



DHCPv6 Repackaging

The Dynamic Host Configuration Protocol for IPv6 (DHCPv6) repackaging feature consists of DHCPv6 individual address assignment and stateless DHCPv6.

The DHCPv6 Individual Address Assignment feature manages nonduplicate address assignment in the correct prefix based on the network where the host is connected.

The stateless DHCPv6 feature allows DHCPv6 to be used for configuring a node with parameters that do not require a server to maintain any dynamic state for the node.

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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.

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.

Information About DHCPv6 Repackaging

DHCPv6 Prefix Delegation

The IPv6 Access Services—DHCPv6 Prefix Delegation feature can be used to manage link, subnet, and site addressing changes. Dynamic Host Configuration Protocol for IPv6 (DHCPv6) can be used in environments to deliver stateful and stateless information, which are defined as follows:

- Stateful prefix delegation—Address assignment is centrally managed and clients must obtain configuration information such as address autoconfiguration and neighbor discovery that is not available through protocols.
- Stateless prefix delegation—Stateless configuration parameters do not require a server to maintain any dynamic state for individual clients, such as Domain Name System (DNS) server addresses and domain search list options.

Extensions to DHCPv6 also enable prefix delegation, through which an ISP can automate the process of assigning prefixes to a customer for use within the customer's network. The prefix delegation occurs between a provider edge (PE) device and customer premises equipment (CPE) using the DHCPv6 prefix delegation option. Once the ISP has delegated prefixes to a customer, the customer may further subnet and assign prefixes to the links in the customer's network.

Node Configuration Without Prefix Delegation

Stateless Dynamic Host Configuration Protocol for IPv6 (DHCPv6) allows the DHCPv6 to be used for configuring a node with parameters that do not require a server to maintain any dynamic state for the node. The use of stateless DHCPv6 is controlled by router advertisement (RA) messages that are multicast by devices. The DHCPv6 client invokes stateless DHCPv6 when it receives an RA. The DHCPv6 server responds to a stateless DHCPv6 request with configuration parameters, such as the Domain Name System (DNS) servers and domain search list options.

DHCPv6 Address Assignment

Dynamic Host Configuration Protocol for IPv6 (DHCPv6) enables DHCP servers to pass configuration parameters, such as IPv6 network addresses, to IPv6 clients. The DHCPv6 Individual Address Assignment feature manages nonduplicate address assignment in the correct prefix based on the network where the host is connected. Assigned addresses can be from one or multiple prefix pools. Additional options, such as the default domain and Domain Name System (DNS) name-server address, can be passed back to the client. Address pools can be assigned for use on a specific interface or on multiple interfaces, or the server can automatically find the appropriate pool.

How to Configure DHCPv6 Repackaging

Configuring DHCPv6 Address Assignment

Prerequisites for Configuring DHCPv6 Address Assignment

By default, no Dynamic Host Configuration Protocol for IPv6 (DHCPv6) features are configured on the device.

When you configure DHCPv6 address assignment, remember that the specified interface must be one of these Layer 3 interfaces:

- Switch virtual interface (SVI): a VLAN interface created when you enter the **interface vlan** *vlan-id* command.
- EtherChannel port channel in Layer 3 mode: a port-channel logical interface created when you enter the **interface port-channel** *port-channel-number* command.

Enabling the DHCPv6 Server Function on an Interface

Perform this task to enable the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) server function on an interface. Note that to delete a DHCPv6 pool, you must use the **no ipv6 dhcp pool** *poolname* global configuration command. Use the **no** form of the DHCP pool configuration mode commands to change the DHCPv6 pool characteristics. To disable the DHCPv6 server function on an interface, use the **no ipv6 dhcp server** interface configuration command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 dhcp pool** *poolname*
4. **address prefix** *ipv6-prefix* [**lifetime** {*valid-lifetime preferred-lifetime* | **infinite**}]
5. **link-address** *ipv6-prefix*
6. **vendor-specific** *vendor-id*
7. **suboption** *number* {**address** *ipv6-address* | **ascii** *ascii-string* | **hex** *hex-string*}
8. **exit**
9. **exit**
10. **interface** *type number*
11. **ipv6 dhcp server** [*poolname* | **automatic**] [**rapid-commit**] [**preference** *value*] [**allow-hint**]
12. **end**
13. Do one of the following:
 - **show ipv6 dhcp pool**
 - **show ipv6 dhcp interface**
14. **copy running-config startup-config**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|--|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device(config)# configure terminal | Enters global configuration mode. |
| Step 3 | ipv6 dhcp pool <i>poolname</i> Example: Device(config)# ipv6 dhcp pool engineering | Enters DHCP for IPv6 pool configuration mode, and defines the name of the IPv6 DHCP pool. |
| Step 4 | address prefix <i>ipv6-prefix</i> [lifetime { <i>valid-lifetime preferred-lifetime</i> infinite }] | (Optional) Specifies an address prefix for address assignment. |

| | Command or Action | Purpose |
|----------------|---|---|
| | <p>Example:</p> <pre>Device(config-dhcpv6)# address prefix 2001:1000::0/64 lifetime infinite</pre> | <ul style="list-style-type: none"> This address must be in hexadecimal, using 16-bit values between colons. lifetime <i>valid-lifetime preferred-lifetime</i>—Specifies a time interval (in seconds) that an IPv6 address prefix remains in the valid state. |
| Step 5 | <p>link-address <i>ipv6-prefix</i></p> <p>Example:</p> <pre>Device(config-dhcpv6)# link-address 2001:1001::0/64</pre> | <p>(Optional) Specifies a link-address IPv6 prefix.</p> <ul style="list-style-type: none"> When an address on the incoming interface or a link address in the packet matches the specified IPv6 prefix, the server uses the configuration information pool. |
| Step 6 | <p>vendor-specific <i>vendor-id</i></p> <p>Example:</p> <pre>Device(config-dhcpv6)# vendor-specific 9</pre> | <p>(Optional) Enters DHCPv6 vendor-specific configuration mode with the vendor-specific identification number.</p> |
| Step 7 | <p>suboption <i>number</i> {address <i>ipv6-address</i> ascii <i>ascii-string</i> hex <i>hex-string</i>}</p> <p>Example:</p> <pre>Device(config-dhcpv6-vs)# suboption 1 address 1000:235D::1</pre> | <p>(Optional) Enters a vendor-specific suboption number.</p> |
| Step 8 | <p>exit</p> <p>Example:</p> <pre>Device(config-dhcpv6-vs)# exit</pre> | <p>Returns to DHCP pool configuration mode.</p> |
| Step 9 | <p>exit</p> <p>Example:</p> <pre>Device(config-dhcpv6)# exit</pre> | <p>Returns to global configuration mode.</p> |
| Step 10 | <p>interface <i>type number</i></p> <p>Example:</p> <pre>Device(config)# interface fastethernet 0/0</pre> | <p>Enters interface configuration mode, and specifies the interface to configure.</p> |
| Step 11 | <p>ipv6 dhcp server [<i>poolname</i> automatic] [rapid-commit] [preference <i>value</i>] [allow-hint]</p> | <p>Enables the DHCPv6 server function on an interface.</p> |

| | Command or Action | Purpose |
|----------------|---|--|
| | <p>Example:</p> <pre>Device(config-if)# ipv6 dhcp server rapid-commit</pre> | |
| Step 12 | <p>end</p> <p>Example:</p> <pre>Device(config-if)# end</pre> | Returns to privileged EXEC mode. |
| Step 13 | <p>Do one of the following:</p> <ul style="list-style-type: none"> • show ipv6 dhcp pool • show ipv6 dhcp interface <p>Example:</p> <pre>Device# show ipv6 dhcp pool</pre> | Verifies DHCPv6 pool configuration or verifies that the DHCPv6 server function is enabled on an interface. |
| Step 14 | <p>copy running-config startup-config</p> <p>Example:</p> <pre>Device# copy running-config startup-config</pre> | (Optional) Saves your entries in the configuration file. |

Enabling the DHCPv6 Client Function on an Interface

Perform this task to enable the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) client function on an interface. To disable the DHCPv6 client function, use the **no ipv6 address dhcp** interface configuration command. To remove the DHCPv6 client request, use the **no ipv6 address dhcp client request vendor** interface configuration command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface *type number***
4. **ipv6 address dhcp [rapid-commit]**
5. **ipv6 address dhcp client request vendor**
6. **end**
7. **show ipv6 dhcp interface**

DETAILED STEPS

| | Command or Action | Purpose |
|--------|---|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | interface <i>type number</i> Example: Device(config)# interface fastethernet 0/0 | Enters interface configuration mode, and specifies the interface to configure. |
| Step 4 | ipv6 address dhcp [rapid-commit] Example: Device(config-if)# ipv6 address dhcp rapid-commit | Enables the interface to acquire an IPv6 address from the DHCPv6 server. |
| Step 5 | ipv6 address dhcp client request vendor Example: Device(config-if)# ipv6 address dhcp client request vendor | (Optional) Enables the interface to request the vendor-specific option. |
| Step 6 | end Example: Device(config-if)# end | Returns to privileged EXEC mode. |
| Step 7 | show ipv6 dhcp interface Example: Device# show ipv6 dhcp interface | Verifies that the DHCPv6 client is enabled on an interface. |

Configuring the Stateless DHCPv6 Function

The server maintains no state related to clients; for example, no prefix pools and records of allocation are maintained. Therefore, this function is “stateless” DHCPv6.

Configuring the Stateless DHCPv6 Server

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 dhcp pool** *poolname*
4. **dns-server** *ipv6-address*
5. **domain-name** *domain*
6. **exit**
7. **interface** *type number*
8. **ipv6 dhcp server** *poolname* [**rapid-commit**] [**preference** *value*] [**allow-hint**]
9. **ipv6 nd other-config flag**
10. **end**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | ipv6 dhcp pool <i>poolname</i> Example: Device(config)# ipv6 dhcp pool dhcp-pool | Configures a Dynamic Host Configuration Protocol for IPv6 (DHCPv6) configuration information pool and enters DHCPv6 pool configuration mode. |
| Step 4 | dns-server <i>ipv6-address</i> Example: Device(config-dhcp)# dns-server 2001:DB8:3000:3000::42 | Specifies the Domain Name System (DNS) IPv6 servers available to a DHCPv6 client. |
| Step 5 | domain-name <i>domain</i> Example: Device(config-dhcp)# domain-name example.com | Configures a domain name for a DHCPv6 client. |

| | Command or Action | Purpose |
|----------------|---|--|
| Step 6 | exit Example: Device(config-dhcp)# exit | Exits DHCPv6 pool configuration mode, and returns the device to global configuration mode. |
| Step 7 | interface <i>type number</i> Example: Device(config)# interface serial 3 | Specifies an interface type and number, and places the device in interface configuration mode. |
| Step 8 | ipv6 dhcp server <i>poolname</i> [rapid-commit] [preference <i>value</i>] [allow-hint] Example: Device(config-if)# ipv6 dhcp server dhcp-pool | Enables DHCPv6 on an interface. |
| Step 9 | ipv6 nd other-config flag Example: Device(config-if)# ipv6 nd other-config flag | Sets the “other stateful configuration” flag in IPv6 router advertisements (RAs). |
| Step 10 | end Example: Device(config-if)# end | Returns to privileged EXEC mode. |

Configuring the Stateless DHCPv6 Client

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface *type number***
4. **ipv6 address autoconfig [default]**
5. **end**

DETAILED STEPS

| | Command or Action | Purpose |
|---------------|---|---|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | interface <i>type number</i> Example: Device(config)# interface serial 3 | Specifies an interface type and number, and places the device in interface configuration mode. |
| Step 4 | ipv6 address autoconfig [default] Example: Device(config-if)# ipv6 address autoconfig | Enables automatic configuration of IPv6 addresses using stateless autoconfiguration on an interface and enables IPv6 processing on the interface. |
| Step 5 | end Example: Device(config-if)# end | Returns to privileged EXEC mode. |

Enabling Processing of Packets with Source Routing Header Options

SUMMARY STEPS

1. enable
2. configure terminal
3. ipv6 source-route
4. end

DETAILED STEPS

| | Command or Action | Purpose |
|--------|--|--|
| Step 1 | enable Example: Device> enable | Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted. |
| Step 2 | configure terminal Example: Device# configure terminal | Enters global configuration mode. |
| Step 3 | ipv6 source-route Example: Device(config)# ipv6 source-route | Enables processing of the IPv6 type 0 routing header. |
| Step 4 | end Example: Device(config-if)# end | Returns to privileged EXEC mode. |

Configuration Examples for DHCPv6 Repackaging

Examples: Configuring the DHCPv6 Server Function

In the following example, Dynamic Host Configuration Protocol for IPv6 (DHCPv6) clients are connected to the DHCPv6 server on Ethernet interface 0/0. The server is configured to use parameters from the DHCP pool called dhcp-pool. This pool provides clients with the IPv6 address of a Domain Name System (DNS) server and the domain name to be used. It also specifies that prefixes can be delegated from the prefix pool called client-prefix-pool1. The prefixes delegated will have valid and preferred lifetimes of 1800 and 600 seconds, respectively. The prefix pool named client-prefix-pool1 has a prefix of length /40 from which it will delegate (sub) prefixes of length /48.

```

ipv6 dhcp pool dhcp-pool
  prefix-delegation pool client-prefix-pool1 lifetime 1800 600
  dns-server 2001:DB8:3000:3000::42
  domain-name example.com
!
interface Ethernet 0/0
  description downlink to clients
  ipv6 address FEC0:240:104:2001::139/64
  ipv6 dhcp server dhcp-pool

```

```
!
ipv6 local pool client-prefix-pool1 2001:DB8:1200::/40 48
```

The following example from the **show ipv6 dhcp** command shows the DHCP unique identifier (DUID) of the device:

```
Device# show ipv6 dhcp
```

```
This device's DHCPv6 unique identifier(DUID): 000300010002FCA5DC1C
```

In the following example, the **show ipv6 dhcp binding** command shows information about two clients, including their DUIDs, IAPDs, prefixes, and preferred and valid lifetimes:

```
Device# show ipv6 dhcp binding
```

```
Client: FE80::202:FCFF:FEA5:DC39 (Ethernet2/1)
DUID: 000300010002FCA5DC1C
IA PD: IA ID 0x00040001, T1 0, T2 0
Prefix: 3FFE:C00:C18:11::/68
preferred lifetime 180, valid lifetime 12345
expires at Nov 08 2002 02:24 PM (12320 seconds)
Client: FE80::202:FCFF:FEA5:C039 (Ethernet2/1)
DUID: 000300010002FCA5C01C
IA PD: IA ID 0x00040001, T1 0, T2 0
Prefix: 3FFE:C00:C18:1::/72
preferred lifetime 240, valid lifetime 54321
expires at Nov 09 2002 02:02 AM (54246 seconds)
Prefix: 3FFE:C00:C18:2::/72
preferred lifetime 300, valid lifetime 54333
expires at Nov 09 2002 02:03 AM (54258 seconds)
Prefix: 3FFE:C00:C18:3::/72
preferred lifetime 280, valid lifetime 51111
```

In the following example, the **show ipv6 dhcp database** command provides information on the binding database agents TFTP, NVRAM, and flash:

```
Device# show ipv6 dhcp database
```

```
Database agent tftp://172.19.216.133/db.tftp:
write delay: 69 seconds, transfer timeout: 300 seconds
last written at Jan 09 2003 01:54 PM,
write timer expires in 56 seconds
last read at Jan 06 2003 05:41 PM
successful read times 1
failed read times 0
successful write times 3172
failed write times 2
Database agent nvram:/dhcpv6-binding:
write delay: 60 seconds, transfer timeout: 300 seconds
last written at Jan 09 2003 01:54 PM,
write timer expires in 37 seconds
last read at never
successful read times 0
failed read times 0
successful write times 3325
failed write times 0
Database agent flash:/dhcpv6-db:
write delay: 82 seconds, transfer timeout: 3 seconds
last written at Jan 09 2003 01:54 PM,
write timer expires in 50 seconds
last read at never
successful read times 0
failed read times 0
successful write times 2220
failed write times 614
```

Example: Configuring the DHCPv6 Client Function

In the following example, this Dynamic Host Configuration Protocol for IPv6 (DHCPv6) client has three interfaces. Ethernet interface 0/0 is the upstream link to a service provider, which has a DHCPv6 server function enabled. The Fast Ethernet interfaces 0/0 and 0/1 are links to local networks.

The upstream interface, Ethernet interface 0/0, has the DHCPv6 client function enabled. Prefixes delegated by the provider are stored in the general prefix called `prefix-from-provider`.

The local networks, Fast Ethernet interfaces 0/0 and 0/1, both assign interface addresses based on the general prefix called `prefix-from-provider`. The bits on the left of the addresses come from the general prefix, and the bits on the right of the addresses are specified statically.

```
interface Ethernet 0/0
  description uplink to provider DHCP IPv6 server
  ipv6 dhcp client pd prefix-from-provider
  !
interface FastEthernet 0/0
  description local network 0
  ipv6 address prefix-from-provider ::5:0:0:0:100/64
  !
interface FastEthernet 0/1
  description local network 1
  ipv6 address prefix-from-provider ::6:0:0:0:100/64
```

Example: Configuring the Stateless DHCPv6 Function

The following example shows how to use the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) function to configure clients with information about the name lookup system. The server is configured with a DHCP pool, which contains the name lookup information that is to be passed to clients. It does not need to contain a prefix pool. This DHCP pool is attached to the access link to customers (Ethernet 0/0) when you enter the `ipv6 dhcp server` command. The access link also has the `ipv6 nd other-config-flag` command enabled. Router advertisement (RA) messages sent from this interface inform clients that they should use DHCPv6 for “other” (for example, nonaddress) configuration information.

```
ipv6 dhcp pool dhcp-pool
  dns-server 2001:DB8:A:B::1
  dns-server 2001:DB8:3000:3000::42
  domain-name example.com
  !
interface Ethernet 0/0
  description Access link down to customers
  ipv6 address 2001:DB8:1234:42::1/64
  ipv6 nd other-config-flag
  ipv6 dhcp server dhcp-pool
```

The client has no obvious DHCPv6 configuration. However, the `ipv6 address autoconfig` command on the uplink to the service provider (Ethernet 0/0) causes the following two events:

- Addresses are autoconfigured on the interface, based on prefixes in RA messages received from the server.
- If received RA messages have the “other configuration” flag set, the interface attempts to acquire the other (for example, nonaddress) configuration from any DHCPv6 servers.

Additional References

Related Documents

| Related Topic | Document Title |
|----------------------------------|---|
| IPv6 addressing and connectivity | <i>IPv6 Configuration Guide</i> |
| Cisco IOS commands | Cisco IOS Master Command List, All Releases |
| IPv6 commands | Cisco IOS IPv6 Command Reference |
| Cisco IOS IPv6 features | Cisco IOS IPv6 Feature Mapping |

Standards and RFCs

| Standard/RFC | Title |
|---------------|------------------|
| RFCs for IPv6 | <i>IPv6 RFCs</i> |

Technical Assistance

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

Feature Information for DHCPv6 Repackaging

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 [http://www.cisco.com/cisco/web/featurenavigator/index.html](#). An account on Cisco.com is not required.

Table 1: Feature Information for DHCPv6 Repackaging

| Feature Name | Releases | Feature Information |
|--------------------|----------------------------|---|
| DHCPv6 Repackaging | Cisco IOS XE Release 3.2SE | <p>The Dynamic Host Configuration Protocol for IPv6 (DHCPv6) repackaging feature consists of DHCPv6 individual address assignment and stateless DHCPv6.</p> <p>The DHCPv6 Individual Address Assignment feature manages nonduplicate address assignment in the correct prefix based on the network where the host is connected.</p> <p>The stateless DHCPv6 feature allows DHCPv6 to be used for configuring a node with parameters that do not require a server to maintain any dynamic state for the node.</p> <p>The following commands were introduced or modified: address prefix, dns-server, domain-name, ipv6 address autoconfig, ipv6 dhcp pool, ipv6 dhcp server, ipv6 nd other-config-flag, ipv6 source-route, link-address, show ipv6 dhcp interface, show ipv6 dhcp pool, suboption, vendor-specific.</p> |

