Lab - Observe DNS Name Resolution

# Objectives

* Observe the conversion of a URL to an IP address.
* Observe DNS lookup using the nslookup command.

# Background / Scenario

Domain Name System (DNS) is invoked when you type a Uniform Resource Locator (URL), such as **http://www.cisco.com**, into a web browser. The first part of the URL describes which protocol is being used. Common protocols are HTTP (Hypertext Transfer Protocol), HTTPS (Hypertext Transfer Protocol over Secure Socket Layer), and FTP (File Transfer Protocol).

DNS uses the second part of the URL, which in this example is www.cisco.com. DNS translates the domain name (like www.cisco.com) to an IP address to allow the source host to reach the destination host.

Work in pairs to complete this lab.

# Required Resources

* 1 PC (Windows 10)
* Internet connectivity

# Instructions

## Observe DNS Conversion

### Observe DNS operation.

* + - 1. Open a **Command Prompt** window.
      2. At the prompt, enter **ping cisco.com**. The computer needs to translate cisco.com into an IP address so it knows where to send the Internet Control Message Protocol (ICMP) packets. Ping is a type of ICMP packet.
      3. The first line of the output shows cisco.com converted to an IP address by DNS. You should be able to see the effect of DNS even if your school has a firewall that prevents pinging, or if Cisco has prevented people from pinging their web server.
      4. Text

         Description automatically generated

C:\Users\Student> **ping cisco.com**

Pinging cisco.com [72.163.4.185] with 32 bytes of data:

Reply from 72.163.4.185: bytes=32 time=34ms TTL=244

Reply from 72.163.4.185: bytes=32 time=32ms TTL=244

Reply from 72.163.4.185: bytes=32 time=34ms TTL=244

Reply from 72.163.4.185: bytes=32 time=34ms TTL=244

Ping statistics for 72.163.4.185:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 32ms, Maximum = 34ms, Average = 33ms

#### Questions:

Which IP address is shown on the screen?

2001:420:1101:1:185

Should cisco.com always resolve to the same IP address? Explain.

No it resolves to several addresses

List a few applications (besides the **ping** command) that need DNS to translate a domain name to an IP address. Perform an internet search as necessary.

Email servers, websites

Verify DNS operation using the nslookup command.

* + - 1. At the command prompt, enter the **nslookup** command.

C:\Users\Student> **nslookup**

Default Server: google-public-dns-a.google.com

Address: 8.8.8.8

Text

Description automatically generated

>

The output above shows that the Default DNS Server was configured to use a Google DNS server.

#### Question:

What is your Default Server listed as?

Unknown

* + - 1. After issuing the previous **nslookup** command, notice how the prompt changed to a single **>**. This is the prompt for the **nslookup** program. From this prompt, you can enter commands related to DNS.

At the prompt, type **?** to see a list of all the available commands that you can use in **nslookup** mode.

#### Question:

List three commands that you can use with **nslookup**:

All, ls, retry=X

* + - 1. At the **nslookup** prompt, type **cisco.com**.

> **cisco.com**

Text

Description automatically generated

#### Questions:

What is the translated IP address?

2001:420:1101:1:185:72

72.163.4.185

Is the IP address an IPv4 address or an IPv6 address?

IPv6

Is it the same as the IP address shown with the **ping** command?

No

At the prompt, type the IP address of the Cisco web server that you just found. What is the Name result?

Text

Description automatically generated

### Identify mail servers using the nslookup command

* + - 1. To identify mail servers using **nslookup**, enter **set type=mx**.

> **set type=mx**

* + - 1. At the prompt, enter **cisco.com**.
      2. Text

         Description automatically generated

> **cisco.com**

Server: google-public-dns-a.google.com

Address: 8.8.8.8

Non-authoritative answer:

cisco.com MX preference = 20, mail exchanger = rcdn-mx-01.cisco.com

cisco.com MX preference = 30, mail exchanger = aer-mx-01.cisco.com

cisco.com MX preference = 10, mail exchanger = alln-mx-01.cisco.com

>

#### Question:

What are the names of the Cisco mail servers identified in the **mail exchanger** field?

* + - 1. At the prompt, type **exit** to return to the regular command prompt.
      2. At the prompt, type **ipconfig /all**.

#### Question:

Write the IP addresses of all the DNS servers that your school computer uses.

Text

Description automatically generated

* + - 1. Enter **exit** to close the Command Prompt window.

# Reflection

* 1. If your school did not have a DNS server, what effect would this have on your use of the internet?

You wouldn’t be able to browse the web

* 1. Some companies do not dedicate a single server for DNS. Instead, the DNS server provides other functions as well. Which functions do you think might be included on a DNS server? Use the **ipconfig /all** command to help you with this.

Email and file sharing

# Answer Key

## Observe DNS Conversion

### Observe DNS operation.

Which IP address is shown on the screen?

72.163.4.185

Should cisco.com always resolve to the same IP address? Explain.

It does not always resolve to the same IP address because there are multiple public IP addresses that resolve to cisco.com.

List a few applications (besides the **ping** command) that need DNS to translate a domain name to an IP address. Perform an internet search as necessary.

A web browser, FTP client, or email client.

### Verify DNS operation using the nslookup command.

What is your Default Server listed as?

Answers may vary. In this example, google-public-dns-a.google.com is listed as the default server.

List three commands that you can use with **nslookup**:

set type=x to set the query type, server <NAME> to set the default DNS server, and help to get command help

What is the translated IP address?

Your answers may vary. At the time of writing, these were the translated IP addresses: 2001:420:1101:1::185 and 72.163.4.185

Is the IP address an IPv4 address or an IPv6 address?

At the time of writing, the domain name was resolved for both IPv4 and IPv6.

Is it the same as the IP address shown with the **ping** command?

Yes.

At the prompt, type the IP address of the Cisco web server that you just found. What is the Name result?

The answer can vary. At the time of writing, www1.cisco.com was the name result.

### Identify mail servers using the nslookup command

What are the names of the Cisco mail servers identified in the **mail exchanger** field?

The answer can vary. At the time of writing, the names of the Cisco mail servers are aer-mx-01.cisco.com, alln-mx-01.cisco.com, rcdn-mx-01.cisco.com.

Write the IP addresses of all the DNS servers that your school computer uses.

Answers will vary.

# Reflection

* 1. If your school did not have a DNS server, what effect would this have on your use of the internet?

You would not be able to browse the web or use any network application that relies on name to IP address translation.

* 1. Some companies do not dedicate a single server for DNS. Instead, the DNS server provides other functions as well. Which functions do you think might be included on a DNS server? Use the **ipconfig /all** command to help you with this.

Email, printer, and file-share name translations. Active Directory domain controller function.

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