

Information About IPv6 Access Services: DHCPv6 Relay Agent

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DHCPv6 Relay Agent

A DHCPv6 relay agent, which may reside on the client's link, is used to relay messages between the client and the server. The DHCPv6 relay agent operation is transparent to the client. A DHCPv6 client locates a DHCPv6 server using a reserved, link-scoped multicast address. For direct communication between the DHCPv6 client and the DHCPv6 server, both of them must be attached to the same link. However, in some situations where ease of management, economy, or scalability is a concern, it is desirable to allow a DHCPv6 client to send a message to a DHCPv6 server that is not connected to the same link. IPv6 enable is required for IPv6 DHCP relay, although IPv6 address is configured.

DHCPv6 Relay Agent Notification for Prefix Delegation

The DHCPv6 relay agent notification for prefix delegation allows the device working as a DHCPv6 relay agent to find prefix delegation options by reviewing the contents of a DHCPv6 RELAY-REPLY packet that is relayed by the relay agent to the client. When a prefix delegation option is found by the relay agent, the relay agent extracts the information about the prefix that is being delegated and inserts an IPv6 static route matching the prefix delegation information onto the relay agent. Future packets destined to that prefix via relay will be forwarded based on the information contained in the prefix delegation. The IPv6 static route is then left in the routing table until the prefix delegation lease time expires or the relay agent receives a release packet from the client releasing the prefix delegation.

No user configuration is required for this feature. Static route management is done automatically by the relay agent.

IPv6 routes are added when the relay agent relays a RELAY-REPLY packet, and IPv6 routes are deleted when the prefix delegation lease time expires or the relay agent receives a release message. An IPv6 static route in the routing table of the relay agent can be updated when the prefix delegation lease time is extended.

The DHCP—DHCPv6 Relay Agent Notification for Prefix Delegation feature leaves a static IPv6 route on the routing table of the relay agent. The registered IPv6 address allows unicast reverse packet forwarding (uRPF) to work by allowing the device doing the reverse lookup to confirm that the IPv6 address on the relay agent is not malformed or spoofed. The static route that remains in the routing table of the relay agent can be redistributed to other routing protocols to advertise the subnets to other nodes. Static routes will be removed when a DHCP_DECLINE message is sent by the client.

DHCPv6 Relay Options: Remote-ID for Gigabit Ethernet and Fast Ethernet Interfaces

The DHCPv6 Ethernet Remote ID Option feature adds the remote identification (remote-ID) option to relayed (RELAY-FORWARD) DHCPv6 packets.

The remote-ID option provides information to the DHCPv6 server, which includes port information, the system's DUID, and the VLAN ID. This information can be used to uniquely identify both the relay and the port on the relay through which the client packet arrived. The DHCPv6 server uses this information to select parameters specific to a particular user, host, or subscriber modem.

The addition of the remote-ID option to the RELAY-FORWARD packet occurs automatically and no user configuration is necessary.

The DHCPv6 server does not need to echo the remote-ID option in the RELAY-REPLY packet. The Internet Assigned Numbers Authority (IANA) has assigned the DHCPv6 option code 37 for the relay agent remote-ID option.

If the remote-ID option is included in the RELAY-REPLY packet, the option is removed from the packet before it is relayed to the client.

DHCPv6 Relay Options: Reload Persistent Interface ID

The DHCPv6 Relay—Reload Persistent Interface ID Option feature makes the interface ID option persistent. The interface ID is used by relay agents to decide which interface should be used to forward a RELAY-REPLY packet. A persistent interface-ID option will not change if the device acting as a relay agent goes offline during a reload or a power outage. When the device acting as a relay agent returns online, it is possible that changes to the internal interface index of the relay agent may have occurred in certain scenarios (such as, when the relay agent reboots and the number of interfaces in the interface index changes, or when the relay agents boot up and has more virtual interfaces than it did before the reboot). This feature prevents such scenarios from causing any problems.

This feature changes the DHCPv6 interface-ID option to be expressed as the short form of the interface name. The interface name as the DHCPv6 interface ID helps avoid potential problems that could arise due to physical or logical interfaces changing on the relay agent after a reload.

DHCPv6 Relay Chaining

DHCPv6 messages can be relayed through multiple relay agents. This configuration is called *relay chaining*. A relay chaining configuration can be supported only when each relay agent adds information to DHCPv6 messages before relaying them. The information helps in relaying the DHCPv6 reply back to the DHCPv6 client through the same path.

The delegated IPv6 prefix must be routable in order to be useful. The actual DHCPv6 Prefix Delegation (PD) client may not be permitted to inject routes into the delegating network. In service provider (SP) networks, for example, an edge device typically acts as a DHCPv6 relay agent, and this edge device often has the responsibility to maintain routes within the SP network for clients' PD bindings. In the event that DHCPv6 requests and responses are relayed through a chain of DHCPv6 relays, there may be a need to introduce

appropriate routes (particularly with DHCPv6 PD) in the Forwarding Information Base (FIB) so that routing is handled transparently.

DHCPv6 Relay Agent Notification for Prefix Delegation

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No user configuration is required for this feature. Static route management is done automatically by the relay agent.

IPv6 routes are added when the relay agent relays a RELAY-REPLY packet, and IPv6 routes are deleted when the prefix delegation lease time expires or the relay agent receives a release message. An IPv6 static route in the routing table of the relay agent can be updated when the prefix delegation lease time is extended.

The DHCP—DHCPv6 Relay Agent Notification for Prefix Delegation feature leaves a static IPv6 route on the routing table of the relay agent. The registered IPv6 address allows unicast reverse packet forwarding (uRPF) to work by allowing the device doing the reverse lookup to confirm that the IPv6 address on the relay agent is not malformed or spoofed. The static route that remains in the routing table of the relay agent can be redistributed to other routing protocols to advertise the subnets to other nodes. Static routes will be removed when a DHCP_DECLINE message is sent by the client.

DHCPv6 Relay Options: Remote ID for Ethernet Interfaces

This feature adds the remote identification (remote-ID) option to relayed (RELAY-FORWARD) DHCPv6 packets.

The remote-ID option provides information to the DHCPv6 server, including port information, the system's DUID, and the VLAN ID. Collectively, this information can be used to uniquely identify both the relay and the port on the relay through which the client's packet arrived. The DHCPv6 server uses this information to select parameters specific to a particular user, host, or subscriber modem. This feature works only for Ethernet interfaces at this time.

This feature introduces no user configuration. Because the addition of the remote-ID option to the RELAY-FORWARD packet occurs automatically, no user configuration is necessary.

The DHCPv6 server does not need to echo the remote-ID option in the RELAY-REPLY packet. Internet Assigned Numbers Authority (IANA) has assigned the DHCPv6 option code 37 for the relay agent remote-ID option.

If the remote-ID option is included in the RELAY-REPLY packet, the option is stripped out of the packet before the packet is relayed to the client.

DHCPv6 Relay Options: Reload Persistent Interface ID Option

This feature makes the interface-ID option, which is used by relay agents to decide which interface should be used when forwarding a RELAY-REPLY packet, persistent. A persistent interface-ID option will not change

if the router acting as a relay agent goes offline (such as during a reload or a power outage). When the router acting as a relay agent returns online, it is possible that changes to the internal interface index of the relay agent may have occurred in certain scenarios (such as cases where the relay agent reboots and has a change in the number of interfaces in the interface index, or the relay agents boots up and has more virtual interfaces than it did before the reboot). This feature prevents this scenario from causing any problems.

This feature changes the DHCPv6 interface-ID option to be expressed as simply the short form of the interface name. This syntax helps avoid potential problems that could arise due to physical or logical interfaces changing on the relay agent after a reload.

DHCPv6 Relay Chaining

This feature makes the interface-ID option, which is used by relay agents to decide which interface should be used when forwarding a RELAY-REPLY packet, persistent. A persistent interface-ID option will not change if the router acting as a relay agent goes offline (such as during a reload or a power outage). When the router acting as a relay agent returns online, it is possible that changes to the internal interface index of the relay agent may have occurred in certain scenarios (such as cases where the relay agent reboots and has a change in the number of interfaces in the interface index, or the relay agents boots up and has more virtual interfaces than it did before the reboot). This feature prevents this scenario from causing any problems.

This feature changes the DHCPv6 interface-ID option to be expressed as simply the short form of the interface name. This syntax helps avoid potential problems that could arise due to physical or logical interfaces changing on the relay agent after a reload.

How to Configure IPv6 Access Services: DHCPv6 Relay Agent

Configuring the DHCPv6 Relay Agent

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ipv6 enable**
5. **ipv6 dhcp relay destination** *ipv6-address* [*interface-type interface-number*]
6. **end**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Device(config)# interface gigabitethernet 4/2/0`	Specifies an interface type and number, and enters interface configuration mode.
Step 4	**ipv6 enable** **Example:** `Device(config-if)# ipv6 enable`	Enables IPv6 processing on an interface.
Step 5	**ipv6 dhcp relay destination** *ipv6-address* [*interface-type interface-number*] **Example:** `Device(config-if) ipv6 dhcp relay destination FE80::250:A2FF:FEBF:A056 gigabitethernet 4/3/0`	Specifies a destination address to which client packets are forwarded and enables the DHCPv6 relay service on the interface.
Step 6	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuration Examples for IPv6 Access Services: DHCPv6 Relay Agent

Example: Configuring the DHCPv6 Relay Agent

```
Device# show ipv6 dhcp interface

Ethernet1/0 is in relay mode
  Relay destinations:
    3FFB:C00:C18:6:A8BB:CCFF:FE03:2701
Serial3/0 is in relay mode
  Relay destinations:
    3FFB:C00:C18:6:A8BB:CCFF:FE03:2600
    FE80::A8BB:CCFF:FE03:2801 on Serial3/0
    FF05::1:3
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
IPv6 commands	*Cisco IOS IPv6 Command Reference*
IPv6 addressing and connectivity	*IPv6 Configuration Guide*
Cisco IOS IPv6 features	Cisco IOS IPv6 Feature Mapping

Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	*IPv6 RFCs*

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 IPv6 Access Services: DHCPv6 Relay Agent

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

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

Table 1: Feature Information for IPv6 Access Services: DHCPv6 Relay Agent

Feature Name	Releases	Feature Information
IPv6 Access Services: DHCPv6 Relay Agent		A DHCP relay agent, which may reside on the client's link, is used to relay messages between the client and server. The following commands were introduced or modified: **ipv6 dhcp relay destination**, **show ipv6 dhcp interface**.
DHCPv6 Relay Agent Notification for Prefix Delegation		DHCPv6 relay agent notification for prefix delegation allows the device working as a DHCPv6 relay agent to find prefix delegation options by reviewing the contents of a DHCPv6 packet that is being relayed by the relay agent to the client.
DHCPv6 Relay: Reload Persistent Interface ID Option		This feature makes the interface-ID option, which is used by relay agents to decide which interface should be used when forwarding a RELAY-REPLY packet, persistent.