

Institute of Computer Technology

B. Tech Computer Science and Engineering

Sub: Computer Networks

Course Code:-2CSE502

Sem-V(CS)

Class:-A

Practical:4

Aim: To implement access control list (ACL) in network of an organization containing different departments.

Scenario:

There is an organization of the University having 3 different departments University, ICT and DCS. IPv4 addressing scheme is used for assigning the IP address to the device as shown in Table1. Each department has multiple employees, which have specific rights to communicate within the network.

The details of the rights are as mentioned below:

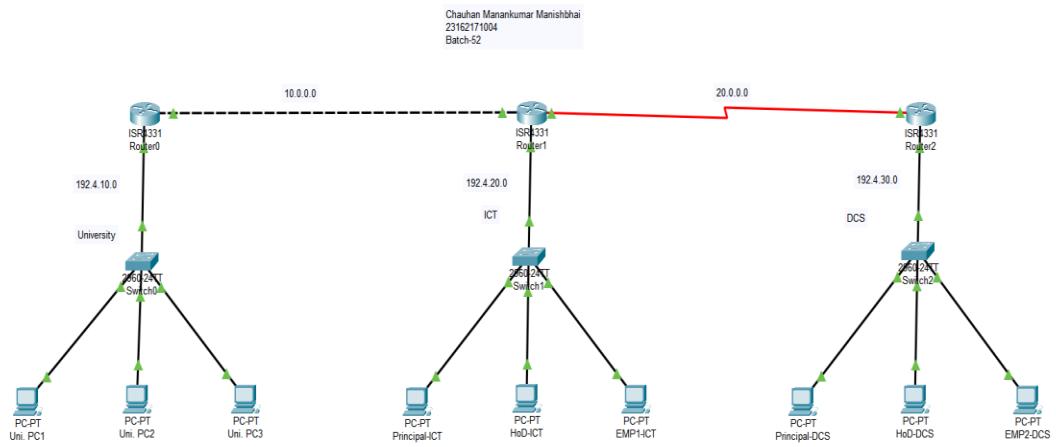
Access Rights:

- University can contact all employees.
- Only Principal can contact University office.
- All Principals should contact each other
- All head of departments can contact each other

Configure Access Control List (ACL) at each router according to the specified access rights.

Procedure:

1) Create network as given below:

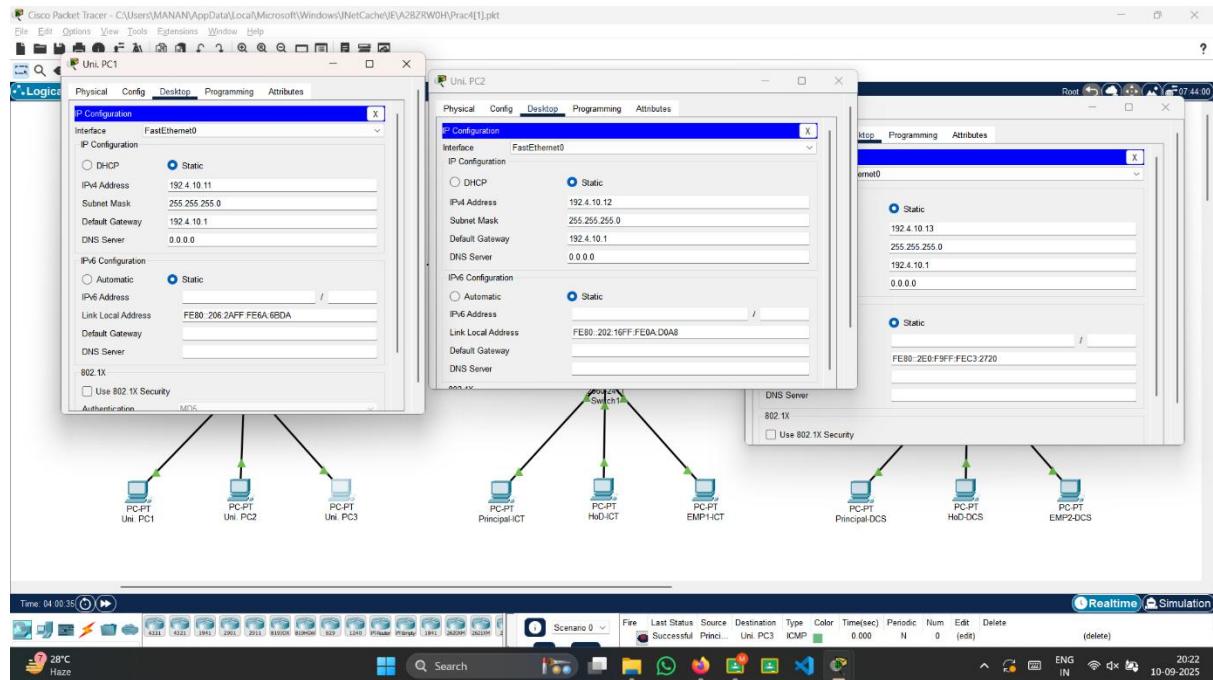


IP Address of devices

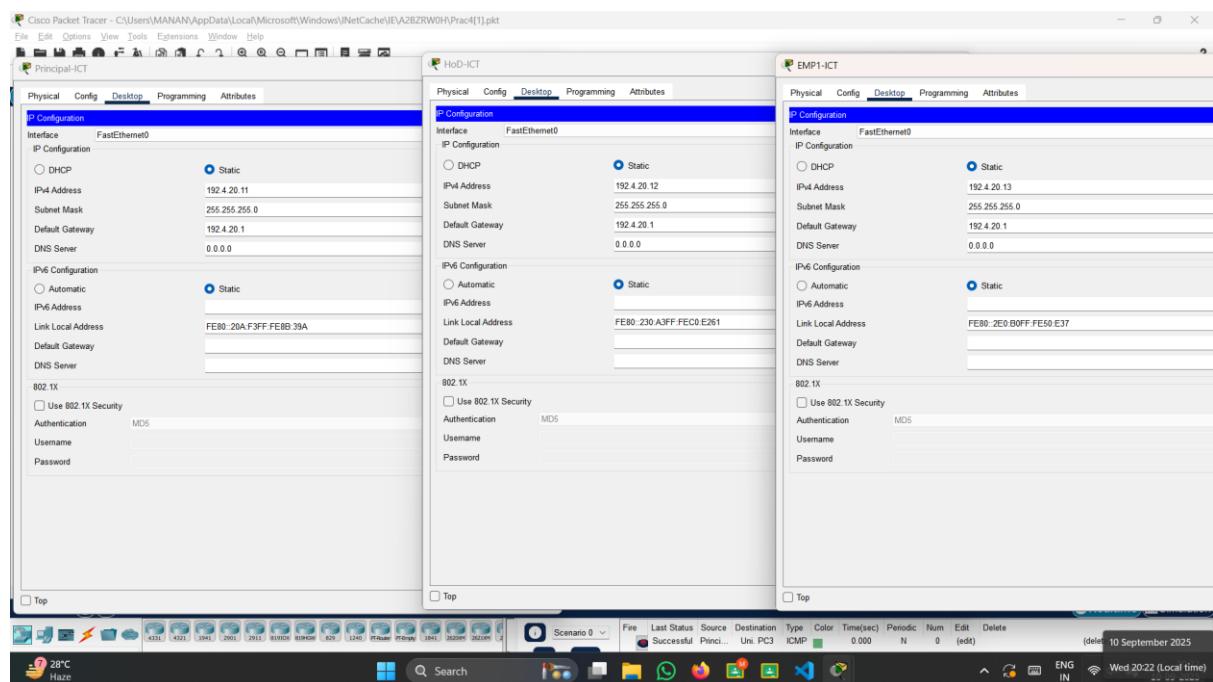
Department	Device	IP Address	Subnet Mask	Default Gateway
University	Uni. PC1	192.04.10.11	255.255.255.0	192.04.10.1
	Uni. PC2	192.04.10.12	255.255.255.0	192.04.10.1
	Uni. PC3	192.04.10.13	255.255.255.0	192.04.10.1
ICT	Principal-ICT	192.04.20.11	255.255.255.0	192.04.20.1
	HoD-ICT	192.04.20.12	255.255.255.0	192.04.20.1
	EMP1-ICT	192.04.20.13	255.255.255.0	192.04.20.1
DCS	Principal-DCS	192.04.30.11	255.255.255.0	192.04.30.1
	HoD-DCS	192.04.30.12	255.255.255.0	192.04.30.1
	EMP2-DCS	192.04.30.13	255.255.255.0	192.04.30.1

2) Configure IP address (All Devices, Routers)

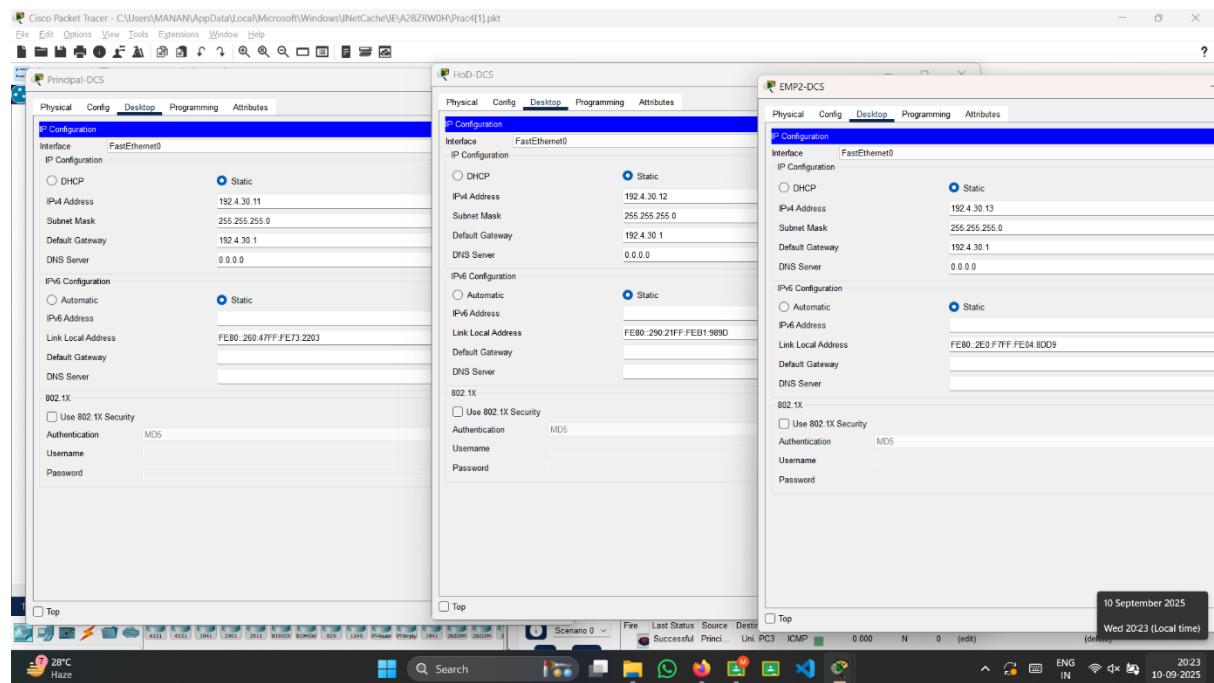
Uni PC's IP config:



ICT PC's IP config:



DCS PC's IP config:



Router 0 IP config:

The image displays two windows of a network configuration tool for Router 0. Both windows have a left sidebar with navigation tabs: Physical, Config (which is selected), CLI, and Attributes. The main area shows interface configurations.

Top Window (GigabitEthernet0/0/0):

- Port Status:** On (checked)
- Bandwidth:** 100 Mbps (selected)
- Duplex:** Full Duplex (selected)
- MAC Address:** 0030.F2EB.E501
- IP Configuration:**
 - IPv4 Address:** 192.4.10.1
 - Subnet Mask:** 255.255.255.0
- Tx Ring Limit:** 10

Bottom Window (GigabitEthernet0/0/1):

- Port Status:** On (checked)
- Bandwidth:** 100 Mbps (selected)
- Duplex:** Full Duplex (selected)
- MAC Address:** 0030.F2EB.E502
- IP Configuration:**
 - IPv4 Address:** 10.0.0.1
 - Subnet Mask:** 255.0.0.0
- Tx Ring Limit:** 10

Router 1 IP config:

The image displays three separate windows of a network configuration interface, all titled "Router1". Each window has tabs for "Physical", "Config" (which is selected), "CLI", and "Attributes". A left sidebar lists navigation options under "GLOBAL", "ROUTING", "SWITCHING", and "INTERFACE", with specific interface names like "GigabitEthernet0/0/0" through "Serial0/1/0" listed.

Top Window (Serial0/1/0 Configuration):

Serial0/1/0	
Port Status	<input checked="" type="checkbox"/> On
Duplex	<input checked="" type="radio"/> Full Duplex
Clock Rate	2000000
IP Configuration	20.0.0.1
IPv4 Address	255.0.0.0
Tx Ring Limit	10

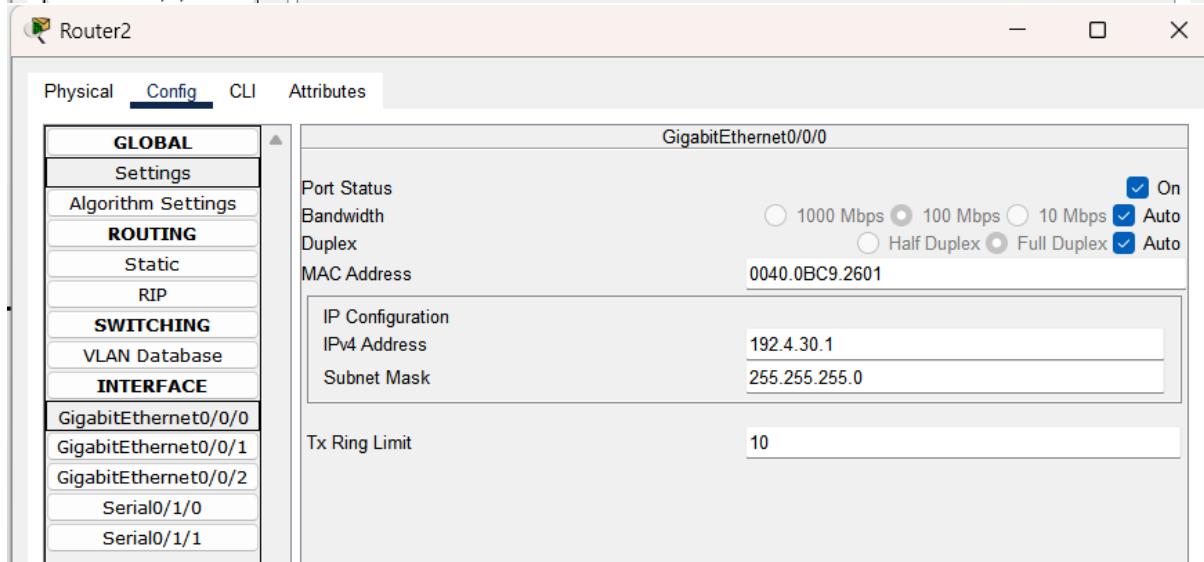
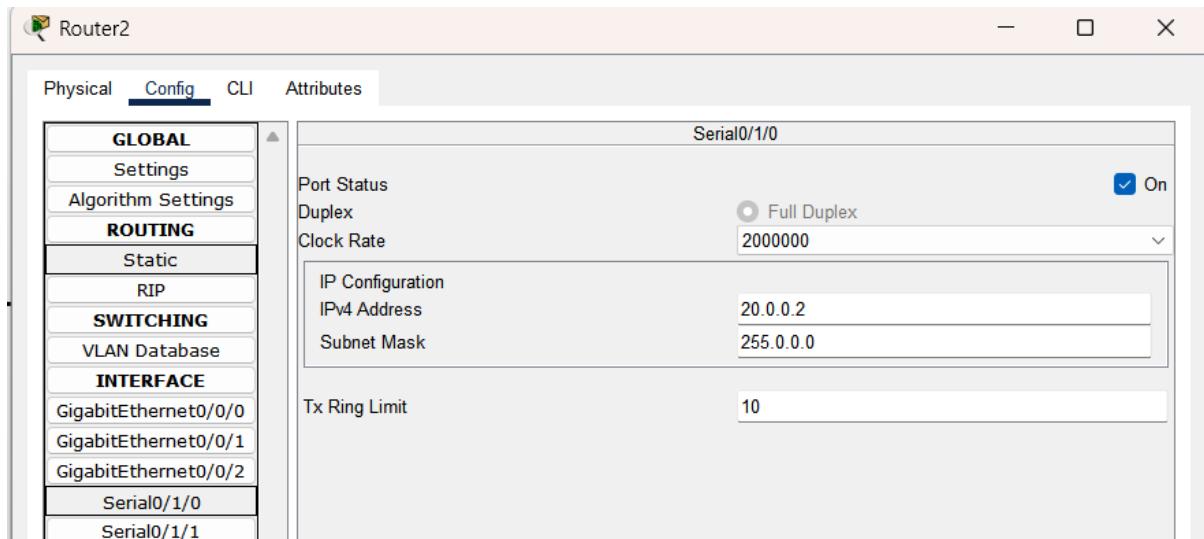
Middle Window (GigabitEthernet0/0/1 Configuration):

GigabitEthernet0/0/1	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input checked="" type="radio"/> 1000 Mbps
Duplex	<input checked="" type="radio"/> Half Duplex
MAC Address	0050.0FCA.8602
IP Configuration	10.0.0.2
IPv4 Address	255.0.0.0
Tx Ring Limit	10

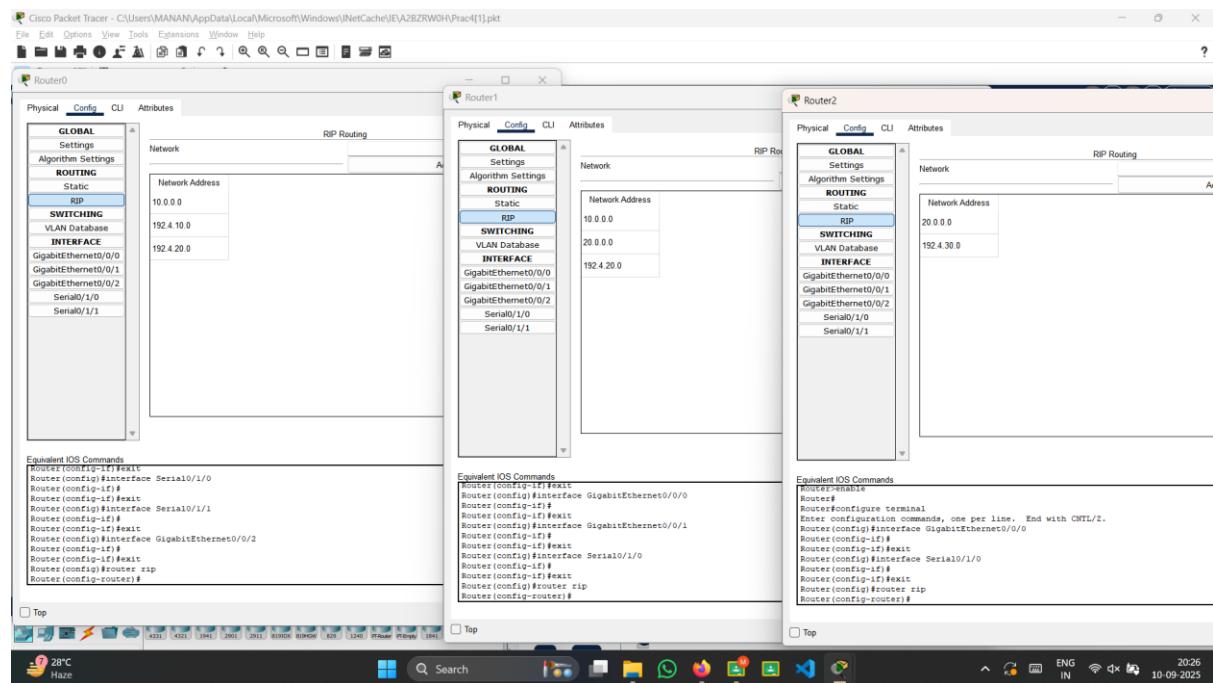
Bottom Window (GigabitEthernet0/0/0 Configuration):

GigabitEthernet0/0/0	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input checked="" type="radio"/> 100 Mbps
Duplex	<input checked="" type="radio"/> Full Duplex
MAC Address	0050.0FCA.8601
IP Configuration	192.4.20.1
IPv4 Address	255.255.255.0
Tx Ring Limit	10

Router 2 IP config:



3) Configure dynamic routing table (RIP in routers):



4) Configure ACL on Router0

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip acc
Router(config)#ip access-list sta
Router(config)#ip access-list standard R0
Router(config-std-nacl)#permit host 192.4.20.11
Router(config-std-nacl)#permit host 192.4.30.11
Router(config-std-nacl)#exit
Router(config)#do sh
Router(config)#do show run
Router(config)#do show run
Router(config)#do show run |section acces
Router(config)#do show run |section acces
Router(config)#do show run | section access-list
ip access-list standard R0
    permit host 192.4.20.11
    permit host 192.4.30.11
ip access-list standard R0\
    permit 192.4.20.0 0.0.0.255
    permit 192.4.30.0 0.0.0.255
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip access-group R0 out
Router(config-if)#
```

5) Configure ACL on Router1

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip access-list extended R1
Router(config-ext-nacl)#remark AC1 on Router1(extended)
Router(config-ext-nacl)#permit ip host 192.4.10.0 0.0.0.255 any
^
% Invalid input detected at '^' marker.

Router(config-ext-nacl)#permit ip 192.4.10.0 0.0.0.255 any
Router(config-ext-nacl)#permit ip host 192.4.30.11
% Incomplete command.
Router(config-ext-nacl)#permit ip host 192.4.30.11 host 192.4.
^
% Invalid input detected at '^' marker.

Router(config-ext-nacl)#permit ip host 192.4.30.11 host 192.4.20.11
Router(config-ext-nacl)#exit
Router(config)#do show run | section access-list
^
% Invalid input detected at '^' marker.

Router(config)#do show run | section access-list
ip access-list extended R1
    remark AC1 on Router1(extended)
    permit ip 192.4.10.0 0.0.0.255 any
    permit ip host 192.4.30.11 host 192.4.20.11
    permit ip host 192.4.30.12 host 192.4.20.12
    remark AC1 on Router1(extended)
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip access-group R1 out
Router(config-if)#exit
Router(config)#

```

6) Configure ACL on Router2

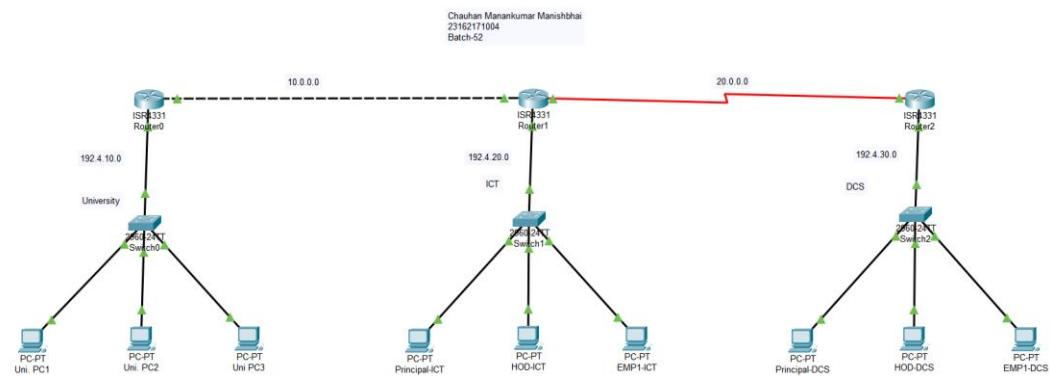
```

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip access-list extended R2
Router(config-ext-nacl)#permit ip 192.4.10.0 0.0.0.255 any
Router(config-ext-nacl)#permit ip host 192.4.20.11 host 192.4.30.11
Router(config-ext-nacl)#permit ip host 192.4.20.12 host 192.4.30.12
Router(config-ext-nacl)#exit
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip access-group R2 out
Router(config-if)#

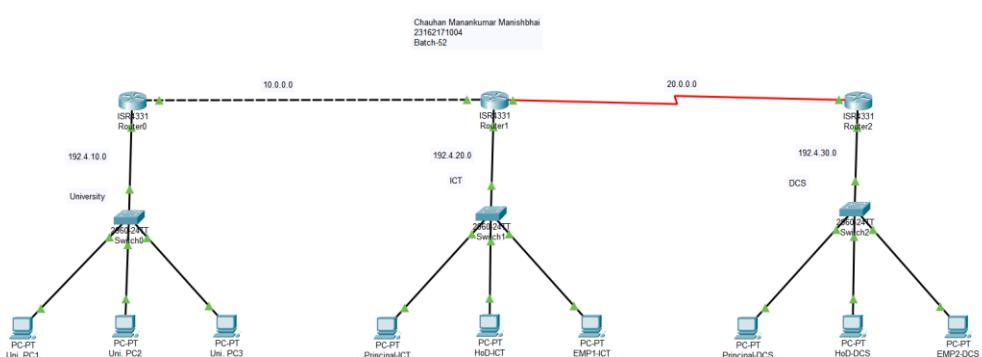
```

Output:-

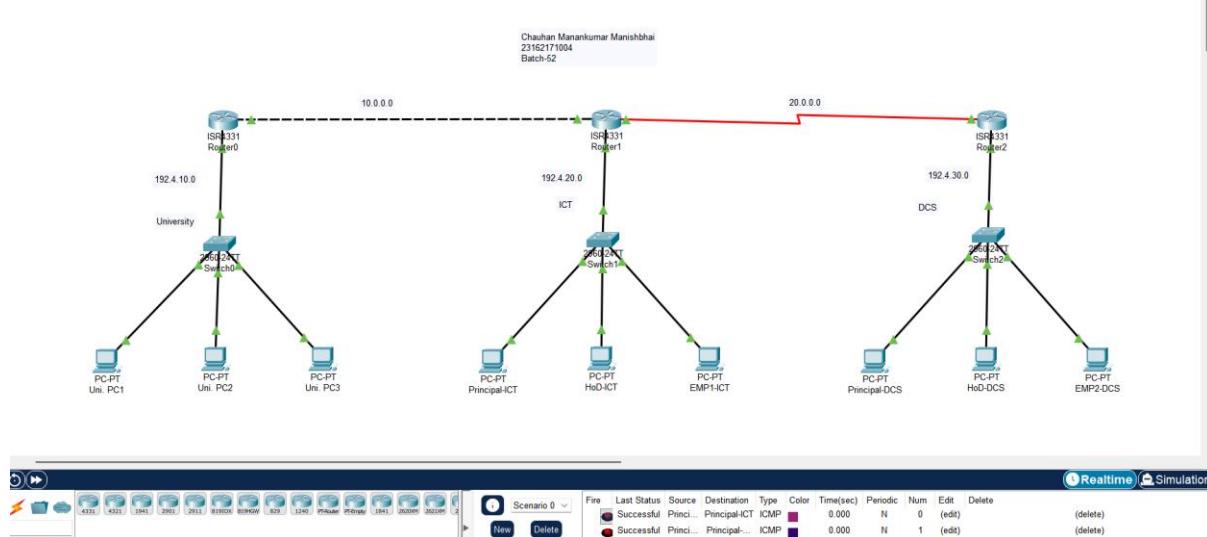
- University can contact all employees.



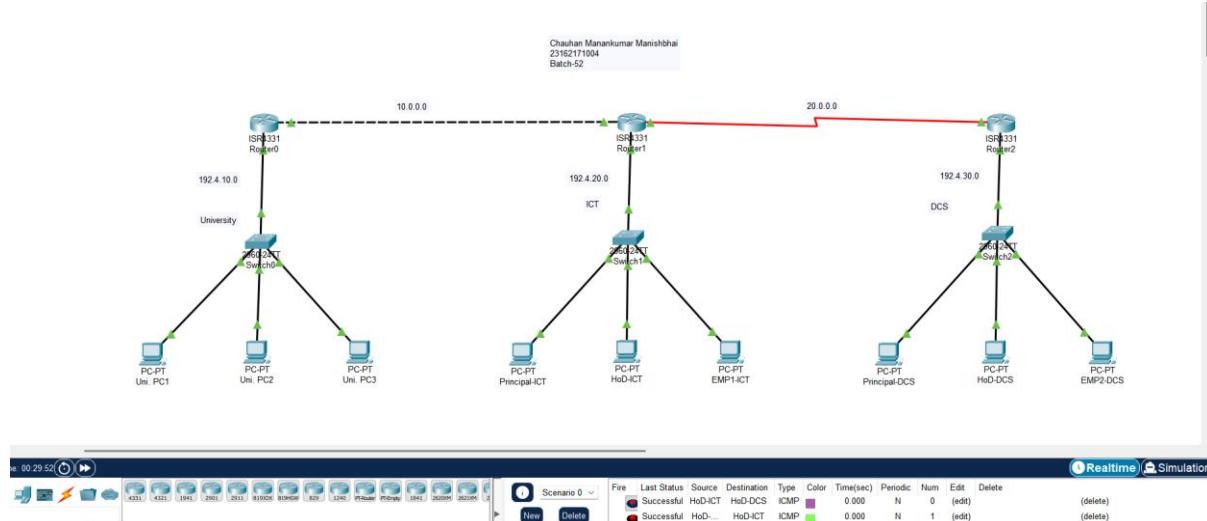
- Only Principal can contact University office.



- All Principals should contact each other



- All head of departments can contact each other



Conclusion:-

ACLs were successfully implemented to control communication between departments. The setup ensured secure access where University, Principals, and HoDs communicated as per the given rights, showing ACL's role in network security and traffic management.