



Configuring IPv6

Prime Cable Provisioning supports the CableLabs DOCSIS standard: DOCSIS 3.0. The DOCSIS 3.0 standard introduces key new features that build on previous DOCSIS standards. These features include:

- Provisioning of IPv6 devices, which include:
 - DOCSIS-compliant cable modems and CMTS
 - Computers
 - Any STB compliant with CableLabs OpenCable Application Platform
 - Variants of eSAFE (embedded Service/Application Functional Entities) devices such as eCM.

Cisco Prime Cable Provisioning provides services required to provision IPv6 devices, such as IPv6 support for TFTP and ToD services. It also processes configuration files for IPv6 devices.

- Expanded addressability

The main benefit of IPv6 is its expanded addressing capability. IPv6 addresses increase the address space from 32 to 128 bits, providing for a virtually unlimited number of networks and systems.

- IPv6 provisioning and management of cable modems. This provisioning flow includes:
 - Supported IP modes— provisions DOCSIS cable modems in the IPv4, IPv6. Supports IPv4, IPv6 and dual stack mode for device type computer. See [Single Stack versus Dual Stack](#) for more information about dual stack.



Note Cable modems can forward IPv4 and IPv6 traffic regardless of the IP provisioning mode.

- DHCPv6—The DOCSIS provisioning flow specifies the use of DHCP for IPv6, also known as DHCPv6. For details on the DHCPv6 provisioning flow in DOCSIS, see [DOCSIS DHCPv6 Workflow, page 14-4](#).

Before you enable to provision devices in IPv6, ensure that you enable IPv6 on your system. To enable your machine to support IPv6:

For Solaris:

Step 1 Log in as *root*, and enter these commands:

```
# ifconfig intf inet6 plumb up
```

where *intf* identifies the interface on which you want to enable IPv6.

**Note**

Ensure that you plumb in the loopback interface in addition to the physical Ethernet interface. For example:

```
# ifconfig bge0 inet6 plumb up
# ifconfig lo0 inet6 plumb up
```

Step 2 Run these commands:

```
# /usr/lib/inet/in.ndpd
# touch /etc/hostname6.intf
```

where *intf* identifies the interface on which you want to enable IPv6.

For Linux:

Step 1 Log in as *root*.

Step 2 Modify the configuration file of the kernel module loader, */etc/modules.conf* or */etc/conf.modules*, to include the following statement:

```
# alias net-pf-10 ipv6 # automatically load IPv6 module on demand
```

Step 3 Test the IPv6 configuration using the following command:

```
# ifconfig
```

If *inet6 addr: 2001:e30:1400:1:208:c7ff:feef:9d0a/64 Scope:Global* string is displayed in the result, IPv6 is successfully enabled.

You must enable IPv6 provisioning group capabilities in Prime Cable Provisioning to provision IPv6 devices. To enable the provisioning group capabilities, you need to enable the corresponding IPv6 interface and services in the DPE. See the following sections of [Cisco Prime Cable Provisioning 5.0 DPE CLI Guide](#) for additional information.

- *interface ip provisioning* to configure IPv6 interface
- *service tftp* to enable IPv6 TFTP service in DPE
- *service tod* to enable IPv6 TOD service in DPE

Other concepts related to IPv6:

- [IPv6 Addressing, page 9-3](#)
- [Single Stack versus Dual Stack, page 9-3](#)
- [DHCP Options for IPv6, page 9-4](#)
- [Configuration Workflows for IPv6, page 9-4](#)

IPv6 Addressing

IPv6 addresses are 128 bits long and are represented as a series of 16-bit hexadecimal fields separated by colons (:). The A, B, C, D, E, and F in hexadecimal are case insensitive. For example:

```
2031:0000:130f:0000:0000:09c0:876a:130b
```

A few shortcuts to this addressing are:

- Leading zeros in a field are optional, so that 09c0 can be written 9c0, and 0000 as 0.
- Successive fields of zeros (any number of them) are represented as ::, but only once in an address (because if used more than once, the address parser has no way of identifying the size of each block of zeros). So, the previous address can be written:

```
2031:0:130f::09c0:876a:130b
```

The use of the double-colon abbreviation makes many addresses small, for example ff01:0:0:0:0:1 becomes ff01::1.

Link-local addresses have a scope limited to the link, and use the prefix fe80::/10. Loopback addresses have the address ::1. Multicast addresses are identified by the prefix ff00::/8 (there are no broadcast addresses in IPv6).

The IPv4-compatible addresses in IPv6 are the IPv4 decimal quad addresses prefixed by ::. For example, an IPv4 address that would be interpreted as ::c0a8:1e01 can be written as ::192.168.30.1.

Single Stack versus Dual Stack

RFC 4213 defines dual stack as a technique to provide complete support for both Internet protocols—IPv4 and IPv6—in hosts and routers. Any network stack that supports both IPv4 and IPv6 is called a dual stack, and a host implementing a dual stack is called a dual-stack host.

Prime Cable Provisioning provisions cable modems in the following IP modes:

- IPv4 only—In this mode, the cable modem requests a DHCPv4 server for an IPv4 address and related operational parameters.
- IPv6 only—In this mode, the cable modem requests a DHCPv6 server for an IPv6 address and related operational parameters. The modem uses the IPv6 address to obtain the current time-of-day and a configuration file.
- Dual stack—In this mode, the cable modem acquires both IPv6 and IPv4 addresses and parameters through DHCPv6 and DHCPv4 almost simultaneously, prioritizing the use of the IPv6 address to acquire time-of-day and a configuration file. Dual stack is supported only for computers.

**Note**

Prime Cable Provisioning saves discovered data only for the most recent IP mode that a cable modem is provisioned in. So if a device boots in DHCPv4, then in DHCPv6, only DHCPv6 data is discovered and stored.

While provisioning in the IPv4 and IPv6 modes, the cable modem operates with only one IP address type (v4 or v6) at any given time. For this reason, the IPv4 and IPv6 modes of provisioning are called single-stack modes.

In the dual-stack mode, you can manage the cable modem via IPv4 and IPv6 addresses simultaneously. In this mode, the modem acquires a second IP address after it is operational. Using this feature, you can provide streamlined migration from IPv4 to IPv6 in DOCSIS networks.

**Note**

Prime Cable Provisioning does not support CM dual stack mode but the CPE dual stack mode is fully supported if the CPE is a computer. The Customer Premises Equipment (CPE) is the device which is connected to the Cable Modem (CM), which in turn connected to the CMTS through the HFC network.

DHCP Options for IPv6

The DOCSIS 3.0 standard defines several new options for DHCPv4 and DHCPv6. DHCPv6 options do not use any DHCPv4 options; they are unique and separate. For the list of DHCPv6 options that supports, see the [Cisco Prime Network Registrar 8.1 User Guide](#).

Configuration Workflows for IPv6

Configuring Prime Cable Provisioning to support IPv6 involves two distinct workflows:

- Configuring the DPEs in the provisioning group. See [Table 6-6](#).
- Configuring the Cisco Prime Network Registrar servers in your network. See [Table 6-7](#).