



Implementing the DHCP on Cisco IOS XR Software

This module describes the concepts and tasks you will use to configure the Cisco IOS XR Dynamic Host Configuration Protocol (DHCP).

Feature History for Implementing the DHCP on Cisco IOS XR Software

Release	Modification
Release 2.0	This feature was introduced on the Cisco CRS-1.
Release 3.0	No modification.
Release 3.2	This feature was supported on the Cisco XR 12000 Series Router.
Release 3.3.0	No modification.
Release 3.4.0	DHCP IPv6 Information Pool configuration procedure was added and DHCP relay information description was updated.

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Prerequisites for Configuring the Cisco IOS XR DHCP Relay Agent

The following prerequisites are required to configure a DHCP relay agent:

- A router running Cisco IOS XR software
- A configured and running DHCP client and DHCP server
- Connectivity between the relay agent and DHCP server

- A configured IPv4 helper address

Information About the Cisco IOS XR DHCP Relay Agent

A DHCP relay agent is a host that forwards DHCP packets between clients and servers that do not reside on a shared physical subnet. Relay agent forwarding is distinct from the normal forwarding of an IP router where IP datagrams are switched between networks transparently.

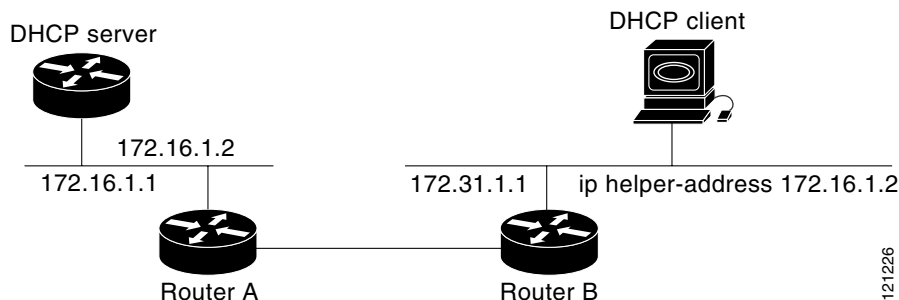
Packet Forwarding Addresses

DHCP clients use User Datagram Protocol (UDP) broadcasts to send DHCPDISCOVER messages when they lack information about the network to which they belong.

If a client is on a network segment that does not include a server, a relay agent is needed on that network segment to ensure that DHCP packets reach the servers on another network segment. UDP broadcast packets are not forwarded (because most routers are not configured to forward broadcast traffic). You can remedy this situation by configuring the interface of the router receiving the broadcasts to forward certain classes of broadcasts to a helper address. You can use more than one helper address per interface.

Figure 2 demonstrates the process. The DHCP client broadcasts a request for an IP address and additional configuration parameters on its local LAN. Acting as a DHCP relay agent, Router B picks up the broadcast, changes the destination address to DHCP server's address and sends the message out on another interface. The relay agent inserts the IP address of the interface containing the helper command into the gateway IP address (giaddr) field of the DHCP packet, which enables the DHCP server to determine which subnet should receive the offer and identify the appropriate IP address range. The relay agent unicasts the messages to the server address; in this case, 172.16.1.2 (which is specified by the `ipv4 helper-address` command).

Figure 2 Forwarding UDP Broadcasts to a DHCP Server Using a Helper Address



How to Configure the Cisco IOS XR DHCP Relay Agent

This section contains the following tasks:

- [Configuring the Packet Forwarding Address, page 87](#)
- [Enabling the Cisco IOS XR DHCP Relay Agent, page 87](#)
- [Configuring Cisco IOS XR Relay Agent Information Option, page 89](#)

Configuring the Packet Forwarding Address

This task describes how to configure the DHCP relay agent to forward packets to a DHCP server. See [Packet Forwarding Addresses](#), page 86 for more information.

SUMMARY STEPS

1. **configure**
2. **interface** *type number*
3. **ipv4 helper-address** *address*

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure Example: RP/0/RP0/CPU0:router(config)# configure terminal	Enters global configuration mode.
Step 2	interface <i>type number</i> Example: RP/0/RP0/CPU0:router(config)# interface FastEthernet0/0	Configures an interface and enters interface configuration mode.
Step 3	ipv4 helper-address <i>address</i> Example: RP/0/RP0/CPU0:router(config-if)# ipv4 helper-address 121.24.43.2	Forwards UDP broadcasts, including BOOTP and DHCP. <ul style="list-style-type: none"> • The value of <i>address</i> can be a specific DHCP server address or a network address (if other DHCP servers are on the destination network segment). Using the network address enables other servers to respond to DHCP requests. • For multiple servers, configure one helper address for each server.

Enabling the Cisco IOS XR DHCP Relay Agent

This task describes how to enable the Cisco IOS XR relay agent. On Cisco IOS XR, the DHCP relay agent is disabled by default.



Note

The Cisco IOS XR relay agent can be enabled on an interface only when the **ipv4 helper-address** command is configured. For more information, see [Configuring the Packet Forwarding Address](#), page 87.

SUMMARY STEPS

1. **configure**

2. **dhcp server**
3. **end**
or
commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure Example: RP/0/RP0/CPU0:router# configure	Enters global configuration mode.
Step 2	dhcp server Example: RP/0/RP0/CPU0:router(config)# dhcp server enable	Enables the DHCP relay agent.

	Command or Action	Purpose
<p>Step 3</p> <pre>end</pre> <p>or</p> <pre>commit</pre> <p>Example:</p> <pre>RP/0/RP0/CPU0:router(config)# end</pre> <p>or</p> <pre>RP/0/RP0/CPU0:router(config)# commit</pre>	<p>Saves configuration changes.</p> <ul style="list-style-type: none"> When you issue the end command, the system prompts you to commit changes: <pre>Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:</pre> <ul style="list-style-type: none"> Entering yes saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode. Entering no exits the configuration session and returns the router to EXEC mode without committing the configuration changes. Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes. Use the commit command to save the configuration changes to the running configuration file and remain within the configuration session. 	

Configuring Cisco IOS XR Relay Agent Information Option

This task describes how to enable support for the DHCP relay agent information option.

A DHCP relay agent may receive a message from another DHCP relay agent that already contains relay information. By default, the relay information from the previous relay agent is replaced (using the replace option).

SUMMARY STEPS

1. **configure**
2. **dhcp relay information option**
3. **dhcp relay information check**
4. **dhcp relay information policy { drop | keep | replace }**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>configure</p> <p>Example: RP/0/RP0/CPU0:router# configure terminal</p>	Enters global configuration mode.
Step 2	<p>dhcp relay information option</p> <p>Example: RP/0/RP0/CPU0:router(config)# ip dhcp relay information option</p>	<p>Enables the system to insert the DHCP relay agent information option (option-82 field) in forwarded BOOTREQUEST messages to a DHCP server.</p> <ul style="list-style-type: none"> This option is injected by the relay agent when forwarding client-originated DHCP packets to the server. Servers recognizing this option can use the information to implement IP address or other parameter assignment policies. When replying, the DHCP server echoes the option back to the relay agent. The relay agent strips the option before forwarding the reply to the client. The relay agent information is organized as a single DHCP option that contains one or more sub-options containing the information known by the relay agent. These sub-options are supported: <ul style="list-style-type: none"> Remote ID Circuit ID <p>This function is disabled by default.</p>
Step 3	<p>dhcp relay information check</p> <p>Example: RP/0/RP0/CPU0:router(config)# ip dhcp relay information check</p>	<p>(Optional) Configures DHCP to check that the relay agent information option in forwarded BOOTREPLY messages is valid.</p> <ul style="list-style-type: none"> By default, DHCP checks that the option-82 field in DHCP reply packets it receives from the DHCP server is valid. If an invalid message is received, the relay agent drops it. If a valid message is received, the relay agent removes the option-82 field and forwards the packet. Use the ip dhcp relay information check command to reenale this functionality if it has been disabled.
Step 4	<p>dhcp relay information policy {drop keep replace}</p> <p>Example: RP/0/RP0/CPU0:router(config)# dhcp relay information policy replace</p>	<p>(Optional) Configures the reforwarding policy for a DHCP relay agent; that is, whether the relay agent will drop, keep, or replace the relay information).</p> <ul style="list-style-type: none"> Replace is the default setting.

Configuration Examples for the Cisco IOS XR DHCP Relay Agent

This section provides the following configuration examples:

- [Packet Forwarding Address: Example, page 91](#)
- [Cisco IOS XR DHCP Relay Agent: Example, page 91](#)
- [Cisco IOS XR Relay Agent Information Option Support: Example, page 92](#)

Packet Forwarding Address: Example

The following example shows how to configure the DHCP relay agent to forward packets to a DHCP server:

```
configure
interface MgmtEth 0/0/CPU0/0
ipv4 helper-address 5.5.5.3
commit

RP/0/0/1:Sep 28 23:28:15.738 : config[65705]: %LIBTARCFG-6-COMMIT :
Configuration committed by user 'test'.
Use 'show commit changes 1000000326' to view the changes.

exit
exit

RP/0/0/1:Sep 28 23:28:20.098 : config[65705]: %SYS-5-CONFIG_I :
Configured from console by console
RP/0/RP0/CPU0:router#

show running-config
...
...
interface MgmtEth0/0/CPU0/0
  ipv4 helper-address 5.5.5.3
  ipv4 address 10.25.58.25 255.255.0.0
!
```

Cisco IOS XR DHCP Relay Agent: Example

The following example shows how to enable the Cisco IOS XR relay agent:

```
configure
dhcp server
commit

RP/0/0/1:Sep 28 23:33:14.645 : config[65705]: %LIBTARCFG-6-COMMIT :
Configuration committed by user 'lab'.
Use 'show commit changes 1000000327' to view the changes.

exit

RP/0/0/1:Sep 28 23:33:19.704 : config[65705]: %SYS-5-CONFIG_I :
Configured from console by console
RP/0/RP0/CPU0:router# show running-config
Building configuration... !!
Last configuration change at 23:33:11 UTC Tue Dec 28 2004 by lab ! hostname router line
aux
  exec-timeout 0 0
  absolute-timeout 0
!
...
...
```

```
dhcp server
...
...
```

Cisco IOS XR Relay Agent Information Option Support: Example

The following example shows how to enable the relay agent and the insertion and removal of the DHCP relay information option:

```
configure
dhcp relay information option
dhcp relay information policy drop
commit
exit
show running-config

Building configuration... !!
Last configuration change at 14:32:03 UTC Fri December 25 2004 by router!
...
...
dhcp relay information option
dhcp relay information policy drop
...
...
```

Information About Configuring DHCP IPv6 Information Pools

A DHCP IPv6 configuration information pool is a named entity that includes information about available configuration parameters and policies that control assignment of the parameters to clients from the pool. A pool is configured independently of the DHCP service and is associated with the DHCP service through the command line.

Each configuration pool can contain the following configuration parameters and operational information:

- Prefix delegation information, which could include a list of available prefixes for a particular client and associated preferred and valid lifetimes
- DNS servers—List of IPv6 addresses of DNS servers
- Domain search list—String containing domain names for DNS resolution
- SIP server address—List of IPv6 addresses of SIP server
- SIP server domain list—String containing domain names for SIP server

Configuring Cisco IOS XR DHCP IPv6 Information Pool Option

This task describes how to enable support for the DHCP IPv6 information pool option with the name pool1.

SUMMARY STEPS

1. **configure**
2. **dhcp ipv6**

3. **pool** *pool-name*
4. **end**
or
commit
5. **show dhcp ipv6 pool** *pool-name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>configure</p> <p>Example: RP/0/RP0/CPU0:router# configure</p>	Enters global configuration mode.
Step 2	<p>dhcp ipv6</p> <p>Example: RP/0/RP0/CPU0:router (config)# dhcp ipv6</p>	Enables the DHCP IPv6 configuration mode.
Step 3	<p>pool <i>pool-name</i></p> <p>Example: RP/0/RP0/CPU0:router (config-dhcp ipv6)# pool pool1</p>	Creates a DHCP pool specified by the <i>pool-name</i> argument for the prefix delegation and the other configurations on the interface.
Step 4	<p>end</p> <p>or</p> <p>commit</p> <p>Example: RP/0/RP0/CPU0:router(config)# end</p> <p>or</p> <p>RP/0/RP0/CPU0:router(config)# commit</p>	<p>Saves configuration changes.</p> <ul style="list-style-type: none"> When you issue the end command, the system prompts you to commit changes: <pre>Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:</pre> <ul style="list-style-type: none"> Entering yes saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode. Entering no exits the configuration session and returns the router to EXEC mode without committing the configuration changes. Entering cancel leaves the router in the current configuration session without exiting or committing the configuration changes. Use the commit command to save the configuration changes to the running configuration file and remain within the configuration session.
Step 5	<p>show dhcp ipv6 pool [<i>pool-name</i>]</p> <p>Example: RP/0/RP0/CPU0:router# show dhcp ipv6 pool pool1</p>	(Optional) Displays the DHCP IPv6 pool name.

Additional References

The following sections provide references related to implementing the Cisco IOS XR DHCP relay agent.

Related Documents

Related Topic	Document Title
Cisco IOS XR DHCP commands	<i>DHCP Commands on Cisco IOS XR Software</i> , Release 3.4.0
Cisco CRS-1 router getting started material	<i>Cisco IOS XR Getting Started Guide</i> , Release 3.4.0
Information about user groups and task IDs	<i>Configuring AAA Services on Cisco IOS XR Software module of the Cisco IOS-XR System Security Configuration Guide</i> , Release 3.4.0

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
To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFC	Title
RFC 2131	<i>Dynamic Host Configuration Protocol</i>
RFC 3315	<i>Dynamic Host Configuration Protocol for IPv6 (DHCPv6)</i>

Technical Assistance

Description	Link
The Cisco Technical Support 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

