Chapter 32

Dynamic Host Configuration Protocol for IPv6 (DHCP6)

Introduction

This chapter describes the Dynamic Host Configuration Protocol for IPv6 (DHCP6) and the support provided by the router. It includes procedures for configuring the router as a DHCP6 server to pass configuration information to IPv6 clients, and for configuring the router as a DHCP6 client, to request IPv6 addresses and other information from a server.

DHCP for IPv6

DHCP6 is used to delegate IPv6 prefixes and to allocate IPv6 addresses. It offers stateful address autoconfiguration, and complements the stateless address autoconfiguration described in RFC 2462, *IPv6 Stateless Address Autoconfiguration*. Stateless address autoconfiguration allows an IPv6-aware device to be plugged into a network, and given an IP address and prefix without manual configuration (see "Stateless address autoconfiguration" on page 31-10 of Chapter 31, Internet Protocol version 6 (IPv6)).

DHCP6 is particularly useful for ISPs to allocate IPv6 prefixes to customer sites. The creation and allocation of complete IPv6 addresses is then performed by IPv6 stateless address autoconfiguration.

When the router is configured as a DHCP6 server, it can:

- **delegate *prefixes* to IPv6 subnets.** Prefixes allow a subnet to be addressed, rather than a single node. Like IPv4 addresses, a proportion of the leftmost bits of the IPv6 address can be used to indicate the subnet (using slash notation, for example, 3ffe:2::/48). IPv6 addresses can then be allocated by stateless address autoconfiguration, by manual configuration, or by using DHCP6.
- **assign *normal* and *temporary* IPv6 *addresses* to devices.** An IPv6 address is a hexadecimal string, made up from eight pairs of octets separated by colons, for example 3ffe:2::0:1. For more information about IPv6 addresses, see Chapter 31, Internet Protocol version 6 (IPv6). Normal addresses are renewed by the server for as long as the device requires an address. Temporary addresses are assigned for a limited time (lease time) and are usually allocated for privacy reasons, as outlined in RFC 3041 "*Privacy Extensions for Stateless Address Autoconfiguration in IPv6*".

DHCP for IPv6 is specified in the Internet Draft "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)" (draft-ietf-dhc-dhcpv6-28.txt, 2 Nov 2002). Prefix delegation is described in the Internet Draft "IPv6 Prefix Options for DHCPv6" (draft-ietf-dhc-dhcpv6-opt-prefix-delegation-02.txt, 10 Feb 2003).

DHCP6 Messages

DHCP6 uses multicast and unicast addresses for communication. A multicast address provides the equivalent functionality to an IPv4 broadcast address. It identifies a group of interfaces, and packets are sent to all interfaces in that group. Addresses reserved for DHCP6 messages are:

- FF02::1:2. This link-scope multicast address is used by clients to communicate with DHCP6 servers. When the DHCP6 module is enabled the router listens to this address.
- FF05::1:3. This site-scope multicast address is used by clients to communicate with DHCP6 servers. When the DHCP6 module is enabled the router listens to this address.

A normal DHCP exchange involves the following messages:

1. **Solicit** - sent by a client to locate DHCP6 servers.
2. **Advertise** - sent by a DHCP6 server to a client in answer to the solicit message.
3. **Request** - sent by the client to request configuration parameters.
4. **Reply** - sent by the server to the client with configuration information.

An IPv6 address may be assigned to the client for a limited or unlimited time. If the address lifetime is limited, it has a preferred lifetime and a (generally longer) valid lifetime. Once half the time between address assignment and the preferred lifetime has passed (the *T1 time*), the client sends a Renew message to the server, requesting an extension to the address lifetime. If the client has not received a reply after 80% of the valid lifetime has passed (the *T2 time*), it sends a multicast Rebind message to discover another DHCP6 server.

DHCP Unique Identifier (DUID)

DHCP6 clients are identified by a DHCP Unique Identifier (DUID). The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client. When you configure the router as a DHCP6 server, you may need to identify the associated clients by their DUIDs, generally in parameters called CLIENTID.

To display the router's DUID, use the command:

```
show dhcp6
```

Identity Associations

DHCP6 clients use identity associations to uniquely identify each interface that is configured by DHCP6. An interface's identity association contains the configuration settings of the interface and an Identity Association IDentifier (IAID). When the client requests settings from the server for a particular interface, it includes the IAID, to identify the interface.

To display the IAID of the router's interfaces, use the command:

```
show dhcp6 interface
```

Configuring DHCP6 Servers

A DHCP6 server can delegate prefixes and/or allocate IPv6 addresses. The following procedure explains how to configure the router as a DHCP6 server.

1. Enable IPv6 and create an IPv6 interface on the server, using the commands:

   ```
   enable ipv6
   create ipv6 interface=interface
   ```

   See Chapter 31, Internet Protocol version 6 (IPv6) for information about configuring IPv6 interfaces.

2. Enable the DHCP6 module on the server, using the command:

   ```
   enable dhcp6
   ```

3. Create a DHCP6 policy on the server

   Create a policy to contain the configuration information that is given to a requesting IPv6 host, and give it a name, using the command:

   ```
   create dhcp6 policy=policy [inherit=name]
   ```

4. Configure the server to delegate a prefix or range of prefixes by assigning the IPv6 prefixes to the policy and specifying a type of PD, using the command:

   ```
   create dhcp6 range=range policy=policy
      ip=ipv6address/prefix-ipv6address/prefix type=pd
   ```

   Configure the server to delegate a range of addresses, by assigning a range of IPv6 addresses to the policy, using the command:

   ```
   create dhcp6 range=range policy=policy
      ip=ipv6address/prefix[-ipv6address/prefix]
      [type={normal|temp}]
   ```

5. If required, add static entries to the range, to ensure that particular clients always receive a particular address or prefix, using the command:

   ```
   add dhcp6 range=range [other-options...]
   ```

6. If required, configure authentication (see "DHCP6 Message Authentication" on page 32-6)

7. Add any other required configuration settings to the policy. For address assignment, use the command:

   ```
   add dhcp6 policy=name [antireplayenabled={true|false}]
      [dnsserver=ipv6add] [domainname=domain-name]
      [preference=preference] [server=ipv6add]
      [t1time=second] [t2time=seconds]
      [replaywindowsize={32|64|128|256}]
   ```

   For prefix delegation, use the command:

   ```
   add dhcp6 policy=name [antireplayenabled={true|false}]
      [dnsserver=ipv6add] [domainname=domain-name]
      [pdlease=0..255] [preference=preference]
      [server=ipv6ad] [replaywindowsize={32|64|128|256}]
   ```

8. Link the policy to the required IPv6 interface, using the command:

   ```
   add dhcp6 interface=interface policy=name
   ```

Configuring DHCP6 Clients

A DHCP6 client can request an IPv6 address for one or more of its interfaces. It can also request a DHCP6 prefix over its interface to the DHCP6 server, and then apply that prefix to other interfaces.

To configure the router as a DHCP6 client that requests an IPv6 address from a DHCP6 server

1. Enable the IPv6 module, using the command:

   ```
   enable ipv6
   ```

2. Create the required interface, using the command:

   ```
   create ipv6 interface=interface
   ```

3. Configure the interface to request its IP address from DHCP6, using the command:

   ```
   add ipv6 interface=interface ip=dhcp
   ```

You can stop the interface from using DHCP6 to configure its IP address, by using the command:

```
delete dhcp6 int=interface
```

To configure the router as a DHCP6 client that requests a prefix from a DHCP6 server, and then apply the prefix to other interfaces:

1. Enable the IPv6 module, using the command:

   ```
   enable ipv6
   ```

2. Create the required interface, using the command:

   ```
   create ipv6 interface=interface
   ```

3. Configure that interface to request a prefix and apply it to another interface or interfaces, using the command:

   ```
   add ipv6 interface=interface ip=pd
      appint=app-interface[,...]
   ```

   The **interface** parameter specifies the interface that requests the prefix from a server. The **appint** parameter specifies the interface or comma-separated list of interfaces where the router applies the prefix.

4. Turn on router advertisements to allow the router to advertise its prefixes to the clients for stateless address autoconfiguration, using the command:

   ```
   enable ipv6 advertise
   ```

You can stop the router from requesting a prefix from a DHCP6 server, by using the command:

```
delete dhcp6 int=interface
```

See Chapter 31, Internet Protocol version 6 (IPv6) for general information about configuring IPv6 interfaces.

DHCP6 Message Authentication

The DHCP6 server and client allow for DHCP6 message authentication for security purposes. The server and client maintain a pair of *keys* and a *key-id*. You can create the key on the server and copy it to the client, or the other way around. Authentication does not provide privacy for the contents of messages. Secure message exchange is provided by the IPsec mechanisms for IPv6.

To configure the DHCP6 server to use authentication

1. For each client that the server supports, create a key and give it a key-id, using the command:

   ```
   create enco key=key-id type=general value=value
   ```

2. Link each key to the required DHCP6 client, using the command:

   ```
   add dhcp6 key=key-id clientid=clientid [strict=true|false]
   ```

   where *clientid* specifies the DUID of the client (see "DHCP Unique Identifier (DUID)" on page 32-3).

3. Configure each client to use the appropriate key.

To configure the router as a DHCP6 client that uses authentication

1. Either create a key and give it a key-id, using the command:

   ```
   create enco key=key-id type=general
   ```

   or copy the key and key-id from the associated server, using the command:

   ```
   create enco key=key-id type=general value=value
   ```

2. Make the key available for DHCP, using the command:

   ```
   add dhcp6 key=key-id [strict=true|false]
   ```

3. Specify that the client uses the key, using the command:

   ```
   add ipv6 interface=interface ip=dhcp key=key-id
   ```

See Chapter 42, Compression and Encryption Services for more information about creating ENCO keys.

Rapid Commit

Rapid Commit allows fewer DHCP6 message exchanges. It is particularly suitable when there is only one DHCP6 server, or when the client requests other configuration parameters instead of an address. With Rapid Commit, the client and server exchange two DHCP messages:

- **Solicit or Information-Request** - a Solicit message is sent by a client to locate DHCP6 servers. An Information-Request message is sent by a client to request configuration parameters without requesting an address.
- **Reply** - sent by the server to the client with configuration information.

Rapid Commit must be enabled on both the client and the server. Rapid Commit is disabled by default. To enable Rapid Commit, use the command:

```
enable dhcp6 rapidcommit
```

Configuration Examples

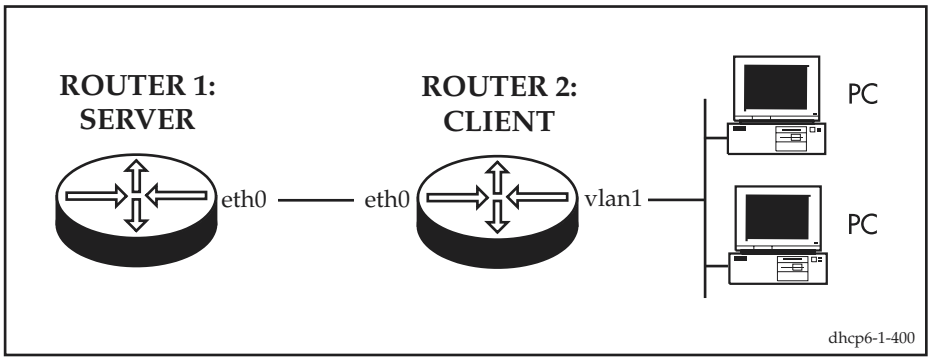
Examples in this section show how to configure a DHCP6 server and a DHCP6 client as follows:

- **Address Assignment**
- **Prefix Delegation**

Both examples are based on the scenario in Figure 32-1.

Before you start this configuration, configure the required VLANs. See Chapter 8, Switching for more information.

Figure 32-1: Example configuration for a basic DHCPv6 network



Address Assignment

Router 1 is a DHCP6 server and Router 2 is a DHCP6 client. Router 2 obtains an IPv6 address from Router 1.

To configure Router 1 as a DHCP6 server

1. **Enable the IPv6 module.**

   Enable IPv6, using the command:

   ```
   enable ipv6
   ```

2. **Create the IPv6 interface.**

   Create the IPv6 interface that responds to DHCPv6 messages, using the command:

   ```
   create ipv6 interface=eth0
   ```

3. **Enable DHCP6 on the server.**

   To enable DHCP6 on the server, use the command:

   ```
   enable dhcp6
   ```

4. **Create a DHCP6 policy.**

   The DCHP6 policy contains the details of the configuration given to the client that makes a DHCP6 request.

   ```
   create dhcp6 policy=nimbus
   ```

5. **Create a DHCP6 range.**

   To configure the server to assign IP addresses to the clients, associate the range of addresses with the policy and specify an address type of "norm"

   ```
   create dhcp6 range=strata policy=nimbus
      ip=3ffe:1::1/128-3ffe:1::ffff/128 type=norm
   ```

6. **Add configuration parameters to the policy.**

   See the **add dhcp6 policy** command on page 32-12 for information about options. In this example, the server assigns a T1 time and a T2 time to the client, in seconds (see "DHCP6 Messages" on page 32-3). After the T1 time, the client asks the server to renew its lease of the IPv6 address. If the client does not receive a reply to the Renew messages after T2 seconds, it attempts to find another DHCP6 server by sending a multicast Rebind message.

   ```
   add dhcp6 policy=nimbus t1time=14400 t2time=28800
   ```

7. **Link the policy to the interface.**

   ```
   add dhcp6 interface=eth0 policy=nimbus
   ```

To configure Router 2 as a DHCP6 client

1. **Enable the IPv6 module.**

   Enable IPv6, using the command:

   ```
   enable ipv6
   ```

2. **Create the IPv6 interface.**

   Create the IPv6 interface that requests the IPv6 address, using the command:

   ```
   create ipv6 interface=eth0
   ```

3. **Configure the IPv6 interface to receive its address from the DHCP6 server.**

   Configure the interface to receive its IPv6 address from DHCP6, using the command:

   ```
   add ipv6 interface=eth0 ip=dhcp
   ```

Prefix Delegation

Router 1 is a DHCP6 server and Router 2 is a DHCP6 client. Router 1 delegates a range of prefixes to the eth0 interface on Router 2. Router 2 applies these prefixes to devices attached to its vlan1 interface. The actual IPv6 addresses of each client interface are assigned by stateless address autoconfiguration.

To configure Router 1 as a DHCP6 server.

1. **Enable the IPv6 module.**

   Enable IPv6, using the command:

   ```
   enable ipv6
   ```

2. **Configure the IPv6 interface.**

   Create the IPv6 interface that responds to DHCPv6 messages, using the command:

   ```
   create ipv6 interface=eth0
   ```

3. **Enable DHCP6 on the server.**

   To enable DHCP6 on the server, use the command:

   ```
   enable dhcp6
   ```

4. **Create a DHCP6 policy.**

   The DCHP6 policy contains the details of the configuration that are given to the client that makes a DHCP6 request.

   ```
   create dhcp6 policy=nimbus
   ```

5. **Create a DHCP6 range.**

   To configure the server to delegate prefixes to the clients, associate the range of prefixes with the policy and specify a range type of "pd".

   ```
   create dhcp6 range=cumulo policy=nimbus
      ip=4ffe:2::/64-4ffe:20::/64 type=pd
   ```

6. **Add configuration parameters to the policy.**

   In this example, the server leases the prefixes to the client for the PDLEASE time.

   ```
   add dhcp6 policy=nimbus pdlease=36000
   ```

7. **Link the policy to the IPv6 interface.**

   ```
   add dhcp6 interface=eth0 policy=nimbus
   ```

To configure Router 2 as a DHCP6 client that receives delegated prefixes and apply them to its interfaces

1. **Enable the IPv6 module.**

   Enable IPv6, using the command:

   ```
   enable ipv6
   ```

2. **Create the IPv6 interfaces.**

   Create the required IPv6 interfaces, using the command:

   ```
   create ipv6 interface=eth0
   create ipv6 interface=vlan1
   ```

   This command also assigns each interface a link local IPv6 address automatically with stateless address autoconfiguration.

3. **Configure DHCP6.**

   Configure the router to request prefixes from the DHCP6 server over eth0 and apply them to devices attached to its vlan1 interface, using the command:

   ```
   add ipv6 interface=eth0 ip=pd appint=vlan1
   ```

4. **Enable IPv6 router advertisements.**

   Turn on router advertisements to allow the router to advertise its prefixes to the clients, using the command:

   ```
   enable ipv6 advertise
   ```

Command Reference

This section describes the commands available on the router to configure and manage Dynamic Host Configuration Protocol for IPv6 (DHCP6).

DHCP6 requires the IPv6 module to be enabled and configured correctly. See Chapter 31, Internet Protocol version 6 (IPv6) for detailed descriptions of the commands required to enable and configure IPv6.

The shortest valid command is denoted by capital letters in the Syntax section. See "Conventions" on page lxv of About this Software Reference for details of the conventions used to describe command syntax. See Appendix A, Messages for a complete list of messages and their meanings.

add dhcp6 interface

Syntax `ADD DHCP6 INTerface=`*`interface`* `POLIcy=`*`name`*

where:

- *interface* is a valid interface.
- *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command specifies a server interface that processes DHCP6 requests on the DHCP6 server, and associates a DHCP6 policy with that interface. The DHCP6 server ignores requests received on interfaces that are not specified with this command.

DHCP6 interfaces can be added on interfaces that do not resolve their addresses through DHCP6 (an interface cannot be both a DCHP6 server and a DHCP6 client). Therefore the DHCP6 interface must already be configured as an IPv6 interface, with a permanent IPv6 address, using the command **create ipv6 interface** or **add ipv6 interface** in Chapter 31, Internet Protocol version 6 (IPv6).

The **interface** parameter specifies the interface that processes DHCP6 requests. Valid interfaces are:

- eth (such as eth0)
- PPP (such as ppp0)
- VLAN (such as vlan1)
- virtual tunnel (such as virt9)

To see a list of current valid interfaces, use the commands **show interface** command on page 9-72 of Chapter 9, Interfaces.

The **policy** parameter specifies the policy to associate with the interface.

Examples To process DHCP6 requests on eth0 using the policy "arch", use the command:

```
add dhcp6 int=eth0 poli=arch
```

Related Commands
add dhcp6 policy
create dhcp6 policy
delete dhcp6 interface
show dhcp6 interface

add dhcp6 key

Syntax

```
ADD DHCP6 KEY=0..65535 [CLIentid=clientid] [STRict={TRue|
   FAlse}]
```

where *clientid* is a hexadecimal string 1 to 32 characters long

Description

This command adds an entry to the DHCP6 authentication database. Message exchanges are authenticated using the delay authentication protocol based on HMAC-MD5. The key must already exist. To create a key, use the command **create enco key** in Chapter 42, Compression and Encryption Services.

The **clientid** parameter is the DHCP Unique Identifier (DUID) of the associated client. The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client. **clientid** is valid when configuring a DHCP6 server and is then required.

The **strict** parameter specifies whether the client or server discards unauthenticated packets. **true** specifies that the client or server discards packets that have no authentication. The default is **true**.

Examples

On the DHCP6 server, to specify that messages exchanged with the client 0x386dd12345 should be authenticated, and to specify that this authentication uses the key that has a key ID of 20, use the command:

```
add dhcp6 key=20 cli=0x386dd12345
```

Related Commands

add dhcp6 policy
delete dhcp6 key
set dhcp6 key
set dhcp6 policy
show dhcp6 key

add dhcp6 policy

Syntax

```
ADD DHCP6 POLIcy=name [ANTIReplayenabled={TRue|FAlse}]
   [DNSServer=ipv6add[,ipv6add]]
   [DOmainname=domain-name[,...]] [PDLease=seconds]
   [PREFerence=0..255] [SERVER=ipv6add] [T1TIme=seconds]
   [T2TIme=seconds] [REPLAywindowsize={32|64|128|256}]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipv6addr* is a valid IPv6 address, with its prefix length indicated by slash notation.
- *domain-name* is a character string 1 to 99 characters long. It may contain any printable character.
- *seconds* is a timeout value in seconds, from 60 to 4294967295.

Description

This command adds options to an existing DHCP6 policy, created using the **create dhcp6 policy** command.

The **antireplayenabled** parameter specifies whether the anti-replay mechanism is enabled for this policy. The anti-replay mechanism reduces the risk of replay attacks. In replay attacks, attackers collect specific packets that they know are valid and are accepted by the server. Then they reuse these packets by injecting them back into the network. The default is **false**.

The **dnsserver** parameter specifies an IPv6 Domain Name Server that is available to the client, or a comma-separated list of two servers.

The **domainname** parameter specifies the domain name, or a comma-separated list of domain names that the client uses when resolving host names.

The **pdlease** parameter specifies the time, in seconds, that a prefix is delegated to a client. The default is 4294967295, which indicates an infinite time.

The **preference** parameter specifies the priority of the DHCP6 server. If more than one DHCP6 server is available to a client, the client selects the server with the highest preference value. The default is **0**.

The **replaywindowsize** parameter specifies the allowable difference in sequence numbers of consecutively-received packets, when **antireplayenabled** is **true**. If two consecutive packets have a greater difference in sequence number than specified here, the second packet fails authentication. This protects against replay attacks by preventing an attacker from reusing old packets. The default is **32**.

The **server** parameter specifies the unicast address of the server. It tells the client the server's address so that the client can unicast to the server directly during the next step of the message exchange process.

The **t1time** parameter specifies the time interval, in seconds, between address assignment and the client transition to the **renew** state (see "DHCP6 Messages" on page 32-3). When the client enters the **renew** state, it sends a message to the server requesting an extension of the address that it has been assigned. T1 time is 0.5*preferred lifetime. The default is **4294967295**, which indicates an infinite time.

The **t2time** parameter specifies the time in seconds between address assignment and the client transition to the REBIND state (see "DHCP6 Messages" on page 32-3). The client enters the REBIND state when it does not receive a reply to a RENEW message. When the client enters the REBIND state, it initiates a message exchange with any available server. T2 time is 0.8*valid lifetime. The default is 4294967295, which indicates an infinite time.

Examples

To specify T1 and T2 times in the policy called "bluesky", use the command:

```
add dhcp6 poli=bluesky titi=10000 t2ti=20000
```

Related Commands

create dhcp6 policy
delete dhcp6 policy
destroy dhcp6 policy
set dhcp6 policy
show dhcp6 interface

add dhcp6 range

Syntax

```
ADD DHCP6 RANge=name IP=ipv6add CLIentid=clientid
   IAid=iaid [INTerface=interface]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipv6add* is an IPv6 address, optionally with a prefix indicated in slash notation.
- *clientid* is a hexadecimal string 1 to 32 characters long.
- *iaid* is a hexadecimal value from 0 to 0xffffffff.
- *interface* is a valid interface.

Description

This command adds a static entry to an existing DHCP6 range. The specified address or prefix is assigned to the specified client. The range is an existing set of IPv6 addresses from which the server allocates addresses to requesting clients.

The **range** parameter specifies the name of an existing DHCP6 range.

The **ip** parameter specifies the IPv6 address to be assigned to the specified client.

The **clientid** parameter specifies the unique identifier for the client, called the DHCP Unique Identifier (DUID). The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client. The router's DUID can be displayed using the **show dhcp6** command.

The **iaid** parameter specifies the Identity Association IDentifier, which uniquely identifies the client interface for this static entry. For prefix delegation, set the IAID to 0.

The **interface** parameter specifies the interface that the client is located on. Valid interfaces are:

- eth (such as eth0)
- PPP (such as ppp0)
- VLAN (such as vlan1)
- virtual tunnel (such as virt9)

To see a list of current valid interfaces, use the commands **show interface** command on page 9-72 of Chapter 9, Interfaces.

Examples

To statically assign the address`3FFE:2::1` to the device with the client ID 486dd0000cd01f9cl, when that address is part of the range "remote", use the command:

```
add dhcp6 ran=remote ip=3ffe:2::1 cli=0x486dd0000cd01f9cl
   ia=0x200
```

Related Commands

create dhcp6 range
delete dhcp6 range
destroy dhcp6 range
show dhcp6 range

create dhcp6 policy

Syntax `CREate DHCP6 POLIcy=`*`name`* `[INHerit=`*`name`*`]`

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command creates a DHCP6 policy. Policies contain the configuration parameters that the server assigns to a requesting IPv6 client. Once the policy has been created, extra configuration parameters can be added to it (for example, security and DNS information), using the command **add dhcp6 policy**.

The **policy** parameter specifies a name for the policy. This name is used in other commands to identify the policy.

The **inherit** parameter specifies the name of a policy that contains configuration settings for the new policy to inherit. The policy can then be added to or modified using the commands **add dhcp6 policy** and **set dhcp6 policy**. This parameter allows you to base new policies on existing policies, and to build a policy hierarchy.

Examples To create a DHCP6 policy called “bluesky”, use the command:

```
cre dhcp6 poli=bluesky
```

Related Commands
add dhcp6 interface
add dhcp6 policy
delete dhcp6 policy
destroy dhcp6 policy
set dhcp6 policy
show dhcp6 policy

create dhcp6 range

Syntax

```
CREate DHCP6 RANge=name IP=ipv6add[-ipv6add] POLIcy=name
   [TYPe={NORMal|TEMPorary|PD}]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipv6add* is an IPv6 address with a valid prefix length.

Description

This command creates a DHCP6 range, and associates a DHCP6 policy with that range. The range specifies the addresses and prefixes that the DHCP6 server can allocate to requesting clients that are using that policy. Each range can be attached only to a single policy, but each policy can have multiple ranges.

The **range** parameter specifies the name of the range to create. This name is used in other commands to identify the range.

The **ip** parameter defines the IPv6 addresses or prefixes to include in the range. The range consists of all addresses or prefixes between (and including) the specified addresses. If the **type** parameter is not of type **pd** and you specify a hyphenated range, then the prefix length must be /128.

The **policy** parameter specifies the name of a policy to associate with the range.

The **type** parameter specifies the type of IPv6 address range to be defined; one of normal, temporary, or prefix delegation. The default is **normal**.

Examples

To create a range called “office” that uses the policy “bluesky” with all addresses from 3ffe:1:2:3:4:5::1 to 3ffe:1:2:3:4:5:ffff:ffff, use the command:

```
cre dhcp6 ran=office poli=bluesky ip=3ffe:1:2:3:4:5::/96
```

To create a range called “delegated” that uses the policy “delpol” to allocate the prefixes 2001:1:2:1::/64 to 2001:1:2:10::/64, use the command:

```
cre dhcp6 ran=delegated poli=delpol ip=2001:1:2:1::/64-
   2001:1:2:10::/64 typ=pd
```

Related Commands

add dhcp6 range
delete dhcp6 range
destroy dhcp6 range
show dhcp6 range

delete dhcp6 interface

Syntax `DELete DHCP6 INTerface=`*`interface`*

Description This command deletes the specified DHCP6 interface. This command can delete any interface created using the **pd**, **dhcp**, and **dhcptemp** options in the **add ipv6 interface** command, and any interface created using the **add dhcp6 interface** command.

Valid interfaces are:

- eth (such as eth0)
- PPP (such as ppp0)
- VLAN (such as vlan1)
- virtual tunnel (such as virt9)

To see a list of current valid interfaces, use the commands **show interface** command on page 9-72 of Chapter 9, Interfaces.

Examples To stop listening for DHCP6 requests on eth0, use the command:

```
del dhcp6 int=eth0
```

To stop the interface eth1 from using DHCP to configure its IP address, use the command:

```
del dhcp6 int=eth1
```

Related Commands **add dhcp6 interface**
show dhcp6 interface

delete dhcp6 key

Syntax `DELete DHCP6 KEY=[0..65535]`

Description This command deletes an entry from the DHCP6 authentication information database. Messages between that client and server are no longer authenticated. The authentication key is not destroyed.

Examples To remove the entry that uses the key with key id 3 from the DHCP6 authentication database, use the command:

```
del dhcp6 key=3
```

Related Commands **add dhcp6 key**
show dhcp6

delete dhcp6 policy

Syntax

```
DELete DHCP6 POLIcy=name [DNSServer] [DOmainname]
   [PDLease] [PREFerence] [SERVER] [T1TIme] [T2TIme]
```

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description

This command deletes an existing option from a DHCP policy.

The **dnsserver** parameter specifies that any IPv6 Domain Name servers are deleted from the policy.

The **domainname** parameter specifies that the domain name setting is deleted from the policy.

The **pdlease** parameter specifies that the prefix delegation lease time setting is deleted from the policy.

The **preference** parameter specifies that the preference of the DHCP6 server is deleted from the policy. When more than one DHCP6 server is available to a client, the client selects the server with the highest preference value.

The **server** parameter specifies that the server's unicast address is deleted from the policy.

The **t1time** parameter specifies that the T1 time be deleted from the policy. The T1 time is the time in seconds between address assignment and the client transition to the RENEW state. T1 time is 0.5*preferred lifetime.

The **t2time** parameter specifies that the T2 time be deleted from the policy. The T2 time is the time in seconds between address assignment and the client transition to the REBIND state. The client enters the REBIND state if it does not receive a reply to a RENEW message. When the client enters the REBIND state, it initiates a message exchange with any available server. T2 time is 0.8*valid lifetime.

Examples

To remove the **dnsserver** setting from the policy "bluesky", use the command:

```
del dhcp6 poli=bluesky dnss
```

Related Commands

add dhcp6 policy
destroy dhcp6 policy
set dhcp6 policy
show dhcp6 interface

delete dhcp6 range

Syntax `DELete DHCP6 RANge=`*`name`* `IP=`*`ipv6add`*

where:

- *name* is a character string,1 to 15 characters long. It may contain any printable character.
- *ipv6add* is an IPv6 address with an optional prefix length.

Description This command deletes an existing static client-address mapping from a DHCP6 range. The address or prefix becomes available to be assigned to any client.

The **range** parameter specifies the name of the range.

The **ip** parameter specifies the IPv6 address or prefix to return to the DHCP6 range.

Examples To delete the static entry 3fffe::abcd from the range "remote", use the command:

```
del dhcp6 ran=remote ip=3fffe::abcd
```

Related Commands
add dhcp6 range
create dhcp6 range
destroy dhcp6 range
show dhcp6 range

destroy dhcp6 policy

Syntax `DESTroy DHCP6 POLIcy=`*`name`*

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command destroys an existing policy. If the policy is currently being used by a client, an error message is displayed and the command fails.

The **policy** parameter specifies the name of the policy to destroy.

Examples To destroy policy "admin", use the command:

```
dest dhcp6 poli=admin
```

Related Commands
add dhcp6 policy
create dhcp6 policy
delete dhcp6 policy
set dhcp6 policy
show dhcp6 policy

destroy dhcp6 range

Syntax `DESTroy DHCP6 RANge=`*`name`*

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command destroys the specified DHCP6 range of IPv6 addresses. The **range** parameter specifies the name of the range to destroy.

Examples To destroy the range "remote", use the command:

```
dest dhcp6 ran=remote
```

Related Commands
add dhcp6 range
create dhcp6 range
delete dhcp6 range
show dhcp6 range

disable dhcp6

Syntax `DISable DHCP6`

Description This command disables the DHCP6 server. All DHCP6 messages are ignored. DHCP6 is disabled by default.

Examples To disable DHCP6, use the command:

```
dis dhcp6
```

Related Commands
enable dhcp6
show dhcp6

disable dhcp6 debug

Syntax `DISable DHCP6 DEBug[={PACKET|STATE|ALL}]`

Description This command disables DHCP6 debugging. DHCP6 debugging is disabled by default.

The **debug** parameter specifies the debugging to disable. If **packet** is specified, packet debugging is disabled. If **state** is specified, state machine debugging is disabled. If **all** is specified, all debugging is disabled. The default is **all**.

Examples To disable DHCP6 debugging, use the command:

```
dis dhcp6 deb
```

Related Commands
enable dhcp6 debug
show dhcp6

disable dhcp6 rapidcommit

Syntax `DISable DHCP6 RAPidcommit`

Description This command disables DHCP6 Rapid Commit. Rapid Commit is disabled by default. See "Rapid Commit" on page 32-6 for information about this option.

Example To disable DHCP6 Rapid Commit, use the command:

```
dis dhcp6 rap
```

Related Commands **enable dhcp6 rapidcommit**
show dhcp6

enable dhcp6

Syntax `ENAble DHCP6`

Description This command enables the DHCP6 server. DHCP6 is disabled by default.

Examples To enable the DHCP6 server, use the command:

```
ena dhcp6
```

Related Commands **disable dhcp6**
show dhcp6

enable dhcp6 debug

Syntax `ENAble DHCP6 DEBug[={PACKET|STATE|ALL}]`

Description This command enables DHCP6 debugging.

The **debug** parameter specifies the debugging to enable. If **packet** is specified, packet debugging is enabled. If **state** is specified, state machine debugging is enabled. If **all** is specified, all debugging is enabled. The default is **all**.

Examples To enable DHCP6 packet debugging, use the command:

```
ena dhcp6 deb=packet
```

Related Commands **disable dhcp6 debug**
show dhcp6

enable dhcp6 rapidcommit

Syntax `ENAble DHCP6 RAPidcommit`

Description This command enables the DHCP6 Rapid Commit option. When Rapid Commit is e4nabled, the RapidCommit option is included in all Solicit messages sent by client interfaces. Rapid Commit is disabled by default. For more information, see "Rapid Commit" on page 32-6.

Examples To enable Rapid Commit, use the command:

```
ena dhcp6 rap
```

Related Commands **disable dhcp6 rapidcommit**
show dhcp6

set dhcp6 key

Syntax

```
SET DHCP6 KEY=0..65535 [CLIentid=clientid] [STRict={TRue|
   FAlse}]
```

where *clientid* is a hexadecimal string 1 to 32 characters long.

Description

This command modifies an entry in the DHCP6 authentication database. Message exchanges are authenticated using the delay authentication protocol based on HMAC-MD5.

The **clientid** parameter is the DHCP Unique Identifier (DUID) of the associated client. The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client. **clientid** is valid only when configuring a DHCP6 server.

The **strict** parameter specifies whether the client or server discards packets with no authentication. **true** specifies that the client or server discards packets with no authentication. **false** specifies that the client or server accepts packets with no authentication, and can be used on networks where some devices do not support authentication. The default is **true**.

Examples

To allow the router to accept unauthenticated packets, use the command:

```
set dhcp6 key=20 str=fa
```

Related Commands

add dhcp6 key
delete dhcp6 key
set dhcp6 policy
show dhcp6 key

set dhcp6 policy

Syntax

```
SET DHCP6 POLIcy=name [DNSServer=ipv6add[,ipv6add]]
   [DOmainname=domain-name[,...]] [PDlease=0..255]
   [PREFerence=0..255] [SERVER=ipv6addr] [T1TIme=seconds]
   [T2TIme=seconds]
```

where:

- *name* is a character string 1 to 15 characters long. It may contain any printable character.
- *ipv6addr* is a valid IPv6 address, with its prefix length indicated by slash notation.
- *domain-name* is a character string 1 to 99 characters long. It may contain any printable character.
- *seconds* is a timeout value in seconds

Description

This command modifies an existing option in a DHCP6 policy.

The **policy** parameter specifies the name of the policy.

The **dnsserver** parameter specifies an IPv6 Domain Name Server that is available to the client, or a comma-separated list of two servers.

The **domainname** parameter specifies the domain name, or a comma-separated list of domain names, that the client uses when resolving host names.

The **pdlease** parameter specifies the time, in seconds, that a prefix is delegated to a client. The default is **4294967295**, which indicates an infinite time.

The **preference** parameter specifies the priority of the DHCP6 server. When more than one DHCP6 server is available to a client, the client selects the server with the highest preference value. The default is **0**.

The **server** parameter specifies the unicast address of the server. It tells the client the server's address so that the client can unicast to the server directly during the next step of the message exchange process.

The **t1time** parameter specifies the time interval, in seconds, between address assignment and the client transition to the **renew** state (see "DHCP6 Messages" on page 32-3). When the client enters the **renew** state, it sends a message to the server requesting an extension of the address that it has been assigned. T1 time is 0.5*preferred lifetime. The default is **4294967295**, which indicates an infinite time.

The **t2time** parameter specifies the time in seconds between address assignment and the client transition to the REBIND state (see "DHCP6 Messages" on page 32-3). The client enters the REBIND state when it does not receive a reply to a RENEW message. When the client enters the REBIND state, it initiates a message exchange with any available server. T2 time is 0.8*valid lifetime. The default is **4294967295**, which indicates an infinite time.

Examples

To set the policy "bluesky" to assign a domain name server with the address 3ffr::dddd to its DHCP6 clients, use the command:

```
set dhcp6 poli=bluesky dnss=3ffr::dddd
```

Related Commands

add dhcp6 policy
delete dhcp6 policy
destroy dhcp6 policy
set dhcp6 policy
show dhcp6 policy

show dhcp6

Syntax `SHow DHCP6`

Description This command displays general information about DHCP6(Figure 32-2 on page 32-26, Table 32-1 on page 32-26).

Figure 32-2: Example output from the **show dhcp6** command

```
DHCP6 Server
------------------------------------------------------------------------

DHCP6 DUID ..................... 0x000386dd0000cd00a056
Module Status .................. Enabled
DHCP6 Debug .................... All
Rapid Commit ................... Disabled
Discarded packets .............. 0
Error Counters
  ------------------------------------------------------------------------
  addressRequestFail ............. 0       authenticationFail ............. 0
  creationError .................. 0       clientIDMismatch ............... 0
  clientIDMissing ................ 0       entryNotFound .................. 0
  messageUnknown ................. 0       optionMissing .................. 0
  optionMismatch ................. 0       serverIDMismatch ............... 0
  serverIDMissing ................ 0       transactIDMismatch ............. 0
  wrongInterface ................. 0
  Total Discarded packets ........ 0
```

Table 32-1: Parameters in output of the **show dhcp6** command

Parameter	Meaning
DHCP6 DUID	The DHCP Unique Identifier. The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client.
Module Status	Whether the DHCP6 server is enabled.
DHCP6 Debug	Whether DHCP6 debugging is enabled.
Rapid Commit	Whether Rapid Commit is enabled.
Discarded packets	The number of DHCP6 packets that have been disabled since the router was last restarted.
Error Counters	The number of times each type of error has occurred since the router was last restarted.
AddressRequestFail	The number of address requests that have failed.
CreationError	The number of times that configuration information could not be saved (for example, memory allocation failures).
ClientIDMissing	The number of times that the ClientID has been missing from DHCP6 messages
MessageUnknown	The number of times that unknown DHCP6 messages were received.
OptionMismatch	The number of times that received options were inaccurate.
ServerIDMissing	The number of times that the ServerID has been missing from DHCP6 messages.
WrongInterface	The number of times that messages were received on the wrong interface.

Table 32-1: Parameters in output of the **show dhcp6** command (cont.)

Parameter	Meaning
AuthenticationFail	The number of times that authentication has failed.
clientIDMismatch	The number of times that the ClientID has not matched.
EntryNotFound	The number of times that a requested entry has not been found.
OptionMissing	The number of times that a required option has been missing from messages.
ServerIDMismatch	The number of times that the ServerID has not matched.
TransactIDMismatch	The number of times that the TransactionID has not matched.
Total Discarded packets	The total number of discarded DHCP6 packets.

Examples To display the current configuration of the DHCP6 server, use the command:

```
sh dhcp6
```

Related Commands

disable dhcp6
enable dhcp6
enable dhcp6 rapidcommit

show dhcp6 client

Syntax `SHow DHCP6 CLIEnt [RANge=`*name*`] [TYPe={PD|NORMal|TEMP}]`

where *name* is a character string 1 to 15 characters long. It may contain any printable characters.

Description This command displays information about currently defined client entries on the server (Figure 32-3, Table 32-2 on page 32-29). The default is to display addresses of clients that are in use, and clients with static mappings of addresses (if **range** and **type** are not specified).

If **range** is specified, clients in the specified range are displayed.

If **type** is specified, clients using the specified type of address are displayed.

Figure 32-3: Example output from the **show dhcp6 client** command

```
DHCP6 Client Entries
--------------------------------------------------------------------------------
Interface .......... eth0
ClientID ........... 0x4000c00000001
Client Scr Address . fe80::0200:cdff:fe02:d9cl
  IAID ............. 00000001
     IPv6 Address .. 3ffe:1::fe00:1:2:1/128
     Type .......... Normal
     Expiry ........ 19 -Jun-2002 12:30:51
  ------------------------------------------------------------------------
  IPv6 Address ..... 3ffe:1:1::/64
     Type .......... delegated
     Expiry ........ 19 -Jun-2002 12:30:51
  ------------------------------------------------------------------------
Interface .......... eth0
ClientID ........... 0x4000c0000000A
Client Src Address . fe80::0200:cdff:fe01:f9cl
  IAID ............. 0000000A
     IPv6 Address .. 4ffe:2::fe00:bbbb:0:1/128
     Type .......... Temporary
     Expiry ........ 19 -Jun-2002 12:30:51
  ------------------------------------------------------------------------
Interface .......... eth1
ClientID ........... 41111c0000000A
Client Src Address . fe80::0200:cdff:fe01:aacl
  IAID .............  -
     IPv6 Address .. 4ffe:2::fe00:bbbb:0:3/128
     Type .......... static
     Expiry ........ never
  ------------------------------------------------------------------------
```

Table 32-2: Parameters in output of the **show dhcp6 client** command

Parameter	Meaning
Interface	The IPv6 interface on the server, over which the client is reached.
Client ID	The DHCP Unique Identifier (DUID) of the client. The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type of the client and the link-layer address of the client.
Client Src Address	The permanent link-local address of the client, assigned by stateless address autoconfiguration when the interface was created.
IAID	The Identity Association ID of the client's interface.
IPv6 Address	The IPv6 address or prefix allocated to the client.
Type	The type of IPv6 address allocated to the client; one of normal, temporary, static (always assigned to that client interface), or delegated (a delegated prefix).
Expiry	The expiry time of the allocated address.

Examples To display information about the clients in the range "remote", use the command:

```
sh dhcp6 clie ran=remote
```

Related Commands

add dhcp6 interface
add dhcp6 policy
create dhcp6 policy
create dhcp6 range
show dhcp6 counter
show dhcp6 server

show dhcp6 counter

Syntax `SHow DHCP6 COUnter [INTerface=`*`interface`*`]`

where *interface* is a valid interface

Description This command displays the DCHP6 counters (Figure 32-4, Table 32-3). If the **interface** parameter is specified, then the counters for that interface are displayed. Valid interfaces are:

- eth (such as eth0)
- PPP (such as ppp0)
- VLAN (such as vlan1)
- virtual tunnel (such as virt9)

To see a list of current valid interfaces, use the commands **show interface** command on page 9-72 of Chapter 9, Interfaces.

Figure 32-4: Example output from the **show dhcp6 counter** command

```
DHCP6 COUNTERS
------------------------------------------------------------------------------
Interface: eth0
  InAdvertise ..................... 0       OutAdvertise ..................... 2
  InConfirm ....................... 0       OutConfirm ....................... 0
  InDecline ....................... 0       OutDecline ....................... 0
  InFailedAuth .................... 0       OutFailedAuth .................... 0
  InInfoRequest ................... 0       OutInfoRequest ................... 0
  InRebind ........................ 0       OutRebind ........................ 0
  InReconfigure ................... 0       OutReconfigure ................... 0
  InRelayForward .................. 0       OutRelayReply .................... 0
  InRelease ....................... 0       OutRelease ....................... 0
  InRenew ......................... 4       OutRenew ......................... 0
  InReply ......................... 0       OutReply ......................... 5
  InRequest ....................... 1       OutRequest ....................... 0
  InSolicit ....................... 2       OutSolicit ....................... 0
------------------------------------------------------------------------------
```

Table 32-3: Parameters in output of the **show dhcp6 counter** command

Parameter	Meaning
Interface	The interface for which the counters are listed.
InAdvertise	The number of Advertise messages received by the router as a DHCP6 client. Servers send Advertise messages in response to Solicit messages, to indicate that they are available.
OutAdvertise	The number of Advertise messages transmitted by the router as a DHCP6 server. Servers send Advertise messages in response to Solicit messages, to indicate that they are available.
InConfirm	The number of Confirm messages received by the router as a DHCP6 server. Clients send Confirm messages to check that their addresses are still appropriate.
OutConfirm	The number of Confirm messages transmitted by the router as a DHCP6 client. Clients send Confirm messages to check that their addresses are still appropriate.

Table 32-3: Parameters in output of the **show dhcp6 counter** command (cont.)

Parameter	Meaning
InDecline	The number of Decline messages received by the router as a DHCP6 server. Clients send Decline messages to decline an offered address, if they determine that the address is already in use.
OutDecline	The number of Decline messages transmitted by the router as a DHCP6 client. Clients send Decline messages to decline an offered address, if they determine that the address is already in use.
InFailedAuth	The number of messaged received that failed authentication
OutFailedAuth	The number of messaged transmitted that failed authentication
InInfo-Request	The number of Information-Request messages received by the router as a DHCP6 server. Clients send Information-Request messages to request configuration settings without requesting addresses.
OutInfo-Request	The number of Information-Request messages transmitted by the routeras a DHCP6 client. Clients send Information-Request messages to request configuration settings without requesting addresses.
InRebind	The number of Rebind messages received by the router as a DHCP6 server. Clients that receive no reply to a Renew message send Rebind messages to any available servers.
OutRebind	The number of Rebind messages transmitted by the router as a DHCP6 client. Clients that receive no reply to a Renew message send Rebind messages to any available servers.
InReconfigure	The number of Reconfigure messages received by the router as a DHCP6 client. Servers send Reconfigure messages when the server has new settings and needs the client to update.
OutReconfigure	The number of Reconfigure messages transmitted by the router as a DHCP6 server. Servers send Reconfigure messages when the server has new settings and needs the client to update.
InRelay-Forward	The number of Relay-Forward messages received by the router as a DHCP6 server. Relay agents send Relay-Forward messages when they are relaying messages from a client. The client's message is included in the Relay-Forward message.
OutRelay-Reply	The number of Relay-Reply messages transmitted by the router as a DHCP6 server. Servers send Relay-Reply messages to the relay agent for the relay agent to pass on to the client.
InRelease	The number of Release messages received by the router as a DHCP6 server. Clients send Release messages when they no longer require their IPv6 addresses.
OutRelease	The number of Release messages transmitted by the router as a DHCP6 client. Clients send Release messages when they no longer require their IPv6 addresses.
InRenew	The number of Renew messages received by the router as a DHCP6 server. Clients send Renew messages to request an extension of their addresses.
OutRenew	The number of Renew messages transmitted by the router as a DHCP6 client. Clients send Renew messages to request an extension of their addresses.
InReply	The number of Reply messages received by the router as a DHCP6 client. Servers send Reply messages in response to client messages requesting addresses, configuration settings, extensions or acknowledgements.

Table 32-3: Parameters in output of the **show dhcp6 counter** command (cont.)

Parameter	Meaning
OutReply	The number of Reply messages transmitted by the router as a DHCP6 server. Servers send Reply messages in response to client messages requesting addresses, configuration settings, extensions or acknowledgements.
InRequest	The number of Request messages received by the router as a DHCP6 server. Clients send Request messages to request IPv6 addresses and other configuration parameters from a server.
OutRequest	The number of Request messages transmitted by the router as a DHCP6 client. Clients send Request messages to request IPv6 addresses and other configuration parameters from a server.
InReconfigure	The number of Reconfigure messages received by the router as a DHCP6 client. Servers send Reconfigure messages when the server has new settings and needs the client to update.
OutReconfigure	The number of Reconfigure messages transmitted by the router as a DHCP6 server. Servers send Reconfigure messages when the server has new settings and needs the client to update.
InSolicit	The number of Solicit messages received by the router as a DHCP6 server. Clients send Solicit messages to identify available servers.
OutSolicit	The number of Solicit messages transmitted by the router as a DHCP6 client. Clients send Solicit messages to identify available servers.

Examples

To display the current counters for the DHCP6 server, use the command:

```
sh dhcp6 cou
```

Related Commands

add dhcp6 interface
add dhcp6 policy
create dhcp6 policy
create dhcp6 range
show dhcp6
show dhcp6 client
show dhcp6 server

show dhcp6 interface

Syntax `SHow DHCP6 INTerface[=`*`interface`*`]`

where *interface* is a valid interface

Description This command displays information about DHCP6 interfaces that have been configured on the router (Figure 32-5, Table 32-4 on page 32-34). If **interface** is specified, information about that interface is shown. Valid interfaces are:

- eth (such as eth0)
- PPP (such as ppp0)
- VLAN (such as vlan1)
- virtual tunnel (such as virt9)

To see a list of current valid interfaces, use the commands **show interface** command on page 9-72 of Chapter 9, Interfaces.

Figure 32-5: Example output from the **show dhcp6 interface** command

```
DHCP6 Interfaces
-------------------------------------------------------------------------------
Interface ................. eth0
Type ...................... Server Interface
Interface state ........... -
Policy attached ........... blue sky
No. of Clients ............ 10
No. of Servers ............ 0
-------------------------------------------------------------------------------
Interface ................. eth1
Type ...................... Client/PD Interface
Policy attached ........... -
No. of Servers ............ 1
Interface State ........... BIND
Request Prefix ............ 3ffe:0002::
Request Length ............ 64
  Apply Interface ......... ppp0
  Next 16-bit value ....... 1
-------------------------------------------------------------------
Interface IAID Information:
Interface Name                          IAID
-----------------------------------------------
eth0                                    0x00018000
eth1                                    0x00028000
-------------------------------------------------------------------------------
```

Table 32-4: Parameters in output of the **show dhcp6 interface** command

Parameter	Meaning
Interface	The IPv6 interface that is configured as this DHCP6 interface.
Type	The DHCP6 interface type; one of "server", "client","server/PD" (a server that assigns prefixes to its clients) or "client/PD" (a client that requests prefixes and delegates them to its interface.
Interface state	The current state of the DHCP6 interface; one of INITIAL, RAPIDCOMMIT, SOLICIT, REQUEST, CONFIRM, BIND, RENEW, REBIND, INFOREQ, or RECONF. This applies to client interfaces only.
Request Prefix	The prefix allocated to the client interface by the server, or the prefix requested by the client interface if the server has not allocated a prefix to it.
Request Length	The prefix length allocated to the client interface by the server, or the length requested by the client interface if the server has not allocated a prefix to it.
Apply Interface	An interface on which the client applies the delegated prefix.
Next 16-bit value	The next 16 bits for the prefix assigned to this interface, if the delegated prefix has a prefix length of less than 64 bits.
Policy attached	The policy associated with this interface.
No. of Clients	For a server interface, the number of clients the server is currently serving over this interface. For a client, this value is 0.
No. of Servers	For a client, the number of DHCP6 servers known on this interface. For a server, this value is 0.
Interface IAID Information	
Interface Name	The name of each IPv6 interface.
IAID	The Identity Association ID of the interface.

Examples To display information about the DHCP6 interfaces, use the command:

```
sh dhcp6 int
```

Related Commands **add dhcp6 interface**
delete dhcp6 interface

show dhcp6 key

Syntax `SHow DHCP6 KEY[=key-id]`

where *key-id* is an integer from 0 to 65535

Description This command displays information about the DHCP6 authentication database (Figure 32-6, Table 32-5). If a key id is specified, then information about that entry is displayed.

Figure 32-6: Example output from the **show dhcp6 key** command

```
DHCP6 Key Entries
-----------------------------------------------------------------
No.    ClientID             Strict      Protocol     Algorithm
           Value
-----------------------------------------------------------------
1      0x4000c00000001      TRUE        delay        HMAC-MD5
           0x736563726574
-----------------------------------------------------------------
10     0x5000c0ddfd345      FALSE       delay        HMAC-MD5
           0x7865de432379
-----------------------------------------------------------------
```

Table 32-5: Parameters in output of the **show dhcp6 key** command

Parameter	Meaning
No.	The entry's key id number.
ClientID	DHCP Unique Identifier (DUID) of the client that is associated with this key entry. Messages between the server and that client are authenticated.
Strict	Whether this client or server discards unauthenticated packets.
Protocol	Authentication protocol that is used to verify DHCP6 messages between this server and client.
Algorithm	Authentication algorithm that is used to verify DHCP6 messages between this server and client.
Value	Preshared key that is used to authenticate messages.

Examples To display information about the authentication entry with a key id of 20, use the command:

```
sh dhcp6 key=20
```

Related Commands
add dhcp6 key
delete dhcp6 key
show enco key in Chapter 42, Compression and Encryption Services

show dhcp6 policy

Syntax `SHow DHCP6 POLIcy[=`*name*`]`

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command displays information about the currently defined policies (Figure 32-7, Table 32-6). If a policy name is specified, then information about the specified policy is displayed.

Figure 32-7: Example output from the **show dhcp6 policy** command

```
DHCP6 Policies

Name: policy1
  Base Policy: none
  03 T1Time ........... 360000
  03 T2Time ........... 720000
  20 dnsserver ........ fec0:1::4

Name: remote
  Base Policy: policy1
  03 T1Time ........... (policy1)360000
  03 T2Time ........... (policy1)720000
  20 dnsserver ........ (policy1)fec0:1::4
  51 leasetime ........ (remote) infinity
```

Table 32-6: Parameters in output of the **show dhcp6 policy** command

Parameter	Meaning
Name	The name of the policy.
Base Policy	The base policy that this policy inherited its settings from.
options...	A list of the options configured for the policy. Each entry includes the DHCP6 option identifier, the parameter keyword and the current value(s) of the option. If the policy is configured to inherit some or all of its settings, the source of each option is shown in parentheses.

Examples To display information about the policy “base”, use the command:

```
sh dhcp6 poli=base
```

Related Commands

add dhcp6 policy
create dhcp6 policy
delete dhcp6 policy
destroy dhcp6 policy
set dhcp6 policy

show dhcp6 range

Syntax `SHow DHCP6 RANge[=`*name*`]`

where *name* is a character string 1 to 15 characters long. It may contain any printable character.

Description This command displays information about the currently defined ranges (Figure 32-8, Table 32-7). If a range name is specified, then information about the specified range is displayed.

Figure 32-8: Example output from the **show dhcp6 range** command

```
DHCP6 Ranges
-------------------------------------------------------------
Name: remote
   Prefix Block             : 4ffe:1:2:3::/64
   Range Type               : normal
   Policy                   : rempol
   Address(es) in use       : 2
   -----------------------------------------------------------
   4ffe:1:2:3::1/128          in use
   4ffe:1:2:3::2/128          in use
-------------------------------------------------------------
Name: delegated
   Prefix Block             : 4ffe:1:2:3::/64 -->
                              4ffe:1:2:200::/64
   Range Type               : normal
   Policy                   : base
   Address(es) in use       :0
-------------------------------------------------------------
Name: delegate2
   Prefix Block             : 4ffe:1:3::/56 -->
                              4ffe:1:30::/56
   Range Type               : delegation
   Policy                   : delepol
   Address(es) in use       : 0
```

Table 32-7: Parameters in output of the **show dhcp6 range** command

Parameter	Meaning
Name	The name of the range.
Prefix Block	The block of IPv6 addresses or prefixes defined for this range.
Range Type	The type of range, one of "temporary", "normal" for a normal address range, or "delegation" for a prefix range.
Policy	The policy associated with this address range.
Address(es) in use	A list of the IPv6 addresses or prefixes that are currently in use, or "0" if none are in use.

Examples To display information about the range "remote", use the command:

```
sh dhcp6 ran=remote
```

Related Commands

add dhcp6 range
create dhcp6 range
delete dhcp6 range
destroy dhcp6 range

show dhcp6 server

Syntax `SHow DHCP6 SERVER`

Description This command displays information about the currently defined server entries that the DHCP6 client has discovered (Figure 32-9, Table 32-8).

Figure 32-9: Example output from the **show dhcp6 server** command

```
DHCP6 Server
------------------------------------------------------------------------------
Interface ..............  eth0
ServerID ...............  0x000386dd0000cd00a056
Server Src Address .....  unknown
Reconfigure Nonce ......  0x15379385901537938591
Primary DNS Server .....  2001:200::0001
Secondary DNS Server ...  2001:200::0002
Server Preference ......  0
Domain Search List .....  ed.co.nz
   IAID ................  4294966783
      IPv6 Address .....  2001:ae2c:0098:2014:0002:1d08::8/128
      Expiry ...........  never
   ---------------------------------------------------------------------------
   IAID ................  512
      IPv6 Address .....  4ffe:0001::1111/128
      Expiry ...........  never
   ---------------------------------------------------------------------------
```

Table 32-8: Parameters in output of the **show dhcp6 server** command

Parameter	Meaning
Interface	The IPv6 interface on the client, over which the server is reached.
ServerID	The DHCP Unique Identifier (DUID) of the server. The DUID consists of a number, followed by a hexadecimal string that identifies the hardware type and the link-layer address.
Server Src Address	The source address of the server. The client knows this address when the server advertises its unicast address in a DHCP message.
Reconfigure Nonce	The nonce value initially known by the client. This is used to validate Reconfigure messages sent by this server.
Primary DNS	The IPv6 address of the primary Domain Name Server, if the DHCP6 server supplies this to the client.
Secondary DNS	The IPv6 address of the secondary Domain Name Server, if the DHCP6 server supplies this to the client.
Server Preference	The priority of the DHCP6 server. If more than one DHCP6 server is available to a client, the client selects the server with the highest preference value.
Domain Search List	The list of domain names that the client uses when resolving host names if the DHCP6 server supplies this to the client.
IAID	The Identity Association ID of the client's interface.
IPv6 Address	The IPv6 address or prefix allocated to the client.

Table 32-8: Parameters in output of the **show dhcp6 server** command (cont.)

Parameter	Meaning
Type	The type of IPv6 address allocated to the client; either normal, temporary, static (always assigned to that client interface), or delegated (a delegated prefix).
Expiry	The expiry time of the allocated address.

Examples To display information about the DHCP6 servers the client has learned of, use the command:

```
sh dhcp6 range=remote
```

Related Commands

add dhcp6 policy
add ipv6 interface in Chapter 31, Internet Protocol version 6 (IPv6)
show dhcp6 client
show dhcp6 counter
show ipv6 interface in Chapter 31, Internet Protocol version 6 (IPv6)