuration: Example

The following example shows how to configure one interface and multiple DHCP pools that have different ISPs by using the **network** command.

```
interface ethernet1
 ip address 10.0.0.1 255.0.0.0
 ip address 10.1.0.1 255.0.0.0
!
ip dhcp pool x
 network 10.0.0.0 255.0.0.0
 class ISP1
!
ip dhcp pool y
 network 10.1.0.0 255.0.0.0
 class ISP2
```

Multiple Relay Sources and Destinations Configuration: Example

In the following example, multiple relay sources and destinations may be configured for a relay pool. This is similar the ip helper-address configuration on multiple interfaces. Pools are matched to the (possibly multiple) IP addresses on an incoming interface in the order in which they appear when using the **show running-config** command to display information about that interface. Once either a relay is found or an address allocation is found, the search stops. For example, given the following configuration:

```
interface ethernet1
 ip address 10.0.0.1 255.0.0.0
 ip address 10.0.0.5 255.0.0.0 secondary

ip dhcp pool x
 relay source 10.0.0.0 255.0.0.0
 relay destination 10.0.0.1

ip dhcp pool y
 relay source 10.0.0.0 255.0.0.0
 relay destination 10.0.0.1
```

In the following example, the DHCP client packet would be relayed to 10.0.0.1, if the SG specified ISP1 as the class name, and would be relayed to 10.0.0.5, if the SG specified ISP2 as the class name.

```
interface ethernet1
 ip address 10.0.0.1 255.0.0.0
 ip address 10.0.0.5 255.0.0.0 secondary

ip dhcp pool x
 relay source 10.0.0.0 255.0.0.0
 relay destination 10.2.0.0 255.0.0.0
 class ISP1
  relay target 10.0.0.1
 class ISP2
  relay target 10.0.0.5
```

SG-Supplied Class Name Configuration: Example

In the following example, an SG-supplied class name is to be used in selecting the remote DHCP server to which packets should be relayed.

```
ip dhcp pool abc-pool-1
 relay source 10.1.0.0 255.255.0.0
 relay destination 10.1.0.0
 class classname1
  relay target 10.20.10.1
 class classname2
  relay target 10.0.10.1
 class classname3
```

In the example above, an SG-supplied class name, called classname1, would relay the DHCP DISCOVER packet to the server at the relay target IP address 10.20.10.1, while SG classname2 would relay the DHCP DISCOVER packet to the server at the relay target IP address 10.0.10.1. This configuration relays the packet to destination IP address 10.0.0.1, because the pool matches the first configured address on the interface. If the SG returns a classname3, then the default pool is the default address specified as the relay destination. If the SG returns any class name other than classname1, classname2, or classname3, then no relay action is taken.

Additional References

The following sections provide references related to configuring DHCP Enhancements for Edge-Session Management.

Related Documents

Related Topic	Document Title
DHCP commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	*Cisco IOS IP Addressing Services Command Reference,* Release 12.4
DHCP conceptual information	"DHCP Overview" module
DHCP server configuration	"Configuring the Cisco IOS DHCP Server" module
DHCP client configuration	"Configuring the Cisco IOS DHCP Client" module
DHCP relay agent configuration	"Configuring the Cisco IOS DHCP Relay Agent" module
DHCP server on-demand address pool manager configuration	"Configuring the DHCP Server On-Demand Address Pool Manager" module
DHCP advanced features	"Configuring DHCP Services for Accounting and Security" module
DHCP options	"DHCP Options" appendix in the *Network Registrar User's Guide*, Release 6.1.1

Standards

Standards	Title
No new or modified standards are supported by this functionality.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
RFC 951	*Bootstrap Protocol (BOOTP)*
RFC 1542	*Clarifications and Extensions for the Bootstrap Protocol*
RFC 2131	*Dynamic Host Configuration Protocol*

RFCs	Title
RFC 2685	*Virtual Private Networks Identifier*
RFC 3046	*DHCP Relay Information Option*

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Feature Information for DHCP Enhancements for Edge-Session Management

Table 1 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Cisco IOS Release 12.2(1) or a later release appear in the table.

Not all commands may be available in your Cisco IOS software release. For details on when support for a specific command was introduced, see the command reference documentation.

For information on a feature in this technology that is not documented here, see the "DHCP Features Roadmap".

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for DHCP Enhancements for Edge-Session Management

Feature Name	Releases	Feature Configuration Information
DHCP Relay Accounting	12.4(6)T	The DHCP Relay Accounting feature allows a Cisco IOS DHCP relay agent to send a RADIUS accounting start packet when an address is assigned to a client and a RADIUS accounting stop packet when the address is released. This feature is enabled by using the **accounting** command with relay pools that use the **relay destination** command in DHCP pool configuration mode. The following sections provide information about this feature: • Configuring a Relay Pool with a Relay Source and Destination • Configuring a Relay Pool for a Remote DHCP Server No new commands were introduced by this feature.
DHCP Enhancements for Edge-Session Management	12.3(14)T 12.2(28)SB	The DHCP Enhancements for Edge-Session Management feature provides the capability of simultaneous service by multiple ISPs to customers using one network infrastructure. The end-user customer may change ISPs at any time. All sections in this module provide information about this feature. The following commands were introduced by this feature: **relay destination**, **relay source**, and **relay target**.

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