HOW TO PREPARE YOUR PC TO DO THE LABS EFFECTIVELY?

1- It is preferred that you do your labs and Assignments in your

Virtual Machine not on your original operating systems.

To setup A Virtual Machine on your pc see “index”

2- During Testing Don’t forget to

a. Turn off Firewall Both on Client and Server PCs

b. Turn off Firewall of any Antivirus Both Client and Server.

c. Test Connectivity between Client and Server.

d. Do not use Proxy Server on Both Client and Server PCs

3- After finshed your labs don’t forget to:

a. Uninstall the programs you used

b. Disabled the accounts you create

c. Disables the rules you setup on firewall

d. Enable your firewall and antivirus

e. Use your proxy server

Lab 1

 Building the network (Configuring your IP address)

By default the DHCP (distribute IP address to Client) will give your PC

an IP address if they are assigned to obtain an IP address automatically.

To know your current IP address (logical) use the command:

1- Ipconfig Command

- Ipconfig

  Gives details about your network settings

  Start -> cmd -> ipconfig

  answer

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::935b:41cf:6189:2cc8%12
   IPv4 Address. . . . . . . . . . . : 192.168.100.169
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.100.1
```

- Ipconfig /all

  Gives more details about your network settings

  Start ->cmd->ipconfig/all

  Answer

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wireless-AC 9560 160MHz
   Physical Address. . . . . . . . . : 4C-1D-96-5E-68-11
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::935b:41cf:6189:2cc8%12(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.100.169(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Sunday, October 20, 2024 8:47:36 AM
   Lease Expires . . . . . . . . . . : Monday, October 21, 2024 8:47:36 AM
   Default Gateway . . . . . . . . . : 192.168.100.1
   DHCP Server . . . . . . . . . . . : 192.168.100.1
   DHCPv6 IAID . . . . . . . . . . . : 88874390
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2E-30-A7-E5-F8-75-A4-32-9C-A5
   DNS Servers . . . . . . . . . . . : 192.168.100.1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

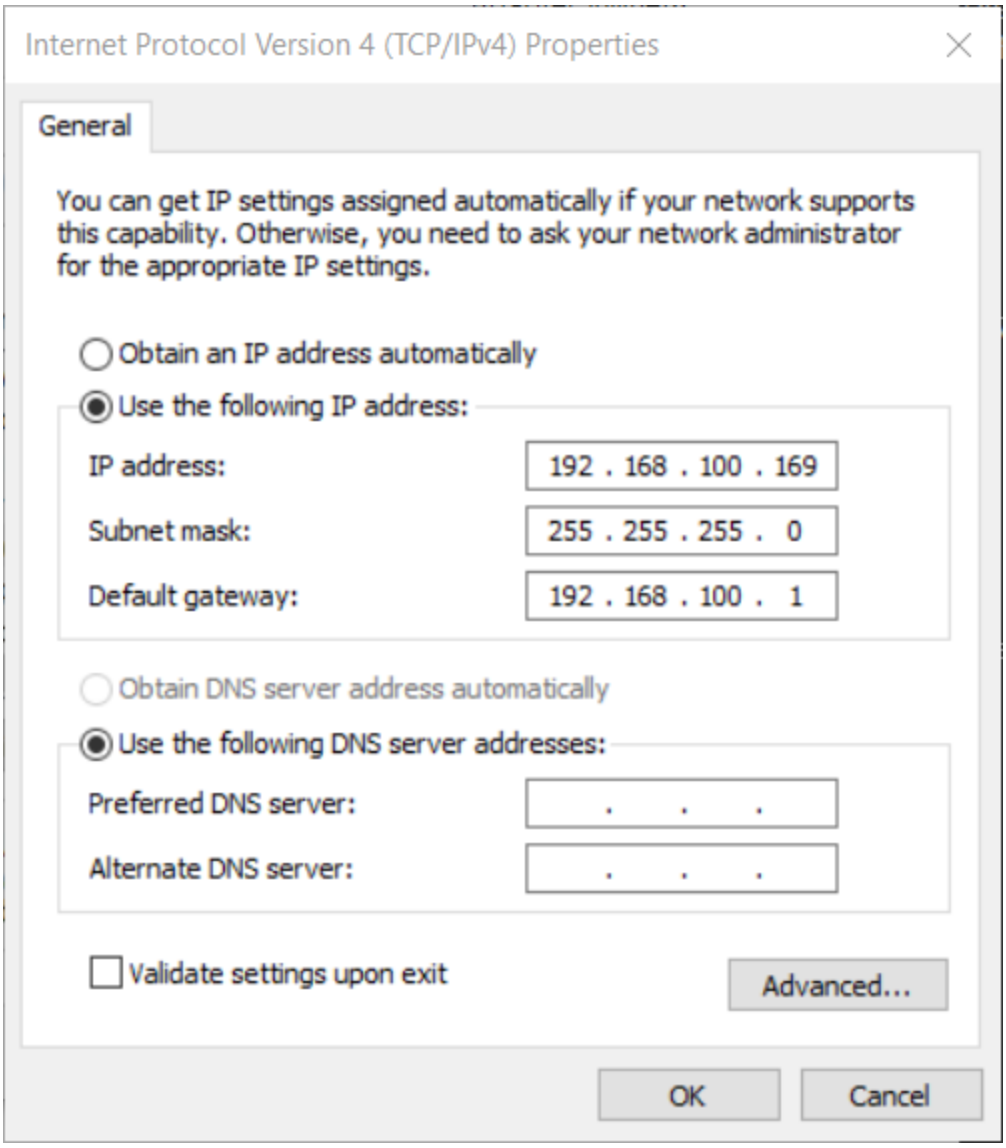
2- Configure IP address manually.

Start->Control panel->Network and Internet->Network and sharing Center

-> In the Left panel Change Adaptor settings->select Local Area Connection -> properties -> internet protocol version4 ->

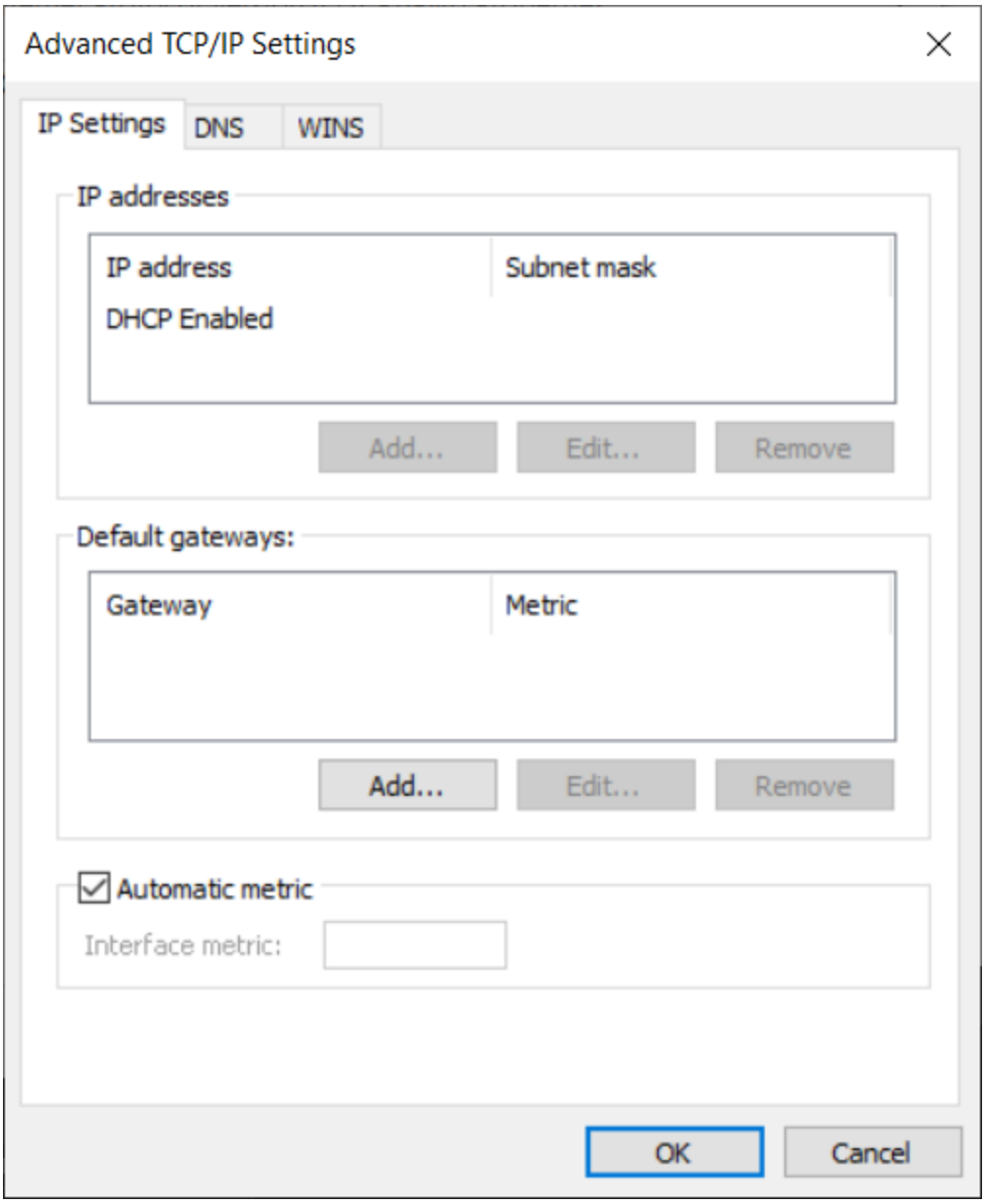
adaptor-> Double click and edit network settings

Answer



Click the Advanced button and you can add IP address, Gateway, DNS,..etc

Answer



- To know your Real IP (Static) address Use website like as : https://whatismyipaddress.com/
- 

To check the connectivity between devices use the

3- Ping Command

- Check the connectivity
  Ping Destination IP Of_Remote_Host

```
C:\Users\shyma>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=41ms TTL=118
Reply from 8.8.8.8: bytes=32 time=41ms TTL=118
Reply from 8.8.8.8: bytes=32 time=41ms TTL=118
Reply from 8.8.8.8: bytes=32 time=43ms TTL=118

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 41ms, Maximum = 43ms, Average = 41ms

C:\Users\shyma>
```

- Check the Availability of website “google.com”

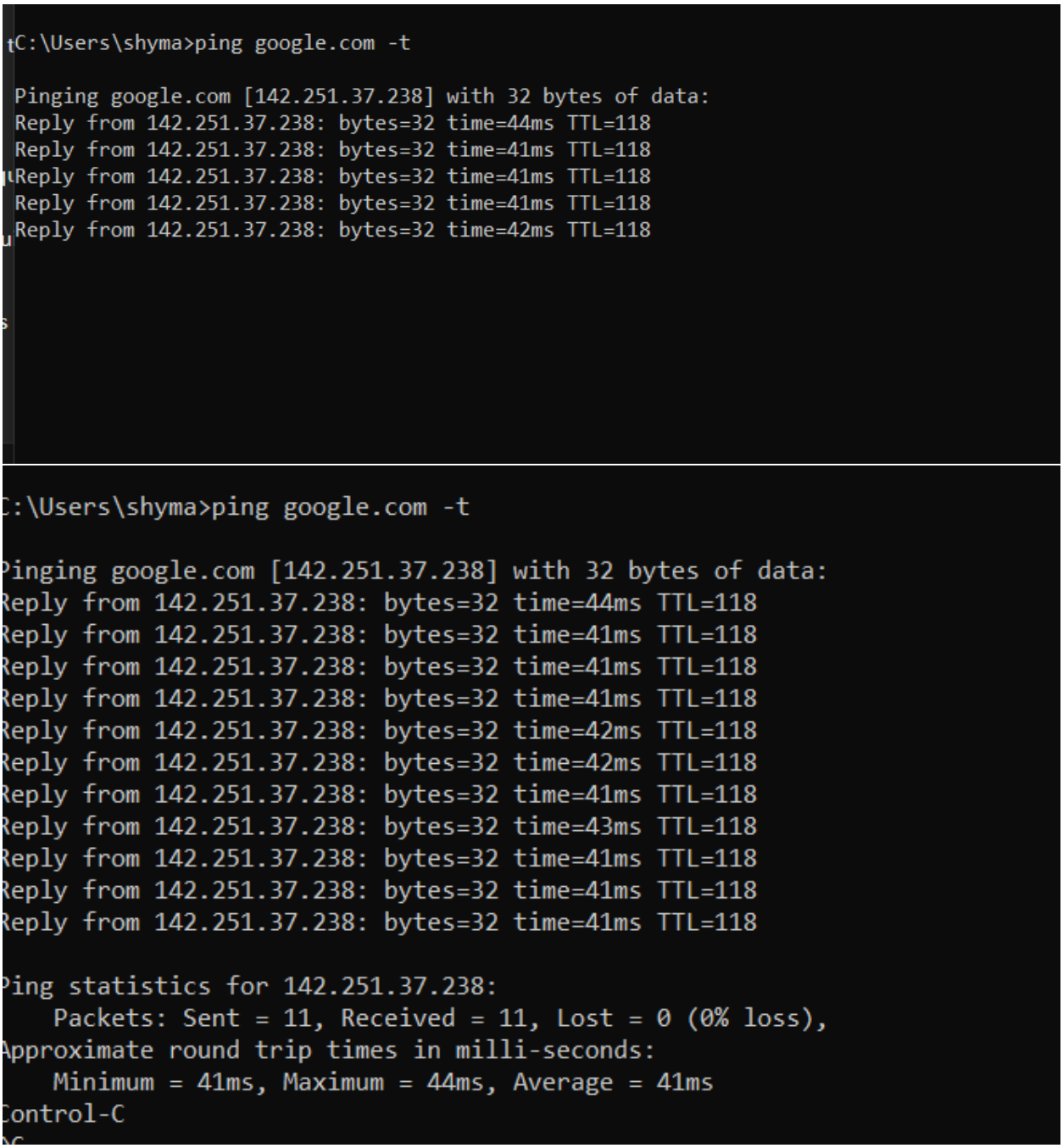
```
C:\Users\shyma>ping google.com

Pinging google.com [142.251.37.238] with 32 bytes of data:
Reply from 142.251.37.238: bytes=32 time=42ms TTL=118
Reply from 142.251.37.238: bytes=32 time=42ms TTL=118
Reply from 142.251.37.238: bytes=32 time=44ms TTL=118
Reply from 142.251.37.238: bytes=32 time=42ms TTL=118

Ping statistics for 142.251.37.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 42ms, Maximum = 44ms, Average = 42ms

C:\Users\shyma>
```

- Continue ping operation unlimited (just add the switch "-t")
  ping <ip> -t , to exit write : ctrl+c



- To control the number of pinging packets,
  (just add the switch "-n" followed by the required packet number (space))

```
C:\Users\shyma>ping google.com -n 2

Pinging google.com [142.251.37.238] with 32 bytes of data:
Reply from 142.251.37.238: bytes=32 time=42ms TTL=118
Reply from 142.251.37.238: bytes=32 time=41ms TTL=118

Ping statistics for 142.251.37.238:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 41ms, Maximum = 42ms, Average = 41ms
```

- To control the size of pinging packets,
  (just add the switch "-l" followed by the required packet size)

```
C:\Users\shyma>ping google.com -l 3

Pinging google.com [142.251.37.238] with 3 bytes of data:
Reply from 142.251.37.238: bytes=3 time=41ms TTL=118
Reply from 142.251.37.238: bytes=3 time=41ms TTL=118
Reply from 142.251.37.238: bytes=3 time=43ms TTL=118
Reply from 142.251.37.238: bytes=3 time=41ms TTL=118

Ping statistics for 142.251.37.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 41ms, Maximum = 43ms, Average = 41ms

C:\Users\shyma>
```

4- MAC address

to know your current MAC (physical) address use the command:

* Ipconfig /all

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wireless-AC 9560 160MHz
   Physical Address. . . . . . . . . : 4C-1D-96-5E-68-11
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::935b:41cf:6189:2cc8%12(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.100.169(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : Sunday, October 20, 2024 8:47:36 AM
   Lease Expires . . . . . . . . . . : Monday, October 21, 2024 8:47:36 AM
   Default Gateway . . . . . . . . . : 192.168.100.1
   DHCP Server . . . . . . . . . . . : 192.168.100.1
   DHCPv6 IAID . . . . . . . . . . . : 88874390
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2E-30-A7-E5-F8-75-A4-32-9C-A5
   DNS Servers . . . . . . . . . . . : 192.168.100.1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

* getmac

```
C:\Users\shyma>getmac

Physical Address    Transport Name
=================== ============================================================
4C-1D-96-5E-68-11   \Device\Tcpip_{7DE9C4FA-FB2D-4FEC-99CC-F895D593D6E1}
F8-75-A4-32-9C-A5   Media disconnected
4C-1D-96-5E-68-15   Media disconnected
00-50-56-C0-00-01   \Device\Tcpip_{7B36A579-0252-441A-9F6F-7A19FAF34E56}
00-50-56-C0-00-08   \Device\Tcpip_{170444A7-01B3-4DAF-83B0-2641358BD28E}

C:\Users\shyma>
```

5- ARP Command

Run the following command to view the contents of the ARP cache (Run as Admin)

C:\>arp –a

```
C:\Windows\system32>arp -a

Interface: 192.168.236.1 --- 0x3
  Internet Address      Physical Address      Type
  192.168.236.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

Interface: 192.168.127.1 --- 0xb
  Internet Address      Physical Address      Type
  192.168.127.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

Interface: 192.168.100.169 --- 0xc
  Internet Address      Physical Address      Type
  192.168.100.1         b4-6e-08-b6-69-4e     dynamic
  192.168.100.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

C:\Windows\system32>
```

.To delete the arp cache write the command

C:\>arp –d

```
C:\Windows\system32>arp -d

C:\Windows\system32>
```

6- Routing Table Commands

- To view the local routing table, write the command

C:/>route print

```
C:\Users\shyma>route  print
===========================================================================
Interface List
 16...f8 75 a4 32 9c a5 ......Realtek PCIe GbE Family Controller
 21...4c 1d 96 5e 68 12 ......Microsoft Wi-Fi Direct Virtual Adapter
  7...4e 1d 96 5e 68 11 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 11...00 50 56 c0 00 01 ......VMware Virtual Ethernet Adapter for VMnet1
  3...00 50 56 c0 00 08 ......VMware Virtual Ethernet Adapter for VMnet8
 12...4c 1d 96 5e 68 11 ......Intel(R) Wireless-AC 9560 160MHz
  4...4c 1d 96 5e 68 15 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.100.1  192.168.100.169     50
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
    192.168.100.0    255.255.255.0         On-link   192.168.100.169    306
  192.168.100.169  255.255.255.255         On-link   192.168.100.169    306
  192.168.100.255  255.255.255.255         On-link   192.168.100.169    306
    192.168.127.0    255.255.255.0         On-link     192.168.127.1    291
    192.168.127.1  255.255.255.255         On-link     192.168.127.1    291
  192.168.127.255  255.255.255.255         On-link     192.168.127.1    291
    192.168.236.0    255.255.255.0         On-link     192.168.236.1    291
    192.168.236.1  255.255.255.255         On-link     192.168.236.1    291
  192.168.236.255  255.255.255.255         On-link     192.168.236.1    291
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link     192.168.127.1    291
        224.0.0.0        240.0.0.0         On-link     192.168.236.1    291
        224.0.0.0        240.0.0.0         On-link   192.168.100.169    306
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link     192.168.127.1    291
  255.255.255.255  255.255.255.255         On-link     192.168.236.1    291
  255.255.255.255  255.255.255.255         On-link   192.168.100.169    306
===========================================================================
```

- To add a route to the routing table, write the command
  Destination Net ID mask IP GW IP metric value
  C:/>Route add 163.121.12.0 mask 255.255.255.0 163.121.12.1 metric 1 (Most trusted)

```
C:\Windows\system32>route add 192.168.1.0 mask 255.255.255.0 192.168.1.1 metric 1
 OK!

C:\Windows\system32>
```

C:/>Route add 163.121.12.0 mask 255.255.255.0 163.121.12.1 metric 100 (lest trusted)

```
C:\Windows\system32>route add 10.0.0.0 mask 255.255.255.0 10.0.0.1 metric 100
 OK!

C:\Windows\system32>
```

Problem:
With route add command: Element Not found – parameter is in correct
Solving: Adding new route using Net ID NOT Host ID
Route add 163.121.12.0 mask 255.255.255.0 163.121.12.1 >>> Right

Route add 163.121.12.10 mask 255.255.255.0 163.121.12.1 >>> Wrong

- To add a default route

```
C:\Windows\system32>route add 0.0.0.0 mask 0.0.0.0 192.168.1.1 metric 10
 OK!
```

- To Show the default route before adding new route:

```
IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.100.1  192.168.100.169     50
          0.0.0.0          0.0.0.0      192.168.1.1  192.168.100.169     60
         10.0.0.0    255.255.255.0         10.0.0.1  192.168.100.169    150
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
      192.168.1.0    255.255.255.0      192.168.1.1  192.168.100.169     51
    192.168.100.0    255.255.255.0         On-link   192.168.100.169    306
  192.168.100.169  255.255.255.255         On-link   192.168.100.169    306
  192.168.100.255  255.255.255.255         On-link   192.168.100.169    306
    192.168.127.0    255.255.255.0         On-link     192.168.127.1    291
    192.168.127.1  255.255.255.255         On-link     192.168.127.1    291
  192.168.127.255  255.255.255.255         On-link     192.168.127.1    291
    192.168.236.0    255.255.255.0         On-link     192.168.236.1    291
    192.168.236.1  255.255.255.255         On-link     192.168.236.1    291
  192.168.236.255  255.255.255.255         On-link     192.168.236.1    291
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link     192.168.127.1    291
        224.0.0.0        240.0.0.0         On-link     192.168.236.1    291
```

- To delete a certain route

```
C:\Windows\system32>route delete 192.168.1.0
 OK!
```

- To Delete default route

```
C:\Windows\system32>route delete 0.0.0.0
 OK!

C:\Windows\system32>
```

7- Opened ports and sessions

- To know about the concurrent TCP connections on my PC