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## Introduction

This document describes how to use the Prefix Delegation feature in order to configure the DHCPv6 (Dynamic Host Configuration Protocol for IPv6) server and client. This feature can be used to manage link, subnet, and site addressing changes.

In this example configuration, the router named *DHCPv6 server* has the Prefix Delegation feature enabled and acts as a delegating router. The delegating router automates the process of assigning prefixes to the requesting router (that is, the DHCP client). Once the server has delegated prefixes to the client, the interface that is connected to the local area network (LAN) of the requesting router has an IPv6 address using the received prefix block. The requesting router then announces this address in the Router Advertisement messages. The client routers (that is, the routers in the local network) can use the autoconfig option to pull the global IP address from the advertised Router Advertisement messages by the DHCP client.

## Prerequisites

### Requirements

Ensure that you meet these requirements before you attempt this configuration:

- Knowledge of [IPv6 Addressing and Basic Connectivity](#)
- Knowledge of [Implementing DHCP for IPv6](#)

### Components Used

This document is not restricted to specific software and hardware versions.

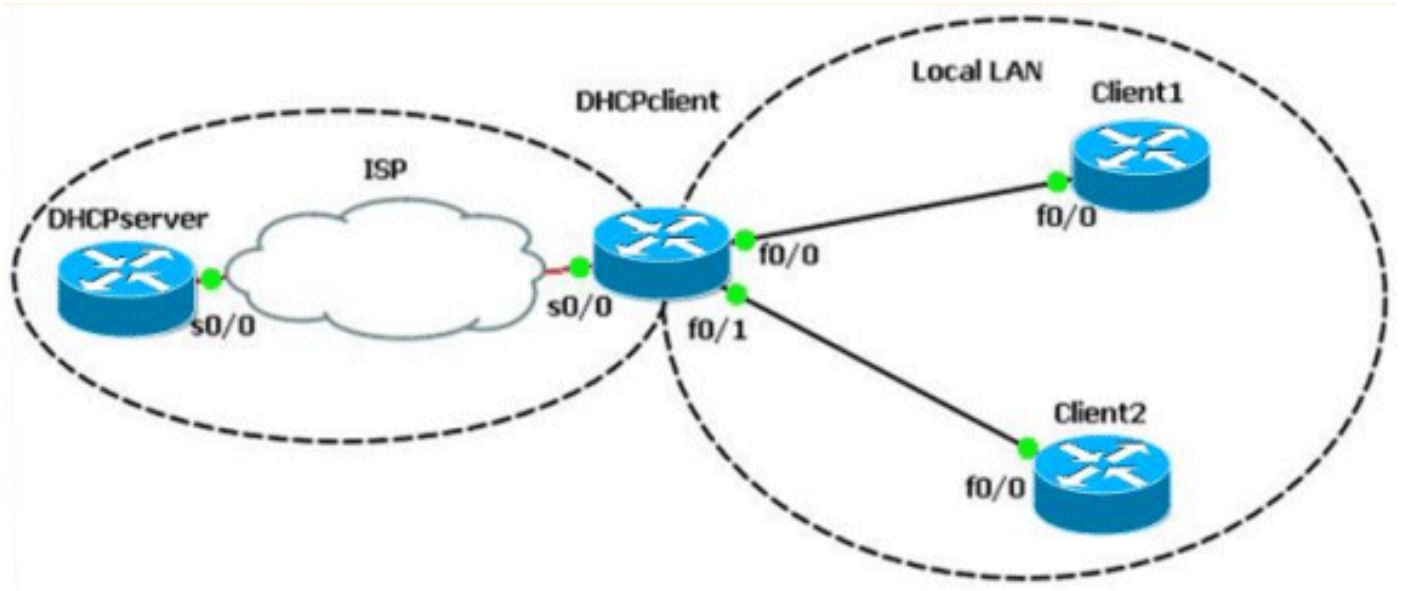
The configurations in this document are based on the Cisco 3700 series router on Cisco IOS® Software Release software 12.4 (15)T 13.

## Configure

In this section, you are presented with the information to configure the features described in this document.

## Network Diagram

This document uses this network setup:



## Configurations

This document uses these configurations:

- [DHCP Server Configuration](#)
- [DHCP Client Configuration](#)
- [Local LAN Clients 1 and 2 Configuration](#)

Here's a link to video that demonstrates the steps involved in configuring DHCPv6 on Cisco IOS routers available on [Cisco Support Community](#) [↗](#) :

[Configuration of DHCPv6 in Cisco IOS](#) [↗](#)



DHCPSEVERER#show running-config

```

version 12.4
!
hostname DHCPSEVER
!
ipv6 unicast-routing
ipv6 dhcp pool dhcpv6
!--- The DHCP pool is named "dhcpv6." ! prefix-delegation pool dhcpv6-pool1 lifetime 1800 600 !-
-- The prefix delegation pool name is "dhcpv6-pool1." ! dns-server 2001:DB8:3000:3000::42
domain-name example.com ! interface Serial0/0 no ip address ipv6 address 2010:AB8:0:1::1/64 ipv6
enable ipv6 dhcp server dhcpv6 clock rate 2000000 ! ipv6 local pool dhcpv6-pool1
2001:DB8:1200::/40 48 !--- The prefix pool named dhcpv6-pool1 has a prefix of length !--- /40
from which it will delegate (sub)prefixes of length /48. ! end

```

DHCPCLIENT#show running-config

```

version 12.4
!
hostname DHCPCLIENT
!
ipv6 unicast-routing
!
interface Serial0/0
no ip address
ipv6 address autoconfig default
!--- The autoconfig default adds a static ipv6 !--- default route pointing to upstream DHCP
server. ! ipv6 enable ipv6 dhcp client pd prefix-from-provider !--- The DHCP client prefix
delegation is !--- given the name prefix-from-provider. ! clock rate 2000000 ! interface
FastEthernet0/0 no ip address duplex auto speed auto ipv6 address prefix-from-provider
::1:0:0:0:1/64 !--- The first 48 bits are imported from the delegated !--- prefix
(2001:db8:1200) and the ::/64 is the client !--- identifier that gives the interface Fa0/1 the
!--- global IPv6 address 2001:DB8:1200:1::1/64. ! ipv6 enable ! interface FastEthernet0/1 no ip
address duplex auto speed auto ipv6 enable ipv6 address prefix-from-provider ::1/64 !---
Similarly, the global IPv6 address !--- for fa0/1 is 2001:DB8:1200::1. ! end

```

## Local LAN Configuration

### Client 1

CLIENT1#show running-config

```

version 12.4
!
hostname CLIENT1
!
ipv6 unicast-routing
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
ipv6 address autoconfig
!--- The clients can run autoconfig to get an IPv6 !--- address
depending on the router advertisements !--- sent by the DHCP client
(requesting router). ! ipv6 enable ! end

```

### Client 2

CLIENT2#show running-config

```

version 12.4
!
hostname CLIENT2
!
ipv6 unicast-routing
!
interface FastEthernet0/0
no ip address
duplex auto
speed auto
ipv6 address autoconfig
ipv6 enable
!
end

```

## Verify

Use the commands described in this section in order to verify the configuration.

**Note:** In order to conserve space, some output in this section wraps to a new line.

## On the DHCP Server

The output in this section shows that the number of active clients is 1 and also shows other configuration parameter information, such as domain name server address and preferred life time information.

### [show ipv6 dhcp pool](#)

```
DHCPv6 pool: dhcpv6
  Prefix pool: dhcpv6-pool1
  preferred lifetime 600, valid lifetime 1800
  DNS server: 2001:DB8:3000:3000::42
  Domain name: example.com
  Active clients: 1
```

The [show ipv6 dhcp binding](#) command provides information about the clients, which includes their DUIDs, IAPDs, prefixes, and preferred and valid lifetimes.

### [show ipv6 dhcp binding](#)

```
Client: FE80::C002:FFF:FEB4:0
  DUID: 00030001C2020FB40000
  Username : unassigned
  Interface : Serial0/0
  IA PD: IA ID 0x00060001, T1 300, T2 480
  Prefix: 2001:DB8:1200::/48
  preferred lifetime 600, valid lifetime 1800
  expires at Mar 02 2002 01:26 AM (1707 seconds)
```

## On the DHCP Client

The [show ipv6 dhcp interface](#) command shows that interface S0/0 is configured in client mode and also shows the details of the DNS server address and the domain name that it received from the DHCP server.

### [show ipv6 dhcp interface](#)

```
Serial0/0 is in client mode
  State is OPEN
  Renew will be sent in 00:04:37
  List of known servers:
  Reachable via address: FE80::C003:FFF:FEB4:0
  DUID: 00030001C2030FB40000
  Preference: 0
  Configuration parameters:
  IA PD: IA ID 0x00060001, T1 300, T2 480
  Prefix: 2001:DB8:1200::/48
  preferred lifetime 600, valid lifetime 1800
  expires at Mar 01 2002 10:59 AM (1777 seconds)
  DNS server: 2001:DB8:3000:3000::42
  Domain name: example.com
  Information refresh time: 0
  Prefix name: prefix-from-provider
  Rapid-Commit: disabled
```

The [show ipv6 interface](#) command on the FastEthernet interfaces Fa0/0 and Fa0/1 provides this output:

### **show ipv6 int fa0/0**

```
FastEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address
    is FE80::C002:FFF:FEB4:0
```

### **show ipv6 int fa0/1**

```
FastEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address
    is FE80::C002:FFF:FEB4:1
```

```
No Virtual link-local address(es):
Global unicast address(es):
  2001:DB8:1200:1::1, subnet is
    2001:DB8:1200:1::/64 [CAL/PRE]
    valid lifetime 1535 preferred lifetime 335
!--- Output omitted.
```

```
No Virtual link-local address(es):
Global unicast address(es):
  2001:DB8:1200::1, subnet is
    2001:DB8:1200::/64 [CAL/PRE]
    valid lifetime 1712 preferred lifetime 512
!--- Output omitted.
```

The [show ipv6 general-prefix](#) command verifies any received prefix (general prefix) from the DHCP server through Prefix Delegation.

### [show ipv6 general-prefix](#)

```
IPv6 Prefix prefix-from-provider, acquired via DHCP PD
  2001:DB8:1200::/48 Valid lifetime 1656, preferred lifetime 456
!--- 2001:DB8:1200::/48 is the general prefix received from server. FastEthernet0/1 (Address command)
FastEthernet0/0 (Address command)
```

## On the Local LAN Clients

The [show ipv6 interface](#) command on the FastEthernet interface Fa0/0 of the client routers Client 1 and Client 2 provides this output:

### show ipv6 int fa0/0

#### Client 1

```
FastEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address
    is FE80::C000:FFF:FEB4:0
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:1200:1:C000:FFF:FEB4:0, subnet is
      2001:DB8:1200:1::/64 [EUI/CAL/PRE]
    valid lifetime 1709 preferred lifetime 509
```


#### Client 2

```
FastEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address
    is FE80::C001:FFF:FEB4:0
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:1200:0:C001:FFF:FEB4:0, subnet
      is 2001:DB8:1200::/64 [EUI/CAL/PRE]
    valid lifetime 1770 preferred lifetime 570
```

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

## Related Information

- [IPv6 Technology Support](#)
- [Configuration of DHCPv6 in Cisco IOS](#) 
- [Technical Support & Documentation - Cisco Systems](#)