



DHCP Server RADIUS Proxy

Last Updated: December 3, 2012

The DHCP Server RADIUS Proxy feature is a RADIUS-based address assignment mechanism in which a Dynamic Host Configuration Protocol (DHCP) server authorizes remote clients and allocates addresses based on replies from a RADIUS 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.

Prerequisites for DHCP Server RADIUS Proxy

Before you can configure the DHCP Server RADIUS Proxy feature, you must be running DHCPv4 or a later version. For information about release and platform support, see the [Feature Information for DHCP Server RADIUS Proxy, page 20](#).



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Restrictions for DHCP Server RADIUS Proxy

The DHCP Server RADIUS Proxy supports only one address authorization pool on the router.

Information About DHCP Server RADIUS Proxy

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DHCP Server RADIUS Proxy Overview

The DHCP Server RADIUS Proxy feature is an address allocation mechanism for RADIUS-based authorization of DHCP leases. This feature supports DHCP options 60 and 121.

The process of authorizing the client using the RADIUS server is as follows:

- 1 The DHCP server passes client information to a RADIUS server.
- 2 The RADIUS server returns all required information to the DHCP server as RADIUS attributes.
- 3 The DHCP server translates the RADIUS attributes into DHCP options and sends this information back to RADIUS in a DHCP OFFER message.
- 4 DHCP binding is synchronized after the RADIUS server authorizes the client session.

If a local pool and an authorization pool are configured on the router, the DHCP server can assign addresses from both pools for different client interfaces.

DHCP Server RADIUS Proxy Enhancement

The DHCP Server RADIUS Proxy Enhancement feature is an enhancement to the DHCP Server RADIUS Proxy feature introduced in Cisco IOS Release 15.0(1)S. This feature supports DHCP options 60 and 121.

The process of authorizing the client using the RADIUS server is as follows:

- 1 The DHCP server passes client information to a RADIUS server.
- 2 The RADIUS server returns classname information and other optional information (Session-Timeout and Session-Duration) to the DHCP server as RADIUS attributes.
- 3 The DHCP server assigns the IP address from the specified class, if it is available, and translates any other optional attributes received from the RADIUS server into DHCP options. The information is sent to the DHCP client as a DHCP OFFER message.
- 4 DHCP binding is synchronized after the RADIUS server authorizes the client session.

DHCP Server RADIUS Proxy Architecture

The allocation of addresses in a DHCP and RADIUS proxy architecture occurs in the following sequence:

- 1 The client accesses the network from a residential gateway and sends a DHCP DISCOVER broadcast message to the relay agent. The DHCP DISCOVER message contains the client IP address, hostname, vendor class identifier, and client identifier.
- 2 The relay agent sends a DHCP DISCOVER unicast message with the following information to the router:
 - Relay agent information (option 82) with the remote ID suboption containing the inner and outer VLAN IDs.
 - Client information in the DHCP DISCOVER packet.

The router determines the address of the DHCP server from the IP helper address on the interface that receives the DHCP packet.

- 1 RADIUS receives an access-request message to translate the DHCP options to RADIUS attributes.
- 2 RADIUS responds with an access-accept message, and delivers the following attributes to the DHCP server:
 - Framed-IP-Address
 - Framed-IP-Netmask
 - Session-Timeout
 - Session-Duration
- 3 The DHCP server sends an OFFER unicast message with the following translations from the RADIUS server access-accept message to the client:
 - Framed-IP-Address inserted into the DHCP header.
 - Framed-IP-Netmask inserted into DHCP option 1 (subnet mask).
 - Session-Timeout inserted into DHCP option 51 (IP address lease time).
 - Framed-Route that is translated from the standard Cisco Framed-Route format into DHCP option 121 or the DHCP default gateway option (if the network and netmask are appropriate for a default route).
 - A copy of relay agent information (option 82). Before the DHCP client receives the packet, the relay removes option 82.
 - T1 time set to the Session-Timeout and T2 time set to the Session-Duration.
- 4 The client returns a formal request for the offered IP address to the DHCP server in a DHCP REQUEST broadcast message.
- 5 The DHCP confirms that the IP address is allocated to the client by returning a DHCP ACK unicast message containing the lease information and the DHCP options to the client.
- 6 A RADIUS server accounting request starts, followed by a RADIUS server accounting response that is used by the authentication, authorization, and accounting (AAA) subsystem.

When a RADIUS server attribute is not present in an access-accept message, the corresponding DHCP option is not sent to the DHCP client. If the required information to produce a particular RADIUS server attribute is not available to the DHCP server, the DHCP server does not include information in the RADIUS packet. Noninclusion can be in the form of not sending an attribute (if there is no information at all), or omitting information from the attribute (in the case of CLI-based format strings).

If a DHCP option is provided to the DHCP server but is invalid, the DHCP server may not transmit the corresponding RADIUS attribute in the access-request, or may transmit an invalid RADIUS server attribute.

DHCP Server RADIUS Proxy Enhancement Architecture

The allocation of addresses in a DHCP and RADIUS proxy enhancement architecture occurs in the following sequence:

- 1 The client accesses the network from a residential gateway and sends a DHCP DISCOVER broadcast message to the relay agent. The DHCP DISCOVER message contains the client IP address, hostname, vendor class identifier, and client identifier.
- 2 The relay agent sends a DHCP DISCOVER unicast message with the following information to the router:
 - Relay agent information (option 82) with the remote ID suboption containing the inner and outer VLAN IDs.
 - Client information in the DHCP DISCOVER packet.

The router determines the address of the DHCP server from the IP helper address on the interface that receives the DHCP packet.

- 1 The RADIUS server receives an access-request message to translate the DHCP options to RADIUS attributes.
- 2 The RADIUS server responds with an access-accept message and delivers the following attributes to the DHCP server:
 - Classname
 - Session-Timeout (optional)
 - Session-Duration (optional)
- 3 The DHCP server identifies the addresses configured under the specified classname and assigns an address to the client.
- 4 The DHCP server sends an OFFER unicast message containing the following translations from the RADIUS server access-accept message to the client:
 - Session-Timeout inserted into DHCP option 51 (IP address lease time).
 - Framed-Route that is translated from the standard Cisco Framed-Route format into DHCP option 121 or the DHCP default gateway option
 - A copy of relay agent information (option 82). Before the DHCP client receives the packet, the relay removes option 82.
 - T1 time set to the Session-Timeout and T2 time set to the Session-Duration.
- 5 The client returns a formal request for the offered IP address to the DHCP server in a DHCP REQUEST broadcast message.
- 6 The DHCP server confirms the IP address allocation by sending a DHCP ACK unicast message containing the lease information and the DHCP options to the client.
- 7 A RADIUS server accounting request starts, followed by a RADIUS server accounting response that is used by the AAA subsystem.



Note

If the classname attribute is not present in the access-accept message received, the DHCP server assumes a default classname and tries to assign the IP address from a default class. The IP address is assigned to the client only if the IP address is available for a default class.

- If the Framed-IP-Address, Framed-IP-Netmask, Session-Timeout, and Session-Duration attributes are present in the access-accept message, then the classname attribute is ignored and the DHCP server assigns the IP address received in the Framed-IP-Address attribute to the client.

DHCP Server and RADIUS Translations

The table below lists the translations of DHCP options in a DHCP DISCOVER message to attributes in a RADIUS server access-request message.

Table 1 *DHCP DISCOVER to RADIUS Access-Request Translations*

DHCP DISCOVER	RADIUS Access-Request
Client identifier	Cisco attribute-value (AV) pair dhcp-client-id that equals the hexadecimal-encoded value of DHCP option 61
DHCP relay information option that can contain a VLAN parameter on the D-router	Cisco AV pair dhcp-relay-info that equals the hexadecimal-encoded value of DHCP option 82
Gateway address of the relay agent (giaddr field of a DHCP packet)	NAS-identifier
Hostname	Cisco AV pair client-hostname that equals the value of DHCP option 12
Not Applicable	User-Password as configured on the DHCP server
Vendor class	Cisco AV pair dhcp-vendor-class that equals a hexadecimal-encoded value of DHCP option 60
Virtual MAC address of the residential gateway	User-Name

The table below lists the translations of attributes in a RADIUS server access-accept message to DHCP options in a DHCP OFFER message.

Table 2 *RADIUS Access-Accept to DHCP OFFER Translations*

RADIUS Access-Accept	DHCP OFFER
Cisco AV pair session-duration in seconds, where seconds is greater than or equal to the number of seconds in the Session-Timeout attribute	Provides session control on the DHCP server. This attribute is not transmitted to the DHCP client.
Classname	Contains a string that specifies the class to be used by the DHCP server in the an address allocation.
Framed-IP-Address	IP address of the residential gateway.
Framed-IP-Netmask	Subnet mask (option 1).

RADIUS Access-Accept	DHCP OFFER
Framed-Route (RADIUS attribute 22). One route for each DHCP option is allowed with a maximum of 16 Framed-Route options for a RADIUS packet	Contains up to 16 classless routes in one option (option 121).
Session-Timeout	IP address lease time (option 51).

RADIUS Profiles for the DHCP Server RADIUS Proxy

When you configure the RADIUS server user profiles for the DHCP server RADIUS proxy, use the following guidelines:

- The Session-Timeout attribute must contain a value, in seconds. If this attribute is not present, the DHCP OFFER is not sent to the client.
- A RADIUS user profile must contain the following attributes:
 - Framed-IP-Address
 - Framed-IP-Netmask
 - Framed-Route
 - Session-Timeout
 - Session-Duration--Session-Duration is the Cisco AV pair session-duration = seconds, where seconds is the maximum time for the duration of a lease including all renewals. The value for Session-Duration must be greater than or equal to the Session-Timeout attribute value, and it cannot be zero.
- Additional RADIUS server attributes are allowed but are not required. The DHCP server ignores additional attributes that it does not understand. If a RADIUS server user profile contains a required attribute that is empty, the DHCP server does not generate the DHCP options.

RADIUS Profiles for the DHCP Server RADIUS Proxy Enhancement

When you configure the RADIUS server user profiles for the DHCP server RADIUS proxy enhancement for a classname, use the following guidelines:

- The Session-Timeout attribute (if present) must contain a value, in seconds.
- A RADIUS user profile may contain the following attributes:
 - Classname (default classname is considered, if this attribute is not present)
 - Framed-Route
 - Session-Timeout
 - Session-Duration--Session-Duration is the Cisco AV pair session-duration = seconds, where “seconds” is the maximum time for the duration of a lease including all renewals. The value for Session-Duration should be greater than or equal to the Session-Timeout attribute value, and it cannot be zero.
- Additional RADIUS server attributes are allowed but are not required. The DHCP server ignores additional attributes that it does not understand.

How to Configure DHCP Server RADIUS Proxy

- [Configuring AAA-Related Commands for DHCP Server RADIUS Proxy, page 7](#)
- [Configuring the DHCP Server for RADIUS Proxy Authorization, page 11](#)
- [Configuring the DHCP Server Proxy Enhancement, page 13](#)
- [Monitoring and Maintaining the DHCP Server, page 16](#)

Configuring AAA-Related Commands for DHCP Server RADIUS Proxy

Perform this task to configure AAA-related commands required to configure the DHCP Server RADIUS Proxy and DHCP Server RADIUS Proxy Enhancement features.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **service dhcp**
4. **aaa new-model**
5. **aaa group server radius** *group-name*
6. **server** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*]
7. **exit**
8. **aaa authorization network** *method-list-name* **group** *group-name*
9. **aaa accounting network** *method-list-name* **start-stop group** *group-name*
10. **interface** *type slot / subslot / port* [*. subinterface*]
11. **encapsulation dot1q** *vlan-id* **second-dot1q** {**any** | *vlan-id* [, *vlan-id* [- *vlan-id*]]}
12. **ip address** *address mask*
13. **no shutdown**
14. **exit**
15. **radius-server host** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*]
16. **radius-server key** {**0** *string* | **7** *string* | *string*}
17. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.

Command or Action	Purpose
<p>Step 3 <code>service dhcp</code></p> <p>Example:</p> <pre>Router(config)# service dhcp</pre>	<p>Enables DHCP server and relay agent features on the router.</p> <ul style="list-style-type: none"> By default, these features are enabled on the router.
<p>Step 4 <code>aaa new-model</code></p> <p>Example:</p> <pre>Router(config)# aaa new-model</pre>	<p>Enables the AAA access control system.</p>
<p>Step 5 <code>aaa group server radius <i>group-name</i></code></p> <p>Example:</p> <pre>Router(config)# aaa group server radius group1</pre>	<p>Specifies the name of the server host list to group RADIUS server hosts, and enters server-group configuration mode.</p> <ul style="list-style-type: none"> <i>group-name</i> --Character string to name the server group. The following words cannot be used as the group name: <ul style="list-style-type: none"> auth-guest enable guest if-authenticated if-needed krb5 krb-instance krb-telnet line local none radius rcmd tacacs tacacsplus
<p>Step 6 <code>server <i>ip-address</i> [auth-port <i>port-number</i>] [acct-port <i>port-number</i>]</code></p> <p>Example:</p> <pre>Router(config-sg-radius)# server 10.1.1.1 auth-port 1700 acct-port 1701</pre>	<p>Specifies the IP address of the RADIUS server host for the defined server group.</p> <ul style="list-style-type: none"> Repeat this command for each RADIUS server host to associate with the server group. <ul style="list-style-type: none"> <i>ip-address</i>- —IP address of the RADIUS server host. auth-port <i>port-number</i>- —(Optional) Specifies the UDP destination port for authentication requests. Default value is 1645. acct-port <i>port-number</i> —(Optional) Specifies the UDP destination port for accounting requests. Default value is 1646.

	Command or Action	Purpose
Step 7	<p>exit</p> <p>Example:</p> <pre>Router(config-sg-radius)# exit</pre>	Exits server-group configuration mode.
Step 8	<p>aaa authorization network <i>method-list-name</i> group <i>group-name</i></p> <p>Example:</p> <pre>Router(config)# aaa authorization network acct1 group group1</pre>	<p>Specifies the methods list and server group for DHCP authorization.</p> <ul style="list-style-type: none"> • <i>method-list-name</i> --Character string to name the authorization methods list. • group --Specifies a server group. • <i>group-name</i> --Name of the server group to apply to DHCP authorization.
Step 9	<p>aaa accounting network <i>method-list-name</i> start-stop <i>group</i> <i>group-name</i></p> <p>Example:</p> <pre>Router(config)# aaa accounting network acct1 start-stop group group1</pre>	<p>Specifies that AAA accounting runs for all network service requests.</p> <ul style="list-style-type: none"> • <i>method-list-name</i> --Character string to name the accounting methods list. • start-stop --Sends a start accounting notice at the beginning of a process and a stop accounting notice at the end of a process. The start accounting record is sent in the background. The requested user process begins regardless of whether or not the start accounting notice is received by the accounting server. • group --Specifies a server group. • <i>group-name</i> --Name of the server group to apply to DHCP accounting.
Step 10	<p>interface <i>type slot / subslot / port</i> [<i>subinterface</i>]</p> <p>Example:</p> <pre>Router(config)# interface ethernet 1/10/0.0</pre>	Configures an interface or subinterface that allows the DHCP client to obtain an IP address from the DHCP server, and enters subinterface configuration mode.
Step 11	<p>encapsulation dot1q <i>vlan-id</i> second-dot1q {<i>any</i> <i>vlan-id</i> [, <i>vlan-id</i> [- <i>vlan-id</i>]]}</p> <p>Example:</p> <pre>Router(config-subif)# encapsulation dot1q 100 second- dot1q 200</pre>	<p>(Optional) Enables IEEE 802.1Q encapsulation of traffic on a subinterface in a VLAN.</p> <ul style="list-style-type: none"> • <i>vlan-id</i> --VLAN ID, integer in the range 1 to 4094. To separate the starting and ending VLAN ID values that are used to define a range of VLAN IDs, enter a hyphen. (Optional) To separate each VLAN ID range from the next range, enter a comma. • second-dot1q --Supports the IEEE 802.1Q-in-Q VLAN Tag Termination feature to configure an inner VLAN ID. • any --Any second tag in the range 1 to 4094.

Command or Action	Purpose
<p>Step 12 <code>ip address <i>address mask</i></code></p> <p>Example:</p> <pre>Router(config-subif)# ip address 192.168.1.1 255.255.255.0</pre>	<p>Specifies an IP address for an interface or subinterface.</p> <ul style="list-style-type: none"> • <i>address</i> is the IP address of the interface or subinterface. • <i>mask</i> is the subnet address for the IP address.
<p>Step 13 <code>no shutdown</code></p> <p>Example:</p> <pre>Router(config-subif)# no shutdown</pre>	<p>Enables the interface or subinterface.</p>
<p>Step 14 <code>exit</code></p> <p>Example:</p> <pre>Router(config-subif)# exit</pre>	<p>Exits subinterface configuration mode and enters global configuration mode.</p>
<p>Step 15 <code>radius-server host <i>ip-address</i> [<i>auth-port port-number</i>] [<i>acct-port port-number</i>]</code></p> <p>Example:</p> <pre>Router(config)# radius-server host 10.1.1.1</pre>	<p>Specifies a RADIUS server host.</p> <ul style="list-style-type: none"> • <i>ip-address</i> is the IP address of the RADIUS server host. • auth-port <i>port-number</i>-- (Optional) Specifies the UDP destination port for authentication requests. Default value is 1645. • acct-port <i>port-number</i>-- (Optional) Specifies the UDP destination port for accounting requests. Default value is 1646.
<p>Step 16 <code>radius-server key {<i>0 string</i> <i>7 string</i> <i>string</i>}</code></p> <p>Example:</p> <pre>Router(config)# radius-server key string1</pre>	<p>Specifies the authentication and encryption key for all RADIUS communications between the router and the RADIUS daemon.</p> <ul style="list-style-type: none"> • 0 <i>string</i>-- Specifies an unencrypted (cleartext) shared key • 7 <i>string</i> -- Specifies a hidden shared key. <p>Note Any key you enter must match the key on the RADIUS daemon. All leading spaces are ignored, but spaces within and at the end of the key are used. If you use spaces in your key, do not enclose the key in quotation marks unless the quotation marks are part of the key.</p>
<p>Step 17 <code>exit</code></p> <p>Example:</p> <pre>Router(config)# exit</pre>	<p>Exits global configuration mode.</p>

Configuring the DHCP Server for RADIUS Proxy Authorization

Perform this task to configure the DHCP Server for RADIUS Proxy feature.

Configure the AAA configuration before configuring the DHCP Server for RADIUS Proxy feature.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp use class [aaa]**
4. **ip dhcp pool *name***
5. **accounting *method-list-name***
6. **authorization method *method-list-name***
7. **authorization shared-password *password***
8. **authorization username *string***
9. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	ip dhcp use class [aaa] Example: Router(config)# ip dhcp use class aaa	Configures the DHCP server to use the AAA server to get the class name.
Step 4	ip dhcp pool <i>name</i> Example: Router(config)# ip dhcp pool pool1	Specifies a name for the DHCP server address pool, and enters DHCP pool configuration mode. <ul style="list-style-type: none"> • <i>name</i> --Name of the pool.

Command or Action	Purpose
<p>Step 5 <code>accounting <i>method-list-name</i></code></p> <p>Example:</p> <pre>Router(dhcp-config)# accounting acct1</pre>	<p>Enables DHCP accounting.</p> <ul style="list-style-type: none"> • <i>method-list-name</i> --Name of the accounting methods list.
<p>Step 6 <code>authorization method <i>method-list-name</i></code></p> <p>Example:</p> <pre>Router(dhcp-config)# authorization method auth1</pre>	<p>Enables DHCP authorization.</p> <ul style="list-style-type: none"> • <i>method-list-name</i> --Name of the authorization methods list.
<p>Step 7 <code>authorization shared-password <i>password</i></code></p> <p>Example:</p> <pre>Router(dhcp-config)# authorization shared-password password1</pre>	<p>Specifies the password that is configured in the RADIUS user profile.</p>

Command or Action	Purpose
<p>Step 8 <code>authorization username <i>string</i></code></p> <p>Example:</p> <pre>Router(dhcp-config)# authorization username %c-user1</pre>	<p>Specifies the parameters that RADIUS sends to a DHCP server when downloading configuration information for a DHCP client.</p> <ul style="list-style-type: none"> • The <i>string</i> argument contains the following formatting characters to insert DHCP client information: <ul style="list-style-type: none"> ◦ %%--Transmits the percent sign (%) character in the string sent to the RADIUS server ◦ %c--Ethernet address of the DHCP client (chaddr field) in ASCII format ◦ %C--Ethernet address of the DHCP client in hexadecimal format ◦ %g--Gateway address of the DHCP relay agent (giaddr field) ◦ %i--Inner VLAN ID from the DHCP relay information (option 82) in ASCII format ◦ %I--Inner VLAN ID from the DHCP relay information in hexadecimal format ◦ %o--Outer VLAN ID from the DHCP relay information (option 82) in ASCII format ◦ %O--Outer VLAN ID from the DHCP relay information (option 82) in hexadecimal format ◦ %p--Port number from the DHCP relay information (option 82) in ASCII format ◦ %P--Port number from the DHCP relay information (option 82) in hexadecimal format ◦ %u--Circuit ID from the DHCP relay information in ASCII format ◦ %U--Circuit ID from the DHCP relay information in hexadecimal format ◦ %r--Remote ID from the DHCP relay information in ASCII format ◦ %R--Remote ID from the DHCP relay information in hexadecimal format <p>Note The percent (%) sign is a marker to insert the DHCP client information associated with the specified character. The % is not sent to the RADIUS server unless you specify the %% characters.</p>
<p>Step 9 <code>exit</code></p> <p>Example:</p> <pre>Router(dhcp-config)# exit</pre>	<p>Exits DHCP pool configuration mode.</p>

Configuring the DHCP Server Proxy Enhancement

Perform this task to configure the DHCP Server Proxy Enhancement feature.

Configure the AAA configuration before configuring the DHCP Server for RADIUS Proxy feature.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip dhcp use class aaa**
4. **ip dhcp pool** *name*
5. **accounting** *server-group-name*
6. **authorization method** *method-list-name*
7. **authorization shared-password** *password*
8. **authorization username** *username*
9. **exit**
10. **ip dhcp pool** *name*
11. **network** *network-number* [*mask* **[secondary]**] | / *prefix-length* [**[secondary]**]
12. **class** *class-name*
13. **address range** *start-ip end-ip*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	ip dhcp use class aaa Example: Router(config)# ip dhcp use class aaa	Specifies to use the AAA server to get class name.
Step 4	ip dhcp pool <i>name</i> Example: Router(config)# ip dhcp pool pool1	Configures a DHCP address pool on a DHCP server and enters DHCP pool configuration mode.

	Command or Action	Purpose
Step 5	accounting <i>server-group-name</i> Example: Router(dhcp-config)# accounting list1	Enables DHCP accounting on a server group.
Step 6	authorization method <i>method-list-name</i> Example: Router(dhcp-config)# authorization method list1	Specifies a method list to be used for address allocation using RADIUS for DHCP.
Step 7	authorization shared-password <i>password</i> Example: Router(dhcp-config)# authorization shared-password password1	Specifies the password that RADIUS sends to a DHCP or RADIUS server when downloading configuration information for a DHCP client.
Step 8	authorization username <i>username</i> Example: Router(dhcp-config)# authorization username user1	Specifies the parameters that RADIUS sends to a DHCP server when downloading configuration information for a DHCP client.
Step 9	exit Example: Router(dhcp-config)# exit	Exits DHCP pool configuration mode and returns to global configuration mode.
Step 10	ip dhcp pool <i>name</i> Example: Router(config)# ip dhcp pool name2	Configures a DHCP address pool on a DHCP server and enters DHCP pool configuration mode.
Step 11	network <i>network-number [mask [secondary]] /prefix-length [secondary]</i> Example: Router(config)# network 10.0.0.1 255.255.255.0	Configures the network number and mask for a DHCP address pool primary or secondary subnet on a Cisco IOS DHCP server.

Command or Action	Purpose
Step 12 <code>class class-name</code> Example: <pre>Router(config)# class name1</pre>	Associates a class with a DHCP address pool and enters DHCP pool class configuration mode.
Step 13 <code>address range start-ip end-ip</code> Example: <pre>Router(config-dhcp-pool-class)# address range 10.0.0.1 10.0.0.5</pre>	Sets an address range for a DHCP class in a DHCP server address pool.

Monitoring and Maintaining the DHCP Server

Perform this task to verify and monitor DHCP server information. Once the router is in privileged EXEC mode, you can enter the commands in any order.

SUMMARY STEPS

1. `enable`
2. `debug ip dhcp server packet`
3. `debug ip dhcp server events`
4. `show ip dhcp binding [address]`
5. `show ip dhcp server statistics`
6. `show ip dhcp pool [name]`
7. `show ip route dhcp [address]`

DETAILED STEPS

Command or Action	Purpose
Step 1 <code>enable</code> Example: <pre>Router> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2 <code>debug ip dhcp server packet</code> Example: <pre>Router# debug ip dhcp server packet</pre>	(Optional) Enables DHCP server debugging.

Command or Action	Purpose
<p>Step 3 <code>debug ip dhcp server events</code></p> <p>Example:</p> <pre>Router# debug ip dhcp server events</pre>	(Optional) Reports DHCP server events, such as address assignments and database updates.
<p>Step 4 <code>show ip dhcp binding [address]</code></p> <p>Example:</p> <pre>Router# show ip dhcp binding</pre>	<p>(Optional) Displays a list of all bindings created on a specific DHCP server.</p> <ul style="list-style-type: none"> Use the show ip dhcp binding command to display the IP addresses that have already been assigned. Verify that the address pool has not been exhausted. If necessary, re-create the pool to create a larger pool of addresses. Use the show ip dhcp binding command to display the lease expiration date and time of the IP address of the host.
<p>Step 5 <code>show ip dhcp server statistics</code></p> <p>Example:</p> <pre>Router# show ip dhcp server statistics</pre>	(Optional) Displays count information about server statistics and messages sent and received.
<p>Step 6 <code>show ip dhcp pool [name]</code></p> <p>Example:</p> <pre>Router# show ip dhcp pool</pre>	(Optional) Displays the routes added to the routing table by the DHCP server and relay agent.
<p>Step 7 <code>show ip route dhcp [address]</code></p> <p>Example:</p> <pre>Router# show ip route dhcp [address]</pre>	(Optional) Displays information about DHCP address pools.

Configuration Examples for DHCP Server Radius Proxy

- [Example Configuring the DHCP Server for RADIUS Proxy, page 17](#)
- [Example Configuring RADIUS Profiles for RADIUS Proxy, page 18](#)
- [Example Configuring the DHCP Server for RADIUS Proxy Enhancement, page 18](#)
- [Example Configuring RADIUS Profiles for RADIUS Proxy Enhancement, page 19](#)

Example Configuring the DHCP Server for RADIUS Proxy

The following example shows how to configure a DHCP server for RADIUS-based authorization of DHCP leases. In this example, DHCP clients can attach to Ethernet interface 4/0/1 and Ethernet subinterface

4/0/3.10. The username string (%c-user1) specifies that the RADIUS server sends the Ethernet address of DHCP client named user1 to the DHCP server.

```
Router> enable
Router# configure terminal
Router(config)# service dhcp
Router(config)# aaa new-model
Router(config)# aaa group server radius rad1
Router(config-sg)# server 10.1.1.1
Router(config-sg)# server 10.1.5.10
Router(config-sg)# exit

Router(config)# aaa authorization network auth1 group group1
Router(config)# aaa accounting network acct1 start-stop group group1
Router(config)# aaa session-id common
Router(config)# ip dhcp database tftp://172.16.1.1/router-dhcp write-delay 100 timeout 5
!
Router(config)# ip dhcp pool pool_common
Router(config-dhcp)# accounting acct1
Router(config-dhcp)# authorization method auth1
Router(config-dhcp)# authorization shared-password cisco
Router(config-dhcp)# authorization username %c-user1
Router(config-dhcp)# exit
!
Router(config)# interface ethernet 4/0/1
Router(config-if)# ip address 10.0.0.1 255.255.255.0
Router(config-if)# exit
Router(config-if)# interface ethernet 4/0/3.10

Router(config-if)# encapsulation dot1q 100 second-dot1q 200
Router(config-if)# ip address 10.1.1.1 255.255.255.0
Router(config-if)# exit
Router(config)# radius-server host 10.1.3.2
Router(config)# radius-server key cisco
Router(config)# exit
```

Example Configuring RADIUS Profiles for RADIUS Proxy

The following example shows how to configure a typical RADIUS user profile to send attributes in an access-accept message to the DHCP server:

```
DHCP-00059A3C7800 Password = "password"
Service-Type = Framed,
Framed-Ip-Address = 10.3.4.5,
Framed-Netmask = 255.255.255.0,
Framed-Route = "0.0.0.0 0.0.0.0 10.3.4.1",
Session-Timeout = 3600,
Cisco:Cisco-Avpair = "session-duration=7200"
```

Example Configuring the DHCP Server for RADIUS Proxy Enhancement

The following example shows how to configure a DHCP server for RADIUS-based authorization of classname. In this example, DHCP clients can attach to Ethernet interface 4/0/1 and Ethernet subinterface 4/0/3.10. The username string (%c-user1) specifies that the RADIUS server sends the Ethernet address of DHCP client named user1 to the DHCP server.

```
Router> enable
Router# configure terminal
Router(config)# service dhcp
Router(config)# aaa new-model
Router(config)# aaa group server radius rad1
Router(config-sg)# server 10.1.1.1
Router(config-sg)# server 10.1.5.10
Router(config-sg)# exit
Router(config)# aaa authorization network auth1 group group1
```

```

Router(config)# aaa accounting network acct1 start-stop group group1
Router(config)# aaa session-id commo
n
Router(config)# ip dhcp database tftp://172.0.2.1/router-dhcp write-delay 100 timeout 5
!
Router(config)# ip dhcp pool pool_common
Router(config-dhcp)# accounting acct1
Router(config-dhcp)# authorization method auth1
Router(config-dhcp)# authorization shared-password password1
Router(config-dhcp)# authorization username %c-user1
Router(config-dhcp)# exit
!
Router(config)# ip dhcp pool pool_subnet
Router(config-dhcp)# network 10.3.4.0 255.255.255.0
Router(config-dhcp)# class class-1
Router(config-dhcp)# address range 10.3.4.1 10.3.4.10
Router(config-dhcp)# exit
!
Router(config)# interface ethernet 4/0/1
Router(config-if)# ip address 10.0.0.1 255.255.255.0
Router(config-if)# exit
Router(config-if)# interface ethernet 4/0/3.10
Router(config-if)# encapsulation dot1q 100 second-dot1q 200
Router(config-if)# ip address 10.1.1.1 255.255.255.0
Router(config-if)# exit
Router(config)# radius-server host 10.1.3.2
Router(config)# radius-server key cisco
Router(config)# exit

```

Example Configuring RADIUS Profiles for RADIUS Proxy Enhancement

The following example shows how to configure a typical RADIUS user profile to send attributes in an access-accept message to the DHCP server:

```

DHCP-00059A3C7800 Password = "password"
Service-Type = Framed,
Classname = "class-1"
Framed-Route = "0.0.0.0 0.0.0.0 10.3.4.1",
Session-Timeout = 3600,
Cisco:Cisco-Avpair = "session-duration=7200"

```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
DHCP relay configuration	<i>Configuring the Cisco IOS DHCP Relay Agent</i>
DHCP commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	<i>Cisco IOS IP Addressing Services Command Reference</i>

Standards

Standards	Title
No new or modified standards are supported, and support for existing standards has not been modified.	--

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco software 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, and support for existing RFCs has not been modified.	--

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 DHCP Server RADIUS Proxy

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 3 Feature Information for Cisco IOS DHCP Server Radius Proxy

Feature Name	Releases	Feature Information
DHCP Server RADIUS Proxy	12.2(31)ZV1 12.2(34)SB 12.2(33)XNE 15.0(1)S	The DHCP Server RADIUS Proxy feature enables a server to authorize remote clients and allocate addresses based on replies from the server. The following commands were modified by this feature: authorization method (DHCP), authorization shared-password , authorization username (DHCP).
DHCP Radius Proxy Enhancement	15.0(1)S	The DHCP Radius Proxy Enhancement feature provides an option to configure the DHCP server to accept either the class name or an IP address to assign to the client. The following commands were introduced or modified: accounting (DHCP), address range , authorization method (DHCP), authorization shared-password , authorization username (DHCP), class (DHCP), network (DHCP).

Glossary

client --A host trying to configure its interface (obtain an IP address) using DHCP or BOOTP protocols.

DHCP --Dynamic Host Configuration Protocol.

giaddr --gateway IP address. The giaddr field of the DHCP message provides the DHCP server with information about the IP address subnet on which the client is to reside. It also provides the DHCP server with an IP address where the response messages are to be sent.

MPLS --Multiprotocol Label Switching.

relay agent --A router that forwards DHCP and BOOTP messages between a server and a client on different subnets.

server --DHCP or BOOTP server.

VPN --Virtual Private Network. Enables IP traffic to use tunneling to travel securely over a public TCP/IP network.

VRF --VPN routing and forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that

defines a customer VPN site that is attached to a PE router. Each VPN instantiated on the PE router has its own VRF.

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