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Date: 10/02/25
Course: CIST-2881-D1
Assignment: Researching IPv6

Instructions:

At one time, the depletion of IPv4 addresses seemed imminent, but the use of private IP address ranges and network address translation made it possible for IPv4 to continue to work well. However, the next generation of IP was already being created, and its developers took advantage of this opportunity to include important security features that IPv4 lacked; IPv6 includes native support for IPsec.

The implementation of IPv6 has been slow. Although the U.S. government has converted its networks so that they support both IPv4 and IPv6, many Internet service providers have been slow to follow, and this reluctance is also found in Europe. IPv4 and IPv6 are not very compatible protocols, and migration to IPv6 is a very expensive and complicated task.

Still, it seems likely that IPv6 will become the standard network-layer protocol in the not-too-distant future; both Windows Server 2016 and Windows 10 have implemented IPv6. The more you know about it, the better prepared you will be to troubleshoot network issues. In this assignment, you will learn about the design of IPv6 and some of its features.

Complete the following activity:

1. Open your web browser and go to
   http://technet.microsoft.com/en-us/library/dd379498(v=ws.10).aspx
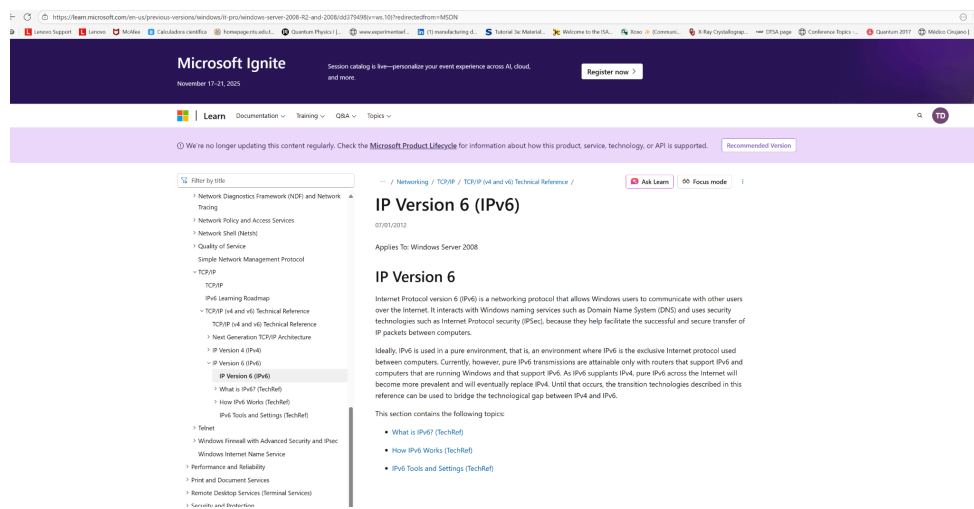
2. Links to an external site.
3. .
   It is not unusual for websites to change where files are stored. If the suggested URL no longer functions, go to technet.microsoft.com and search for "how ipv6 works."

4. Read How IPv6 Works, including the following three links: IPv6 Addressing (only through the section "Types of IPv6 Addresses"), IPv6 Neighbor Discovery, and IPv6 Routing.
5. Go tohttp://technet.microsoft.com/en-us/library/dd392258(v=ws.10).aspx
6. Links to an external site.
7. and read the material presented.
8. Answer the following Review Questions.

Review Questions:

1. The IPv6 loopback address is _____.
   1. <FIBA>0000:0000:0000:0000:0000:0000:0000:0001
   2. 0.0.1
   3. ::1
   4. FE80:0000:0000:0000:0000:0000:0000:0001

I learned that ::1 is the IPv6 loopback address, which is like the 127.0.0.1 address in IPv4. The double colon :: is a shortcut that means all the zeros, so ::1 is the same as 0000:0000:0000:0000:0000:0000:0000:0001. It's used by a device to send data to itself to test the network.

2. Which of the following is a valid IPv6 address?
   1. 21DA:00D3:0000:2F3B:0000:02AA:00FF:FE28:9C5A
   2. 21DA:00D3::2F3B:02AA::9C5A
   3. 21DA:00D3:0000:2F3B:02AA:00FF:FE28:9C5A
   4. 21DA::2F3B::FE28:9C5A

Not all options are correct. An IPv6 address must have 8 groups of 4 hexadecimal digits. Some addresses use :: more than once, which is not allowed, and some have too many groups. The correct one has exactly 8 groups, so it follows the rules.

3. In the IPv6 protocol, an anycast is equivalent to an IPv4 protocol broadcast. True or False? False

I found out that anycast in IPv6 means sending data to the nearest device that has the address. In IPv4, broadcast sends data to all devices on the network. Since IPv6 does not use broadcast, anycast is not the same thing.

4. The IPv6 Neighbor Discovery Process performs a similar function as the IPv4 protocol _____.
   1. <FIBA>ARP
   2. UPD
   3. TCP
   4. WINS

ARP in IPv4 finds the MAC address of a device when you know the IP address. In IPv6, Neighbor Discovery does the same job and also helps with auto-assigning addresses and finding routers. It basically replaces ARP.

5. Which of the following is a valid Netsh command?
    1. netsh interface ipv6> show mld
    2. netsh interface ipv6> show ipstats
    3. netsh interface ipv6> show dhcpservers
    4. netsh interface ipv6> show joins

Netsh is a Windows tool to manage network settings. The show mld command shows Multicast Listener Discovery information in IPv6. The other commands listed aren't valid IPv6 Netsh commands, so this one is correct.