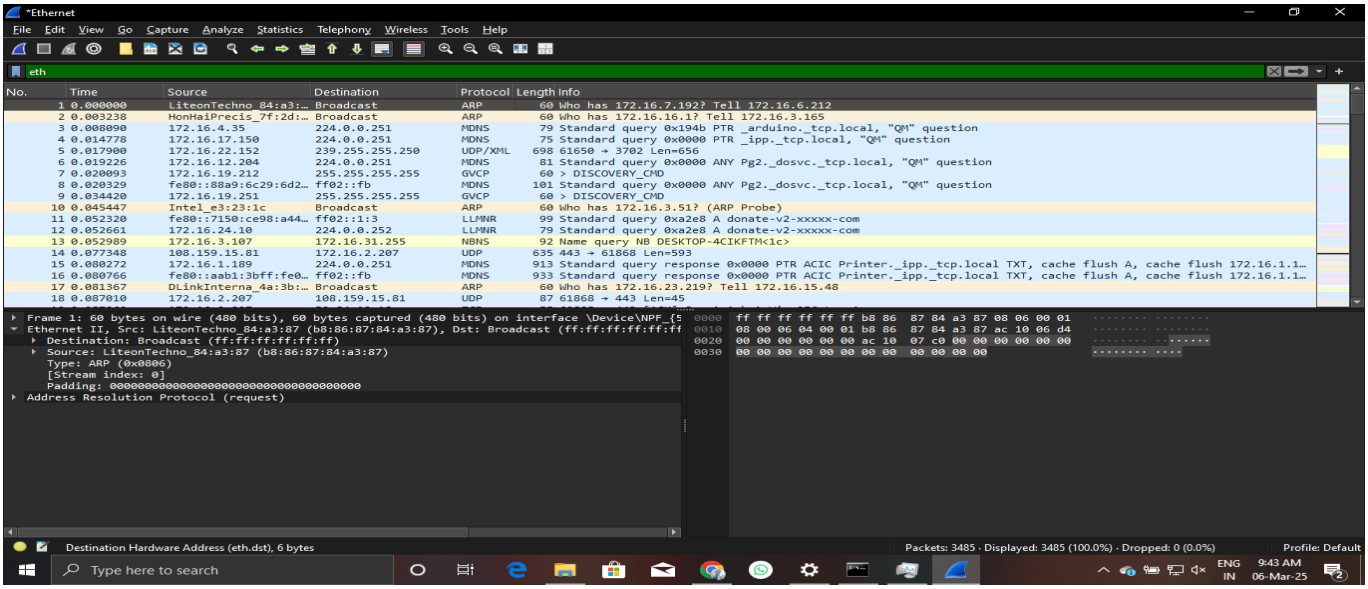
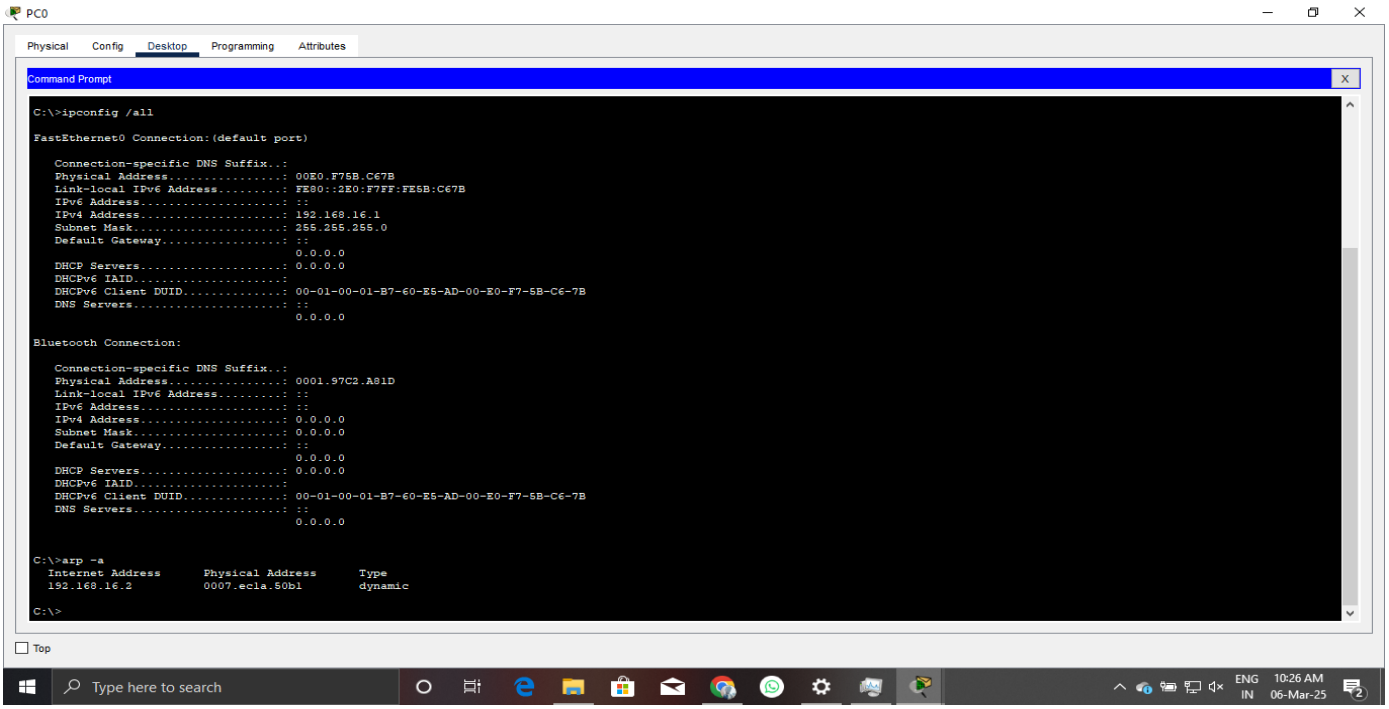
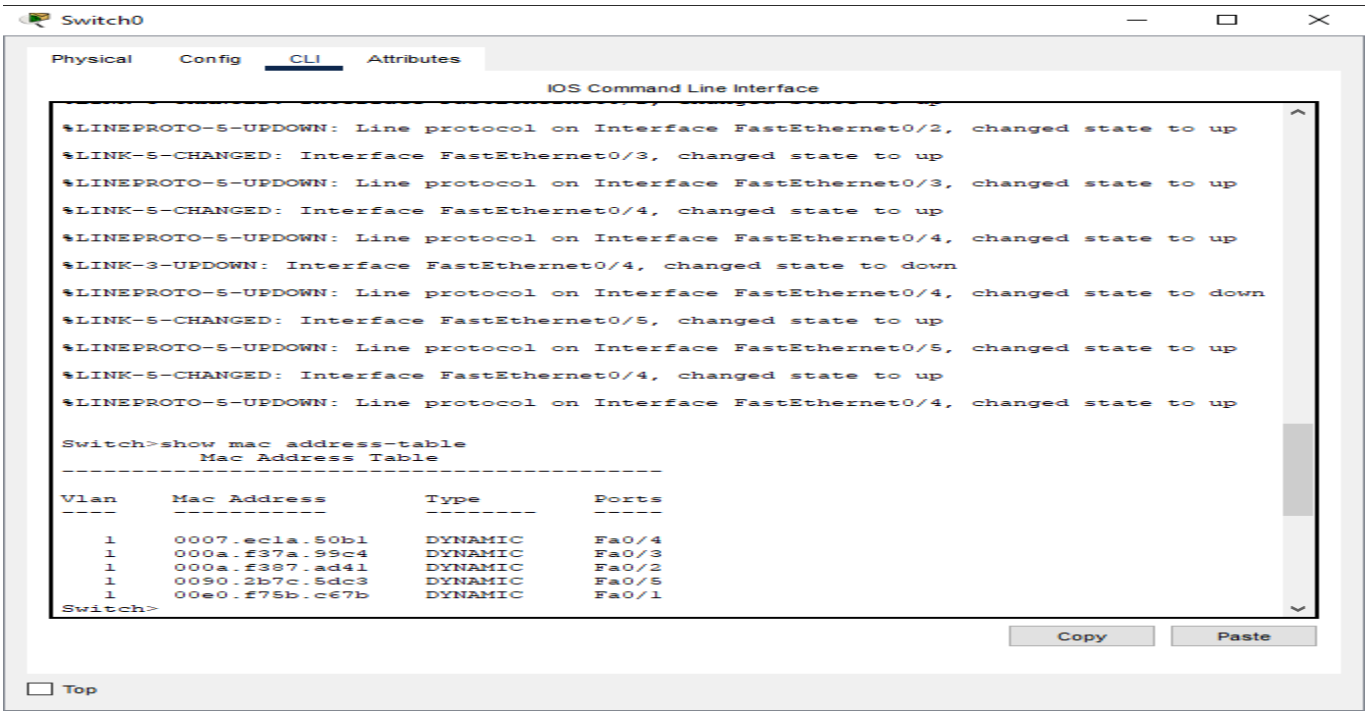
Network Training Assignment 3&4

- **Yuvan Shankar G**

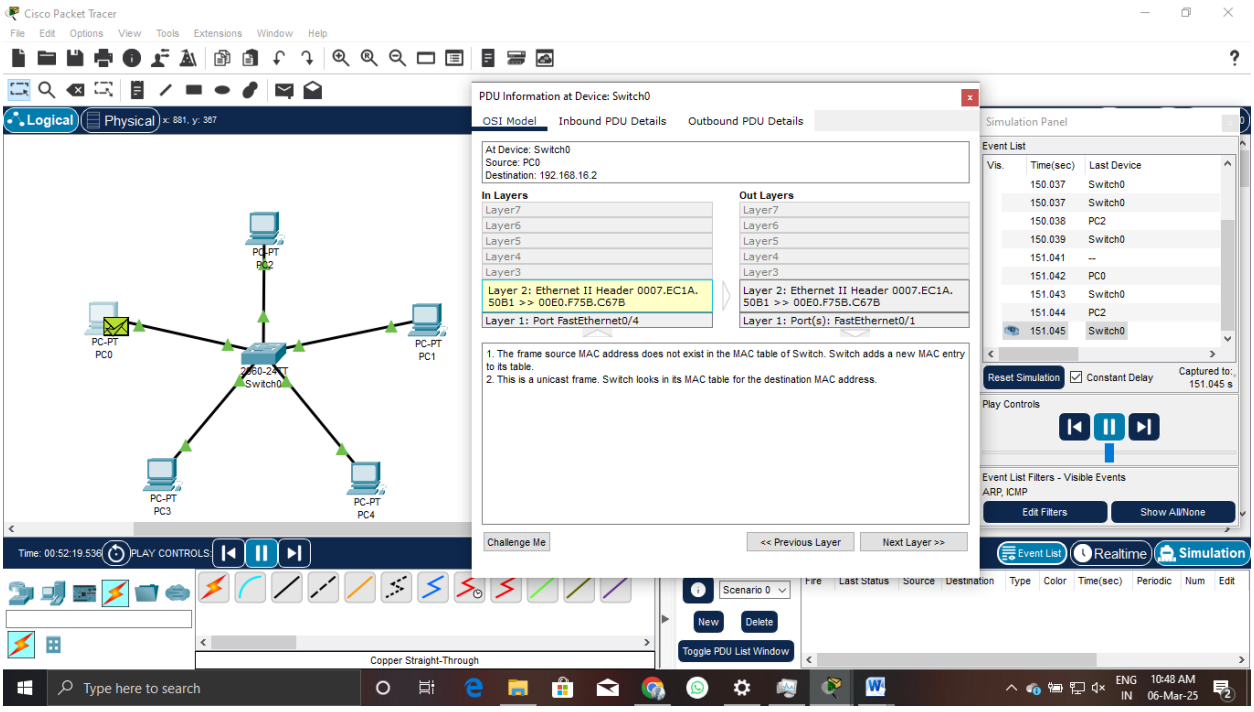
Problem1:

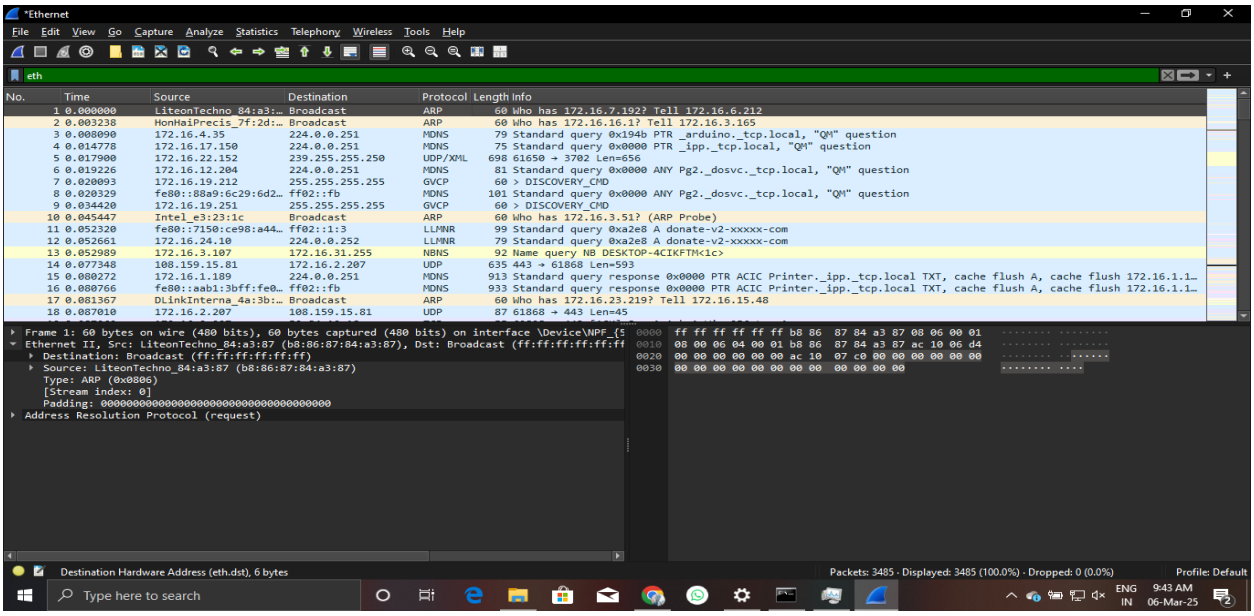





Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/4, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
Switch>show mac address-table
Mac Address Table
Vlan Mac Address Type Ports
1 0007.ecla.50b1 DYNAMIC Fa0/4
1 000a.f37a.99c4 DYNAMIC Fa0/3
1 000a.f387.ad41 DYNAMIC Fa0/2
1 0090.2b7c.5dc3 DYNAMIC Fa0/5
1 00e0.f75b.c67b DYNAMIC Fa0/1
Switch>
Copy
Paste
Top

Problem2:


Cisco Packet Tracer
File Edit Options View Tools Extensions Window Help
Logical
Physical
PDU Information at Device: Switch0
OSI Model
Inbound PDU Details
Outbound PDU Details
At Device: Switch0
Source: PC0
Destination: 192.168.16.2
In Layers
Out Layers
Layer 2: Ethernet II Header 0007.EC1A.50B1 >> 00E0.F75B.C67B
Layer 1: Port FastEthernet0/4
Layer 1: Port(s): FastEthernet0/1
1. The frame source MAC address does not exist in the MAC table of Switch. Switch adds a new MAC entry to its table.
2. This is a unicast frame. Switch looks in its MAC table for the destination MAC address.
Challenge Me
<< Previous Layer
Next Layer >>
Simulation Panel
Event List
Reset Simulation
Constant Delay
Play Controls
Event List Filters - Visible Events
ARP, ICMP
Edit Filters
Show All/None
Event List
Realtime
Simulation
PC-PT PC0
PC-PT PC1
PC-PT PC2
PC-PT PC3
PC-PT PC4
2960-24TT Switch0
Copper Straight-Through
Type here to search

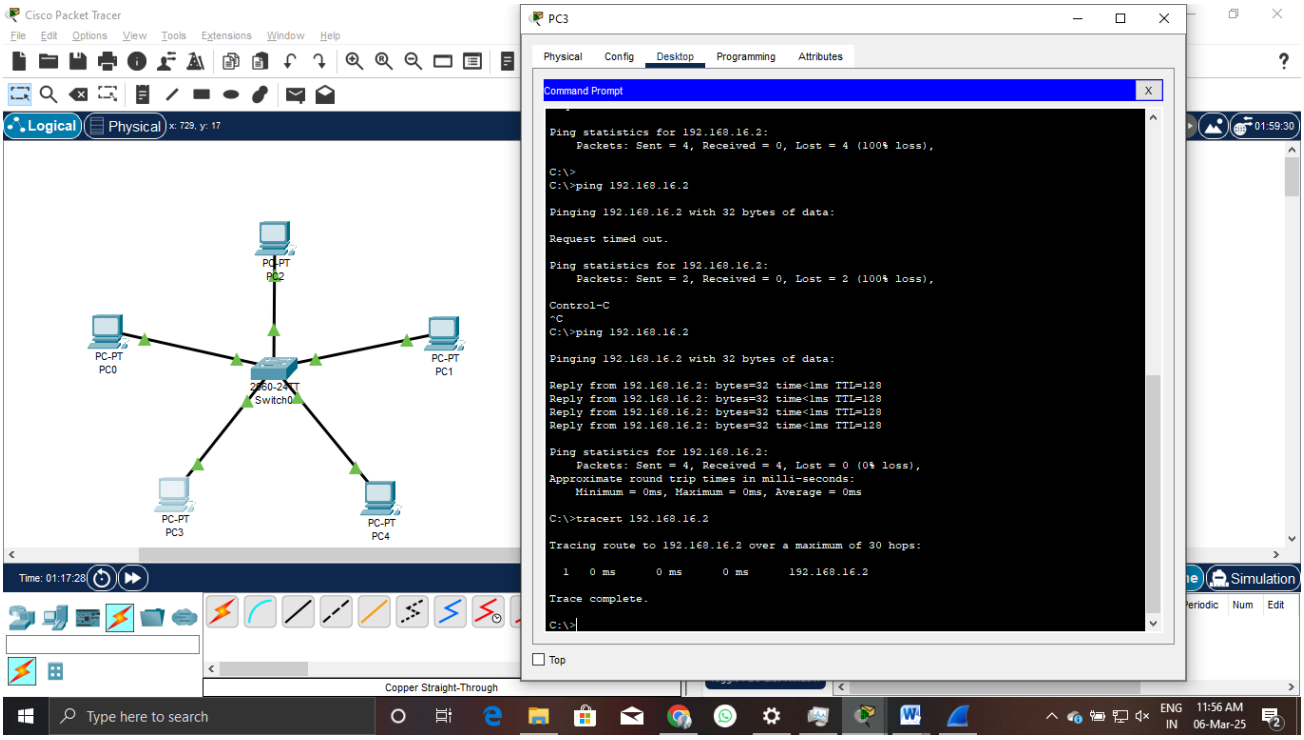


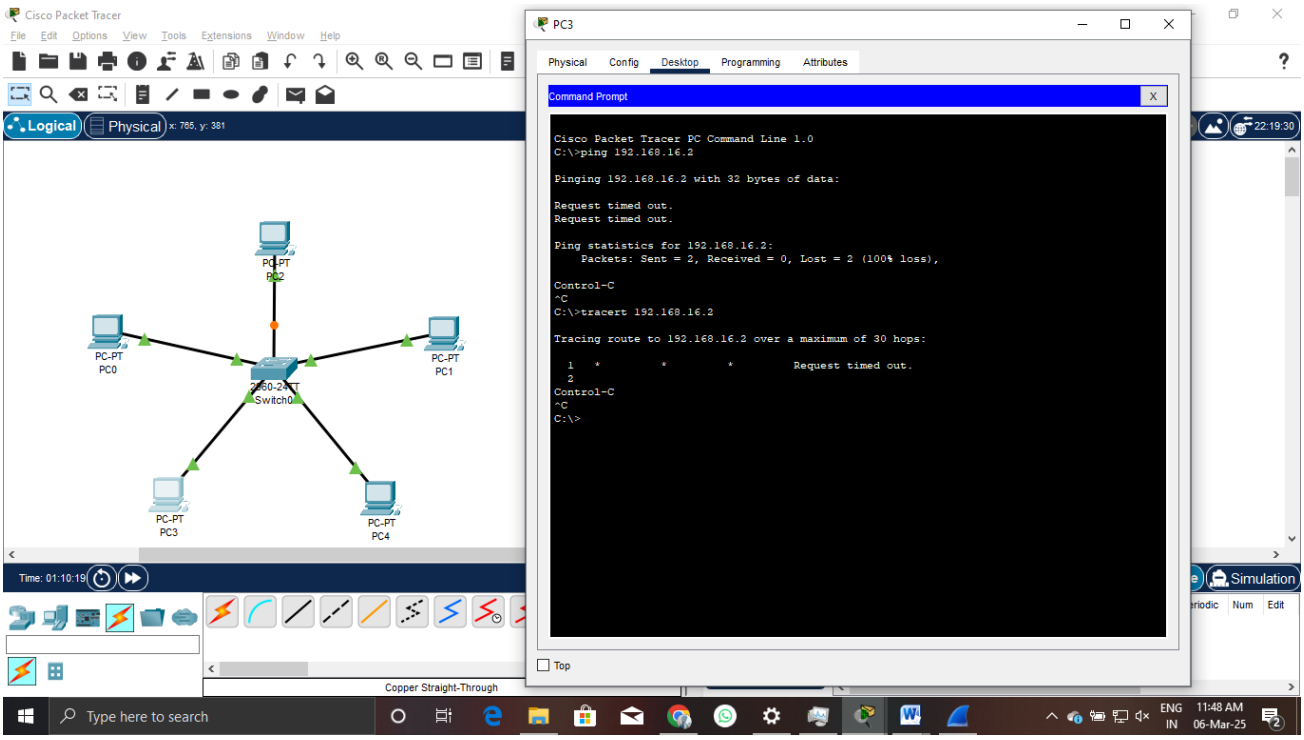
Problem3:

```
root@ubuntu1804:/# nmcli connection show
NAME                UUID                                  TYPE      DEVICE
Wired connection 1  641f231c-82c4-3495-a930-a7f0f3065926  ethernet  enp0s3
root@ubuntu1804:/# nmcli connection modify "
help                path                uuid
id                  --temporary         Wired connection 1
root@ubuntu1804:/# nmcli connection modify "
help                path                uuid
id                  --temporary         Wired connection 1
root@ubuntu1804:/# nmcli connection modify "Wired connection 1" ipv4.method "manual" ipv4.addresses 192.168.16.1/24 gw4 192.16.1.1
root@ubuntu1804:/# nmcli connection down Wired\ connection\ 1
Connection 'Wired connection 1' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/1)
root@ubuntu1804:/# nmcli connection up Wired\ connection\ 1
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/2)
root@ubuntu1804:/# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:cb:3a:16 brd ff:ff:ff:ff:ff:ff
    inet 192.168.16.1/24 brd 192.168.16.255 scope global noprefixroute enp0s3
       valid_lft forever preferred_lft forever
    inet6 fd00::b0f9:9951:ace9:a4fc/64 scope global temporary dynamic
       valid_lft 86391sec preferred_lft 14391sec
    inet6 fd00::a47b:ef2b:3e3e:6030/64 scope global dynamic mngtmpaddr noprefixroute
       valid_lft 86391sec preferred_lft 14391sec
    inet6 fe80::4c32:42ef:d017:52c6/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
root@ubuntu1804:/# ping 192.168.16.1
PING 192.168.16.1 (192.168.16.1) 56(84) bytes of data.
64 bytes from 192.168.16.1: icmp_seq=1 ttl=64 time=0.097 ms
64 bytes from 192.168.16.1: icmp_seq=2 ttl=64 time=0.087 ms
64 bytes from 192.168.16.1: icmp_seq=3 ttl=64 time=0.088 ms
64 bytes from 192.168.16.1: icmp_seq=4 ttl=64 time=0.088 ms
```

```
root@ubuntu1804:/# sudo ip link set enp0s3 address 00:11:07:20:03:00
root@ubuntu1804:/# ip link set enp0s3 address 00:11:07:20:03:00
root@ubuntu1804:/# ip link set enp0s3 up
root@ubuntu1804:/# ip link show enp0s3
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode DEFAULT group default qlen 1000
    link/ether 00:11:07:20:03:00 brd ff:ff:ff:ff:ff:ff
root@ubuntu1804:/#
```

Problem4:


Cisco Packet Tracer
PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Ping statistics for 192.168.16.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
C:\>ping 192.168.16.2
Pinging 192.168.16.2 with 32 bytes of data:
Request timed out.
Ping statistics for 192.168.16.2:
Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),
Control-C
^C
C:\>ping 192.168.16.2
Pinging 192.168.16.2 with 32 bytes of data:
Reply from 192.168.16.2: bytes=32 time<1ms TTL=128
Reply from 192.168.16.2: bytes=32 time<1ms TTL=128
Reply from 192.168.16.2: bytes=32 time<1ms TTL=128
Reply from 192.168.16.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.16.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>tracert 192.168.16.2
Tracing route to 192.168.16.2 over a maximum of 30 hops:
1 0 ms 0 ms 0 ms 192.168.16.2
Trace complete.
C:\>
Top
Logical
Physical
PC-PT PC2
PC-PT PC0
PC-PT PC1
2960-24TT Switch0
PC-PT PC3
PC-PT PC4
Copper Straight-Through
Simulation
Type here to search
ENG IN
11:56 AM 06-Mar-25


Cisco Packet Tracer
PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.16.2
Pinging 192.168.16.2 with 32 bytes of data:
Request timed out.
Request timed out.
Ping statistics for 192.168.16.2:
Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),
Control-C
^C
C:\>tracert 192.168.16.2
Tracing route to 192.168.16.2 over a maximum of 30 hops:
1 * * * Request timed out.
2
Control-C
^C
C:\>
Top
Logical
Physical
PC-PT PC2
PC-PT PC0
PC-PT PC1
2960-24TT Switch0
PC-PT PC3
PC-PT PC4
Copper Straight-Through
Simulation
Type here to search
ENG IN
11:48 AM 06-Mar-25

Problem 5,6,7:

```
ubuntu@ubuntu1804:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.16.1  netmask 255.255.255.0  broadcast 192.168.16.255
        inet6 fd00::a47b:ef2b:3e3e:6030  prefixlen 64  scopeid 0x0<global>
        inet6 fe80::4c32:42ef:d617:52c6  prefixlen 64  scopeid 0x20<link>
        inet6 fd00::fd36:8bf7:8eca:6cff  prefixlen 64  scopeid 0x0<global>
        ether 08:00:27:cb:3a:16  txqueuelen 1000  (Ethernet)
        RX packets 77  bytes 10928 (10.9 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 153  bytes 16866 (16.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 319  bytes 25762 (25.7 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 319  bytes 25762 (25.7 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ubuntu@ubuntu1804:~$
```

```
PS C:\Users\Sudhan> ping 192.168.16.1

Pinging 192.168.16.1 with 32 bytes of data:
Reply from 192.168.16.1: bytes=32 time=3ms TTL=63
Reply from 192.168.16.1: bytes=32 time=8ms TTL=63
Reply from 192.168.16.1: bytes=32 time=2ms TTL=63
Reply from 192.168.16.1: bytes=32 time=2ms TTL=63

Ping statistics for 192.168.16.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 8ms, Average = 3ms
PS C:\Users\Sudhan> tracert 192.168.16.1

Tracing route to 192.168.16.1 over a maximum of 30 hops

  1     2 ms     2 ms     3 ms  Sudhan.mshome.net [192.168.137.1]
  2     *        *        *     Request timed out.
  3    35 ms     8 ms    11 ms  192.168.16.1

Trace complete.
PS C:\Users\Sudhan>
```

Problem8:

The Linux kernel provides strong support for Ethernet communication, ensuring transmission and reception through its network stack.

Ethernet devices are represented as network interfaces (eth0, ens3) and managed by the netdev subsystem, accessible under /sys/class/net.

Kernel modules drivers interact with physical NICs to facilitate network communication.

When sending data, the socket API passes application data to the TCP/IP stack, which encapsulates it and hands it over to the NIC driver for transmission.

Upon receiving data, the NIC generates an interrupt, prompting the kernel to process the Ethernet frame and forward it to the appropriate protocol handler or application.

The Linux kernel dynamically loads Ethernet drivers such as e1000 for Intel NICs and r8169 for Realtek NICs to handle packet transmission, reception, and network interface functions.

Users can inspect NIC configurations and driver details using ethtool and sysfs.

Network traffic is managed by directing packets through routing tables.

Problem9:

Find the network interface in which LAN devices are connected

Cmd: ip link show

Enable the network interface (up)

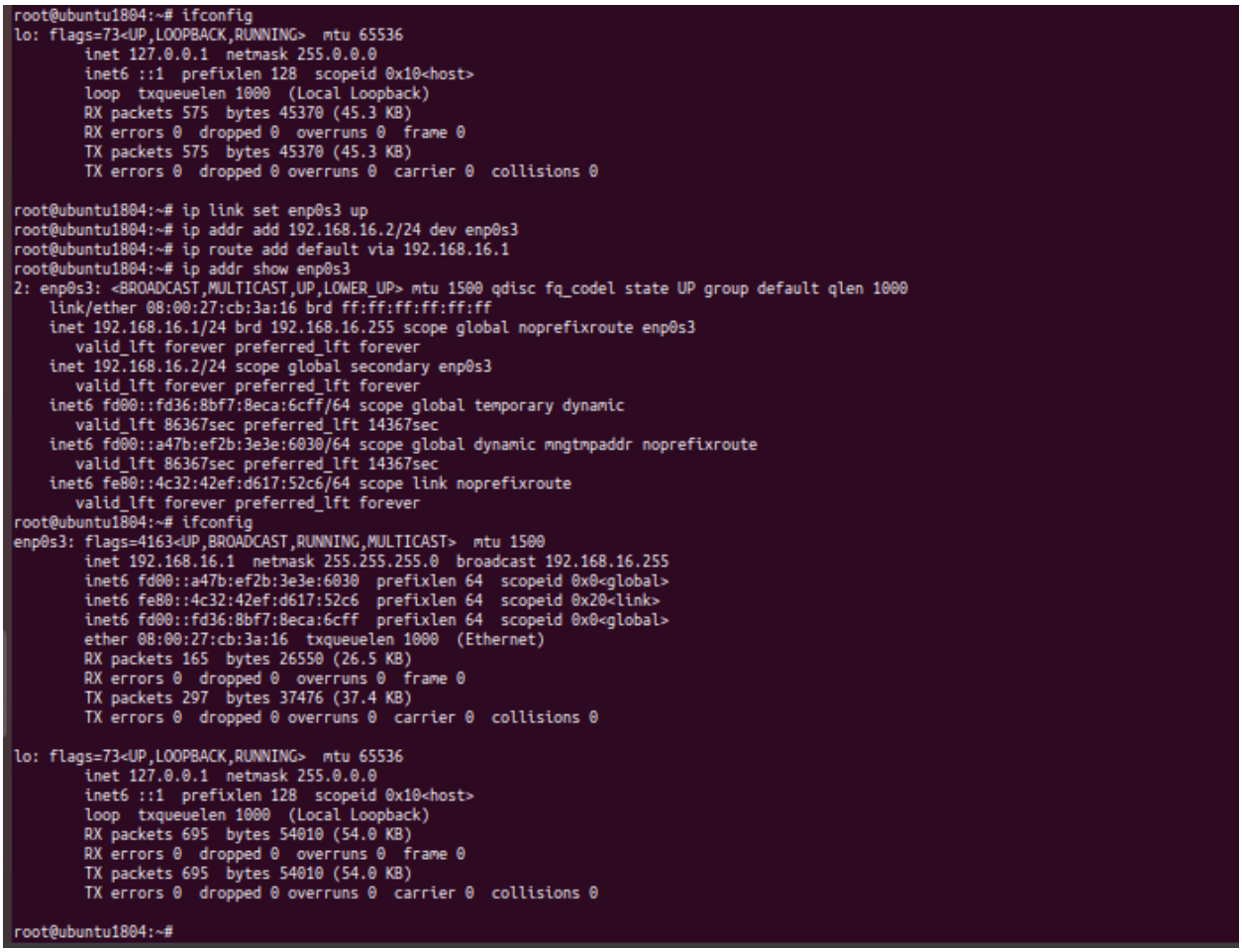
Cmd: ip link set enp0s3 up

Assign static IP

Cmd: ip addr add 192.168.16.1/24 dev enp0s3

Set default gateway

Cmd: ip route add default via 192.168.1.1



Problem10:

Use bridge link to list active bridges.

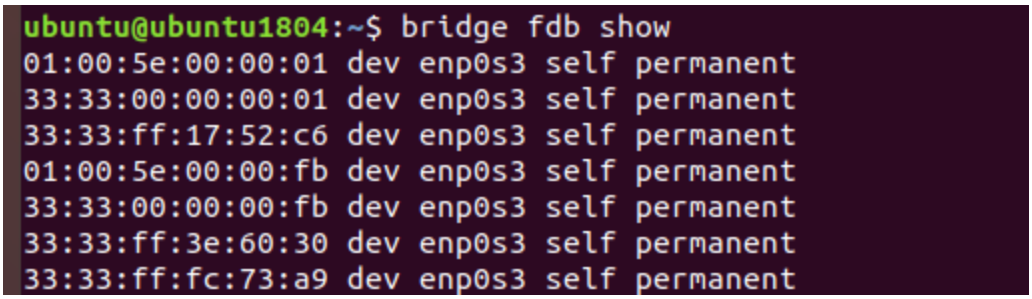
Run bridge fdb show to display learned MAC addresses and their associated interfaces.

Use ip link show to view available network interfaces and their MAC addresses.

Send a ping request between two devices using ping 192.168.1.2.

After generating traffic, re-run bridge fdb show to check if the switch has learned the device's MAC address.

These commands help in troubleshooting Software-Defined Networking (SDN) connectivity.


ubuntu@ubuntu1804:~$ bridge fdb show
01:00:5e:00:00:01 dev enp0s3 self permanent
33:33:00:00:00:01 dev enp0s3 self permanent
33:33:ff:17:52:c6 dev enp0s3 self permanent
01:00:5e:00:00:fb dev enp0s3 self permanent
33:33:00:00:00:fb dev enp0s3 self permanent
33:33:ff:3e:60:30 dev enp0s3 self permanent
33:33:ff:fc:73:a9 dev enp0s3 self permanent