Project Report

Course Code: CSE 314

Course Title: Computer Networks Lab

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My network Scenario

In this project, I designed a sample network for a college. The college has 5 rooms 1 IT Room, 1 Teachers Room, 3 Lab Rooms and 1 common room.

In IT room, there can be up to 10 devices. I have taken 3 routers,1 Pc and 1 laptop as a demo. In this section I have used Static IP configuration.

In teachers' room, there is an arrangement for 50 devices.

In this room I have used static IP configuration.

In each Lab Rooms, there is an arrangement for 60 devices. I have used DHCP for IP Configuration. Lab1 can't use DNS service.

In Common Room, there can be up to 50 devices can be connected through wireless router.

Some of the features I've added in this network are,

- ❖ All the devices existing in the network can ping each other.
- ❖ I have used dynamic routing to establish connectivity through the whole network as it is much more convenient to use.
- ❖ I have used a password protected wireless router through which people can use wireless connection in common room.
- ❖ Another task for configuring this network was configuration of Servers i.e. DNS, HTTP, FTP etc.

❖ I have configured DNS server as DNS servers translate human-friendly domain names to machine-friendly IP addresses.

❖ For configuring HTTP I made a custom webpage which can be accessed from any host in the any network by IP address called 10.0.1.6 or tas@edu.com.

❖ For configuring the FTP same concept. Here I made a user called 'abc' and password '12345'

❖ For configuring the Email server I used the same concept by giving usernames and passwords.

❖ I have configured DHCP for IP configuration in Lab1, Lab2 and Lab3.

Thus, my entire network is configured.

Devices used:

1.Routers

2.Switches

3.PCs

4.Laptops

5.Servers

6.Smart Phones

7.Tablet PCs

8. Printer

What are the new things I've added?

❖ I have added password protected wireless router
   For wireless network configuration.
❖ Configured Email server for sending mail from one
  device to another.
❖ Configured DNS server to translate human-friendly
   domain names to machine-friendly IP addresses.
❖ Configured HTTP server for browsing custom web page.
❖ Configured FTP server for enabling file transfer from
   one device to another.
❖ Configured DHCP which automatically provides an
   Internet Protocol (IP) host with its IP address and other
   related configuration information.
❖ Added smart devices smartphone, tablet PC and
   prepared PC and laptop for wireless connection.
❖ In my network devices of wireless network can
   communicate to the other networks.

Calculations:
The calculations for the network are given below:

Calculations:

IP Address : 10.0.0.0

For lab 1: 61

$hb = 6$ $nb = 26$ $m = 64$

IP: 10.0.0.0/26 $k = 0$

Mask: 255.255.255.192 $b = 63$

Net : 10.0.0.0

1st : 10.0.0.1

Last: 10.0.0.62

Broadcast: 10.0.0.63

For lab 2: 61

$hb = 6$ $nb = 26$

IP : 10.0.0.64/26

Mask : 255.255.255.192 $m = 64$

Net: 10.0.0.64 $h = 64$

1st : 10.0.0.65 $b = 127$

Last: 10.0.0.126

Broadcas: 10.0.0.127

For lab 3 : 10.0.0.128 -|61|

nb=6 nb=26

IP: 10.0.0.128/26

Mask: 255.255.255.192

Net : 10.0.0.128
1st : 10.0.0.129
Last : 10.0.0.190
Broadcast : 10.0.0.191

$m = 64$

$h = 128$

$b = 191$

For teachers : 50+1 = 51

hb= 6 nb = 26

IP: 10.0.0.192/26

Mask : 255.255.255.192

Net: 10.0.0.192
1st: 10.0.0.193
Last: 10.0.0.254
Broadcast: 10.0.0.255

$m = 64$

$h = 192$

$b = 255$

IF ROOM = 11

nb = 4   nb = 28

IP: 10. 0. 1. 0/28
Mask: 255. 255. 255. 240

Network: 10.0. 1. 0
1st   : 10.0. 0. 1. 1
Last : 10. 0. 1. 14
Broadcast: 10. 0. 1. 15

In between: 2

IP: 10. 0. 1. 16/30
Mask: 10. 255. 255. 255. 252

Net : 10. 0. 1. 16
1st : 10. 0. 1. 17
Last : 10. 0. 1. 18
Broadcast : 10. 0. 1. 19

In between : 2

hb = 2   nb = 30

$m = 16$

$h = 0$

$b = 15$

$m = 4$

$h = 16$

$b = 19$

IP: 10.0.1.20/30

Mask: 255.255.255.252

Net: 10.0.1.20

1st: 10.0.1.21

Last: 10.0.1.22

Broadcast: 10.0.1.23

$\left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\}$ $m = 4$

$n = 20$

$b = 23$

Inbetween: 2

$nb = 2$ $nb = 30$

IP: 10.0.1.24/2

Mask: 255.255.255.252

Net: 10.0.1.24

1st: 10.0.1.25

Last: 10.0.1.26

Broadcast: 10.0.1.27

$\left.\begin{array}{l} \\ \\ \\ \\ \end{array}\right\}$ $m = 4$

$n = 24$

$b = 27$

In between : 2

IP : 10. 0. 1. 28/30

Mask : 255.255.255.252

Net : 10.0. 1. 28

1st : 10.0.1.29

cast : 10. 0. 1. 30

Broadcast : 10.0. 1.31

m = 4
h = 28
b = 31

In between : 2

IP : 10.0. 1.32/30

Mask : 255.255.255.252

Net : 10.0. 1. 32

1st : 10.0. 1. 33

Last : 10.0. 1. 34
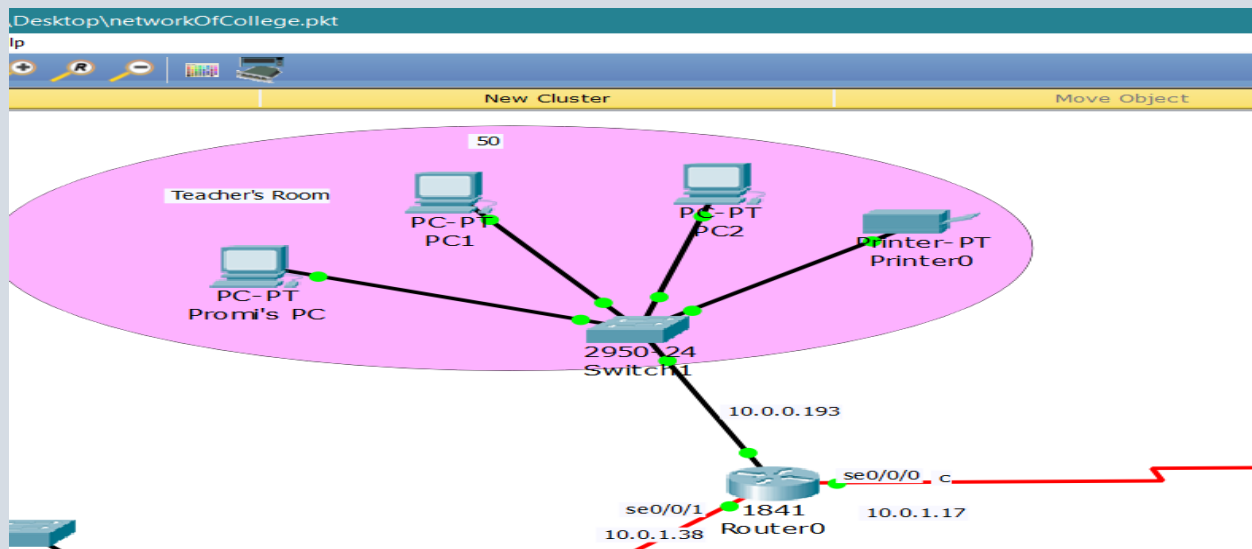
Broadcast : 10.0. 1. 35

m = 4
h = 32
b = 35

In between : 2

IP : 10. 0. 1. 36/30

Mask : 255.255.255.252

Net : 10.0. 1. 36

1st : 10.0.1.37

Last : 10.0.1.38

Broadcast 10.0. 1. 39

m = 4
h = 36
b = 39

Design:

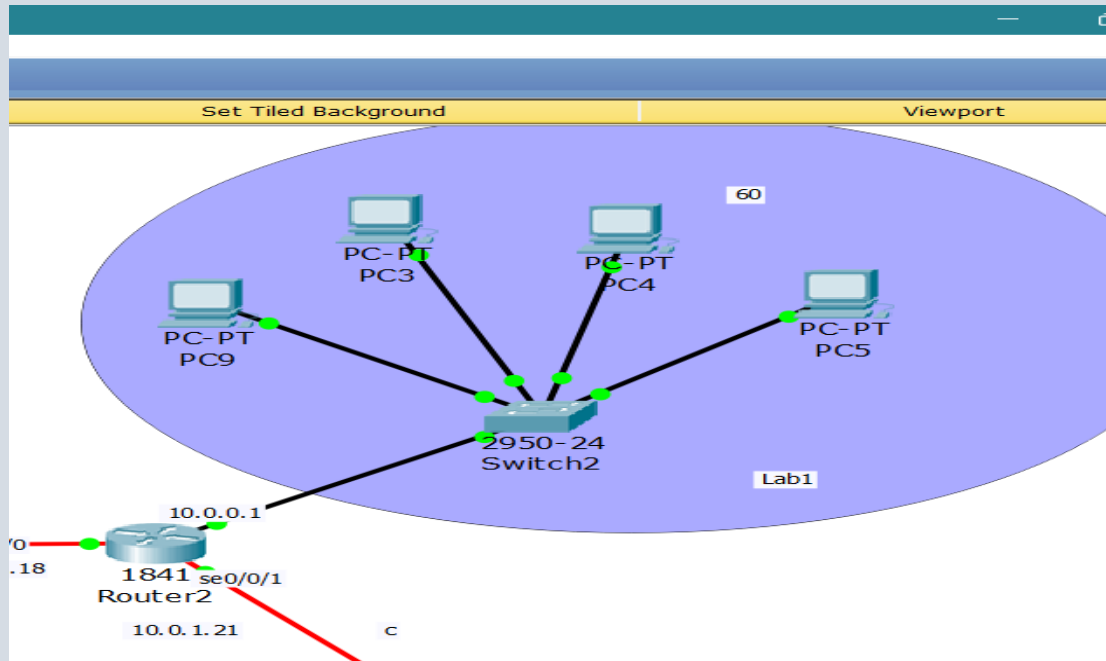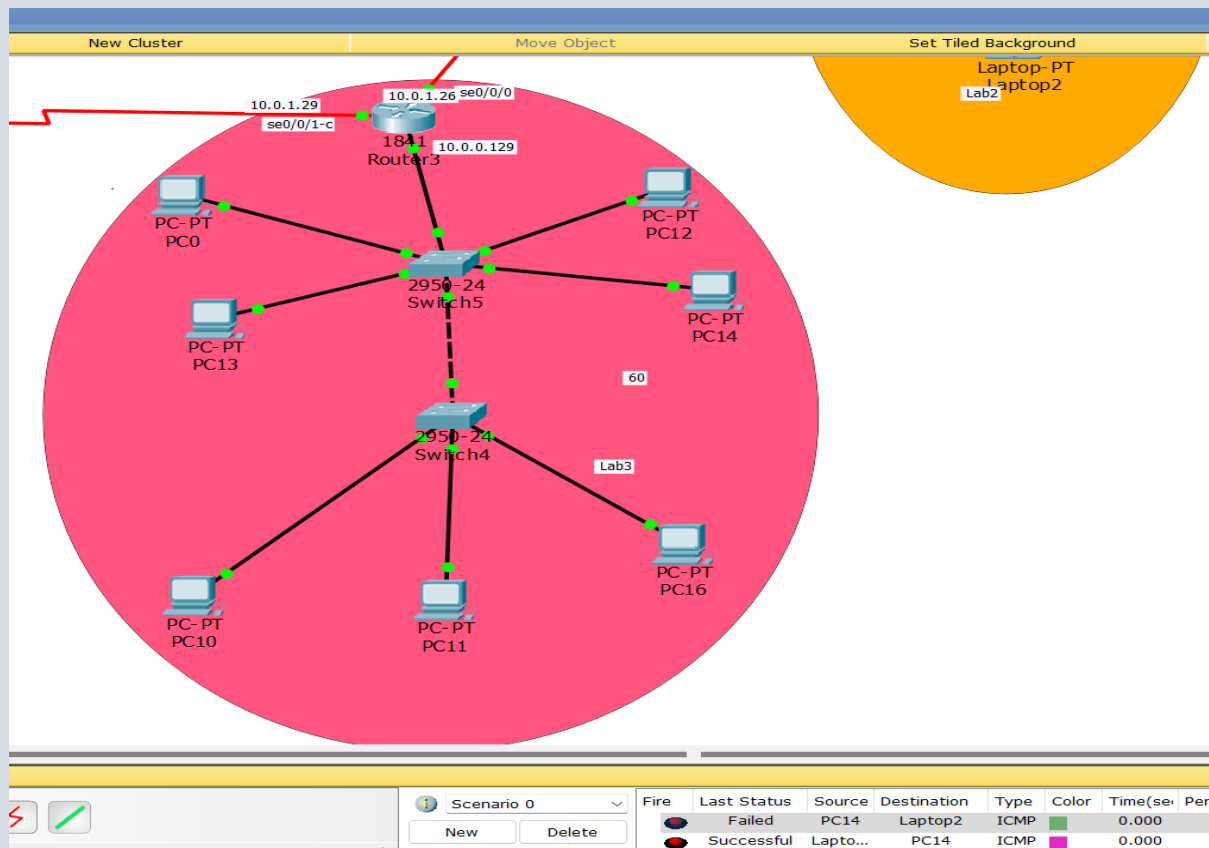The design of the above described network is given below:
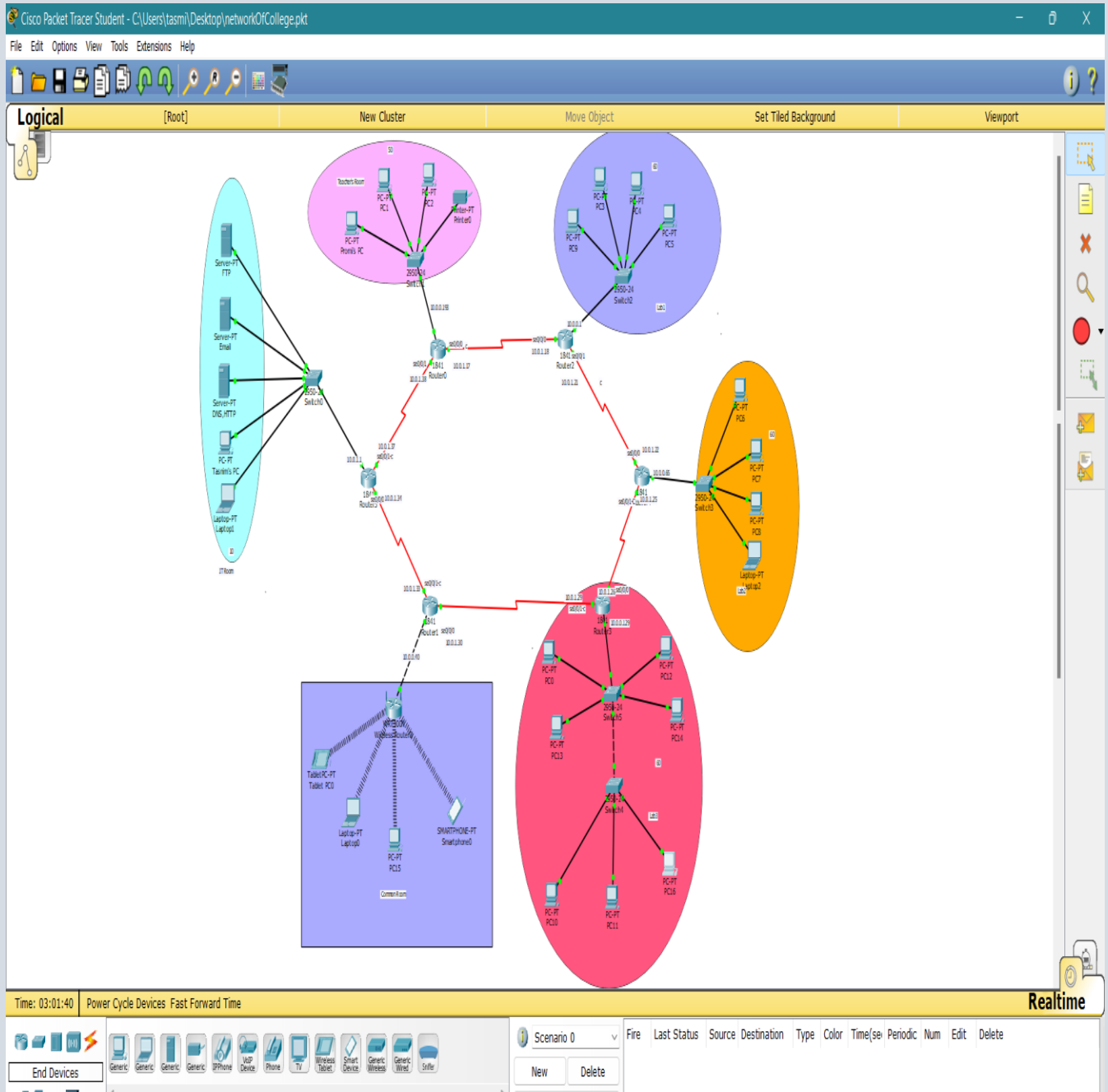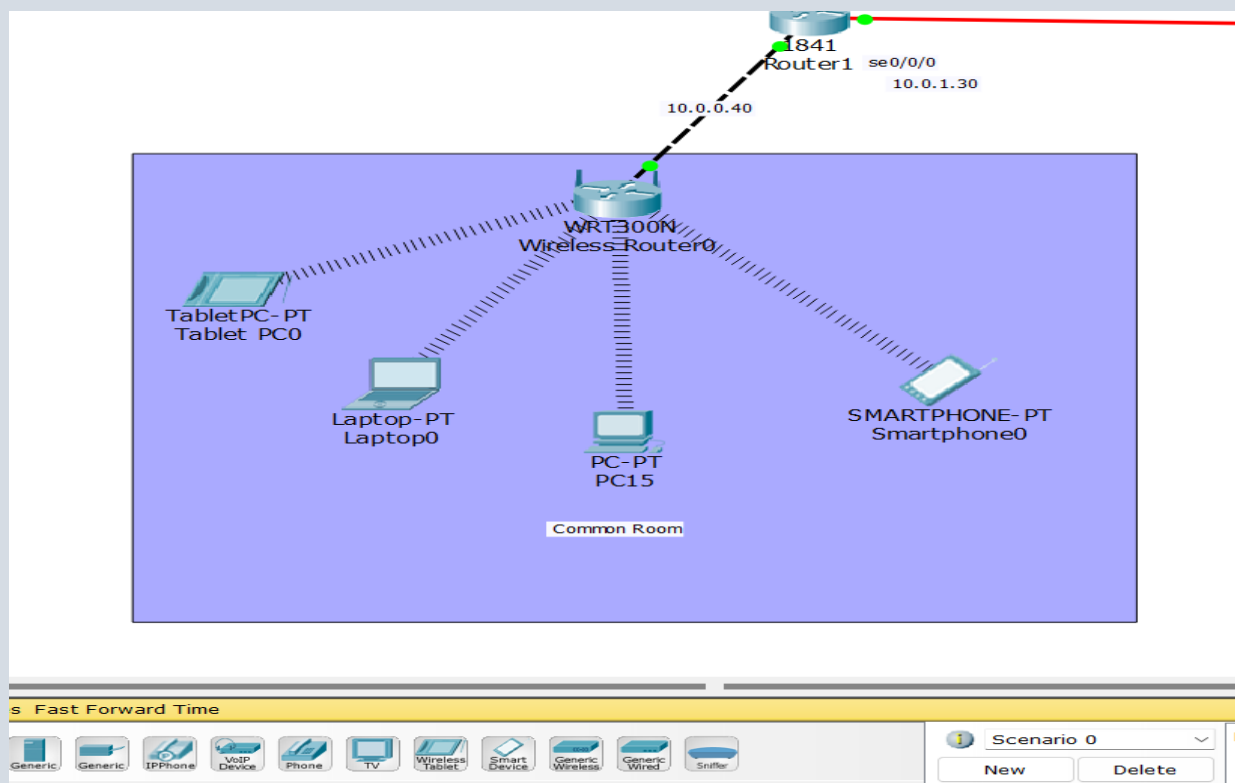
IT Room:
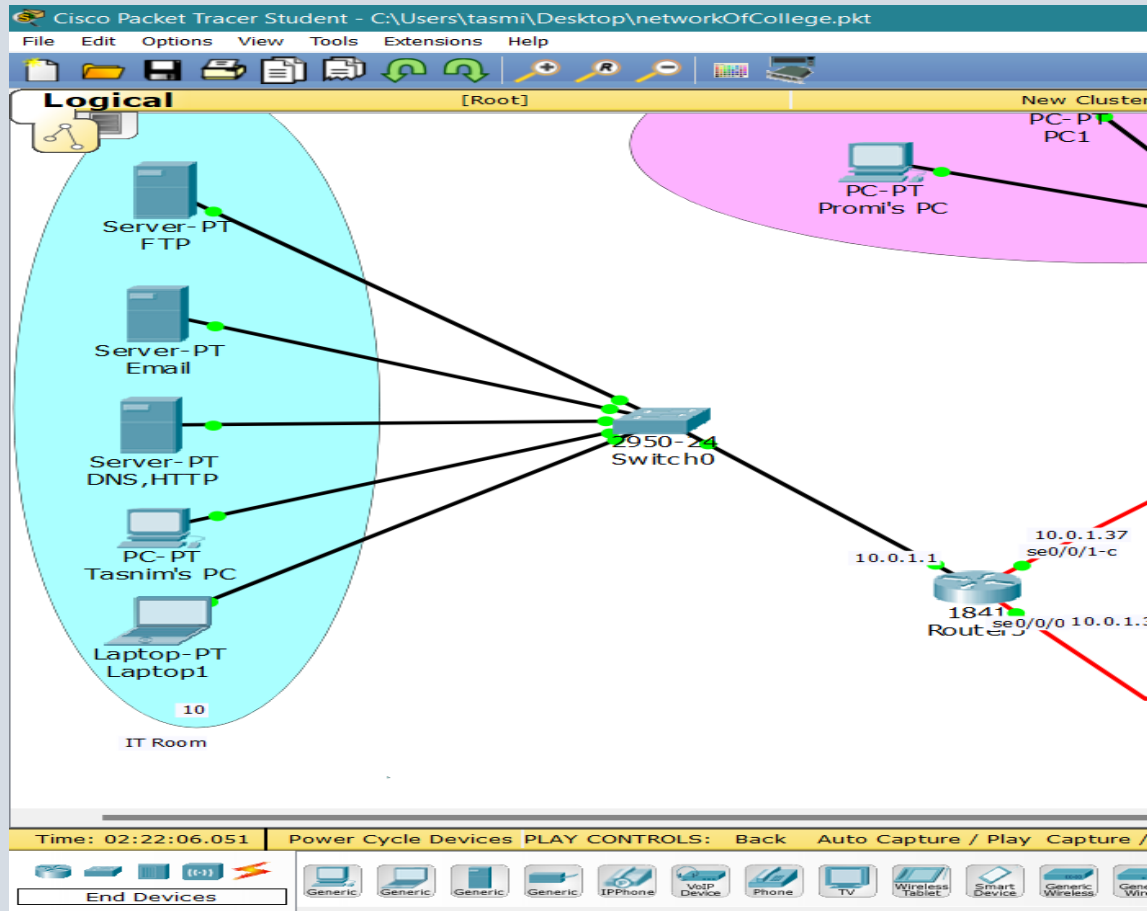
Teachers' Room:

Lab1, Lab2, Lab3:
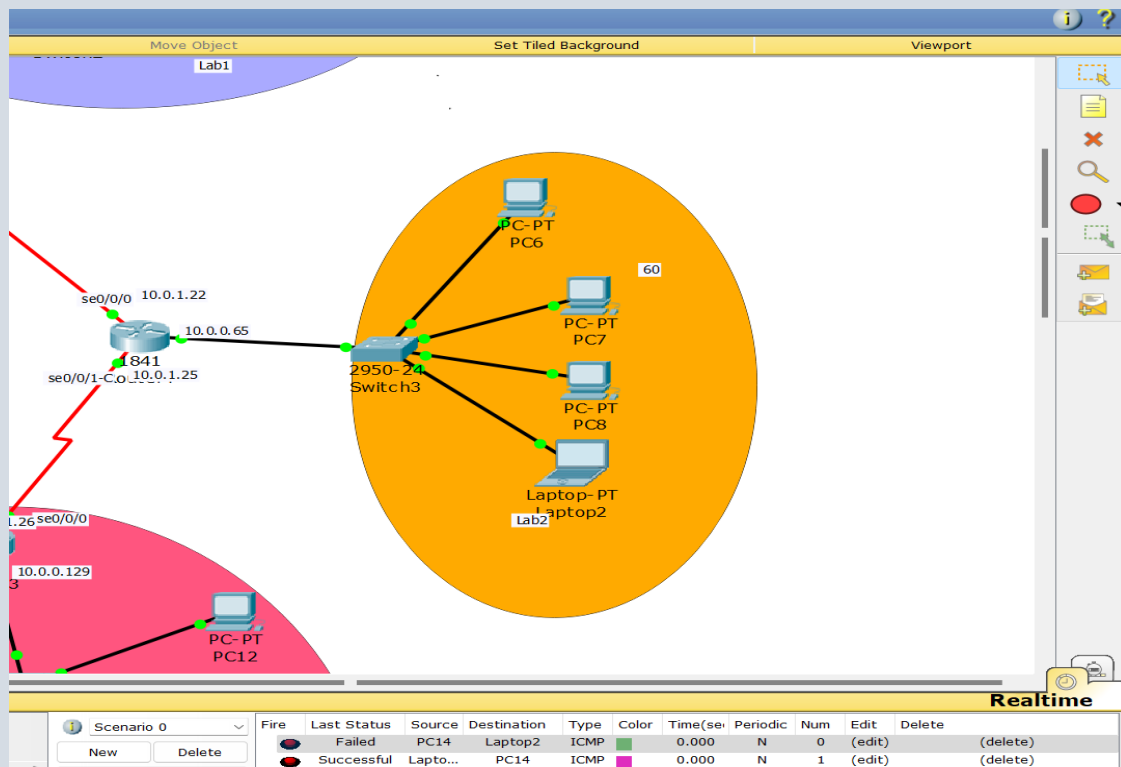
Common Room:

Codes:

```
Router0:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.193 255.255.255.192
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.17 255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut
exit
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.38 255.255.255.252
Router(config-if)#no shut

Router2:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.1 255.255.255.192
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.18  255.255.255.252
Router(config-if)#no shut
exit
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.21  255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut


Router4:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.65 255.255.255.192
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.22  255.255.255.252
Router(config-if)#no shut
exit
```

```
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.25  255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut



Router3:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.129 255.255.255.192
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.26  255.255.255.252
Router(config-if)#no shut
exit
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.29  255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut



Router1:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.30  255.255.255.252
Router(config-if)#no shut
exit
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.33  255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut



Router5:
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.1.1 255.255.255.240
Router(config-if)#no shut
```

```
Router(config-if)#exit
Router(config)#int s0/0/0
Router(config-if)#ip address 10.0.1.34  255.255.255.252
Router(config-if)#no shut
exit
Router(config)#int s0/0/1
Router(config-if)#ip address 10.0.1.37  255.255.255.252
Router(config-if)#clock rate 56000
Router(config-if)#no shut
```

RIP VER 2:

```
Router 0:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 10.0.0.192
Router(config-router)#network 10.0.1.16
Router(config-router)#network 10.0.1.36
Router(config-router)#no auto-summary
Router(config-router)#

Router 2:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 10.0.0
Router(config-router)#network 10.0.1.20
Router(config-router)#network 10.0.1.16
Router(config-router)#no auto-summary
Router(config-router)#

Router 4:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 10.0.0.64
Router(config-router)#network 10.0.1.20
Router(config-router)#network 10.0.1.24
Router(config-router)#no auto-summary
Router(config-router)#

Router 3:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 100.0.0.128
Router(config-router)#network 10.0.1.24
Router(config-router)#network 10.0.1.28
Router(config-router)#no auto-summary
Router(config-router)#
```

```
Router 1:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 192.168.2.0
Router(config-router)#network 10.0.1.28
Router(config-router)#network 10.0.1.32
Router(config-router)#no auto-summary
Router(config-router)#

Router 5:
Router(config)#router rip
Router(config-router)#ver 2
Router(config-router)#network 10.0.1.0
Router(config-router)#network 10.0.1.32
Router(config-router)#network 10.0.1.36
Router(config-router)#no auto-summary
Router(config-router)#
```

DHCP:

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip dhcp pool TasminPoolOne
Router(dhcp-config)#default-router 10.0.0.1
Router(dhcp-config)#network 10.0.0.0 255.255.255.192
Router(dhcp-config)#exit

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip dhcp pool tasminPoolTwo
Router(dhcp-config)#network 10.0.0.64 255.255.255.192
Router(dhcp-config)#default-router 10.0.0.65
Router(dhcp-config)#dns-server 10.0.1.6
Router(dhcp-config)#exit
Router>en

Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip dhcp pool TasminPoolThree
Router(dhcp-config)#network 10.0.0.128 255.255.255.192
Router(dhcp-config)#default-router 10.0.0.129
Router(dhcp-config)#dns-server 10.0.1.6
Router(dhcp-config)#exit
Router(config)#
```
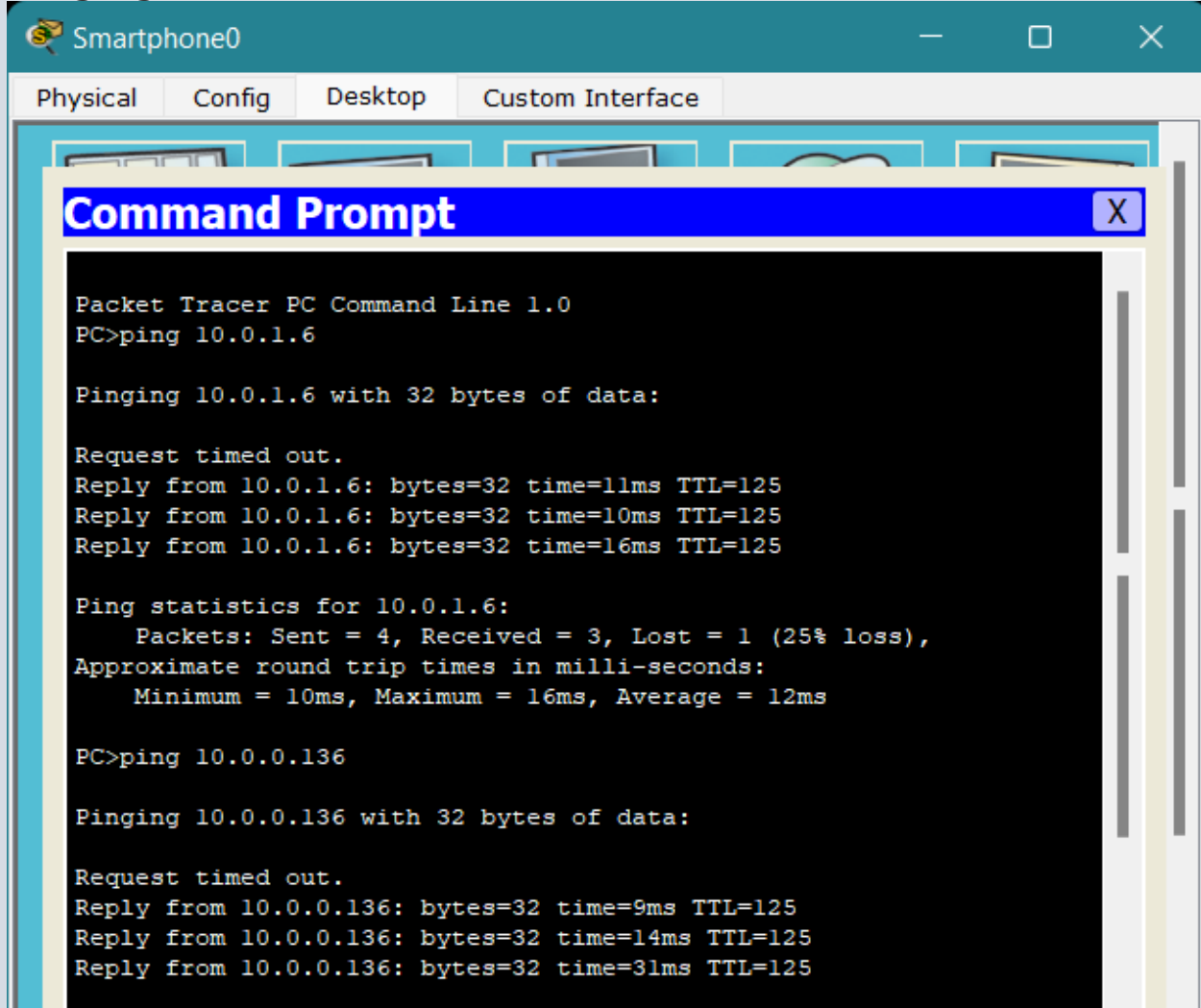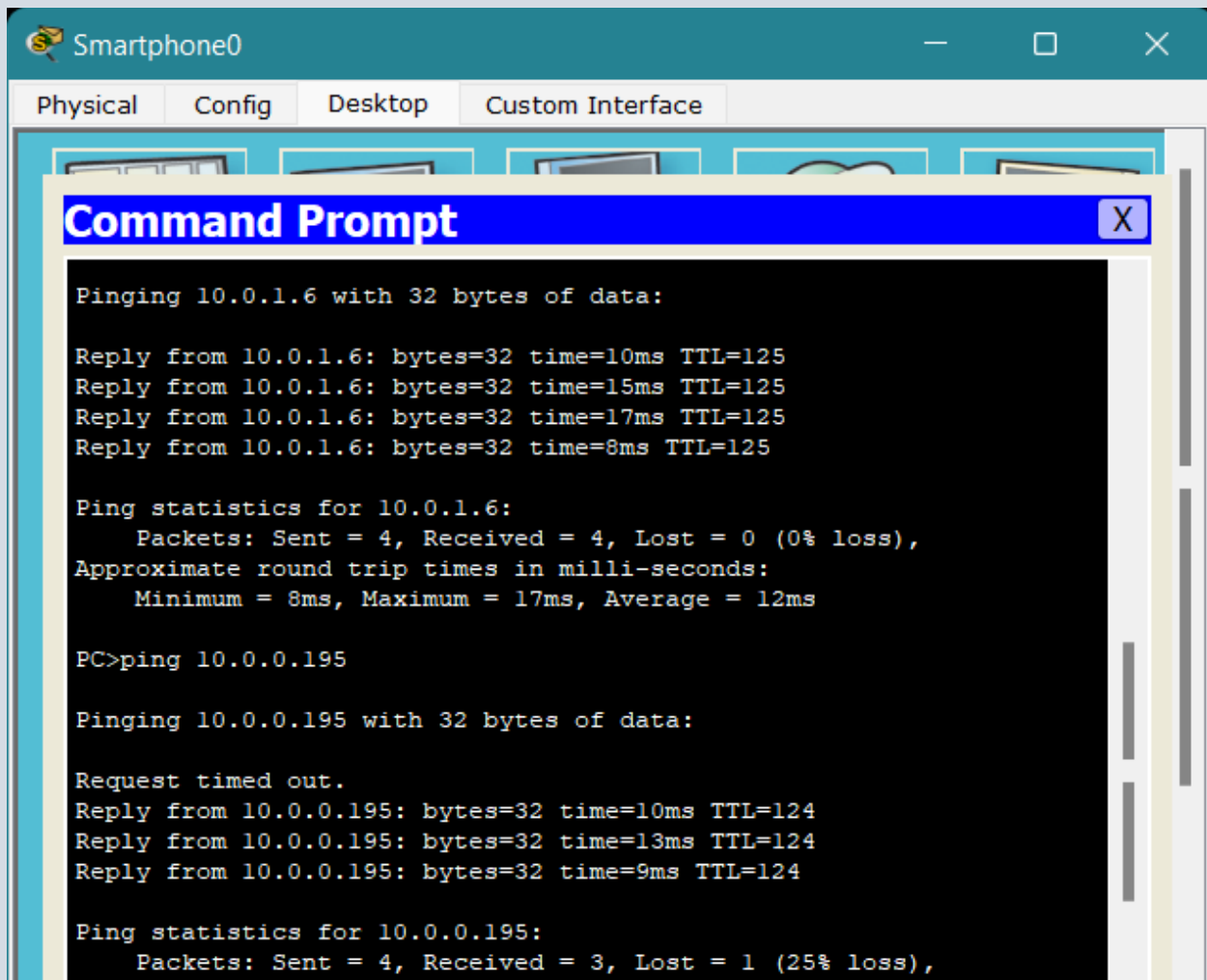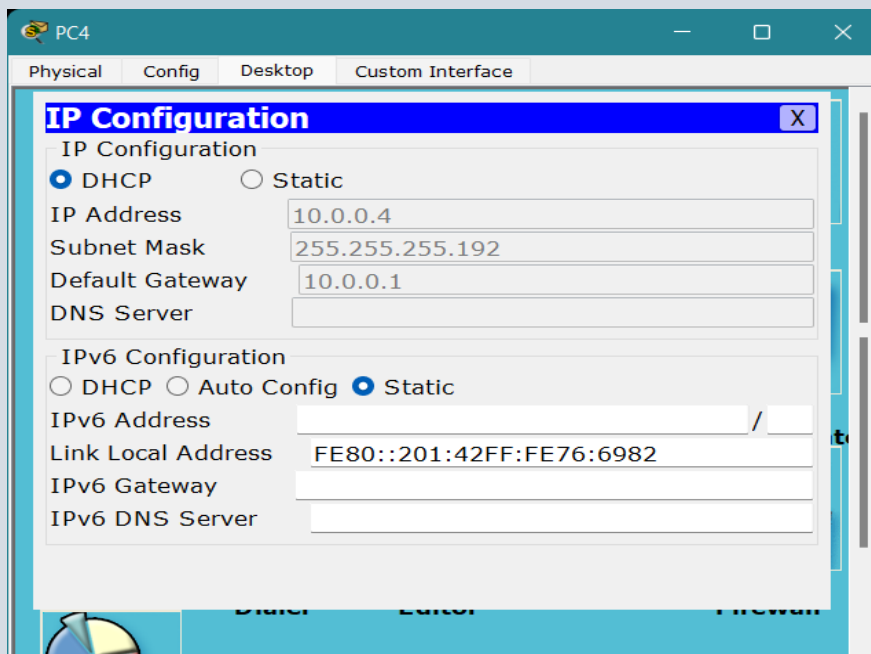
Result:

PDU List Window:

PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(se	Periodic	Num	Edit	Delete
●	Successful	Smar...	PC5	ICMP	▮	0.000	N	0	(edit)	(delete)
●	Successful	Lapto...	PC5	ICMP	▮	0.000	N	1	(edit)	(delete)
●	Successful	Table...	PC7	ICMP	▮	0.000	N	2	(edit)	(delete)
●	Successful	PC12	PC2	ICMP	▮	0.000	N	3	(edit)	(delete)
●	Successful	Email	Laptop2	ICMP	▮	0.000	N	4	(edit)	(delete)
●	Successful	Tasni...	Promi's PC	ICMP	▮	0.000	N	5	(edit)	(delete)
●	Successful	PC6	PC13	ICMP	▮	0.000	N	6	(edit)	(delete)

Pinging:

Smartphone0

Physical | Config | Desktop | Custom Interface

Command Prompt   X

```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.1.6

Pinging 10.0.1.6 with 32 bytes of data:

Request timed out.
Reply from 10.0.1.6: bytes=32 time=11ms TTL=125
Reply from 10.0.1.6: bytes=32 time=10ms TTL=125
Reply from 10.0.1.6: bytes=32 time=16ms TTL=125

Ping statistics for 10.0.1.6:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 16ms, Average = 12ms

PC>ping 10.0.0.136

Pinging 10.0.0.136 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.136: bytes=32 time=9ms TTL=125
Reply from 10.0.0.136: bytes=32 time=14ms TTL=125
Reply from 10.0.0.136: bytes=32 time=31ms TTL=125
```

Smartphone0

Physical | Config | Desktop | Custom Interface

Command Prompt

```
Pinging 10.0.1.6 with 32 bytes of data:

Reply from 10.0.1.6: bytes=32 time=10ms TTL=125
Reply from 10.0.1.6: bytes=32 time=15ms TTL=125
Reply from 10.0.1.6: bytes=32 time=17ms TTL=125
Reply from 10.0.1.6: bytes=32 time=8ms TTL=125

Ping statistics for 10.0.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 17ms, Average = 12ms

PC>ping 10.0.0.195

Pinging 10.0.0.195 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.195: bytes=32 time=10ms TTL=124
Reply from 10.0.0.195: bytes=32 time=13ms TTL=124
Reply from 10.0.0.195: bytes=32 time=9ms TTL=124

Ping statistics for 10.0.0.195:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
```

DHCP:

PC4

Physical | Config | Desktop | Custom Interface

IP Configuration

IP Configuration
- ● DHCP   ○ Static

IP Address	10.0.0.4
Subnet Mask	255.255.255.192
Default Gateway	10.0.0.1
DNS Server	

IPv6 Configuration
- ○ DHCP   ○ Auto Config   ● Static

IPv6 Address	/
Link Local Address	FE80::201:42FF:FE76:6982
IPv6 Gateway	
IPv6 DNS Server	

PC8

Physical | Config | Desktop | Custom Interface

IP Configuration [X]

IP Configuration

● DHCP   ○ Static

IP Address	10.0.0.68
Subnet Mask	255.255.255.192
Default Gateway	10.0.0.65
DNS Server	10.0.1.6

IPv6 Configuration

○ DHCP ○ Auto Config ● Static

IPv6 Address	/
Link Local Address	FE80::201:96FF:FE31:EB31
IPv6 Gateway	
IPv6 DNS Server	

PC12

Physical | Config | Desktop | Custom Interface

IP Configuration [X]

IP Configuration

● DHCP   ○ Static

IP Address	10.0.0.132
Subnet Mask	255.255.255.192
Default Gateway	10.0.0.129
DNS Server	10.0.1.6

IPv6 Configuration

○ DHCP ○ Auto Config ● Static

IPv6 Address	/
Link Local Address	FE80::2D0:97FF:FE90:C5D9
IPv6 Gateway	
IPv6 DNS Server	

Email:

Promi's PC — □ ✕

Physical | Config | Desktop | Custom Interface

MAIL BROWSER ✕

Mails

Compose | Reply | Receive | Delete | onfigure Ma

	From	Subject	Received
1	tasnim@...	Greetings	Sun Dec 5 2...

Sent : Sun Dec 5 2021 09:31:45

Hi I am Tasnim

Receiving mail from POP3 Server 10.0.1.4
Receive Mail Success.

Cancel
Send/Receive

Tasnim's PC — □ ✕

Physical | Config | Desktop | Custom Interface

MAIL BROWSER ✕

Mails

Compose | Reply | Receive | Delete | onfigure Ma

	From	Subject	Received
1	promi@...	Greetings	Sun Dec 5 2...

Sent : Sun Dec 5 2021 09:23:17

Hello! I am Promi. How are you? Hope everything is going well.

Sending mail to promi@gmail.com , with subject : Greetings
.. Mail Server: 10.0.1.4
Send Success.

Cancel
Send/Receive

FTP:

DNS, HTTP:

Thus, we get a fully working network of a college.

<u>References:</u>

1. Google
2. YouTube