Lab 1

Internet Speed Test & Computer Command Prompt

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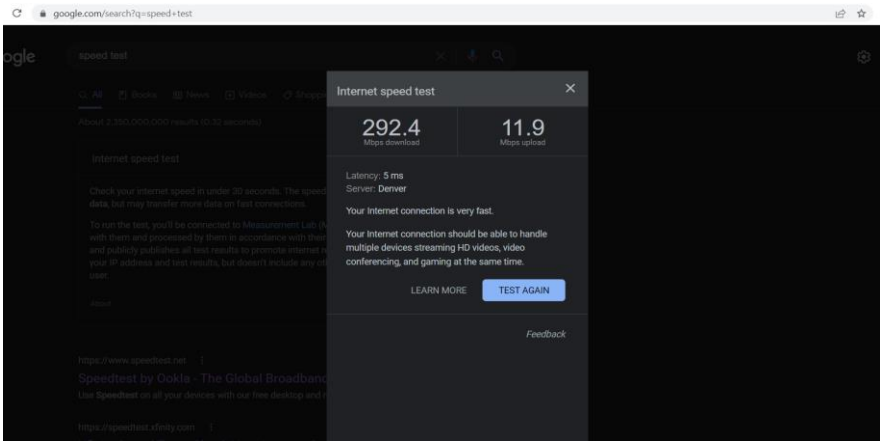
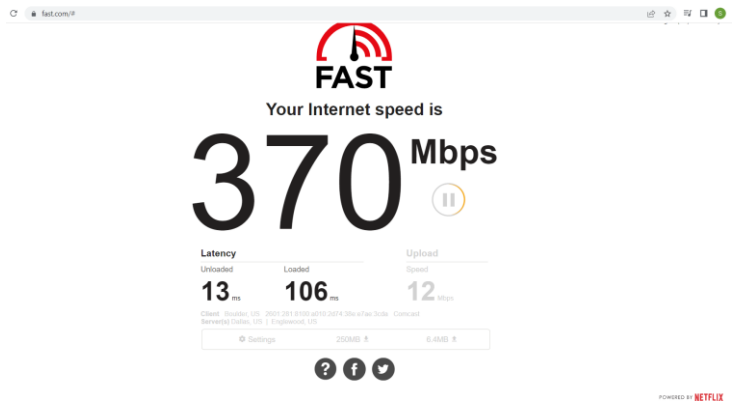
1. Select three (at least one of the three should be from an ISP (i.e. Comcast)) free, online Internet speed test sites (*Note: be careful where you click on some sites, as there are often malicious adds on free testing sites*).

   a. Provide a screenshot of the results/summary page from each site. [**6 points**]

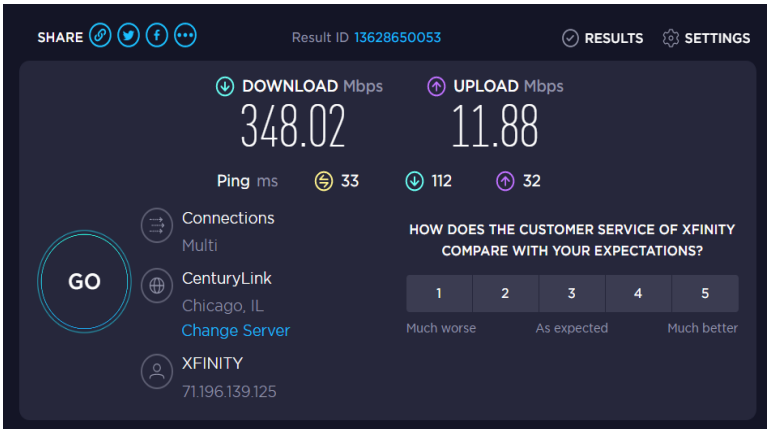
   Ans :: 1.Google Speed Test



2. Netflix Speed Test



3. Ookla Speed Test



Were the results from the various sites the same or different? Why? [**2 points**]

Ans :: The result from various sites are different. And different because of the following.

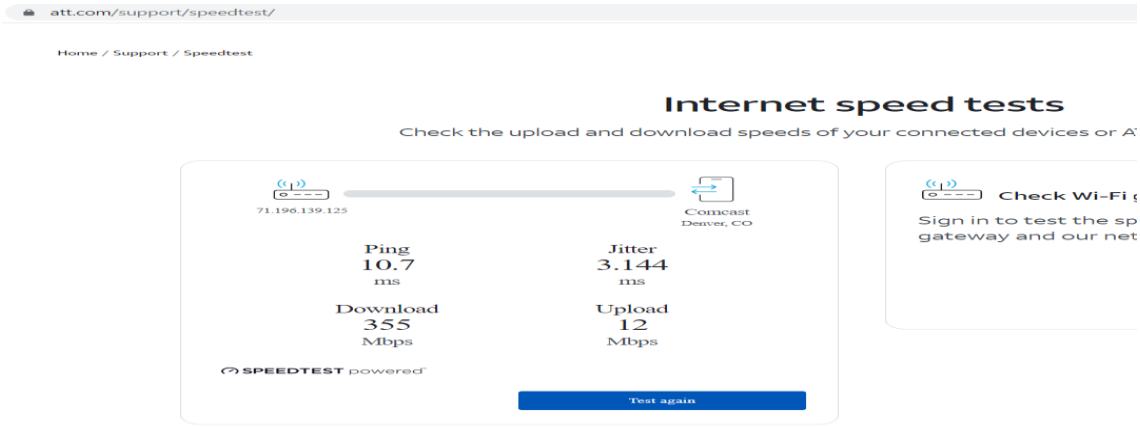
1. **Ping Times** is different
2. **Server locations** are different and the ping times are affected by distance. The greater the distance usually means the ping goes through more routers between the device and the destination server and every hop may cause amount of latency.
3. No. of Devices connected
4. **Network Congestion**: Traffic varies from second-to-second and sometimes certain routers (default gateways) are more congested than others

1. Choose your favorite testing site, used previously, to use again.

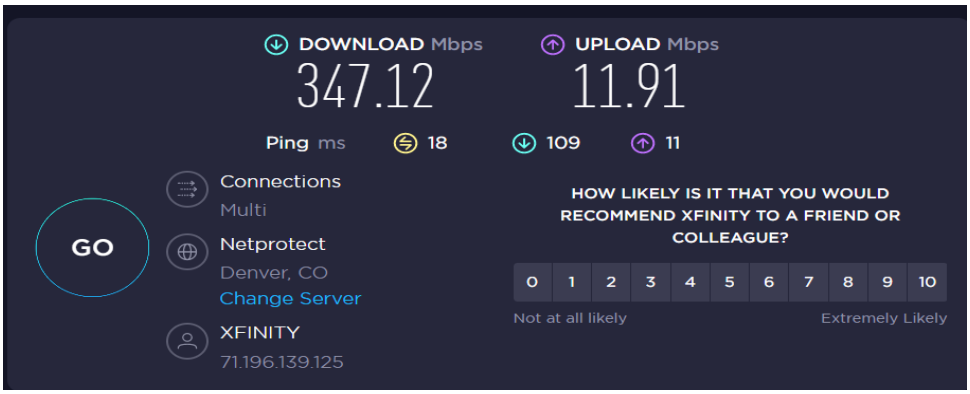
   a. Find a location where you can use either a wired or wireless connection.

   Run the speed test on wireless. Provide a screenshot of the results. [2 points]

   Ans:



   i. **Run the speed test on wired. Provide a screenshot of the results**. [**2 points**]

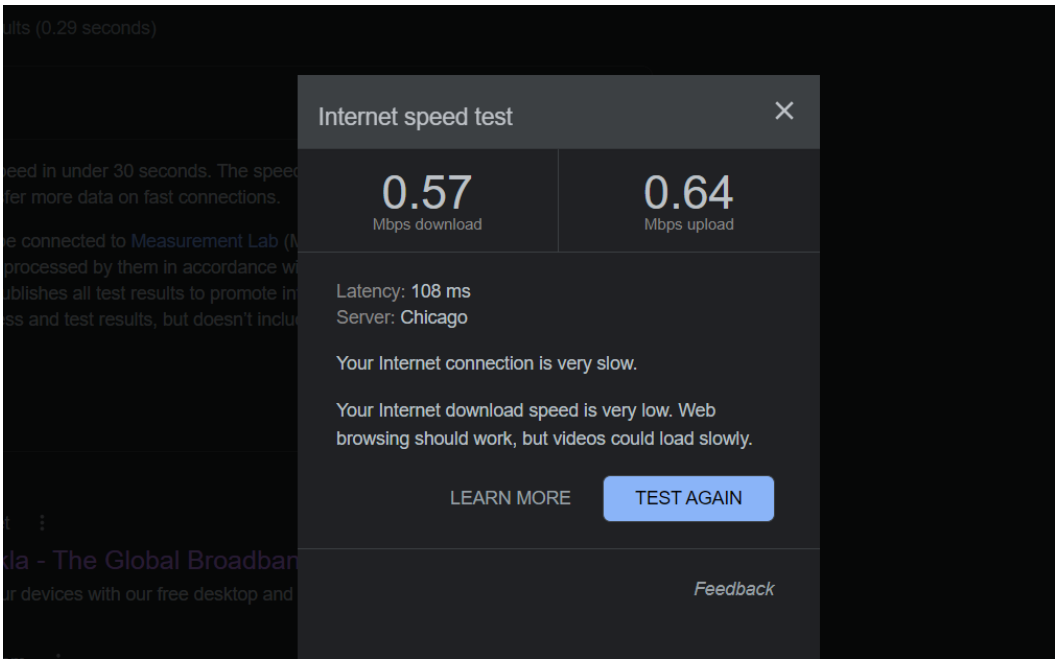


Were the results different? Why or why not? [2 points]

Ans : Ethernet cable / wired-connection has slightly faster speed because of the direct connection. The direct wired-connection don't face the Network Congestion as faced by Router/Modem.

Run the speed test at a different location (on campus, home, coffee shop). Were the results better or worse than your other tests? Why?

Ans ::



The result was worse. And worse because of the greater Number of devices connected to the same Network. And the shared bandwidth.

List three benefits of obtaining accurate Internet speed test results?

Ans :: 1. Identification of potential network issue and real-time download/upload speeds
2. Troubleshooting of network issue
3. Easy to keep a track of quality of Internet connectivity provided by ISP's.

What are three best practices to obtain accurate Internet speed test results?

Ans : 1. Choose the test server in closest proximity
2. Close the browser windows and disconnect other connected devices
3. Reset modem/router and reset your machine prior to speed test
4. Prefer using a wired-connection for accurate speed-test result

1. **Explain the following concepts, and how they are used with speed tests**? [**2 points each**]

   a. **Ping (Latency) Test**

   Ans :: Ping test is used to check the connectivity between end device and server. It is the time required for a data packet transfer from device to the server and back.

```
C:\Users\Srivaishnavi>ping 10.0.2.17

Pinging 10.0.2.17 with 32 bytes of data:
Reply from 10.0.2.17: bytes=32 time=5ms TTL=255
Reply from 10.0.2.17: bytes=32 time=3ms TTL=255
Reply from 10.0.2.17: bytes=32 time=2ms TTL=255
Reply from 10.0.2.17: bytes=32 time=2ms TTL=255

Ping statistics for 10.0.2.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 5ms, Average = 3ms

C:\Users\Srivaishnavi>
```

   b. **Download Test**

   Ans: Download test is used to measure the time taken to get the response for http request from webserver. It is measured in Mega Bits per second (Mbps). Ex:: downloading a song from spotify.

   c. **Upload Test**

   Ans: The upload test is performed to measure how fast the data can transfer from your computer to the internet. Its measured in Mbps. Ex : uploading a picture on Instagram

   d. **Is TCP or UDP used? Why?**

   Ans: Speedtest mainly uses TCP (Transmission Control Protocol) with HTTP Fallback for maximum compatability.It uses TCP to ensure a secure transmission.

If the results of your speed test is lower than what you expect/pay for from your ISP, list two things you could do to troubleshoot the connection/speed before you contact the ISP?

Ans : Check the spyware, viruses, add-on programs on my computer impacting my internet service connectivity.
2 Reset the router/modem.
2.Check Wi-fi router configuration and update the firmware

After troubleshooting, if you determine your Internet speed is lower than what you expect from your ISP, list three ways you could potentially boost your Internet speed, and explain each

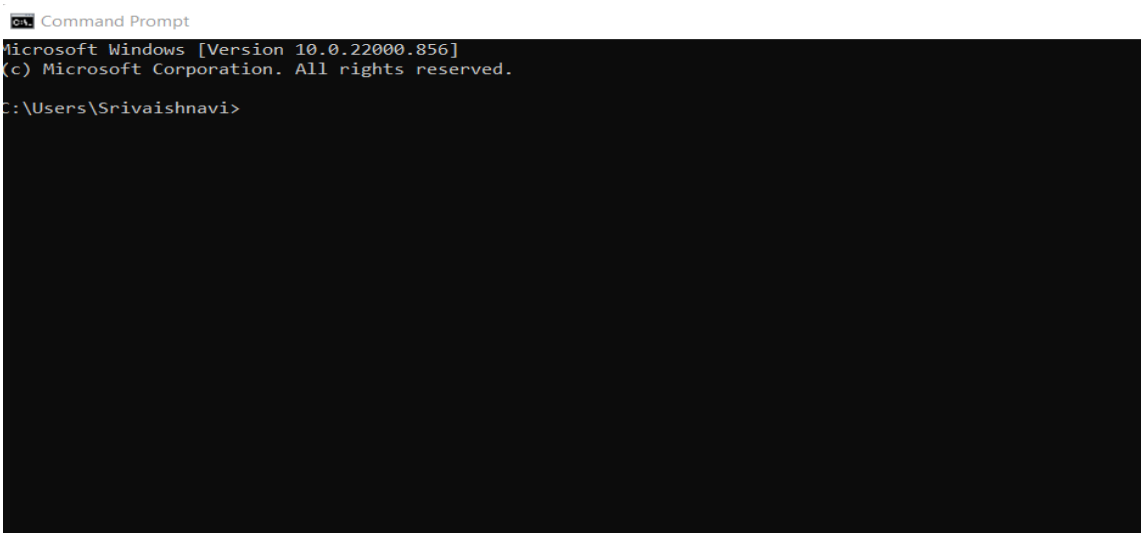
Ans : Switch the Wi-fi frequency band : Use the less frequently used band to access the Wi-Fi connection so the airwaves in this frequency can be a little crowded **Extend your Wi-Fi network:** Use WiFi-boosters or wired access points to amplify or redistribute existing Wi-Fi signals and to increase the reach of my network. **Upgrade to faster internet**

Objective 2 – Command Prompt (Windows/Mac)

The command line, also known as cmd or shell, is used by system administrators to quickly interact with a machine, without having to click through numerous graphic menus. This objective will provide the useful commands that are needed for networking and information gathering on a computer, such as IP address, MAC address, default-gateway, DNS, ARP table, and IP connectivity.

1. Basic Networking Information
    a. Open the command prompt
        i. **Windows users:** The easiest way to achieve this in Windows is to type “cmd” + <enter> in the Windows search bar.

        Ans ::



    b. What is another way you can find the command prompt on your windows/mac machine? List the steps. [**2 points**]

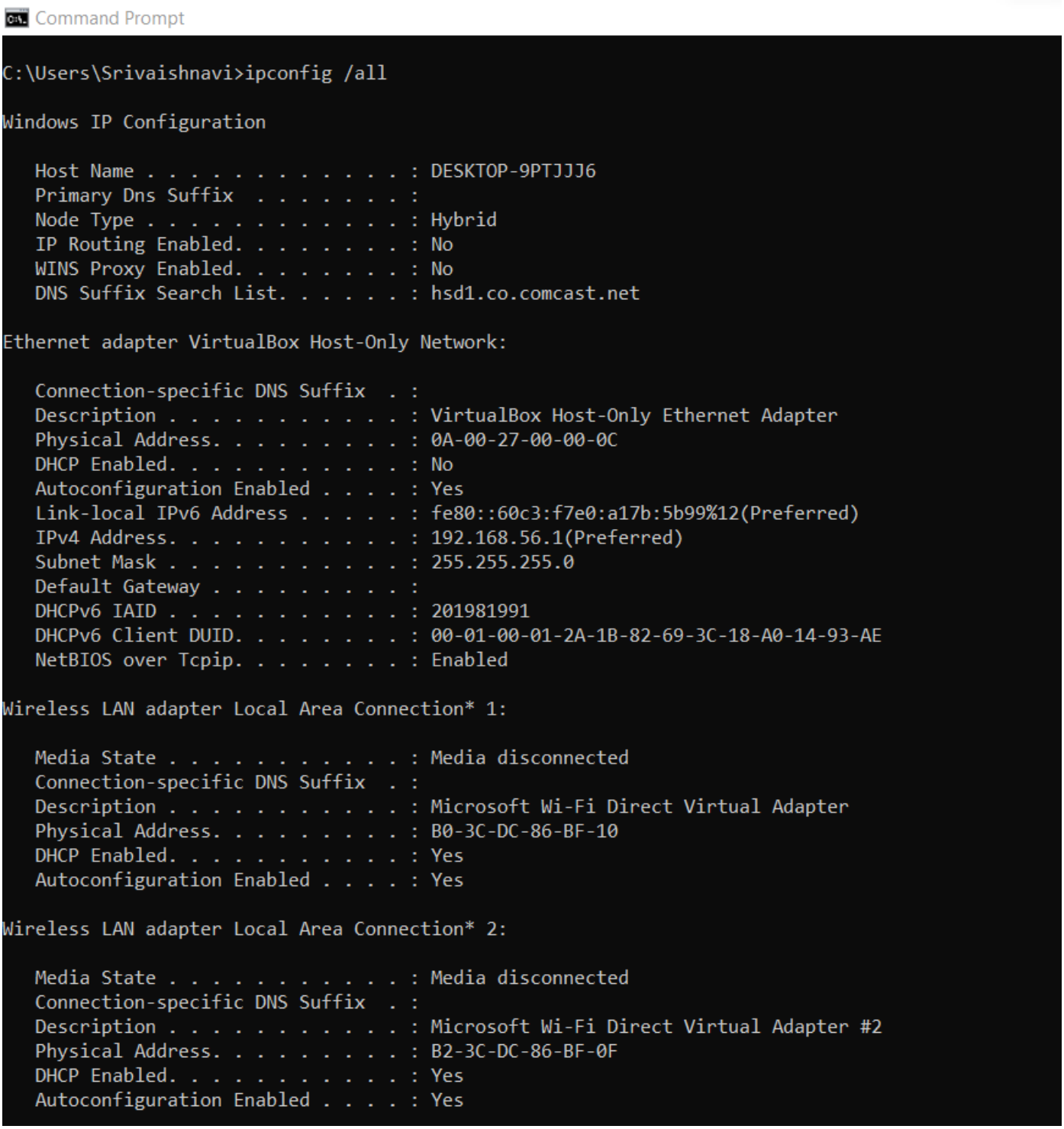
    Ans : Window + X = Windows / Windows (Terminal)

    Windows + R = type “cmd”

    File Explorer > type cmd in the navigation bar and the cmd will be opened.

Issue a single command that will indicate all of the following information. Provide a screenshot of the command output [3 points], as well as answer the following questions based on the output [1 point each]:

Ans : ipconfig /all command gives the information about the network and device configurations



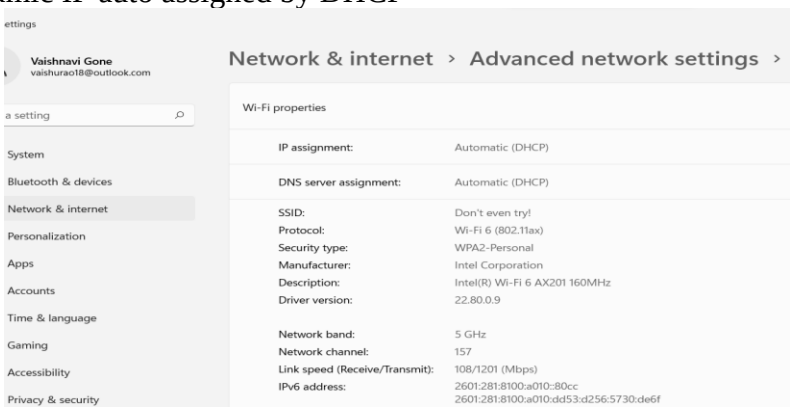
```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : hsd1.co.comcast.net
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX201 160MHz
   Physical Address. . . . . . . . . : B0-3C-DC-86-BF-0F
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2601:281:8100:a010::80cc(Preferred)
   Lease Obtained. . . . . . . . . . : Sunday, September 4, 2022 3:16:51 AM
   Lease Expires . . . . . . . . . . : Thursday, September 8, 2022 2:36:03 AM
   IPv6 Address. . . . . . . . . . . : 2601:281:8100:a010:dd53:d256:5730:de6f(Preferred)
   Temporary IPv6 Address. . . . . . : 2601:281:8100:a010:1451:57fe:10cf:2592(Preferred)
   Link-local IPv6 Address . . . . . : fe80::dd53:d256:5730:de6f%15(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.0.0.16(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Sunday, September 4, 2022 3:16:51 AM
   Lease Expires . . . . . . . . . . : Tuesday, September 6, 2022 9:19:22 AM
   Default Gateway . . . . . . . . . : fe80::1e93:7cff:fe7a:dbc0%15
                                       10.0.0.1
   DHCP Server . . . . . . . . . . . : 10.0.0.1
   DHCPv6 IAID . . . . . . . . . . . : 179322076
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2A-1B-82-69-3C-18-A0-14-93-AE
   DNS Servers . . . . . . . . . . . : 2001:558:feed::1
                                       2001:558:feed::2
                                       75.75.75.75
                                       75.75.76.76
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : B0-3C-DC-86-BF-13
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

C:\Users\Srivaishnavi>
```

1.What is your machine's IP address?

Ans : 10.0.0.16/24

2.Is it static or dynamic (DHCP)?

Ans :: It's a Dynamic IP auto assigned by DHCP



What is the difference between static/dynamic?

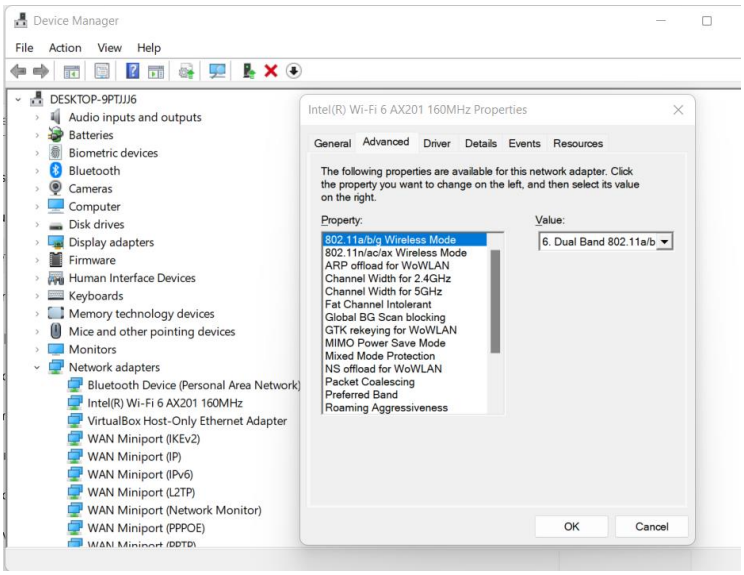
Ans : **Static IP** :: Doesn't use Routing protocol. SysAdmin Manually configures the route and makes an entry to the routing table so route doesn't change automatically. It is suitable for small network and the link failure affects the network.
Dynamic IP :: Uses the Routing protocol like RIP, OSPF, BGP. Routing protocol decides the route for data packets and makes entry into the routing table. Its used for large networks and the link failure doesn't affect the network.

What layer of the OSI model is an IP

Ans : IP Address operates in the Network Layer (Layer 3)

Which NIC are you using (wired/wireless)? Indicate this.

Ans : Intel (R) Wi-Fi 6A AX201 160MHz operating in 802.11a/b/q Wireless mode property is used.



What is your machine's default-gateway address?

Ans : Ipv4 default gateway : 10.0.0.1

```
IPv4 Address. . . . . . . . . . . : 10.0.0.16(Preferred)
Subnet Mask . . . . . . . . . . . : 255.255.255.0
Lease Obtained. . . . . . . . . . : Sunday, September 4, 2022 3:16:51 AM
Lease Expires . . . . . . . . . . : Tuesday, September 6, 2022 9:19:22 AM
Default Gateway . . . . . . . . . : fe80::1e93:7cff:fe7a:dbc0%15
                                    10.0.0.1
DHCP Server . . . . . . . . . . . : 10.0.0.1
DHCPv6 IAID . . . . . . . . . . . : 179322076
DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2A-1B-82-69-3C-18-A0-14-93-AE
DNS Servers . . . . . . . . . . . : 2001:558:feed::1
                                    2001:558:feed::2
```

What is the purpose of a default-gateway?

Ans : Default gateway serves as a access point or a IP router that send information from computer in one network to the other network. When a host wants to reach destination outside its own network, it uses default gateway. A router is widely used default gateway.

List the DNS server(s).

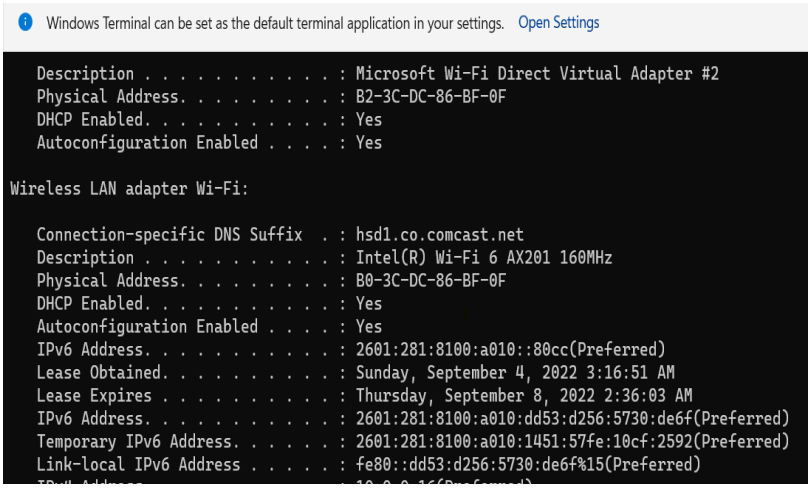
Ans :: Root Name Server, TLD Name Server, Authoritative Name Server

```
  DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2A-1B-82-69-3C-18-A0-14-93-AE
  DNS Servers . . . . . . . . . . . : 2001:558:feed::1
                                      2001:558:feed::2
                                      75.75.75.75
                                      75.75.76.76
  NetBIOS over Tcpip. . . . . . . . : Enabled
```

What is the purpose of a DNS server?

Ans : Domain Name System (DNS) translates domain names into computer understandable ip address.

What is your MAC address of the NIC being used? Ans :: b2-3c-dc-86-bf-0f



What layer of the OSI model is a MAC address?

Ans :: MAC Address operates in the Data-Link Layer (Layer2) of the OSI Model.

IP Connectivity

Open the command prompt

Ping www.google.com. Provide a screenshot of the results [**2 points**]

Ans :

```
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi> ping www.google.com

Pinging www.google.com [2607:f8b0:400f:803::2004] with 32 bytes of data:
Reply from 2607:f8b0:400f:803::2004: time=32ms
Reply from 2607:f8b0:400f:803::2004: time=10ms
Reply from 2607:f8b0:400f:803::2004: time=11ms
Reply from 2607:f8b0:400f:803::2004: time=12ms

Ping statistics for 2607:f8b0:400f:803::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 32ms, Average = 16ms
PS C:\Users\Srivaishnavi>
```

answer the following questions based on the output [**1 point each**]:

What is ping?

Ans :: Ping is a command line utility, available on virtually any operating system and used to test the internet connectivity, latency b/w a host and destination server

What is the IP address of Google? Ans :: 142.250.72.4

```
Microsoft Windows [Version 10.0.22000.856]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Srivaishnavi>ping www.google.com

Pinging www.google.com [2607:f8b0:400f:804::2004] with 32 bytes of data:
Reply from 2607:f8b0:400f:804::2004: time=28ms
Reply from 2607:f8b0:400f:804::2004: time=14ms
Reply from 2607:f8b0:400f:804::2004: time=10ms
Reply from 2607:f8b0:400f:804::2004: time=10ms

Ping statistics for 2607:f8b0:400f:804::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 28ms, Average = 15ms

C:\Users\Srivaishnavi>nslookup
Default Server:  cdns01.comcast.net
Address:  2001:558:feed::1

> www.google.com
Server:  cdns01.comcast.net
Address:  2001:558:feed::1

Non-authoritative answer:
Name:    www.google.com
Addresses:  2607:f8b0:400f:803::2004
          142.250.72.4
```

```
C:\Users\Srivaishnavi>ping 142.250.72.4

Pinging 142.250.72.4 with 32 bytes of data:
Reply from 142.250.72.4: bytes=32 time=19ms TTL=116
Reply from 142.250.72.4: bytes=32 time=16ms TTL=116
Reply from 142.250.72.4: bytes=32 time=24ms TTL=116
Reply from 142.250.72.4: bytes=32 time=12ms TTL=116

Ping statistics for 142.250.72.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 24ms, Average = 17ms

C:\Users\Srivaishnavi>
```

What was the average round trip time for packets to reach Google's server from your machine?

Ans :: RTT Minimum :: 10ms, Maximum = 32ms, Avg = 16ms

```
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi>
PS C:\Users\Srivaishnavi> ping www.google.com

Pinging www.google.com [2607:f8b0:400f:803::2004] with 32 bytes of data:
Reply from 2607:f8b0:400f:803::2004: time=32ms
Reply from 2607:f8b0:400f:803::2004: time=10ms
Reply from 2607:f8b0:400f:803::2004: time=11ms
Reply from 2607:f8b0:400f:803::2004: time=12ms

Ping statistics for 2607:f8b0:400f:803::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 32ms, Average = 16ms
PS C:\Users\Srivaishnavi>
```

If you wanted to ping an IP address (or domain name) continuously, what parameter would you add to the ping command?

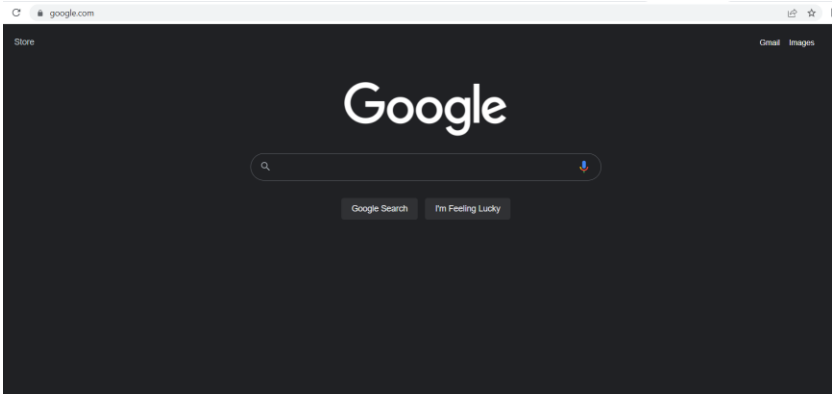
Ans :: Ping <ip address> -t

How would you stop this continuous ping?

Ans :: interrupt using ctrl – break, stop using ctrl + c

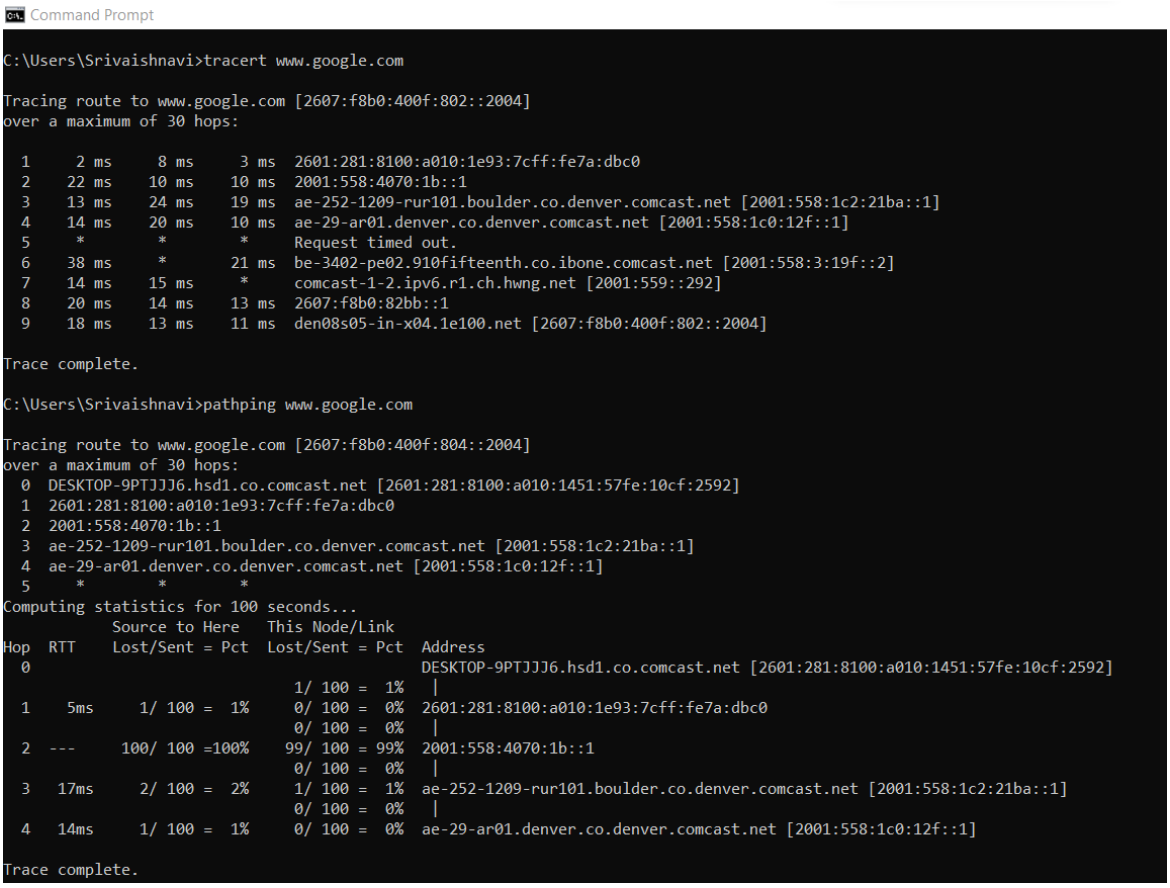
Using the IP address of Google (obtained above), type this in your Internet browser's URL. Does this resolve to www.google.com? Why or why not? [**2 points**]

Ans : Yes. 2607:f8b0:400f:804::2004 / 142.250.72 – resolving to google.com



If you want to see how many Internet routers (hops) and the path your packet traverses to reach Google's server, what command could you use? Provide a screenshot of the command and corresponding output. [**3 points**]

Ans : tracert <ip address/domain name> or Pathping <ip address/domain name>



Total Score = _____/68