LAB 14:

Learning packet motion through DNS server in a network using packet tracer

Introduction:

The **Domain Name System (DNS)** is a hierarchical naming system for computers, services, or any resource participating in the Internet. It associates various information with domain names assigned to such participants. Most importantly, it translates domain names meaningful to humans into the numerical (binary) identifiers associated with networking equipment for the purpose of locating and addressing these devices world-wide. An often used analogy to explain the Domain Name System is that it serves as the "phone book" for the Internet by translating human-friendly computer hostnames into IP addresses. For example, *www.example.com* translates to **208.77.188.166.**

The Domain Name System makes it possible to assign domain names to groups of Internet users in a meaningful way, independent of each user's physical location. Because of this, World-Wide Web (WWW) hyperlinks and Internet contact information can remain consistent and constant even if the current Internet routing arrangements change or the participant uses a mobile device. Internet domain names are easier to remember than IP addresses such as 208.77.188.166(IPv4) or 2001:db8:lf70::999:de8:7648:6e8 (IPv6). People take advantage of this when they recite meaningful URLs and e-mail addresses without having to know how the machine will actually locate them.

The Domain Name System distributes the responsibility of assigning domain names and mapping those names to IP addresses by designating authoritative name servers for each domain. Authoritative name servers are assigned to be responsible for their particular domains, and in turn can assign other authoritative name servers for their sub-domains. This mechanism has made the DNS distributed, fault tolerant, and helped avoid the need for a single central register to be continually consulted and updated

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

Background / Preparation
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 ones 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 in order to allow the source host to reach the destination host.
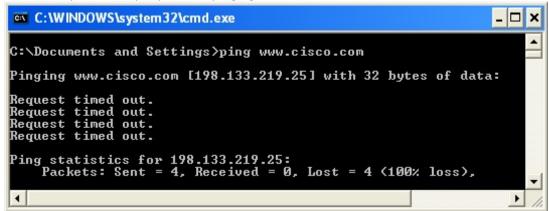Work in pairs to complete this lab.
The following resources are required:

- Windows-based computer with Internet connectivity
- Access to the Run command

Step 1: Observe DNS conversion

a. Click the **Start** button, select **Run**, type **cmd,** and then click **OK**. The command prompt window appears.

b. At the command prompt, type **ping www.cisco.com**. The computer needs to translate www.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.

c. The first line of the output shows www.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.

```
C:\WINDOWS\system32\cmd.exe                     _ □ ×

C:\Documents and Settings>ping www.cisco.com

Pinging www.cisco.com [198.133.219.25] with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 198.133.219.25:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

d. Which IP address is shown on the screen? _____

e. Is it the same as the one shown in the figure? _____ Why do you think this occurred? _____

f. Work together with another student and discuss one or two other instances (besides the **ping** command) in which the computer would use DNS. _____

Step 2: Verify DNS operation using the nslookup command

a. At the command prompt, type the **nslookup** command.

b. What is the default DNS server being used? _____

c. Notice how the command prompt changed. This is the **NSLOOKUP** prompt. From this prompt, you can enter commands related to DNS.

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

e. Write three commands that you can use with **NSLOOKUP**. _____ _____ _____

f. At the **NSLOOKUP** prompt, type **www.cisco.com**.

g. What is the translated IP address? _____

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

i. At the prompt, type the IP address of the Cisco web server that you just found. You can use **NSLOOKUP** to get the domain name of an IP address if you do not know the URL. Using the

previous procedures, find an IP address associated with www.google.com.

_____

Step 3: Identify mail servers using the nslookup command

    a.   At the prompt, type **set type=mx** to have **NSLOOKUP** identify mail servers.

    b.   At the prompt, type **www.cisco.com**.

    c.   What is the primary name server, the responsible mail address, and the default Time to Live (TTL)?

_____

_____

    d.   At the prompt, type **exit** to return to the regular command prompt.

    e.   At the prompt, type **ipconfig /all**.

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

_____

    g.   Type **exit** to close the command prompt window.

Step 4: Reflection

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

_____

_____

_____

    b.   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.

_____