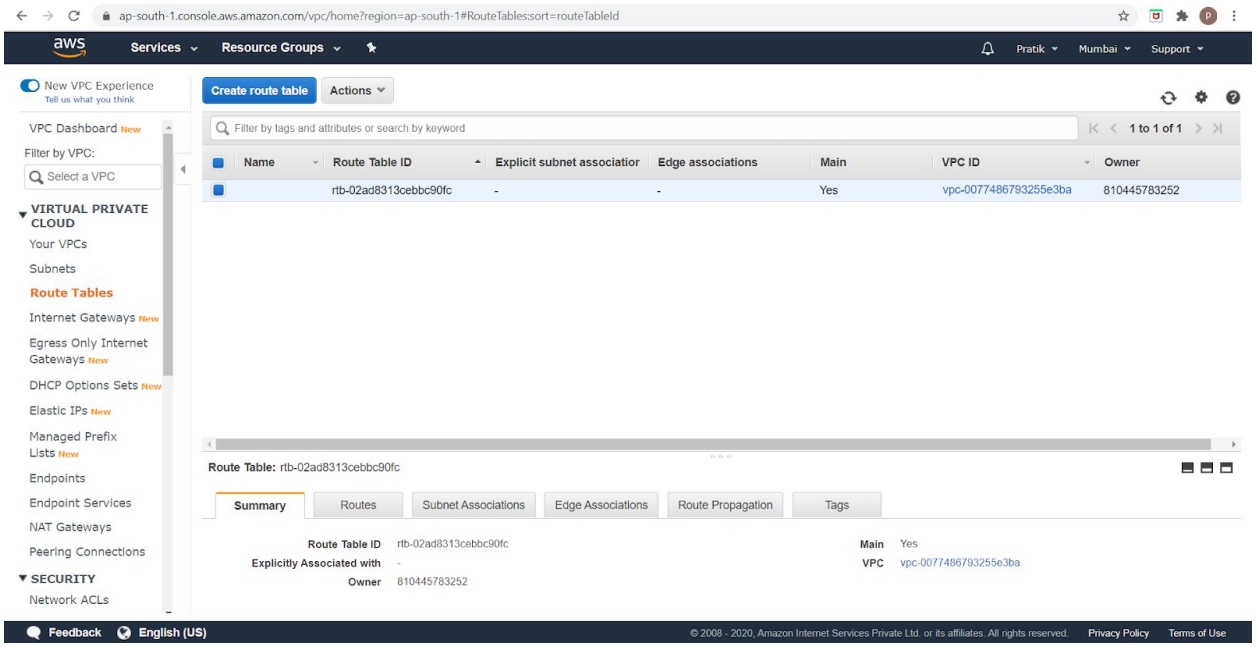
Day 23: Hybrid Multi Cloud Computing

1. In today's session we saw the importance of NAT Gateway,Internet Gateway,IP,Netmask ,Pre-requisites needed to connect different instances,NIC,Switch,Router,Bridge,Concept of private and public IPs.Many other concept such as:-Port addressing Tranlation,Source Network Address Translation,Routing Table,,Concept of br-int,Software-Defined Networking (SDN) and Destination network address translation.
1.1 AWS VPC and Openstack Neutron working as Network as a Service (NAAS).
2. Nat gateway is used to enable instances present in a private subnet to help connect to the internet or AWS services.
3. Switch operates at Layer 2 of OSI Model,Whereas Router operates at Network layer of OSI Model.
4.Internet gateway is a network node that connects two different networks that use different protocols (rules) for communicating.
5.Pre-requisites for two systems A and B to get connected:
> Devices with private IP addresses cannot connect to the Internet directly.Likewise,computers or other devices outside the local network cannot connect directly to a device with a private IP.
>both systems should have a NIC.
>both NIC should have an IP address.
>Public IP can only get connected to a public IP in the same network.
>If Ip of one comp is private and other is also private and belong to same network in this condition we can ping.
>Both should have routing table set.
> there can be wired or wireless connectivity between A and B.
>IPs belong to different network,we use router to connect them.If IPs belong to the same network, we require a switch/hub to connect them
6.Hotspot:-Technically it is a L3 bridge.
7.we generally use SNAT,when we are required to change the private address or port into a public address.Whereas DNAT allows a host on the outside to connect to a host on the inside.
In SNAT sourceIp address changes and destination ip address is maintained but in DNAT sourceIp address is maintained and destination ip address is Changes.
8.SDN:- The SDN layer essentially acts a virtual software switch or router in place of (the physical network devices.
9.Static IP and Dynamic IP
DHCP server Dynamically provides the IP.
AWS-EIP and openstack floating IP Statically provides the IP.

10.Various cmd are as follows:-
>route print
>route del -net 0.0.0.0
>ovs
and many more.


ap-south-1.console.aws.amazon.com/vpc/home?region=ap-south-1#RouteTables:sort=routeTableId
aws
Services
Resource Groups
Pratik
Mumbai
Support
New VPC Experience
Tell us what you think
VPC Dashboard New
Filter by VPC:
Select a VPC
VIRTUAL PRIVATE CLOUD
Your VPCs
Subnets
Route Tables
Internet Gateways New
Egress Only Internet Gateways New
DHCP Options Sets New
Elastic IPs New
Managed Prefix Lists New
Endpoints
Endpoint Services
NAT Gateways
Peering Connections
SECURITY
Network ACLs
Create route table
Actions
Filter by tags and attributes or search by keyword
1 to 1 of 1
Name
Route Table ID
Explicit subnet association
Edge associations
Main
VPC ID
Owner
rtb-02ad8313cebbc90fc
-
-
Yes
vpc-0077486793255e3ba
810445783252
Route Table: rtb-02ad8313cebbc90fc
Summary
Routes
Subnet Associations
Edge Associations
Route Propagation
Tags
Route Table ID rtb-02ad8313cebbc90fc
Explicitly Associated with -
Owner 810445783252
Main Yes
VPC vpc-0077486793255e3ba
Feedback
English (US)
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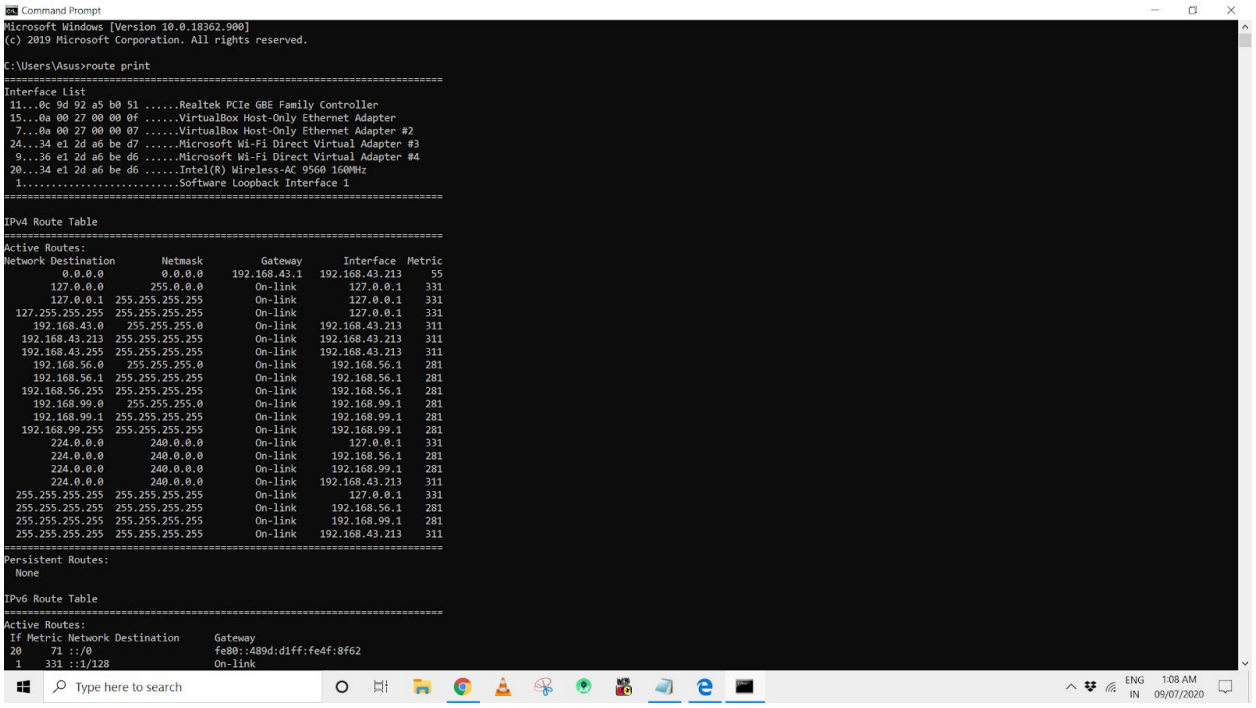
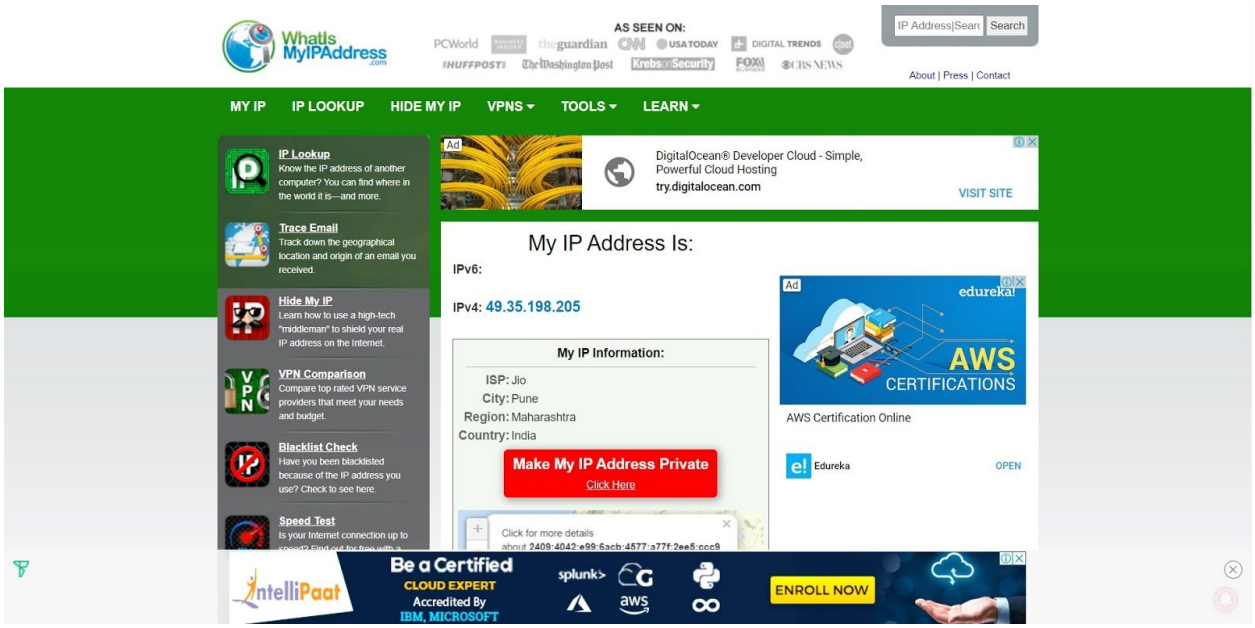
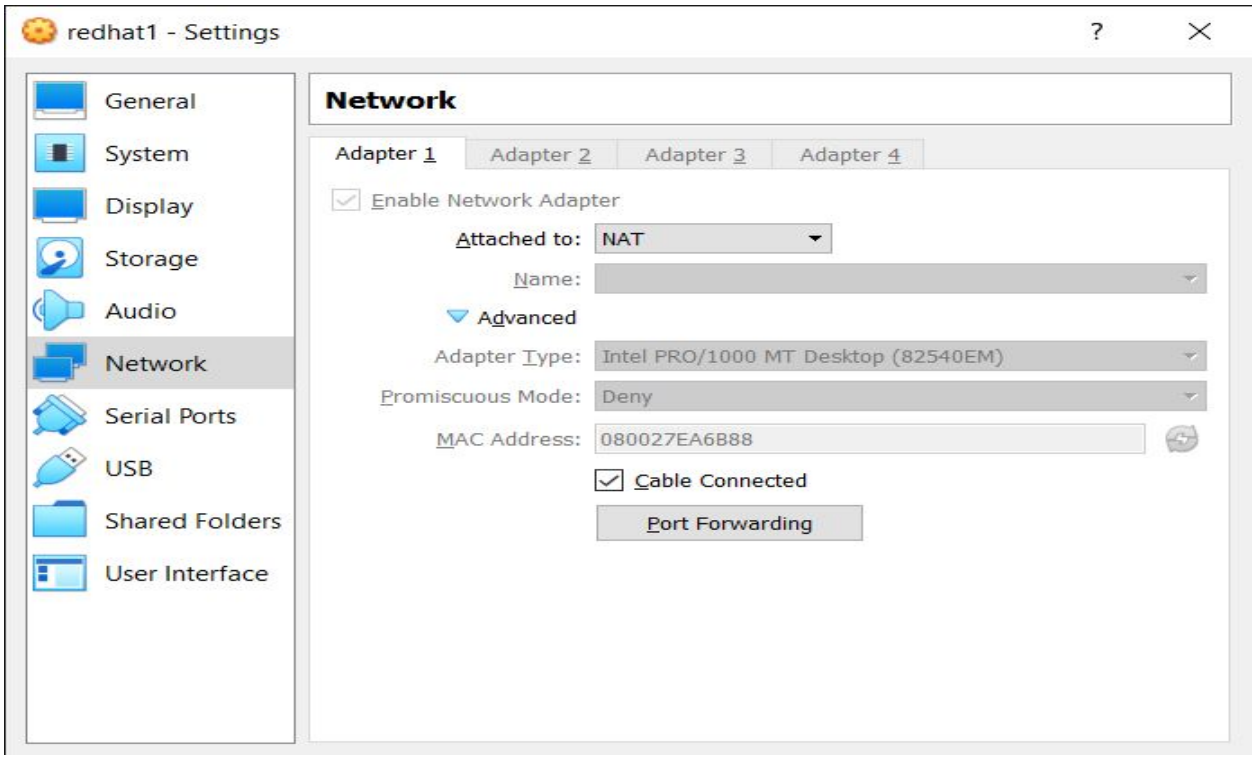
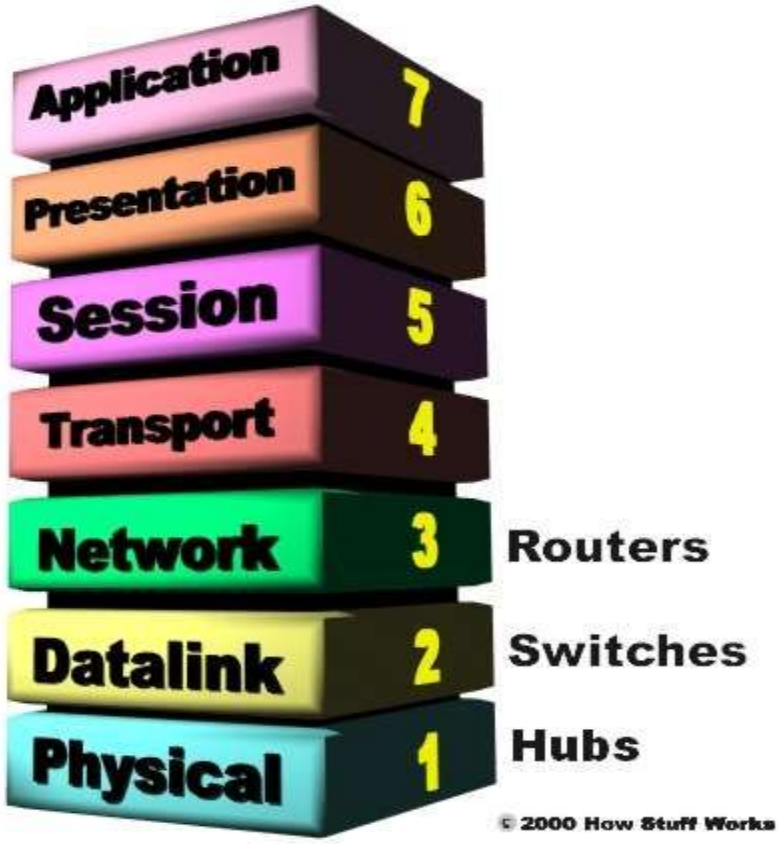

Command Prompt
Microsoft Windows [Version 10.0.18362.900]
(c) 2019 Microsoft Corporation. All rights reserved.
C:\Users\Asus>route print
Interface List
11...0c 9d 92 a5 b0 51 ......Realtek PCIe GBE Family Controller
15...0a 00 27 00 00 0f ......VirtualBox Host-Only Ethernet Adapter
7...0a 00 27 00 00 07 ......VirtualBox Host-Only Ethernet Adapter #2
24...34 e1 2d a6 be d7 ......Microsoft Wi-Fi Direct Virtual Adapter #3
9...36 e1 2d a6 be d6 ......Microsoft Wi-Fi Direct Virtual Adapter #4
20...34 e1 2d a6 be d6 ......Intel(R) Wireless-AC 9560 160MHz
1...........................Software Loopback Interface 1
IPv4 Route Table
Active Routes:
Network Destination Netmask Gateway Interface Metric
0.0.0.0 0.0.0.0 192.168.43.1 192.168.43.213 55
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
192.168.43.0 255.255.255.0 On-link 192.168.43.213 311
192.168.43.213 255.255.255.255 On-link 192.168.43.213 311
192.168.43.255 255.255.255.255 On-link 192.168.43.213 311
192.168.56.0 255.255.255.0 On-link 192.168.56.1 281
192.168.56.1 255.255.255.255 On-link 192.168.56.1 281
192.168.56.255 255.255.255.255 On-link 192.168.56.1 281
192.168.99.0 255.255.255.0 On-link 192.168.99.1 281
192.168.99.1 255.255.255.255 On-link 192.168.99.1 281
192.168.99.255 255.255.255.255 On-link 192.168.99.1 281
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 192.168.56.1 281
224.0.0.0 240.0.0.0 On-link 192.168.99.1 281
224.0.0.0 240.0.0.0 On-link 192.168.43.213 311
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 192.168.56.1 281
255.255.255.255 255.255.255.255 On-link 192.168.99.1 281
255.255.255.255 255.255.255.255 On-link 192.168.43.213 311
Persistent Routes:
None
IPv6 Route Table
Active Routes:
If Metric Network Destination Gateway
20 71 ::/0 fe80::489d:d1ff:fe4f:8f62
1 331 ::1/128 On-link
Type here to search
ENG
IN
1:08 AM
09/07/2020

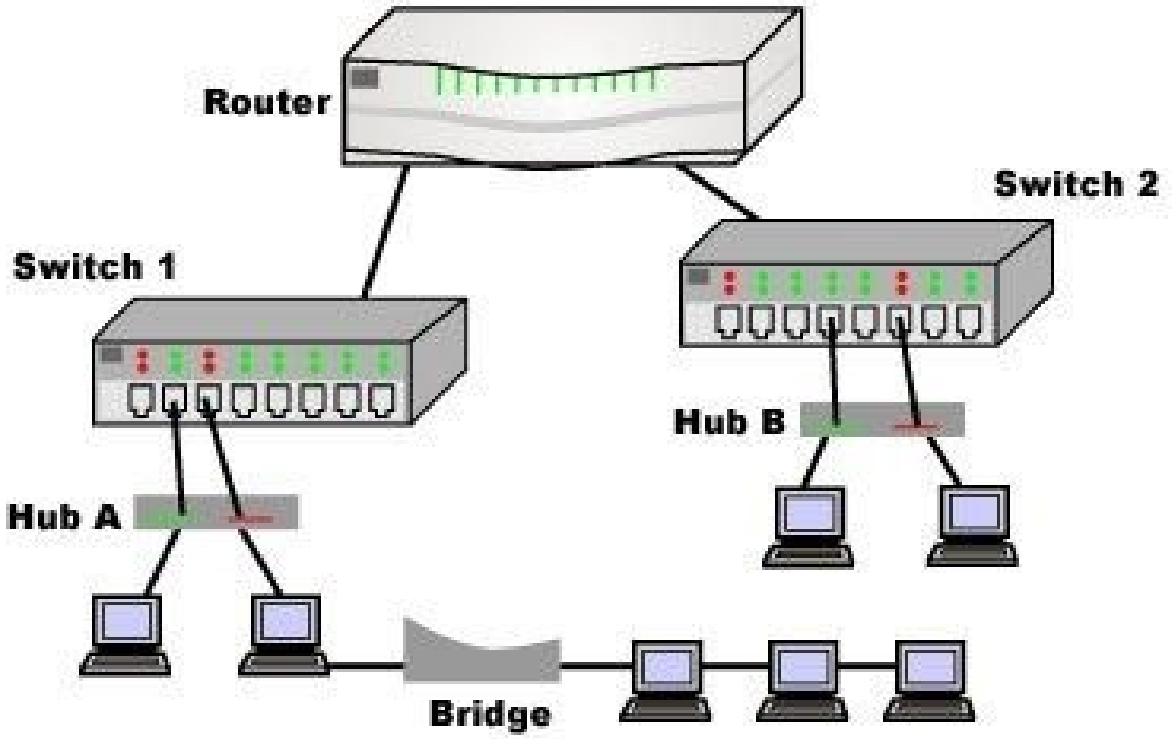
```
IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
 20     71 ::/0                     fe80::489d:d1ff:fe4f:8f62
  1    331 ::1/128                  On-link
 20     71 2409:4042:e99:6acb::/64  On-link
 20    311 2409:4042:e99:6acb:4577:a77f:2ee5:ccc9/128
                                    On-link
 20    311 2409:4042:e99:6acb:ec41:f302:2519:a5fe/128
                                    On-link
 15    281 fe80::/64                On-link
  7    281 fe80::/64                On-link
 20    311 fe80::/64                On-link
 15    281 fe80::2896:1c42:3bee:6271/128
                                    On-link
  7    281 fe80::880a:df23:e777:5c8e/128
                                    On-link
 20    311 fe80::ec41:f302:2519:a5fe/128
                                    On-link
  1    331 ff00::/8                 On-link
 15    281 ff00::/8                 On-link
  7    281 ff00::/8                 On-link
 20    311 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None

C:\Users\Asus>
```





OSI Refernce Model:-





Command Prompt

```
Microsoft Windows [Version 10.0.18362.476]
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C:\Users\Asus>IPCONFIG

Windows IP Configuration


Wireless LAN adapter Local Area Connection* 3:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 4:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::ec41:f302:2519:a5fe%18
   IPv4 Address. . . . . . . . . . . : 192.168.43.213
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.43.1

C:\Users\Asus>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:50099        LAPTOP-C9RU2N4G:65001  ESTABLISHED
  TCP    127.0.0.1:65001        LAPTOP-C9RU2N4G:50099  ESTABLISHED
  TCP    192.168.43.213:50112   52.139.250.253:https   ESTABLISHED
  TCP    192.168.43.213:50208   a-0001:https           TIME_WAIT
  TCP    192.168.43.213:50213   13.107.246.254:https   TIME_WAIT
  TCP    192.168.43.213:50214   131.253.33.254:https   TIME_WAIT
  TCP    192.168.43.213:50216   a-0001:https           ESTABLISHED
  TCP    192.168.43.213:50217   13.107.18.11:https     ESTABLISHED
  TCP    192.168.43.213:50218   a-0001:https           ESTABLISHED
  TCP    192.168.43.213:50219   131.253.33.254:https   ESTABLISHED
  TCP    192.168.43.213:50220   13.107.246.254:https   ESTABLISHED
  TCP    192.168.43.213:50221   13.107.18.254:https    ESTABLISHED
  TCP    192.168.43.213:50222   204.79.197.222:https   ESTABLISHED
```

```
Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> 198.168.43.213
Invalid Command. type ?/help for help
Microsoft Telnet> DISPLAY
Escape Character is 'CTRL+]'
Will auth(NTLM Authentication)
Local echo off
New line mode - Causes return key to send CR & LF
Current mode: Console
Will term type
Preferred term type is ANSI
Microsoft Telnet> QUIT

C:\Users\Asus>ROUTE

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
                  [MASK netmask]  [gateway] [METRIC metric]  [IF interface]

  -f           Clears the routing tables of all gateway entries.  If this is
               used in conjunction with one of the commands, the tables are
               cleared prior to running the command.

  -p           When used with the ADD command, makes a route persistent across
               boots of the system. By default, routes are not preserved
               when the system is restarted. Ignored for all other commands,
               which always affect the appropriate persistent routes.

  -4           Force using IPv4.

  -6           Force using IPv6.

  command      One of these:
                 PRINT     Prints  a route
                 ADD       Adds    a route
                 DELETE    Deletes a route
                 CHANGE    Modifies an existing route
  destination  Specifies the host.
  MASK         Specifies that the next parameter is the 'netmask' value.
  netmask      Specifies a subnet mask value for this route entry.
               If not specified, it defaults to 255.255.255.255.
  gateway      Specifies gateway.
  interface    the interface number for the specified route.
  METRIC       specifies the metric, ie. cost for the destination.
```


Command Prompt

```
C:\Users\Asus>TRACERT

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                  Do not resolve addresses to hostnames.
    -h maximum_hops     Maximum number of hops to search for target.
    -j host-list        Loose source route along host-list (IPv6-only).
    -w timeout          Wait timeout milliseconds for each reply.
    -R                  Trace round-trip path (IPv6-only).
    -S srcaddr          Source address to use (IPv6-only).
    -4                  Force using IPv4.
    -6                  Force using IPv6.

C:\Users\Asus>Ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
            [-r count] [-s count] [[-j host-list] | [-k host-list]]
            [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
            [-4] [-6] target_name

Options:
    -t             Ping the specified host until stopped.
                   To see statistics and continue - type Control-Break;
                   To stop - type Control-C.
    -a             Resolve addresses to hostnames.
    -n count       Number of echo requests to send.
    -l size        Send buffer size.
    -f             Set Don't Fragment flag in packet (IPv4-only).
    -i TTL         Time To Live.
    -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                   and has no effect on the type of service field in the IP
                   Header).
    -r count       Record route for count hops (IPv4-only).
    -s count       Timestamp for count hops (IPv4-only).
    -j host-list   Loose source route along host-list (IPv4-only).
    -k host-list   Strict source route along host-list (IPv4-only).
    -w timeout     Timeout in milliseconds to wait for each reply.
    -R             Use routing header to test reverse route also (IPv6-only).
                   Per RFC 5095 the use of this routing header has been
                   deprecated. Some systems may drop echo requests if
                   this header is used.
    -S srcaddr     Source address to use.
    -c compartment Routing compartment identifier.
    -p             Ping a Hyper-V Network Virtualization provider address.
    -4             Force using IPv4.
    -6             Force using IPv6.
```