



DHCP Client

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The Cisco Dynamic Host Configuration Protocol (DHCP) Client feature allows a Cisco device to act as a host requesting configuration parameters, such as an IP address, from a DHCP server.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for the DHCP Client

The DHCP client can be configured on Ethernet interfaces.

Information About the DHCP Client

- [DHCP Client Operation, page 2](#)
- [Configurable DHCP Client Overview, page 2](#)
- [DHCP Client on WAN Interfaces Overview, page 3](#)



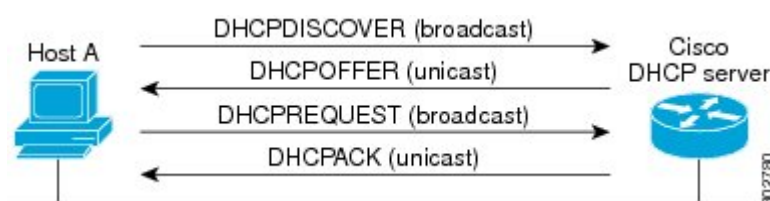
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DHCP Client Operation

The Dynamic Host Configuration Protocol (DHCP) provides a framework for passing configuration information 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. The figure below shows the basic steps that occur when a DHCP client requests an IP address from a DHCP server. The client, Host A, sends a DHCPDISCOVER broadcast message to locate a DHCP server. A DHCP server offers configuration parameters (such as an IP address, a MAC address, a domain name, and a lease for the IP address) to the client in a DHCPOFFER unicast message. The client returns a formal request for the offered IP address to the DHCP server in a DHCPREQUEST broadcast message. The DHCP server confirms that the IP address has been allocated to the client by returning a DHCPACK unicast message to the client.

Figure 1 DHCP Request for an IP Address from a DHCP Server



A DHCP client may receive offers from multiple DHCP servers and can accept any one of the offers; however, the client usually accepts the first offer it receives. The offer from the DHCP server is not a guarantee that the IP address will be allocated to the client; however, the server usually reserves the address until the client has had a chance to formally request the address.

The client returns a formal request for the offered IP address to the DHCP server in a DHCPREQUEST broadcast message. The DHCP server confirms that the IP address has been allocated to the client by returning a DHCPACK unicast message to the client.

Configurable DHCP Client Overview

The configurable DHCP client functionality allows a Dynamic Host Configuration Protocol (DHCP) client to use a user-specified client identifier, class identifier, or suggested lease time when requesting an address from a DHCP server.

Configuration parameters and other control information are carried in tagged data items that are stored in the options field of a DHCP message. The DHCP client provides flexibility by allowing the following options to be configured for a DHCP client:

- Option 33—This option is used to configure a list of static routes in the client.
- Option 51—This option is used in a client request (DHCPDISCOVER or DHCPREQUEST) to allow the client to request a lease time for the IP address.
- Option 55—This option allows the DHCP client to request certain options from the DHCP server. The **ip dhcp client request** command allows the system administrator to turn off some of the requested options, thus removing them from the request list.
- Option 60—This option allows the user to configure the vendor class identifier string to use in the DHCP interaction.
- Option 61—This option is used by DHCP clients to specify their unique identifier. DHCP servers use this value to index their database of address bindings. This value is expected to be unique for all clients in an administrative domain.

DHCP Client on WAN Interfaces Overview

The DHCP Client on WAN Interfaces feature allows a Dynamic Host Configuration Protocol (DHCP) client to acquire an IP address over PPP over ATM (PPPoA) and certain ATM interfaces. By using DHCP rather than the IP Control Protocol (IPCP), a DHCP client can acquire other useful information such as Domain Name System (DNS) addresses, the DNS default domain name, and the default route.

The configuration of PPPoA and Classical IP and Address Resolution Protocol (ARP) over ATM already allows for a broadcast capability over the interface when you enter the **broadcast** command on the ATM interface. The DHCP Client on WAN Interfaces feature removes existing restrictions on what types of interfaces are allowed to send DHCP packets (previously, dialer interfaces were not allowed). This feature also ensures that DHCP RELEASE messages are sent out the interface before a connection is allowed to be broken.

DHCP Client FORCERENEW Message Overview

The Cisco DHCP Client FORCERENEW Message feature provides entity authentication and message authentication, in accordance with RFC 3118, by which Dynamic Host Configuration Protocol (DHCP) clients and servers authenticate the identity of other DHCP entities and verify that the content of a DHCP message has not been changed during delivery through the network.

The message authentication mechanism allows servers to determine whether a request for DHCP information comes from a client that is authorized to use the network. It also allows clients to verify that a DHCP server can be trusted to provide valid configuration.

The Cisco DHCP Client FORCERENEW Message feature requires authentication, and all client-server exchanges must be authenticated. The **ip dhcp client authentication mode** and **key chain** commands must be configured.

When the client gets a FORCERENEW message, the client does the following:

- Authenticates the message according to the authentication mode specified in the **ip dhcp client authentication mode** command. The Cisco DHCP Client FORCERENEW Message feature supports both token-based and message digest algorithm 5 (MD5)-based authentication:
 - Token-based authentication is useful only for basic protection against inadvertently instantiated DHCP servers. Tokens are transmitted in plain text; they provide weak authentication and do not provide message authentication.
 - MD5-based authentication provides better message and entity authentication because it contains a single-use value generated by the source as a message authentication code.
- Changes its state to RENEW.
- Tries to renew its lease according to normal DHCP procedures.

The client discards any multicast FORCERENEW message or message that fails authentication.

How to Configure the DHCP Client

- [Configuring the DHCP Client, page 4](#)
- [Forcing a Release or Renewal of a DHCP Lease for a DHCP Client, page 5](#)
- [Configuring FORCERENEW Message Handling, page 6](#)

Configuring the DHCP Client

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- [Troubleshooting Tips, page 5](#)

Configuring the DHCP Client

Cisco devices running Cisco software include the Dynamic Host Configuration Protocol (DHCP) server and relay agent software, which are enabled by default. Your device can act as both the DHCP client and the DHCP server. Use the **ip address dhcp** command to obtain IP address information for the configured interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address dhcp**
5. **end**
6. **debug dhcp detail**
7. **debug ip dhcp server packets**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	interface <i>type number</i> Example: Device(config)# interface GigabitEthernet 0/0/1	Configures an interface type and enters interface configuration mode.

Command or Action	Purpose
Step 4 <code>ip address dhcp</code> Example: <pre>Device(config-if)# ip address dhcp</pre>	Acquires an IP address on an interface from DHCP.
Step 5 <code>end</code> Example: <pre>Device(config-if)# end</pre>	Returns to privileged EXEC mode.
Step 6 <code>debug dhcp detail</code> Example: <pre>Device# debug dhcp detail</pre>	Displays the DHCP packets that were sent and received.
Step 7 <code>debug ip dhcp server packets</code> Example: <pre>Device# debug ip dhcp server packets</pre>	Displays the server side of the DHCP interaction.

Troubleshooting Tips

To verify the configuration, you can use the **debug dhcp detail** command to display the DHCP packets that were sent and received. To display the server side of the DHCP interaction, use the **debug ip dhcp server packets** command.

Forcing a Release or Renewal of a DHCP Lease for a DHCP Client

Perform this task to force a release or renewal of a DHCP lease for a DHCP client.

Forcing a release or renewal of a DHCP lease for a DHCP client provides the ability to perform two independent operations from the command-line interface (CLI) in EXEC mode:

- Immediately release a DHCP lease for a DHCP client.
- Force a DHCP renewal of a lease for a DHCP client.

This functionality provides the following benefits:

- Eliminates the need to go into the configuration mode to reconfigure the router to release or renew a DHCP lease.
- Simplifies the release and renewal of a DHCP lease.
- Reduces the amount of time spent performing DHCP IP release and renewal configuration tasks.

- [DHCP Release and Renew CLI Operation, page 6](#)

DHCP Release and Renew CLI Operation

- [Overview of Releasing a DHCP Lease, page 6](#)
- [Overview of Renewing a DHCP Lease, page 6](#)

Overview of Releasing a DHCP Lease

The **release dhcp** command starts the process to immediately release a Dynamic Host Configuration Protocol (DHCP) lease for the specified interface. After the lease is released, the interface address is deconfigured. The **release dhcp** command does not deconfigure the **ip address dhcp** command specified in the configuration file for the interface. During a write memory or show running configuration file action, or if the device is rebooted, the **ip address dhcp** command acquires a DHCP address for the interface.

Overview of Renewing a DHCP Lease

The **renew dhcp** command advances the Dynamic Host Configuration Protocol (DHCP) lease timer to the next stage, at which point one of the following occurs:

- If the lease is currently in a BOUND state, the lease is advanced to the RENEW state and a DHCP RENEW request is sent.
- If the lease is currently in a RENEW state, the timer is advanced to the REBIND state and a DHCP REBIND request is sent.

If there is no response to the RENEW request, the interface remains in the RENEW state. In this case, the lease timer will advance to the REBIND state and subsequently send a REBIND request.

If a NAK response is sent in response to the RENEW request, the interface is deconfigured.

Configuring FORCERENEW Message Handling

Perform this task to specify the type of authentication to be used in Dynamic Host Configuration Protocol (DHCP) messages on the interface, specify the key chain to be used in authenticating a request, and enable FORCERENEW message handling on the DHCP client when authentication is enabled.

SUMMARY STEPS

1. **interface** *type number*
2. **ip dhcp client authentication key-chain** *name*
3. **ip dhcp client authentication mode** *type*
4. **exit**
5. **key chain** *name-of-chain*
6. **key** *key-id*
7. **key-string** *text*
8. **exit**
9. **exit**
10. **ip dhcp-client forcerenew**
11. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>interface <i>type number</i></p> <p>Example:</p> <pre>Device(config)# interface Ethernet 1</pre>	Configures an interface type and enters interface configuration mode.
Step 2	<p>ip dhcp client authentication key-chain <i>name</i></p> <p>Example:</p> <pre>Device(config-if)# ip dhcp client authentication key-chain dhcpl</pre>	Specifies the key chain to be used in authenticating a request.
Step 3	<p>ip dhcp client authentication mode <i>type</i></p> <p>Example:</p> <pre>Device(config-if)# ip dhcp client authentication mode md5</pre>	Specifies the type of authentication to be used in DHCP messages on the interface.
Step 4	<p>exit</p> <p>Example:</p> <pre>Device(config-if)# exit</pre>	Exits interface configuration mode.
Step 5	<p>key chain <i>name-of-chain</i></p> <p>Example:</p> <pre>Device(config)# key chain dhcpl</pre>	Defines an authentication key chain needed to enable authentication and enters key-chain configuration mode.
Step 6	<p>key <i>key-id</i></p> <p>Example:</p> <pre>Device(config-keychain)# key 1234</pre>	Identifies an authentication key on a key chain and enters key-chain key configuration mode.
Step 7	<p>key-string <i>text</i></p> <p>Example:</p> <pre>Device(config-keychain-key)# key-string secret</pre>	Specifies the authentication string for a key.

	Command or Action	Purpose
Step 8	exit Example: Device(config-keychain-key)# exit	Returns to key-chain configuration mode.
Step 9	exit Example: Device(config-keychain)# exit	Returns to global configuration mode.
Step 10	ip dhcp-client forcerenew Example: Device(config)# ip dhcp-client forcerenew	Enables DHCP FORCERENEW message handling on the DHCP client.
Step 11	end Example: Device(config)# end	(Optional) Returns to privileged EXEC mode.

Configuration Examples for the DHCP Client

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- [Example: Configuring the Configurable DHCP Client, page 9](#)
- [Example: Configuring an ATM Primary Interface Using aal5snap Encapsulation and Inverse ARP, page 9](#)
- [Example: Configuring an ATM Point-to-Point Subinterface Using aal5snap Encapsulation, page 10](#)
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- [Examples: Releasing a DHCP Lease, page 10](#)
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Example: Configuring the DHCP Client

The figure below shows a simple network diagram of a Dynamic Host Configuration Protocol (DHCP) client on an Ethernet LAN.

Figure 2 Topology Showing a DHCP Client with a Gigabit Ethernet Interface



On the DHCP server, the configuration is as follows:

```
ip dhcp pool 1
 network 10.1.1.0 255.255.255.0
 lease 1 6
```

On the DHCP client, the configuration is as follows on interface E2:

```
interface GigabitEthernet 0/0/0
 ip address dhcp
```

This configuration allows the DHCP client to acquire an IP address from the DHCP server through Gigabit Ethernet interface 0/0/0.

Example: Configuring the Configurable DHCP Client

The following example shows how to customize the Dynamic Host Configuration Protocol (DHCP) client configuration with various configurable DHCP client options on Gigabit Ethernet interface 0/0/1:

```
interface GigabitEthernet 0/0/1
 ip dhcp client client-id ascii my-test1
 ip dhcp client class-id my-class-id
 ip dhcp client lease 0 1 0
 ip dhcp client hostname host1
 no ip dhcp client request tftp-server-address
 ip address dhcp
```

Example: Configuring an ATM Primary Interface Using aal5snap Encapsulation and Inverse ARP

In the following example, the **protocol ip 255.255.255.255 broadcast** command is needed because there must be an ATM map entry to recognize the broadcast flag on the permanent virtual circuit (PVC). You can use any ATM map entry. The **protocol ip inarp** configuration is needed so that the ATM Inverse Address Resolution Protocol (ARP) can operate on the interface so that the system can be pinged once an address is assigned by the Dynamic Host Configuration Protocol (DHCP).

```
interface atm 0
 ip address dhcp
 pvc 1/100
 encapsulation aal5snap
 broadcast
```

```
protocol ip 255.255.255.255 broadcast
protocol ip inarp
```

Example: Configuring an ATM Point-to-Point Subinterface Using aal5snap Encapsulation

The following example shows an ATM point-to-point subinterface configuration using aal5snap encapsulation:

```
interface atm 0.1 point-to-point
ip address dhcp
pvc 1/100
encapsulation aal5snap
broadcast
```

Example: Configuring an ATM Point-to-Point Subinterface Using aal5nlpid Encapsulation

The following example shows an ATM point-to-point subinterface configuration using aal5nlpid encapsulation:

```
interface atm 0.1 point-to-point
ip address dhcp
pvc 1/100
encapsulation aal5nlpid
broadcast
```

Example: Configuring an ATM Point-to-Point Subinterface Using aal5mux PPP Encapsulation

The following example shows an ATM point-to-point subinterface configuration using aal5mux PPP encapsulation:

```
interface atm 0.1 point-to-point
pvc 1/100
encapsulation aal5mux ppp
broadcast
!
interface virtual-template1
ip address dhcp
```

Examples: Releasing a DHCP Lease

In the following example, a Dynamic Host Configuration Protocol (DHCP) release is performed on an interface that was originally assigned an IP address by the DHCP server:

```
Device# release dhcp ethernet 3/1
```

In the following example, an attempt is made to release the DHCP lease on an interface that was not originally assigned an IP address by the DHCP server:

```
Device# release dhcp ethernet 3/1
Interface does not have a DHCP originated address
```

In the following example, the **release dhcp** command is executed without specifying the *type* and *number* arguments:

```
Device# release dhcp
Incomplete command.
```

Examples: Renewing a DHCP Lease

In the following example, a Dynamic Host Configuration Protocol (DHCP) lease is renewed on an interface that was originally assigned an IP address by the DHCP server:

```
Device# renew dhcp ethernet 3/1
```

In the following example, an attempt is made to renew the DHCP lease on an interface that was not originally assigned an IP address by the DHCP server:

```
Device# renew dhcp ethernet 3/1
Interface does not have a DHCP originated address
```

In the following example, the **renew dhcp** command is executed without specifying the *type* and *number* arguments:

```
Device# renew dhcp
Incomplete command.
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
DHCP commands	Cisco IOS IP Addressing Services Command Reference
DHCP conceptual information	“DHCP Overview” module in the <i>IP Addressing: DHCP Configuration Guide</i>

RFCs

RFCs	Title
RFC 2131	<i>Dynamic Host Configuration Protocol</i>
RFC 2132	<i>DHCP Options and BOOTP Vendor Extensions</i>

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for the DHCP Client

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1 *Feature Information for the DHCP Client*

Feature Name	Releases	Feature Information
Configurable DHCP Client	12.2(28)SB 12.3(8)T 15.3(1)S	<p>The Configurable DHCP Client feature provides the flexibility to include various configuration options for the DHCP client. A DHCP client is defined as an Internet host using DHCP to obtain configuration parameters such as an IP address.</p> <p>The following commands were introduced: ip dhcp client class-id, ip dhcp client client-id, ip dhcp client hostname, ip dhcp client lease, ip dhcp client request.</p>
DHCP Client Option 121	15.2(4)S	<p>The DHCP Client Option 121 feature allows you to configure classless static routes by specifying classless network destinations in the routes.</p> <p>No commands were introduced or modified by this feature.</p>

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