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 can 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).

Feature History for DHCP Enhancements for Edge-Session Management

Release	Modification
12.3(14)T	This feature was introduced.
12.2(27)SBA	This feature was integrated into Cisco IOS Release 12.2(27)SBA.

Finding Support Information for Platforms and Cisco IOS Software Images

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.

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Information About DHCP Enhancements for Edge-Session Management

To configure 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 "Configuring DHCP" chapter of the *Cisco IOS IP Configuration Guide*, Release 12.3.

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, refer to *DHCP ODAP Server Support*, Cisco IOS Release 12.2T.

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 a SG that are co-resident (in the same device)
- DHCP client and a 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 hands out addresses from locally configured address pools or acquires a subnet of addresses to hand out from some other system in the network. There are no changes to the server address allocation function to support the configuration.

In this configuration, the end-user DHCP client system sends a broadcast DISCOVER that is received by the DHCP server. The DHCP server uses a "registry call" that notifies the SG of receipt of the DISCOVER broadcast and passes the MAC address and other information to the SG.

The SG returns a class name (for example, the name of the ISP) from which an address is allocated. The address pool is selected by DHCP using either the subnet of the incoming interface (for a non-relayed packet) or the giaddr (for a relayed packet). The class name specified by the SG is taken into account as well. At this point, the DHCP server can allocate an address from the selected address pool.

The registry call that normally returns the class name to use in allocation will return FALSE if no SG is present in the same device. In this case, normal DHCP server address allocation occurs.

Lease state registry notifications (notification of DISCOVER, notification of address allocation, and notification of lease termination) are always done on the IOS DHCP server, since the information is already present.

Note The local configuration can also be performed by 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 become the DHCP server. As the server, the relay agent can obtain enough information about the DHCP session to notify the SG of all events (for example, lease termination).

Becoming the DHCP server is accomplished 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 by using the Server-ID option in the DHCP OFFER packet. When the client sends a REQUEST packet, the original Server-ID option is substituted with the relay agent IP address in the ACK. The DHCP client thinks that the relay agent is the DHCP server and and sends the relay agent all of the DHCP interactions.

Using this configuration, the end-user DHCP client system sends a broadcast DISCOVER packet that is received by the DHCP relay agent system on the edge of the network. The packet is first passed by the relay agent to the DHCP server on the same device that uses a registry call to notify the SG of receipt of the DISCOVER. Following the notification, another registry call makes an inquiry about a DHCP class name to use.

The second registry call passes the client MAC address and other pertinent information to the SG. The SG returns the DHCP class name from which an address is allocated. The address pool is selected by DHCP using the subnet of the incoming interface, and the class name specified by the SG is taken into account as well.

Assuming that the registry call tells DHCP to relay the packet to another server instead of servicing the request locally, (as specified by either the **relay destination** command or **relay target** command), the relay agent creates a relay binding for the packet in order to hold lease state information. The relay agent inserts a giaddr address by using the normal process along with a relay information option (if configured to do so). The relay agent relays the packet to the configured and selected server by the incoming interface and DHCP class name.

Note An address pool can have one DHCP class defined to specify one central DHCP server to which the relay agent passes the packet, or can 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

The following tasks configure the DHCP Enhancements for Edge-Session Management:

- Configuring the DHCP Address Pool and a Class Name, page 4 (optional)
- Configuring a Relay Pool with a Relay Source and Destination, page 6 (required)
- Configuring a Relay Pool for a Remote DHCP Server, page 8 (required)
- Configuring Other Types of Relay Pools, page 10 (optional)

Configuring the DHCP Address Pool and a Class Name

This task shows how 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 a SG and both are at the edge, a class name and address pool should be configured. In this case, the DHCP server notifies a SG of a DISCOVER broadcast received from a client, 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 “giaaddr” 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 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**
5. **network** *network-number* [*mask* | *prefix-length*]
6. **class** *class-name*
7. **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 can either be a symbolic string (such as engineering) or an integer (such as 0).
Step 4	**origin dhcp** **Example:** `Router(config-DHCP)# origin dhcp`	(Optional) Configures an address pool as an on-demand address pool (ODAP) or static mapping pool. The **dhcp** keyword specifies that a DHCP address pool be used.

	Command or Action	Purpose
Step 5	**network** *network-number* [*mask* | *prefix-length*] **Example:** `Router(config-DHCP)# 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 (/).
Step 6	**class** *class-name* **Example:** `Router(config-DHCP)# class abc-pool`	Associates a class with a DHCP address pool. 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	**exit** **Example:** `Router(config-DHCP)# exit`	Exits to interface configuration mode.

Configuring a Relay Pool with a Relay Source and Destination

This task shows how 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 unless they match a particular DHCP class. In that case, see "Configuring Other Types of Relay Pools" section on page 10. This task replaces the IP helper-address interface configuration.

A relay should obtain 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

Substituting the DHCP server with the relay agent negates the use of the DHCP authentication option.

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. **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 can either be a symbolic string (such as engineering) or an integer (such as 0). More than one name can be configured.
Step 4	**update arp** **Example:** `Router(config-DHCP)# update arp`	Configures secure and dynamic Address Resolution Protocol (ARP) entries in the ARP table to their corresponding DHCP bindings.
Step 5	**relay source** *ip-address subnet mask* **Example:** `Router(config-DHCP)# 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.
Step 6	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-DHCP)# 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 VRF associated with the relay destination IP address. If the VRF is not specified, the relay destination address will be in the global address space. • **global**—(Optional) Global IP address. • *ip-address*—IP Address of the relay destination.
Step 7	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

Configuring a Relay Pool for a Remote DHCP Server

This task shows how to use a SG-supplied class name when selecting the remote DHCP server in a configured relay pool to which packets are relayed. Multiple configurations of relay targets can 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 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. **class** *class-name*
7. **relay target** [**vrf** *vrf-name* | **global**] *ip-address*
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 can either be a symbolic string (such as engineering) or an integer (such as 0). You can specify more than one DHCP address pool.

	Command or Action	Purpose
Step 4	**relay source** *ip-address subnet mask* **Example:** `Router(config-DHCP)# 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.
Step 5	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-DHCP)# 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 VRF associated with the relay destination IP address. If the VRF is not specified, the relay destination address will be in the global address space. The VRF name specified in this step is the default VRF name. • **global**—(Optional) Global IP address. • *ip-address*—IP Address of the relay destination. The IP address specified in this step is the default IP address.
Step 6	**class** *class-name* **Example:** `Router(config-DHCP)# class abc-pool`	Associates a class with a DHCP address pool. The *class-name* argument is the name of the class. It should match the DHCP address pool name. You can configure more than one class name.
Step 7	**relay target** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-DHCP)# 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 VRF target can be specified. • **global**—(Optional) Global IP address space. • *ip-address*—IP address of the relay target and more than one target IP address can be specified. **Note** This command specifies the destination for the relay function in the same way as **ip helper-address** command does.
Step 8	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

Configuring Other Types of Relay Pools

This section contains the following procedures:

- Configuring an Network Address Relay Pool, page 10 (required)
- Configuring a Pool Class Address Range as a Relay Pool, page 11 (required)
- Configuring Multiple Relay Sources for a Relay Pool, page 13 (required)

Configuring an Network Address Relay Pool

This task shows how to configure an address range for a relay pool. In this configuration, the SG sends one class name that results in the DISCOVER packet being relayed to the server at the IP address configured using the **relay target** command. If the SG sends a different class name than the one that is configured the packet is sent to the IP address configured using the **network** command.

Restrictions

Specifying the **address range** command and **relay target** command in a pool-class definition is not recommended, 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. **class** *class-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 can either be a symbolic string (such as engineering) or an integer (such as 0).

	Command or Action	Purpose
Step 4	**network** *network-number* [*mask* | *prefix-length*] **Example:** `Router(config-DHCP)# relay source 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(config-DHCP)# class abc-pool`	Associates a class with a DHCP address pool. The *class-name* argument is the name of the class. It should match the DHCP address pool name. More than one class name can be configured.
Step 6	**relay target** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-DHCP)# 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 can be specified. • **global**—(Optional) Global IP address space. • *ip-address*—IP address of the relay target and more than one target IP address can be specified. **Note** The **relay target** command specifies the destination for the relay function in the same way as **ip helper-address** command does.
Step 7	**class** *class-name* **Example:** `Router(config-DHCP)# class abc-pool2`	Associates a class with a DHCP address pool. The *class-name* argument is the name of the class. It should match the DHCP address pool name. More than one class name can be configured.
Step 8	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

Configuring a Pool Class Address Range as a Relay Pool

This task shows how to configure a relay pool and an address range to be used when allocating addresses for a DHCP client without specifying a relay destination or target. The SG could specify a range of address for a DHCP client.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp pool** *name*
4. **network** *network-number* [*mask* | *prefix-length*]
5. **class** *class-name*
6. **address range** *start-ip end-ip*
7. Repeat Steps 5 and 6 for each class 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 can either be a symbolic string (such as engineering) or an integer (such as 0).
Step 4	**network** *network-number* [*mask* | *prefix-length*] **Example:** `Router(config-DHCP)# relay source 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(config-DHCP)# class abc-pool`	Associates a class with a DHCP address pool. The *class-name* argument is the name of the class. It should match the DHCP address pool name. More than one class name can be configured.

	Command or Action	Purpose
Step 6	**address range** *start-ip end-ip* **Example:** `Router(config-DHCP)# address range 10.5.5.0 10.99.99.99`	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 **relay destination** command. **Note** If no address range is assigned to a class name, the address specified with the **network** command is used.
Step 7	Repeat Steps 5 and 6 for each class name.	—
Step 8	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

Configuring Multiple Relay Sources for a Relay Pool

This task shows how to configure multiple relay sources for a relay pool. The configuration is similar to configuring a 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. **ip dhcp pool** *name*
6. **relay source** *ip-address subnet mask*
7. **relay destination** [**vrf** *vrf-name* | **global**] *ip-address*
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	**interface** *type number* **Example:** `Router(config)# interface ethernet1`	Configures an interface and enters interface configuration mode. The arguments are as follows: • *type*—Type to interface. • *number*—Port, connector, or interface card number. On Cisco 4700 series routers, specifies the network interface module (NIM) or network processor module (NPM) number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the show interfaces command. **Note** Refer to the *Cisco IOS Interface and Component Command Reference*, Release 12.3 T, for more information.
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	**ip dhcp pool** *name* **Example:** `Router(config)# ip dhcp pool abc-pool1`	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 can either be a symbolic string (such as engineering) or an integer (such as 0). More than 1 pool can be assigned.
Step 6	**relay source** *ip-address subnet mask* **Example:** `Router(config-DHCP)# 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** Each configured DHCP pool in Step 5, there should be a separate relay source IP address and subnet mask.

	Command or Action	Purpose
Step 7	**relay destination** [**vrf** *vrf-name* | **global**] *ip-address* **Example:** `Router(config-DHCP)# 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 VRF associated with the relay destination IP address. If the VRF is not specified, the relay destination address will be in the global address space. • **global**—(Optional) Global IP address. • *ip-address*—IP Address of the relay destination. **Note**
Step 8	**exit** **Example:** `Router(config-if)# exit`	Exits to global configuration mode.

Configuration Examples for DHCP Enhancements for Edge Session Management

This section contains the following configuration examples:

- DHCP Server Co-Resident with SG Configuration: Example, page 15
- DHCP Relay Agent Co-Resident with SG Configuration: Example, page 16
- SG-Supplied Class Name Configuration: Example, page 17

DHCP Server Co-Resident with SG Configuration: Example

In the following configuration 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.

```
!Address pool for ABC customers

ip dhcp pool abc-pool
 origin dhcp
 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 configuration 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 range 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 20.1.0.0 255.255.0.0 secondary

interface ethernet2
 ip address 30.1.0.0 255.255.0.0
 ip address 40.4.0.0 255.255.0.0

!Address pools for abcpool1 and abcpool2:

 ip dhcp pool abcpool1
 relay source 10.1.0.0 255.255.0.0
 class abcpool1
 relay target 10.55.10.1

!Address pool for abcpool2:

ip dhcp pool abcpool2
 relay source 30.1.0.0 255.255.0.0
 class abcpool2
 relay target 10.55.10.1

!Address pools for defpool1 and defpool2:

ip dhcp pool defpool1
 relay source 20.1.0.0 255.255.0.0
 class defpool1
 relay target 12.10.2.1

ip dhcp pool defpool2
 relay source 40.4.0.0 255.255.0.0
 class defpool2
 relay target 12.10.2.1
```

Configuration of secure ARP for the relay will use the same configuration command as secure ARP already uses on a DHCP server by using the **update arp** in address-pool configuration mode. If the system is allocating an address from this address pool, it will add secure ARP. If the system is relaying a packet using this address pool, it will also add secure ARP.

SG-Supplied Class Name Configuration: Example

In the following configuration 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 30.1.0.0 255.255.0.0
 relay destination 20.1.0.0
 class classname1
 relay target 10.20.10.1
 class classname2
 relay target 10.0.10.1
 class classname3
```

In the configuration above, an SG-supplied class name, called classname1, would relay the DHCP DISCOVER packet to the server at the relay target IP address, while SG classname2 would relay the DHCP DISCOVER packet to the server at the relay target IP address.

If the SG returns a classname3, then the default pool is the default address specified as the relay destination. If the SG returns any other class name other than classname1, classname2, or classname3, then no relay action is taken.

Additional References

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

Related Documents

Related Topic	Document Title
IP addressing and services configuration tasks	*Cisco IOS IP Configuration Guide*, Release 12.3
IP addressing and services commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS IP Command Reference, Volume 1 of 4: Addressing and Services*, Release 12.3T
DHCP configuration tasks	"Configuring DHCP" chapter of the *Cisco IOS IP Configuration Guide*, Release 12.3
DHCP Option 82 overview	*DHCP Option 82 Support for Routed Bridge Encapsulation*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified 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
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 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/public/support/tac/home.shtml

Command Reference

This section documents three new commands only.

- **relay destination**
- **relay source**
- **relay target**

relay destination

To configure an IP address for a relay destination to which packets are forwarded by a DHCP server, use the **relay destination** command in DHCP-pool configuration mode. To disable the IP address, use the **no** form of this command.

relay destination [**vrf** *vrf-name* | **global**] *ip-address*

no relay destination [**vrf** *vrf-name* | **global**] *ip-address*

Syntax Description

vrf	(Optional) Configured virtual routing and forwarding (VRF) that is associated with the relay destination address. The *vrf-name* argument specifies the name of the VRF table.
global	(Optional) IP address selected from the global address space. If the pool does not have any VRF configuration, then the relay destination address defaults to the global address space.
ip-address	IPv4 address of the remote DHCP server to which the DHCP client packets are relayed.

Defaults

No destination IP address to which packets are forwarded is configured.

Command Modes

DHCP-pool configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Examples

The following example shows how to configure an IP address for a relay destination to which packets are forwarded by a DHCP server:

```
ip dhcp pool abc1
 relay source 10.0.0.0 255.255.0.0
 relay destination 10.5.1.1
```

relay source

To configure an IP address for a relay source from which packets are forwarded by a DHCP server, use the **relay source** command in DHCP-pool configuration mode. To disable the IP address, use the **no** form of this command.

relay source *ip-address subnet-mask*

no relay source *ip-address subnet-mask*

Syntax Description

ip-address	IPv4 address of DHCP server from which the DHCP client packets are relayed.
subnet-mask	Subnet mask.

Defaults

No IP address from which IP packets are forwarded is configured.

Command Modes

DHCP-pool configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Examples

The following example shows how to configure a source IP address from which DHCP client packets are relayed:

```
ip dhcp pool abc1
 relay source 10.0.0.0 255.255.0.0
 relay destination 10.5.1.1
```

relay target

To configure an IP address for a relay target to which packets are forwarded by a DHCP server, use the **relay target** command in DHCP-pool configuration mode. To disable the IP address, use the **no** form of this command.

relay target [**vrf** *vrf-name* | **global**] *ip-address*

no relay target [**vrf** *vrf-name* | **global**] *ip-address*

Syntax Description

vrf	(Optional) Configured virtual routing and forwarding (VRF) that is associated with the relay destination address. The *vrf-name* argument specifies the name of the VRF table.
global	(Optional) IP address selected from the global address space. If the pool does not have any VRF configuration, then the relay destination address defaults to the global address space.
ip-address	IPv4 address of the remote DHCP server to which the DHCP client packets are relayed.

Defaults

No target IP address is configured.

Command Modes

DHCP-pool configuration

Command History

Release	Modification
12.3(14)T	This command was introduced.
12.2(27)SBA	This command was integrated into Cisco IOS Release 12.2(27)SBA.

Examples

The following example shows how to configure a relay target if a service gateway (SG)-supplied class name is used to select a DHCP server to which packets are relayed:

```
ip dhcp pool abc1
 relay source 10.0.0. 255.255.0.0.
 relay destination 10.5.1.1
 class classname1
  relay target 10.1.1.1
 class classname2
  relay target 10.2.2.2
 class classname3
```

In the above example, classname1 relays the DHCP DISCOVER packet to the server at 10.1.1.1, while classname2 relays the DHCP DISCOVER packet to the server at 10.2.2.2.

If the SG returned classname3, then the default pool at 10.5.1.1 is used. If the SG returns any other class name other than classname1, classname2, or classname3, then no relay action is taken.

The relay target configuration with respect to any configured VRF pool works in the exact same way as a relay destination configuration works.