Lab – Identify IPv6 Addresses

# Topology



# Objectives

Part 1: Practice with Different Types of IPv6 Addresses

Part 2: Examine a Host IPv6 Network Interface and Address

# Background / Scenario

With the depletion of the Internet Protocol version 4 (IPv4) network address space and the adoption and transition to IPv6, networking professionals must understand how both IPv4 and IPv6 networks function. Many devices and applications already support IPv6. This includes extensive Cisco device Internetwork Operating System (IOS) support and workstation/server operating system support, such as that found in Windows and Linux.

This lab focuses on IPv6 addresses and the components of the address. In Part 1, you will identify the IPv6 address types and IPv6 addresses abbreviation. In Part 2, you will view the IPv6 settings on a PC.

# Required Resources

* 1 PC (Windows with Internet access)

# Instructions

## Practice with Different Types of IPv6 Addresses

In this part, you will identify the different types of IPv6 addresses and practice compressing and decompressing IPv6 addresses.

### Match the IPv6 address to its type.

Match the IPv6 addresses to their corresponding address type. Notice that the addresses have been compressed to their abbreviated notation and that the slash network prefix number is not shown. Some answer choices must be used more than once.

Answer choices:

* + - 1. Loopback address
      2. Global unicast address
      3. Link-local address
      4. Unique-local address
      5. Multicast address

| IPv6 Address | Answer |
| --- | --- |
| 2001:0db8:1:acad::fe55:6789:b210 | * + - 1. Global unicast address |
| ::1 | * + - 1. Loopback address |
| fc00:22:a:2::cd4:23e4:76fa | * + - 1. Unique-local address |
| 2033:db8:1:1:22:a33d:259a:21fe | * + - 1. Global unicast address |
| fe80::3201:cc01:65b1 | * + - 1. Link-local address |
| ff00:: | * + - 1. Multicast address |
| ff00::db7:4322:a231:67c | * + - 1. Multicast address |
| ff02::2 | * + - 1. Multicast address |

### Practice compressing and decompressing IPv6 addresses.

Using the rules of IPv6 address abbreviation, either compress or decompress the following addresses:

* + - 1. 2002:0ec0:0200:0001:0000:04eb:44ce:08a2

Compressed form: 2002:ec0:200:1::4eb:44ce:8a2

* + - 1. fe80:0000:0000:0001:0000:60bb:008e:7402

Compressed form: fe80::1:60bb:8e:7402

* + - 1. fe80::7042:b3d7:3dec:84b8

This address is already in compressed form.

* + - 1. ff00::

This address is already in compressed form.

* + - 1. 2001:0030:0001:acad:0000:330e:10c2:32bf

Compressed form: 2001:30:1:acad::330e:10c2:32bf

## Examine a Host IPv6 Network Interface and Address

In Part 2, you will check the IPv6 network settings of your PC to identify your network interface IPv6 address.

### Check your PC IPv6 network address settings.

Verify that the IPv6 protocol is installed and active on your PC-A (check your Local Area Connection settings).

* + 1. Navigate to the **Control Panel**.
    2. In the Category View, click **Network and Sharing Center** icon. Click **View network status and tasks**.
    3. In the Network and Sharing Center window, you will see your active networks.
    4. On the left side of the window, click **Change adapter settings**. You should now see icons representing your installed network adapters. Right-click your active network interface (it may be an **Ethernet** or a **Wi-Fi**), and then click **Properties**.
    5. In the Properties window, scroll through the list of items to determine whether IPv6 is present, which indicates that it is installed, and if it is also check marked, which indicates that it is active.
    6. Select the item **Internet Protocol Version 6 (TCP/IPv6)** and click **Properties**. You should see the IPv6 settings for your network interface. Your IPv6 properties window is likely set to **Obtain an IPv6 address automatically**. This does not mean that IPv6 relies on the Dynamic Host Configuration Protocol (DHCP). Instead of using DHCP, IPv6 looks to the local router for IPv6 network information and then auto-configures its own IPv6 addresses. To manually configure IPv6, you must provide the IPv6 address, the subnet prefix length, and the default gateway. Click **Cancel** to exit the properties windows.

**Note**: The local router can refer host requests for IPv6 information, especially Domain Name System (DNS) information, to a DHCPv6 server on the network.

* + 1. After you have verified that IPv6 is installed and active on your PC, you should check your IPv6 address information.

Open a command prompt and type **ipconfig /all** and press Enter. Your output should look similar to this:

C:\Users\user> **ipconfig /all**

Windows IP Configuration

<output omitted>

Wireless LAN adapter Wireless Network Connection:

Connection-specific DNS Suffix . :

Description . . . . . . . . . . . : Intel(R) Centrino(R) Advanced-N 6200 AGN

Physical Address. . . . . . . . . : 02-37-10-41-FB-48

DHCP Enabled. . . . . . . . . . . : Yes

Autoconfiguration Enabled . . . . : Yes

**Link-local IPv6 Address . . . . . : fe80::8d4f:4f4d:3237:95e2%14(Preferred)**

IPv4 Address. . . . . . . . . . . : 192.168.2.106(Preferred)

Subnet Mask . . . . . . . . . . . : 255.255.255.0

Lease Obtained. . . . . . . . . . : Sunday, January 06, 2013 9:47:36 AM

Lease Expires . . . . . . . . . . : Monday, January 07, 2013 9:47:38 AM

Default Gateway . . . . . . . . . : 192.168.2.1

DHCP Server . . . . . . . . . . . : 192.168.2.1

DHCPv6 IAID . . . . . . . . . . . : 335554320

DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-14-57-84-B1-1C-C1-DE-91-C3-5D

DNS Servers . . . . . . . . . . . : 192.168.1.1

8.8.4.4

<output omitted>

* + 1. You can see from the output that the client PC has an IPv6 link-local address with a randomly generated interface ID.

#### Questions:

What does it indicate about the network regarding IPv6 global unicast address, IPv6 unique-local address, or IPv6 gateway address?

1/ Pv6 Link-Local Address:

The output indicates the presence of an IPv6 link-local address, which is automatically configured for communication on the local network segment. The line:

Link-local IPv6 Address . . . . . : fe80::8d4f:4f4d:3237:95e2%14(Preferred)

shows the link-local IPv6 address with a randomly generated interface ID.

2/ IPv6 Global Unicast Address:

The output does not explicitly show a global unicast address. It's possible that it exists, but it's not displayed in the provided output. Global unicast addresses are typically assigned by ISPs or other network administrators.

3/ IPv6 Unique-Local Address:

The output does not provide information about a unique-local address. Unique-local addresses are similar to private IPv4 addresses and are used for local communication within an organization or site.

4/ IPv6 Gateway Address:

The default gateway for IPv6 is not explicitly shown in the provided output. It is represented by the line:

Default Gateway . . . . . . . . . : 192.168.2.1

This address is an IPv4 address, indicating the default gateway for IPv4 traffic. The absence of an IPv6 gateway address suggests that the client PC might not be configured to use IPv6 routing on the local network.

What kind of IPv6 addresses did you find when using **ipconfig /all**?

The provided output indicates the presence of an IPv6 link-local address but does not provide information about a global unicast address, unique-local address, or an IPv6 gateway address. The absence of this information in the output limits the ability to conclusively determine the presence of specific IPv6 address types and the configuration of an IPv6 gateway. To obtain a more comprehensive view of the IPv6 configuration, additional details from the complete ipconfig /all output or network configuration settings would be needed.

# Reflection Questions

* 1. How do you think you must support IPv6 in the future?

+ Larger Address Space: IPv6 provides a much larger address space compared to IPv4. This is increasingly important as the number of devices connected to the internet continues to grow.

+ Improved Performance: IPv6 can offer improved performance and efficiency for data routing and packet processing, which can be beneficial for AI systems that rely on internet connectivity.

+ Enhanced Security: IPv6 includes built-in support for IPsec (Internet Protocol Security), a protocol suite for securing internet protocol communications.

+ Future-proofing: As IPv4 addresses become increasingly scarce, ensuring compatibility with IPv6 is a way to future-proof systems and services.

* 1. Do you think IPv4 networks continue on, or will everyone eventually switch over to IPv6? How long do you think it will take?

IPv4 networks will likely continue to coexist with IPv6 networks for an extended period, and the transition to IPv6 will be gradual rather than an abrupt switch. Both IPv4 and IPv6 are expected to be used in parallel for a considerable time.

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