IPv6 in a Dual Stack Environment

Dual stack environment with IPv6 as the preferred address family

This table shows the history of the feature.

Table 1: Feature History

Feature Name	Release Information	Description
IPv6 as Preferred Address Family in a Dual Stack Environment	Cisco IOS XE Catalyst SD-WAN Release 17.10.1a Cisco Catalyst SD-WAN Control Components Release 20.10.1	You can select IPv6 as the preferred address family for control and data connections in a dual stack network environment. For Cisco SD-WAN Manager and Cisco Catalyst SD-WAN Controller, configure IPv6 as the preferred address family by using the feature template or the CLI template. For Cisco IOS XE Catalyst SD-WAN devices, configure IPv6 as the preferred address family using the configuration groups, the Quick Connect workflow, or by CLI commands executed through a CLI add-on profile or template.

Dual stack environment with IPv6 as the preferred address family

A dual stack environment is a network that supports both IPv4 and IPv6 addressing, and where both can be used simultaneously. In a dual stack Cisco Catalyst SD-WAN environment, you can select a preferred address family, either IPv4 or IPv6, for establishing control and data connections.

Control connections

You can select a preferred address family, IPv4 or IPv6, to establish control and data connections in a dual stack network environment. Use the **Dual Stack IPv6 Default** drop-down list in Cisco SD-WAN Manager to set IPv6 or IPv4.

- **Dual Stack IPv6 Default**: **True**:

  The device establishes IPv6 control connections with SD-WAN Manager and the SD-WAN Controller that the device is connected to.

- **Dual Stack IPv6 Default**: **False**:

  The device establishes IPv4 control connections with SD-WAN Manager and the SD-WAN Controller that the device is connected to.

Data connections

Data connections or Bidirectional Forwarding Detection (BFD) sessions are established based on the IPv6 option set in local, remote devices. In a dual stack network environment, if you choose **True** for a local or remote device, the BFD session is an IPv6 connection. Otherwise, it is IPv4.

- **Dual Stack IPv6 Default**: **True**:

  Establishes IPv6 BFD sessions.

- **Dual Stack IPv6 Default**: **False**:

  Establishes IPv4 BFD sessions.

SD-WAN Validator

The **Dual Stack IPv6 Default** drop-down list options applies to devices, SD-WAN Manager, and SD-WAN Controller, but not to SD-WAN Validator.

The connections from SD-WAN Manager, SD-WAN Controller, and devices to the SD-WAN Validator are always dual (IPv4 and IPv6) in a dual stack network environment, regardless of the **Dual Stack IPv6 Default** setting.

NAT44 and NAT66

You can configure an IPv6 connection on devices that are at sites behind NAT44 and NAT66.

Benefits of setting IPv6 as the preferred address family

You have the option to migrate from IPv4 to IPv6, which allows you to have more IP addresses compared to IPv4. With IPv6, there can be no depletion of IP addresses.

Methods for configuring a dual stack environment with IPv6 as the preferred address family

These are methods of configuring devices and SD-WAN Control Components for IPv6 connections.

Configuring devices for IPv6 connectivity

- Configure IPv6 as the preferred address family for devices, using a configuration group, on page 3
- Configure IPv6 as the preferred address family for devices, using the Quick Connect workflow, on page 4
- Configure IPv6 as the preferred address family for devices, using CLI commands, on page 5

Configuring SD-WAN Control Components for IPv6 connectivity

- Configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller, using CLI commands, on page 5
- Configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller, using templates, on page 6

Configure IPv6 as the preferred address family for devices, using a configuration group

Before you begin

Follow these steps to configure IPv6 as the preferred address family for Cisco IOS XE Catalyst SD-WAN devices in a dual stack environment, using a configuration group.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Configuration Groups**.

Step 2 Click **Configuration Groups**.

Step 3 Create a new configuration group or open an existing one to display the full details of the configuration group.

Step 4 In the **Deployment** area, view the devices associated with the configuration group. You can add devices if desired.

Step 5 Click **Deploy** to deploy the configuration to the associated devices.

Step 6 In **Process Overview**, click **Next**.

Step 7 On the **Selected Devices to Deploy** page, select or deselect devices and click **Next**.

Step 8 For **Dual Stack IPv6 Default**, select **True** to set IPv6 as the default connection type, and click **Next**.

Here's how **Dual Stack IPv6 Default** affects control connections and BFD sessions:

- **True**: Devices establish an IPv6 control connection with SD-WAN Manager and the SD-WAN Controller they are connected to. BFD sessions use IPv6.
- **False**: Devices establish an IPv4 control connection with SD-WAN Manager and the SD-WAN Controller they are connected to. BFD sessions use IPv4.

The connections from devices to SD-WAN Validator are always dual (IPv4 and IPv6) in a dual IP stack environment, regardless of how**Dual Stack IPv6 Default** is configured.

Step 9 On the summary page, click **Deploy**.

What to do next

For more information on using configuration groups, see Configuration Groups and Feature Profiles.

Configure IPv6 as the preferred address family for devices, using the Quick Connect workflow

For information about the workflow, see Quick Connect Workflow.

Before you begin

Follow these steps to configure IPv6 as the preferred address family for Cisco IOS XE Catalyst SD-WAN devices in a dual stack environment, using the Quick Connect workflow.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Workflows** > **Quick Connect**.

Step 2 On the **Process Overview** page, click **Next**.

Step 3 Select an option to sync your devices, and click **Next**.

Step 4 On the **Selected devices to bring up** page, select devices, and click **Next**.

Step 5 In the **Dual Stack IPv6 Default** drop-down list, select **True** to set IPv6 as a default connection. Click **Apply**, and then click **Next**.

Here's how **Dual Stack IPv6 Default** affects control connections and BFD sessions:

- **True**: Devices establish an IPv6 control connection with SD-WAN Manager and the SD-WAN Controller they are connected to. BFD sessions use IPv6.
- **False**: Devices establish an IPv4 control connection with SD-WAN Manager and the SD-WAN Controller they are connected to. BFD sessions use IPv4.

The connections from devices to SD-WAN Validator are always dual (IPv4 and IPv6) in a dual IP stack environment, regardless of how**Dual Stack IPv6 Default** is configured.

Step 6 On the **Summary** page, click **Deploy**.

Configure IPv6 as the preferred address family for devices, using CLI commands

Before you begin

Follow these steps to configure IPv6 as the preferred address family for Cisco IOS XE Catalyst SD-WAN devices in a dual stack environment, using CLI commands.

Procedure

Step 1 Create a CLI add-on profile or CLI add-on template.

Step 2 Enable IPv6 on the tunnel interface.

```
interface tunnel1
no shutdown
ipv6 enable
```

Step 3 Enable IPv6.

```
system
ipv6-strict-control true
```

This example configures IPv6 as the preferred address family for devices.

```
interface Tunnel1
 no shutdown
 ip unnumbered GigabitEthernet1
 tunnel source GigabitEthernet1
 tunnel mode sdwan
 ipv6 enable
exit

system
gps-location latitude 32.0
gps-location longitude -100.0
system-ip 10.16.255.14
domain-id 1
site-id 400
ipv6-strict-control true
admin-tech-on-failure
organization-name "Cisco"
vbond vbond
```

Configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller, using CLI commands

Before you begin

Follow these steps to configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller in a dual stack environment, using CLI commands.

Procedure

Step 1 Create a CLI add-on profile or CLI add-on template.

Step 2 Enable IPv6.

```
system
ipv6-strict-control true
```

This example configures IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controllers.

```
system
host-name vm9
system-ip 10.16.255.19
site-id 400
ipv6-strict-control true
port-offset 9
no daemon-restart
admin-tech-on-failure
no vrrp-advt-with-phymac
organization-name "Cisco"
vbond vbond
```

Configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller, using templates

Before you begin

Follow these steps to configure IPv6 as the preferred address family for SD-WAN Manager and SD-WAN Controller in a dual stack environment, using templates.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.

Step 2 Click **Feature Templates**, and click **Add Template**.

Step 3 In the list of devices, select **Controller**.

Step 4 Select **System** from the list of templates.

Step 5 In the **Basic Information** section, for the **Dual Stack IPv6 Default** field, click **On** to enable.

This sets IPv6 as a default connection.

Here's how **Dual Stack IPv6 Default** affects connections:

- **On**: SD-WAN Manager and SD-WAN Controllers establish an IPv6 control connection with other SD-WAN Manager and SD-WAN Controller instances.
- **Off**: SD-WAN Manager and SD-WAN Controllers establish IPv4 control connections.

The connections from SD-WAN Manager and SD-WAN Controller instances to SD-WAN Validator are always dual (IPv4 and IPv6) in a dual IP stack environment, regardless of how**Dual Stack IPv6 Default** is configured.

Step 6 Click **Save**.

Monitor the use of IPv6 as the preferred address family in a dual stack environment, in SD-WAN Manager

After you configure IPv6 as the preferred address family for connections, the BFD connections will be up and running in SD-WAN Manager.

Before you begin

Follow these steps to view the BFD connections in SD-WAN Manager.

Procedure

Step 1 From the Cisco SD-WAN Manager menu, choose **Monitor** > **Devices**.

Step 2 Verify the status of the connection in the **BFD** column.

Monitoring IPv6 as the preferred address family in a dual stack environment

These commands are useful for monitoring the use of IPv6 addressing in a dual stack environment.

Cisco IOS XE Catalyst SD-WAN devices

- **show sdwan control connections**
- **show sdwan control local-properties**
- **show sdwan bfd sessions**
- **show sdwan omp tlocs**
- **show sdwan bfd tloc-summary-list**

SD-WAN Manager and SD-WAN Controller

- **show control connections**
- **show control local-properties**