

## **AIM/OBJECTIVE**

To design a computer network to these buildings of the University with optimum use of network IP addresses. Available IP address ranges 10.20.0.0/16

### **IT Centre Block:**

- Director Office –will be equipped with two desktop computers with network connection.
- Network Manager Room–Network manager office will be equipped with one desktop computer with network connection.
- 2 Technical Officers Room–Each network officers’ room will be equipped with 1Computerswith network connection.
- Staff Office–will be equipped with 5Computerswith network connection.
- Meeting Room-2 data points ( one for Video Conference Facility and one data points to connect computer) and Wi-Fi Coverage
- Lobby area –Wi-Fi Coverage
- Computer Lab 1–will be equipped with 60Computerswith network connection.
- Computer Lab 2 –will be equipped with 60Computerswith network connection.
- Digital Learning and Media Centre –will be equipped with 30Computersand one printer with network connections.
- Printing Room –will be equipped with two printers with network connection.

### **Department Block:**

- 4lecture halls –Each lecture hall will be equipped with one desktop computer and one interactive multimedia projector with network connections.
- 14staff rooms –Each staff room will be equipped with one desktop computer with network connection.
- 4Technical Officers Rooms –Each technical officers room will be equipped with one desktop computer.
- Department Meeting Room –2data points ( one for Video Conference Facility and one data points to connect computer)and Wi-Fi Coverage.
- Computer Lab 1 –will be equipped with 50Computerswith network connection.
- Computer Lab 2 –will be equipped with 50Computerswith network connection.
- Network Engineering Lab –will be equipped with10Computerswith network connection.
- Microprocessor Lab –will be equipped with 12Computerswith network connection.
- Computer Vision and Machine Learning Lab -will be equipped with 50Computerswith network connection.
- Department Office –will be equipped with 2 Computers with network connection and one printer with network connection.

Computers available at staff room can’t be accessed from the network Engineering lab, department office, department meeting room, lecture halls, computer labs, Computer Vision and Machine Learning Lab, Microprocessor Lab, Technical Officers Rooms and the IT Centre(for security reason).

Computers available at the department office can’t be accessed from the staff room, network Engineering lab, department office, department meeting room, lecture halls, computer labs, Computer Vision and Machine Learning Lab, Microprocessor Lab, Technical Officers Rooms and the IT Centre.

Requirement–Printer available at the depratment office can only be accessed by the depratment staffs.– Printer available at the IT Centre printing room can only be accessed by the IT Centre staffs.–Each network node can only be accessed by the administator, not others.

## Network diagram in cisco packet tracer

The network design was developed by referencing the 3-tier type network design model. It consists of core layer with a router, distribution layer with multilayer switch and access layer with switches and end devices. The factors considered in designing network are scalability (accommodate further growth), resilient (tolerate faults) and manageability (ease manage devices).

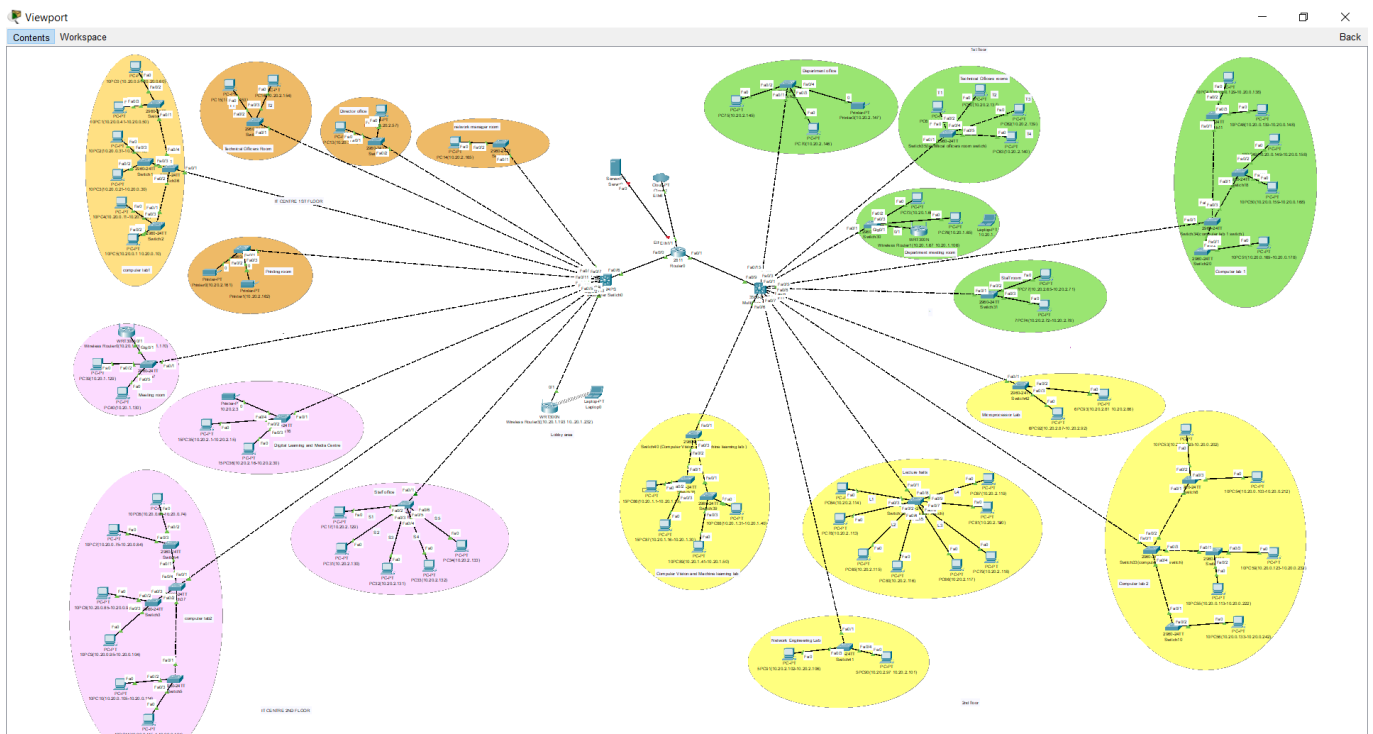


Figure 1: The network setup for the given requirements

- Orange : IT block first floor
- Yellow: IT block second floor
- Green: Department block first floor
- Pink: Department block second floor



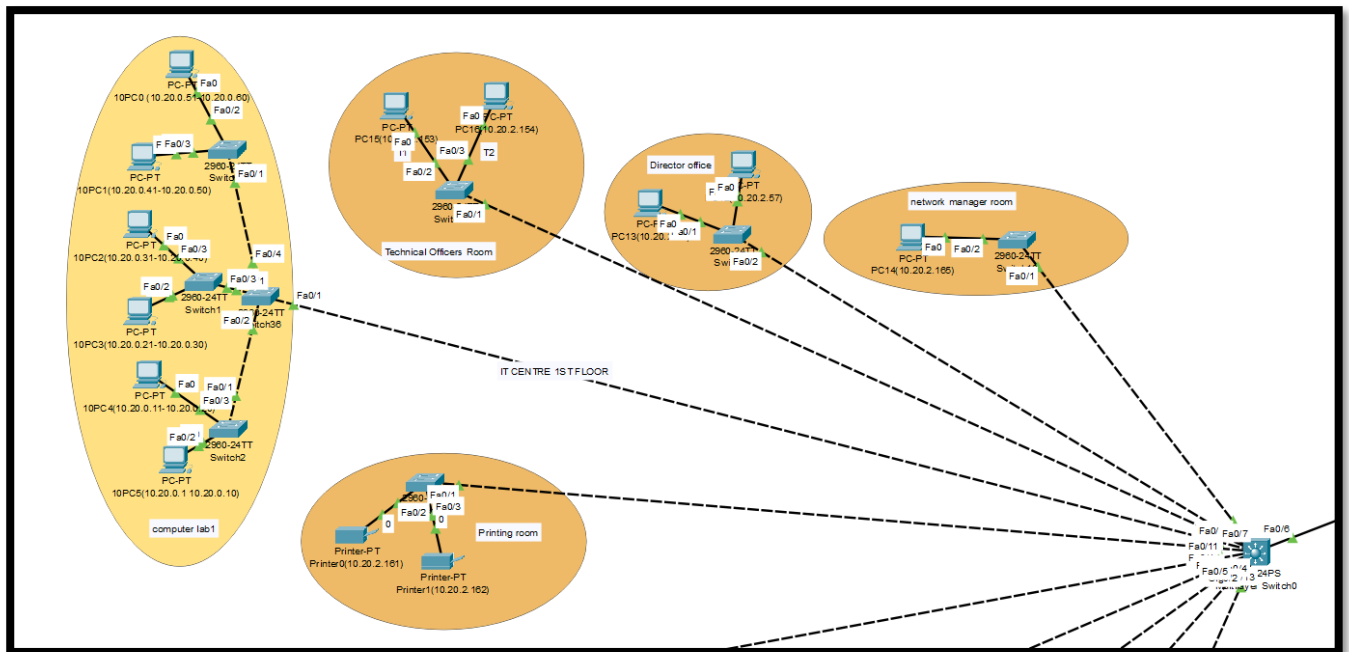


Figure 2:Diagram of IT Centre block first floor

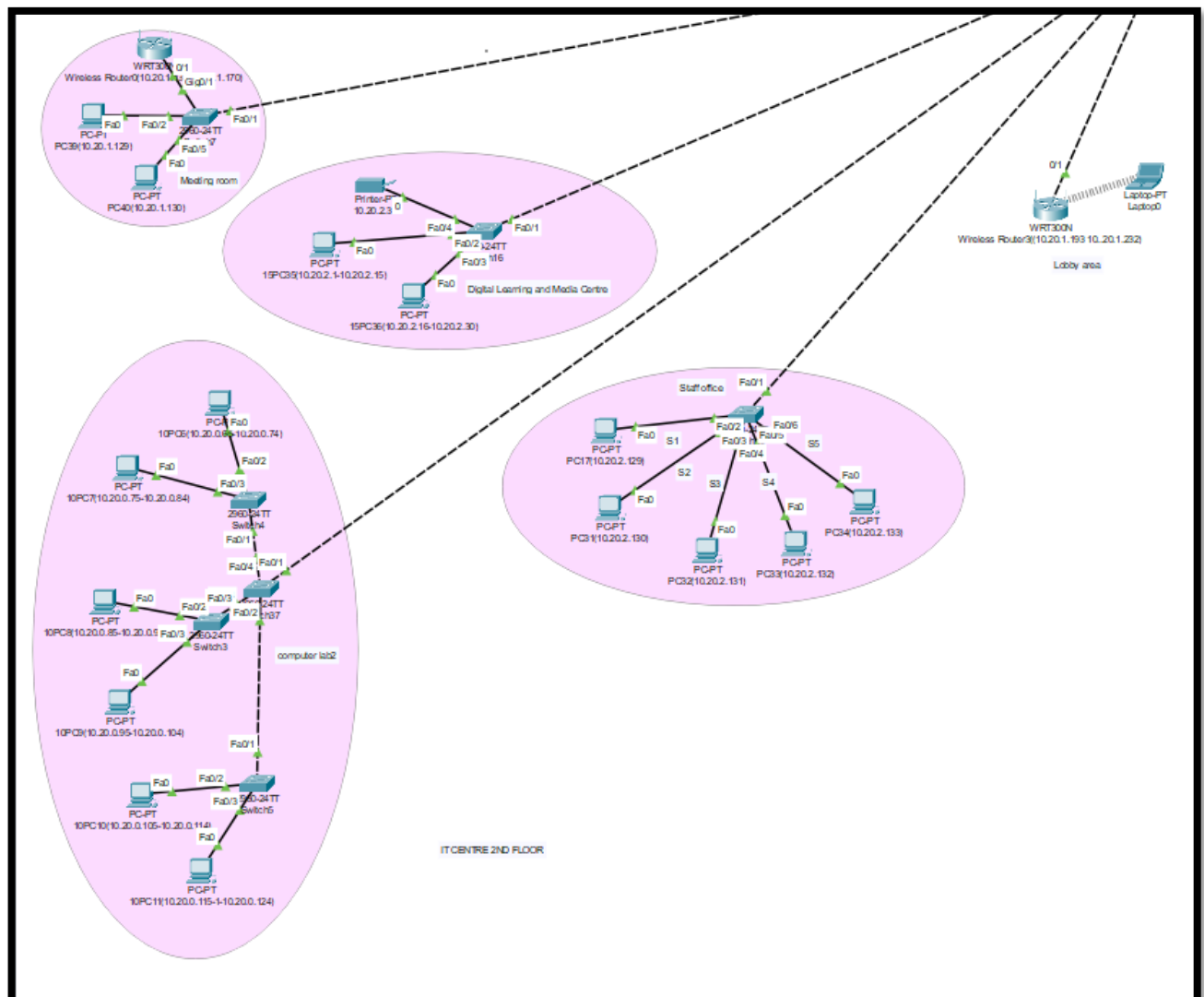


Figure 3:Diagram of IT Centre block second floor

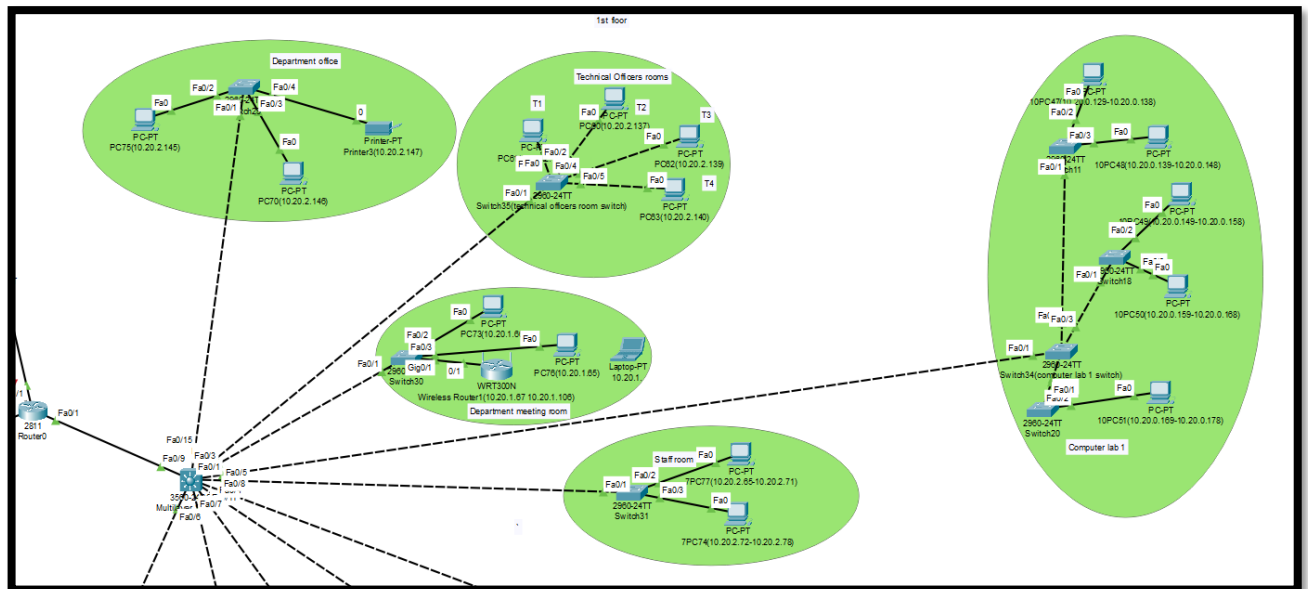


Figure 4:Diagram of Department block first floor

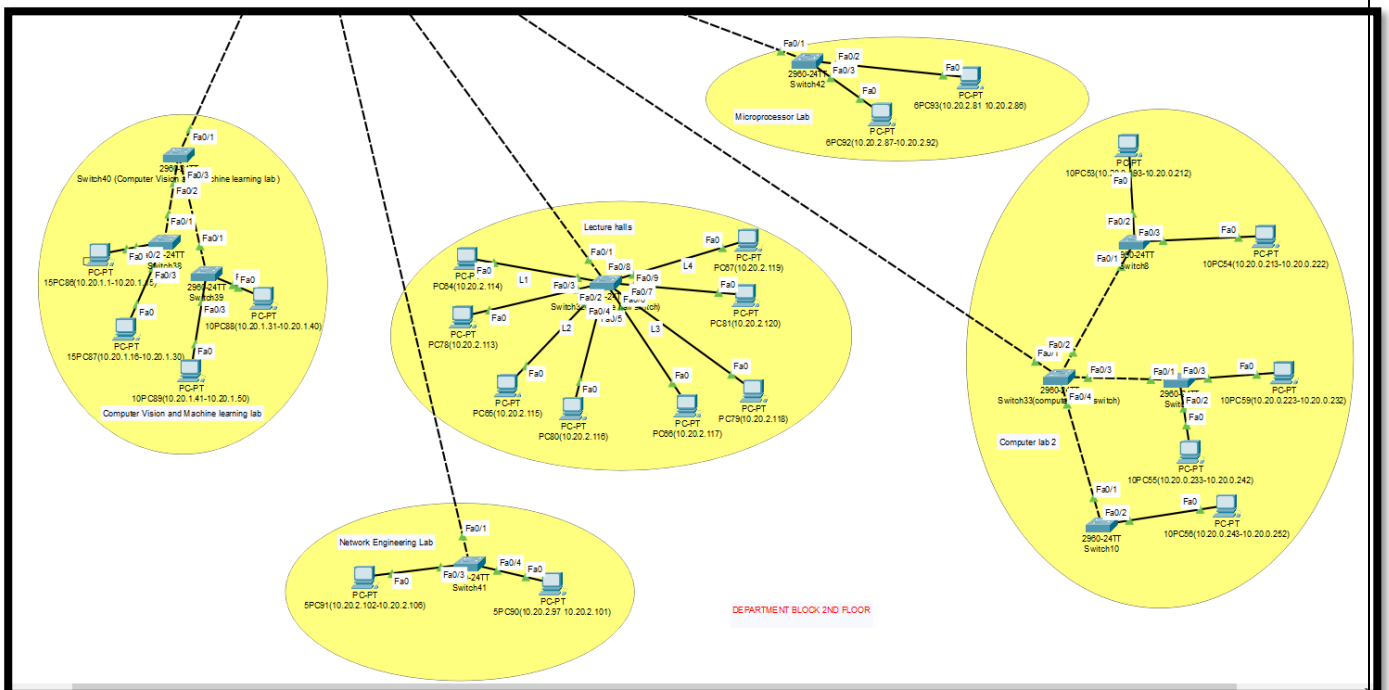


Figure 5:Diagram of IT Centre block second floor

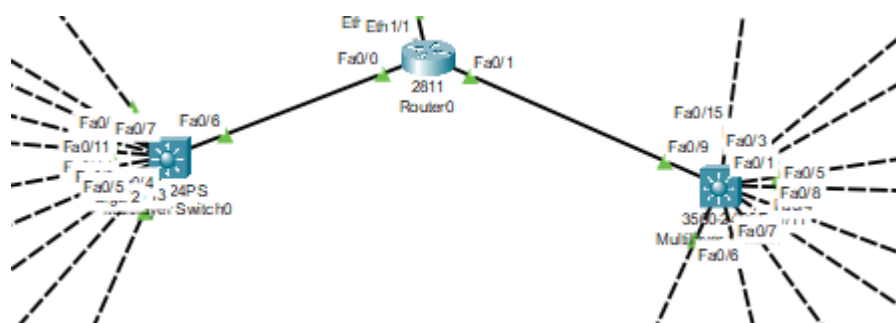


Figure 6:Diagram of two switches corresponding to each department with router

**Details of the vlans, installed devices , assigned IP address ranges and subnet masks**

VLAN	Segments	Installed devices	Allocated size	Network ID	IP address range	Broadcast ID	Subnet mask	CIDR
10	Computer Lab 1 IT Block	60	64	10.20.0.0	10.20.0.0 10.20.0.63	10.20.0.63	255.255.255.192	26
20	Computer Lab 2 IT Block	60	64	10.20.0.64	10.20.0.64 10.20.0.127	10.20.0.127	255.255.255.192	26
30	Computer Lab 1 Department Block	50	64	10.20.0.128	10.20.0.128 10.20.0.191	10.20.0.191	255.255.255.192	26
40	Computer Lab 2 Department Block	50	64	10.20.0.192	10.20.0.192 10.20.0.255		255.255.255.192	26
50	Computer Vision and Machine Learning Lab	50	64	10.20.1.0	10.20.1.0 10.20.1.63	10.20.1.63	255.255.255.192	26
60	Department Meeting Room	2+40 seating capacity Wifi	64	10.20.1.64	10.20.1.64 10.20.1.127	10.20.1.127	255.255.255.192	26
70	Meeting Room	2+40 seating capacity Wifi	64	10.20.1.128	10.20.1.128 10.20.1.191	10.20.1.191	255.255.255.192	26
80	Lobby area	40 seating capacity Wifi	64	10.20.1.192	10.20.1.192 10.20.1.255	10.20.1.255	255.255.255.192	26
90	Digital Learning and Media Centre	30PC +1 printer	64	10.20.2.0	10.20.2.0 10.20.2.63	10.20.2.63	255.255.255.192	26
100	14 staff rooms	14	16	10.20.2.64	10.20.2.64 10.20.2.79	10.20.2.79	255.255.255.240	28
110	Microprocessor Lab	12	16	10.20.2.80	10.20.2.80 10.20.2.95	10.20.2.95	255.255.255.240	28
120	Network Engineering Lab	10	16	10.20.2.96	10.20.2.96 10.20.2.111	10.20.2.111	255.255.255.240	28
130	4 lecture halls	4 PC+4 Projector	16	10.20.2.112	10.20.2.112 10.20.2.127	10.20.2.127	255.255.255.240	28
140	Staff Office Director office	5	8	10.20.2.128	10.20.2.128 10.20.2.135	10.20.2.135	255.255.255.248	29
150	4 Technical Officers Rooms Department office	4	8	10.20.2.136	10.20.2.136 10.20.2.143	10.20.2.143	255.255.255.248	29
160	Department office	2PC +1 Printer	8	10.20.2.144	10.20.2.144 10.20.2.151	10.20.2.151	255.255.255.248	29
170	2 Technical Officers Room	2	4	10.20.2.152	10.20.2.152 10.20.2.155	10.20.2.155	255.255.255.252	30
180	Director office	2PC	4	10.20.2.156	10.20.2.156 10.20.2.159	10.20.2.159	255.255.255.252	30
190	Printing Room	2 printer	4	10.20.2.160	10.20.2.160 10.20.2.163	10.20.2.163	255.255.255.252	30
200	Network Manager Room	1	4	10.20.2.164	10.20.2.164 10.20.2.167	10.20.2.167	255.255.255.252	30



## Router configuration

Router0

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Ethernet1/0

Ethernet1/1

Ethernet1/2

Ethernet1/3

FastEthernet0/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0050.0FDD.9901

IP Configuration

IP Address 10.20.3.1

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

Router#

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface FastEthernet0/0

Router(config-if)#

☐ Top

Router0

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Ethernet1/0

Ethernet1/1

Ethernet1/2

Ethernet1/3

FastEthernet0/1

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0050.0FDD.9902

IP Configuration

IP Address 10.20.3.65

Subnet Mask 255.255.255.192

Tx Ring Limit 10

Equivalent IOS Commands

Router(config)#interface FastEthernet0/0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface FastEthernet0/1

Router(config-if)#

☐ Top

Router0

Physical Config CLI Attributes

IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1,  
changed state to up

Router>enable

Router#

Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#interface FastEthernet0/0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface FastEthernet0/0

Router(config-if)#ip address 10.20.3.1 255.255.255.192

Router(config-if)#ip address 10.20.3.1 255.255.255.192

Router(config-if)#

Router(config-if)#exit

Router(config)#interface FastEthernet0/1

Router(config-if)#ip address 10.20.3.65 255.255.255.192

Router(config-if)#ip address 10.20.3.65 255.255.255.192

Router(config-if)#

Router(config-if)#exit

Router(config)#interface Ethernet1/0

Router(config-if)#ip address 10.20.3.129 255.255.255.192

Router(config-if)#ip address 10.20.3.129 255.255.255.192

Router(config-if)#

Router(config-if)#exit

Router(config)#interface Ethernet1/1

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#ip address 10.20.3.193 255.255.255.192

Router(config-if)#

Ctrl+F6 to exit CLI focus

Copy

Paste

☐ Top

## PC configuration

The screenshot shows the configuration window for PC 10PC6. The 'Config' tab is selected. On the left, the 'INTERFACE' section is expanded, showing 'FastEthernet0'. The main area displays the 'FastEthernet0' configuration. The 'Port Status' is 'On'. 'Bandwidth' is set to '100 Mbps'. 'Duplex' is set to 'Full Duplex'. The 'MAC Address' is '00E0.B0A6.9BB8'. Under 'IP Configuration', 'Static' is selected, with 'IP Address' set to '10.20.0.65' and 'Subnet Mask' set to '255.255.255.192'. Under 'IPv6 Configuration', 'Static' is selected, with 'IPv6 Address' set to 'FE80::2E0:B0FF:FEA6:9BB8' and 'Link Local Address' set to 'FE80::2E0:B0FF:FEA6:9BB8'.

10PC6(10.20.0.65-10.20.0.74)

Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

FastEthernet0

Bluetooth

**FastEthernet0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.B0A6.9BB8

IP Configuration

☐ DHCP

☒ Static

IP Address 10.20.0.65

Subnet Mask 255.255.255.192

IPv6 Configuration

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Address FE80::2E0:B0FF:FEA6:9BB8

Link Local Address: FE80::2E0:B0FF:FEA6:9BB8

☐ Top

Figure: Allocate IP address and enter subnet mask for a PC

The screenshot shows the configuration window for PC 10PC6. The 'Config' tab is selected. On the left, the 'GLOBAL' section is expanded, showing 'Global Settings'. The main area displays the 'Global Settings' configuration. The 'Display Name' is '10PC6(10.20.0.65-10.20.0.74)'. The 'Interfaces' dropdown is set to 'FastEthernet0'. Under 'Gateway/DNS IPv4', 'Static' is selected, with 'Gateway' set to '10.20.0.65' and 'DNS Server' set to an empty field. Under 'Gateway/DNS IPv6', 'Static' is selected, with 'IPv6 Gateway' set to an empty field and 'IPv6 DNS Server' set to an empty field.

10PC6(10.20.0.65-10.20.0.74)

Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

FastEthernet0

Bluetooth

**Global Settings**

Display Name 10PC6(10.20.0.65-10.20.0.74)

Interfaces FastEthernet0

Gateway/DNS IPv4

☐ DHCP

☒ Static

Gateway 10.20.0.65

DNS Server

Gateway/DNS IPv6

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Gateway

IPv6 DNS Server

☐ Top

Figure: Assign a gate way for the corresponding pc



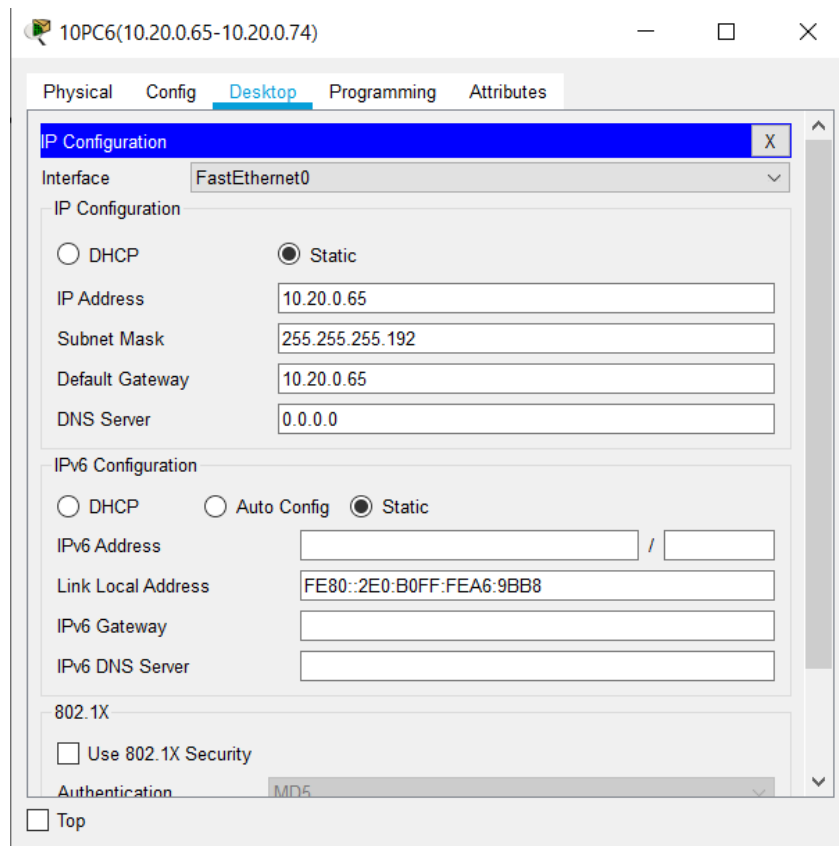


Figure : Configuration of IP

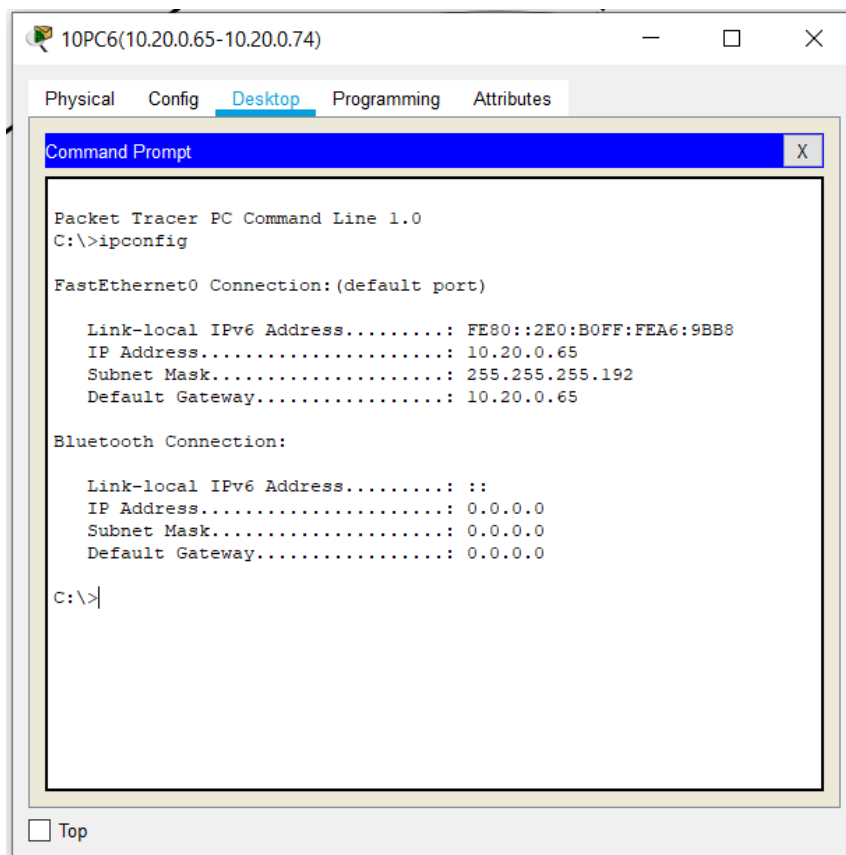


Figure : Configuration of IP in command line

## Pinging

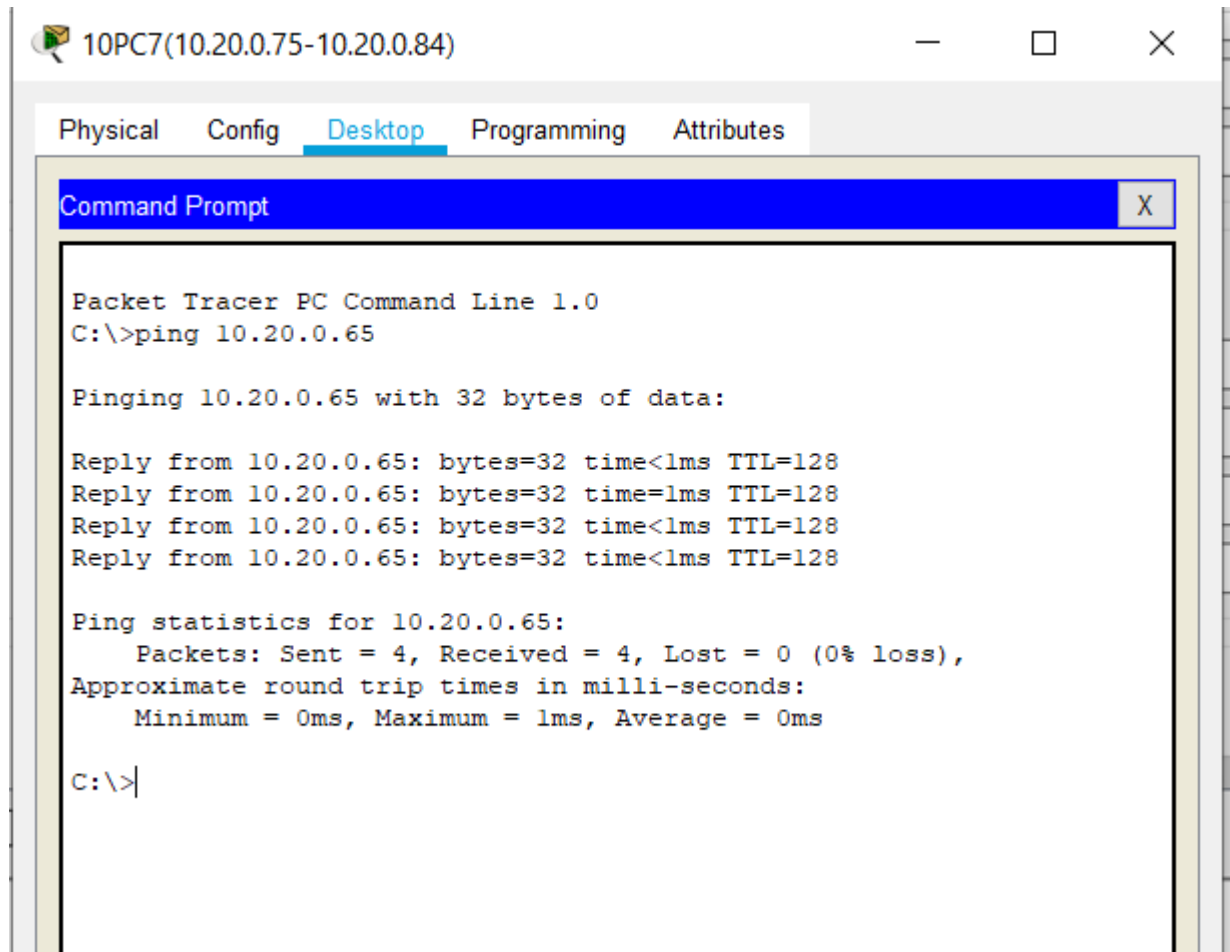


Figure : Pinging the configured PC

PC14(10.20.2.165)

Physical Config **Desktop** Programming Attributes

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.20.2.165

Subnet Mask: 255.255.255.252

Default Gateway: 10.20.3.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20D:BDFF:FEBA:28E6

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

☐ Top

Figure : Configuration of IP for another PC

## Printer configuration

Printer0(10.20.2.161)

Physical **Config** Attributes

**GLOBAL**

Settings

**INTERFACE**

FastEthernet0

**FastEthernet0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 000A.4183.14DD

IP Configuration

☐ DHCP

☒ Static

IP Address 10.20.2.161

Subnet Mask 255.255.255.252

IPv6 Configuration

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Address

Link Local Address: FE80::20A:41FF:FE83:14DD

☐ Top

Figure : Printer configuration (Printing room)

Printer3(10.20.2.147)

Physical **Config** Attributes

**GLOBAL**

Settings

**INTERFACE**

FastEthernet0

**FastEthernet0**

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00E0.F99D.7160

IP Configuration

☐ DHCP

☒ Static

IP Address 10.20.2.147

Subnet Mask 255.255.255.248

IPv6 Configuration

☐ DHCP

☐ Auto Config

☒ Static

IPv6 Address

Link Local Address: FE80::2E0:F9FF:FE9D:7160

☐ Top

Figure : Printer configuration

Switch12

Physical Config CLI Attributes

### IOS Command Line Interface

```
Switch>enable
Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#ip access-list extended Printer
Switch(config-ext-nacl)#permit ip host 10.20.2.162 host
10.20.2.129
Switch(config-ext-nacl)#permit ip host 10.20.2.162 host
10.20.2.130
Switch(config-ext-nacl)#permit ip host 10.20.2.162 host
10.20.2.131
Switch(config-ext-nacl)#permit ip host 10.20.2.162 host
10.20.2.132
Switch(config-ext-nacl)#permit ip host 10.20.2.162 host
10.20.2.133
Switch(config-ext-nacl)#permit ip host 10.20.2.161 host
10.20.2.129
Switch(config-ext-nacl)#permit ip host 10.20.2.161 host
10.20.2.130
Switch(config-ext-nacl)#permit ip host 10.20.2.161 host
10.20.2.131
Switch(config-ext-nacl)#permit ip host 10.20.2.161 host
10.20.2.132
Switch(config-ext-nacl)#permit ip host 10.20.2.161 host
10.20.2.133
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.0.1
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.2.153
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.2.56
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.2.165
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host
10.20.2.1.129

Switch(config-ext-nacl)#deny ip host 10.20.2.162 host
10.20.1.129
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.1.0
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.1.1
Switch(config-ext-nacl)#deny ip host 10.20.2.162 host 10.20.0.65
Switch(config-ext-nacl)#deny ip any any
Switch(config-ext-nacl)#permit ip any any
Switch(config-ext-nacl)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

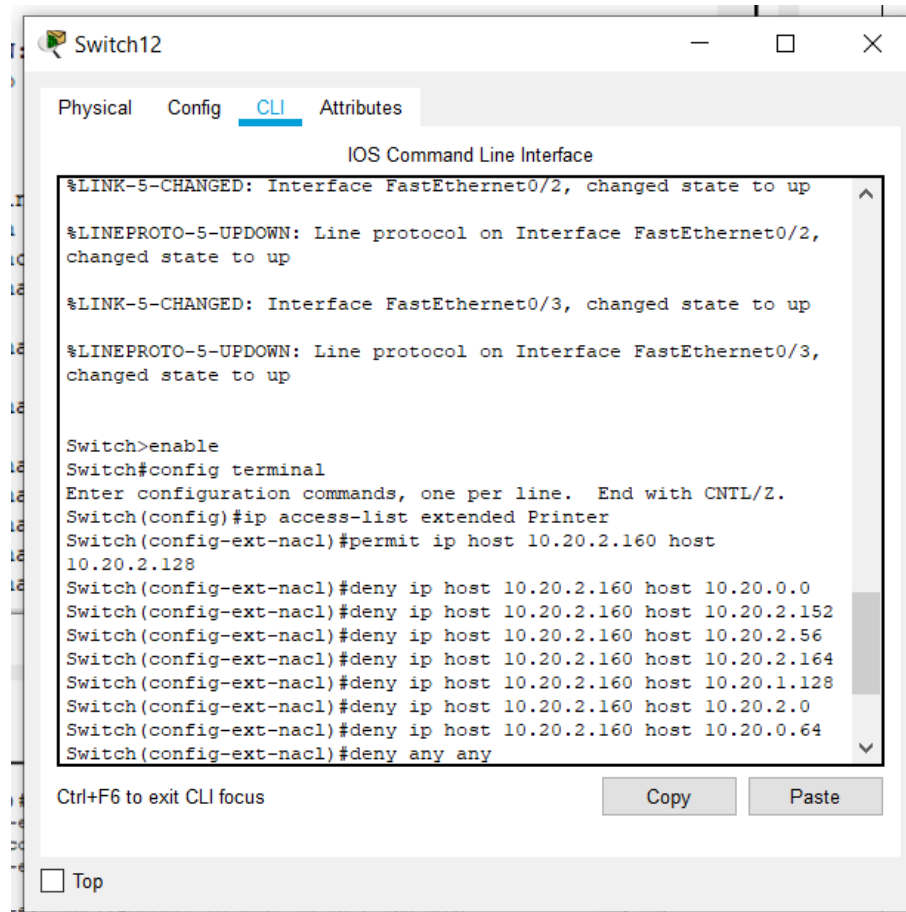


Figure : Printer access of printing room can be only accessed by staff office

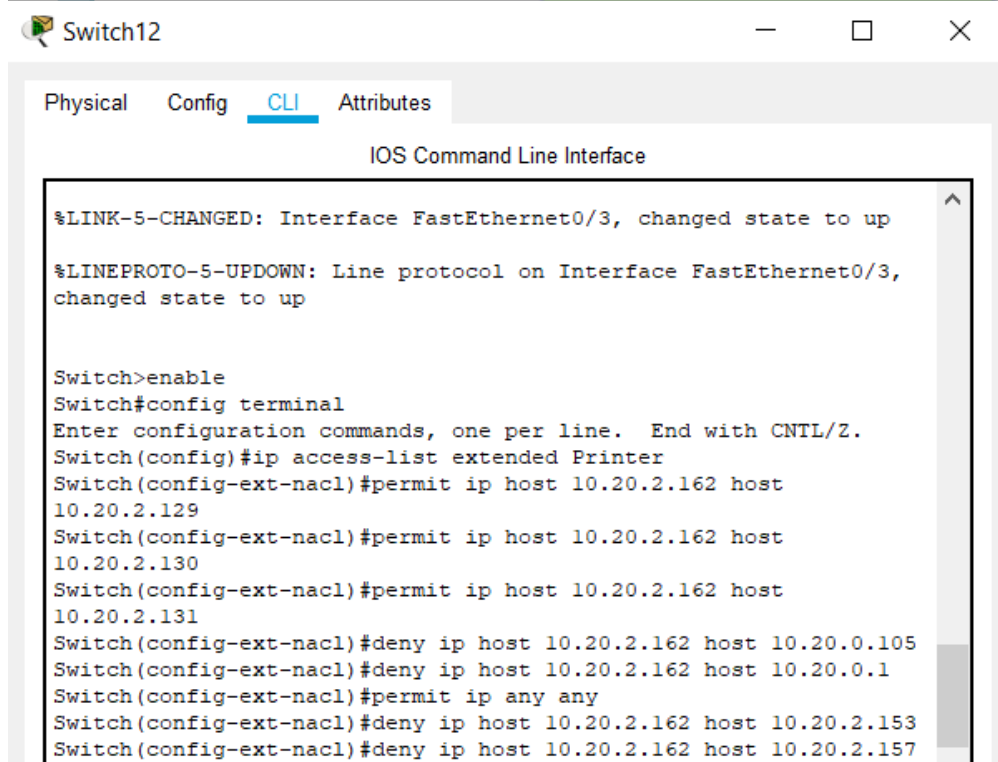


Figure : Printer access of printing room can be only accessed by staff office

## Pinging

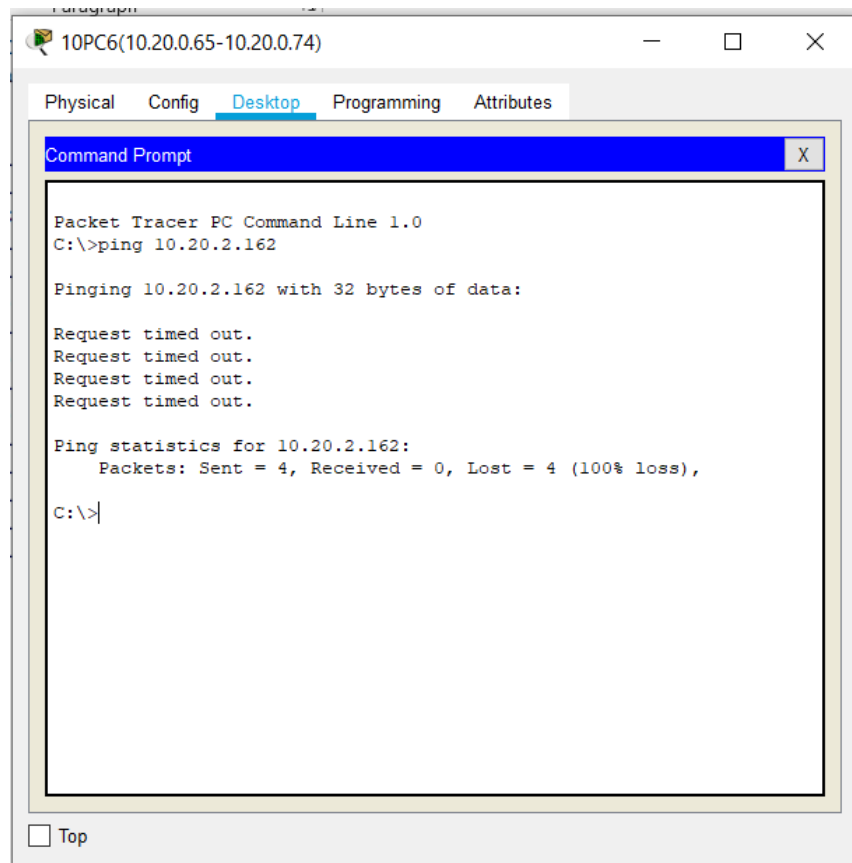


Figure : Printer restriction for a PC 10.20.0.65 in computer lab 2

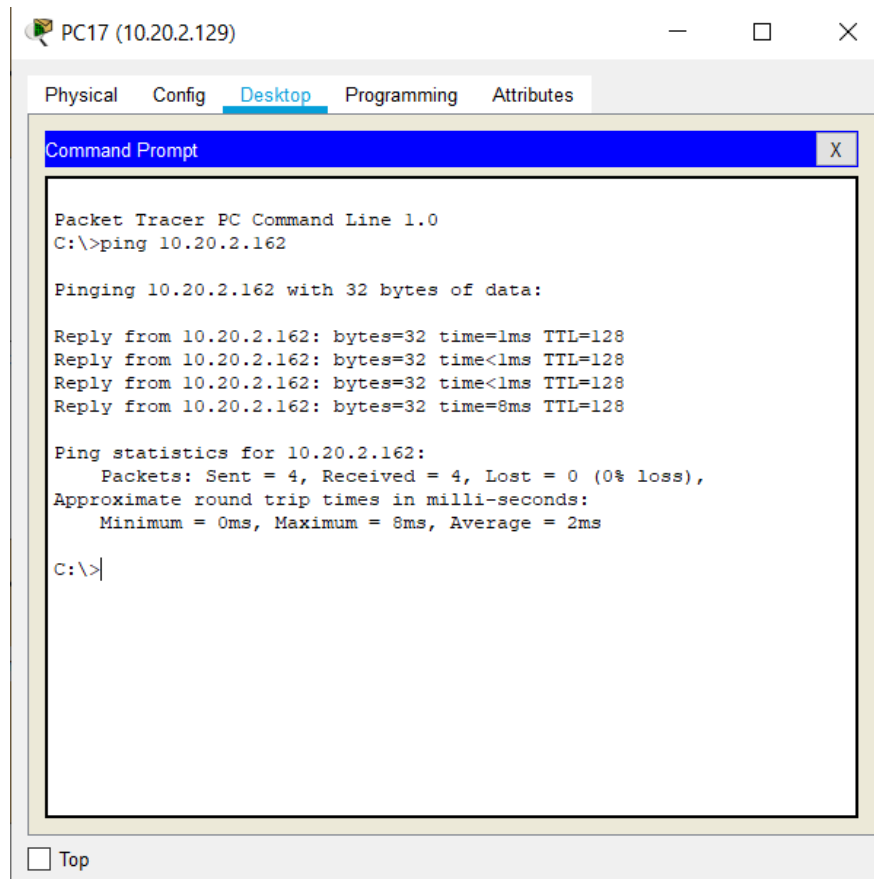


Figure : Printer accessed



## Switch configuration

### Assigning vlans for IT block

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname mainswitch1
mainswitch1(config)#vlan 10
mainswitch1(config-vlan)#name computerlab1
mainswitch1(config-vlan)#vlan 20
mainswitch1(config-vlan)#name computerlab2
mainswitch1(config-vlan)#vlan 70
mainswitch1(config-vlan)#name MeetingRoom
mainswitch1(config-vlan)#vlan 80
mainswitch1(config-vlan)#name LobbyArea
mainswitch1(config-vlan)#vlan 90
mainswitch1(config-vlan)#name DigitalLearningAndMediaCentre
mainswitch1(config-vlan)#vlan 140
mainswitch1(config-vlan)#name StaffOffice
mainswitch1(config-vlan)#vlan 170
mainswitch1(config-vlan)#name TOfficeRoom
mainswitch1(config-vlan)#vlan 180
mainswitch1(config-vlan)#name DirectorOffice
mainswitch1(config-vlan)#vlan 190
mainswitch1(config-vlan)#name PrintingRoom
mainswitch1(config-vlan)#vlan 200
mainswitch1(config-vlan)#name NetworkManagerRoom
mainswitch1(config-vlan)#end
mainswitch1#
%SYS-5-CONFIG_I: Configured from console by console
```

Figure :vlan configuration on mainswitch 1

```
mainswitch1(vlan)#exit
APPLY completed.
Exiting....
mainswitch1#show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gig0/1, Gig0/2
10	computerlab1	active	
20	computerlab2	active	
70	MeetingRoom	active	
80	LobbyArea	active	
90	DigitalLearningAndMediaCentre	active	
140	StaffOffice	active	
170	TOfficeRoom	active	
180	DirectorOffice	active	
190	PrintingRoom	active	
200	NetworkManagerRoom	active	
1002	fddi-default	active	
1003	token-ring-default	active	

--More--

Figure :vlan configuration on mainswitch 1 with 'show vlan' on command prompt before assigning interfaces

```
%LINK-3-CHANGED: Interface FastEthernet0/6, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

mainswitch1>enable
mainswitch1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
mainswitch1(config)#interface FastEthernet0/7
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 10
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/3
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 20
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/4
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 70
mainswitch1(config-if)#exit
mainswitch1(config)#interface Gig0/2
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 80
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/13
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 90
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/5
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 140
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/11
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 170
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/2
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 180
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/1
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 190
mainswitch1(config-if)#exit
mainswitch1(config)#interface FastEthernet0/10
mainswitch1(config-if)#switchport mode access
mainswitch1(config-if)#switchport access vlan 200
mainswitch1(config-if)#exit
mainswitch1(config)#exit
mainswitch1#
%SYS-5-CONFIG_I: Configured from console by console
|
```

Ctrl+F6 to exit CLI focus

Figure: Assigning interfaces for every Vlan in IT block

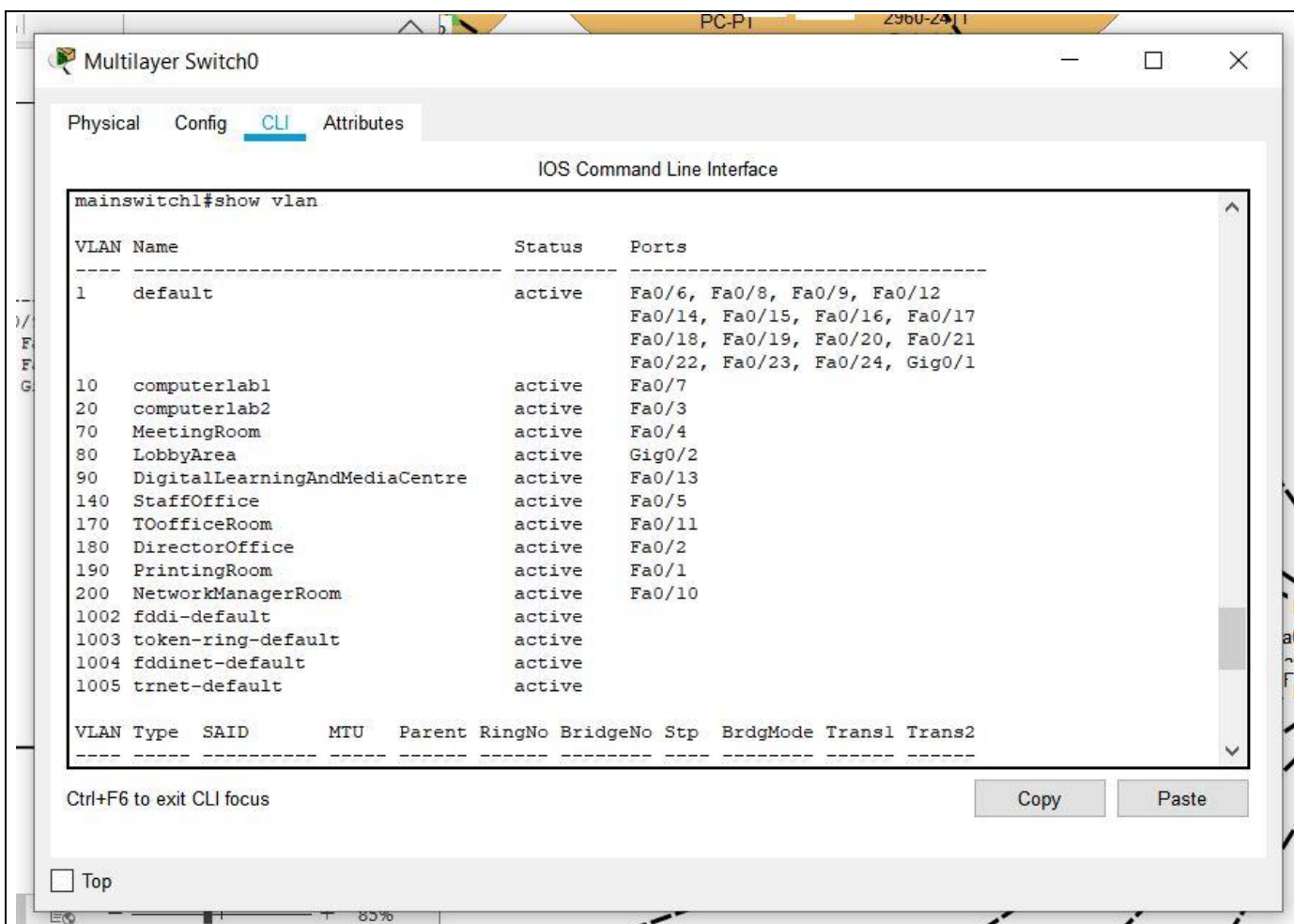


Figure : Show vlans after assigning the interfaces for vlans

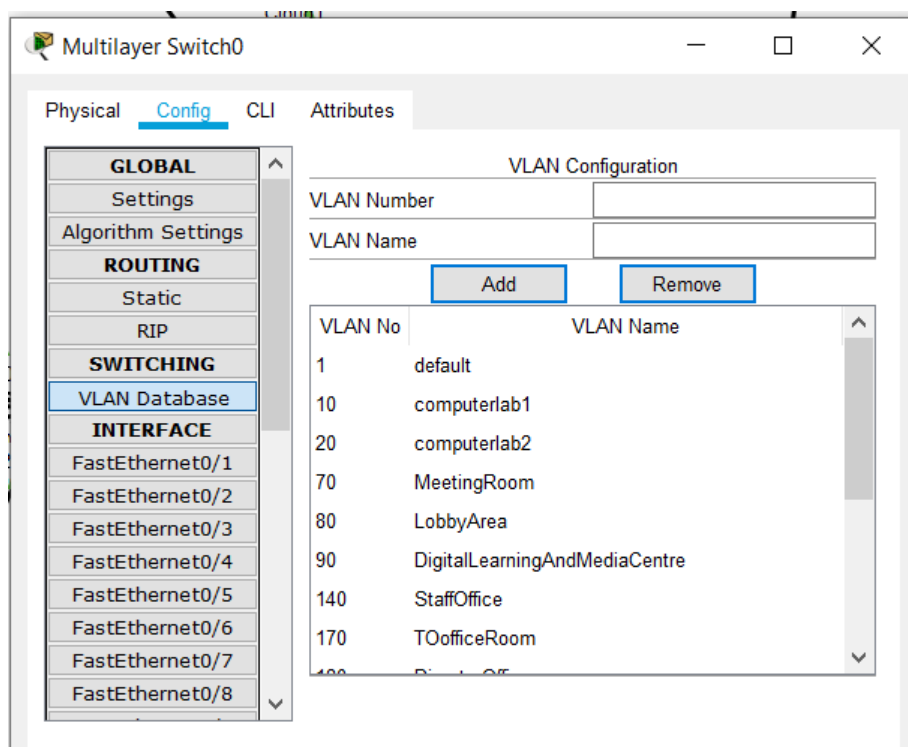


Figure : vlan data base of IT block switch



## Department block vlan set up

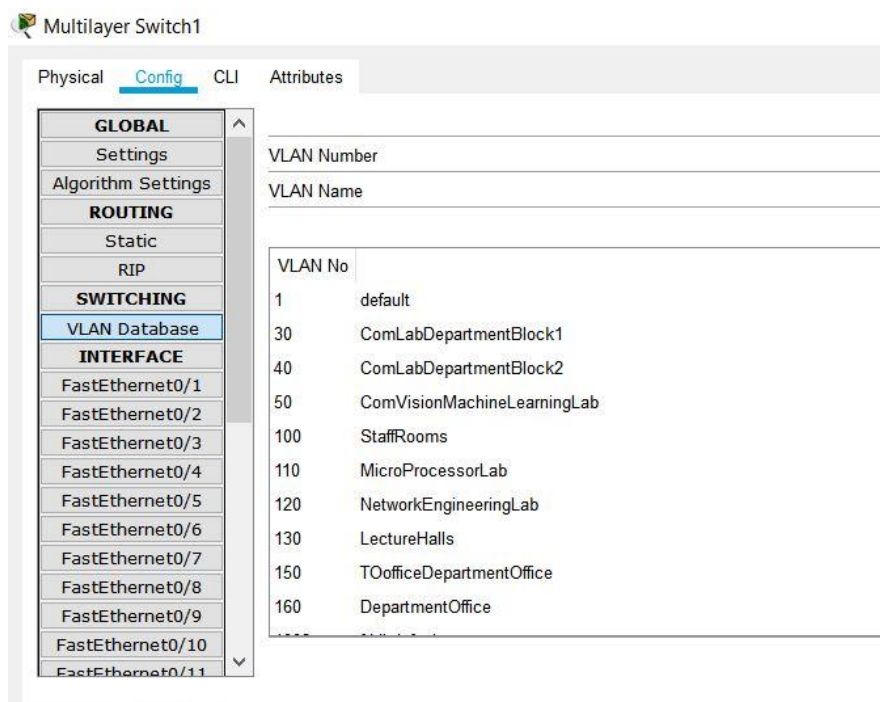


Figure : vlan data base of Department block switch

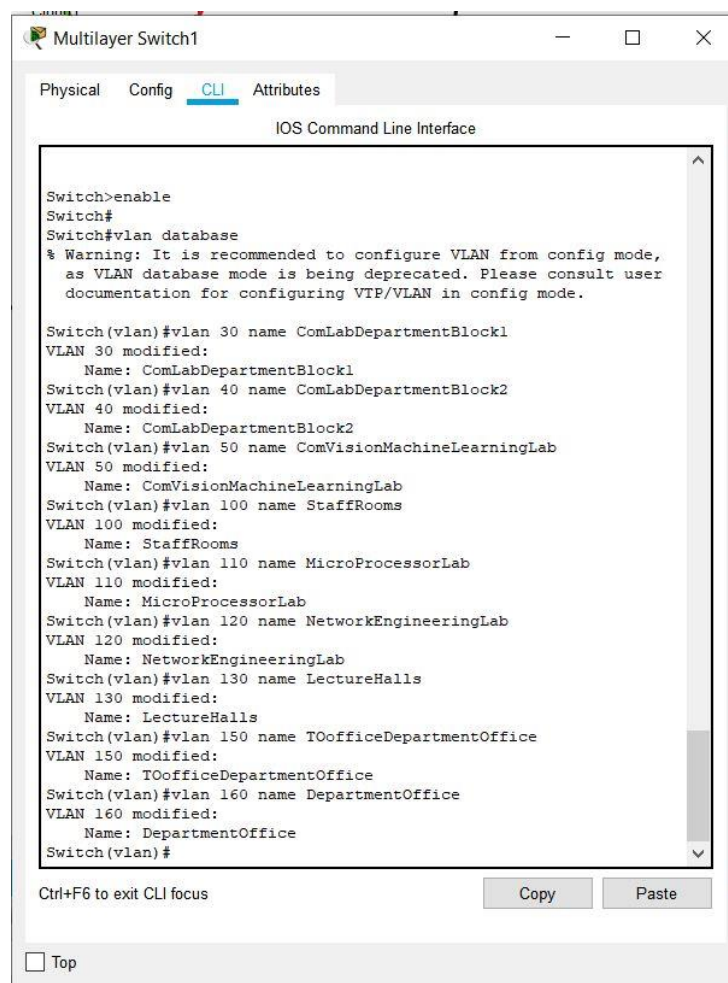


Figure : vlan data base operations in cmd line interfaces

Multilayer Switch1

PhysicalConfigCLIAttributes

IOS Command Line Interface

Switch#  
Switch#  
Switch#  
Switch#  
Switch#  
Switch#show vlan

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gig0/1, Gig0/2
30	ComLabDepartmentBlock1	active	
40	ComLabDepartmentBlock2	active	
50	ComVisionMachineLearningLab	active	
100	StaffRooms	active	
110	MicroProcessorLab	active	
120	NetworkEngineeringLab	active	
130	LectureHalls	active	
150	TOofficeDepartmentOffice	active	
160	DepartmentOffice	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

--More--

Ctrl+F6 to exit CLI focus

CopyPaste

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Figure : Show vlans before assigning the interfaces for vlans

```
Switch(config-if)#exit
Switch(config)#interface Fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#interface Fa0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#exit
Switch(config)#interface Fa0/6
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 50
Switch(config-if)#exit
Switch(config)#interface Fa0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 100
Switch(config-if)#exit
Switch(config)#interface Fa0/8
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 120
Switch(config-if)#exit
Switch(config)#interface Fa0/11
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 130
Switch(config-if)#exit
Switch(config)#interface Fa0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 150
Switch(config-if)#exit
Switch(config)#interface Fa0/15
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 160
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface Fa0/7
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 120
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch(config)#
Switch(config)#interface Fa0/8
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 110
Switch(config-if)#exit
Switch(config)#exit
Switch#
```

Figure: Assigning interfaces for every Vlan in Department block

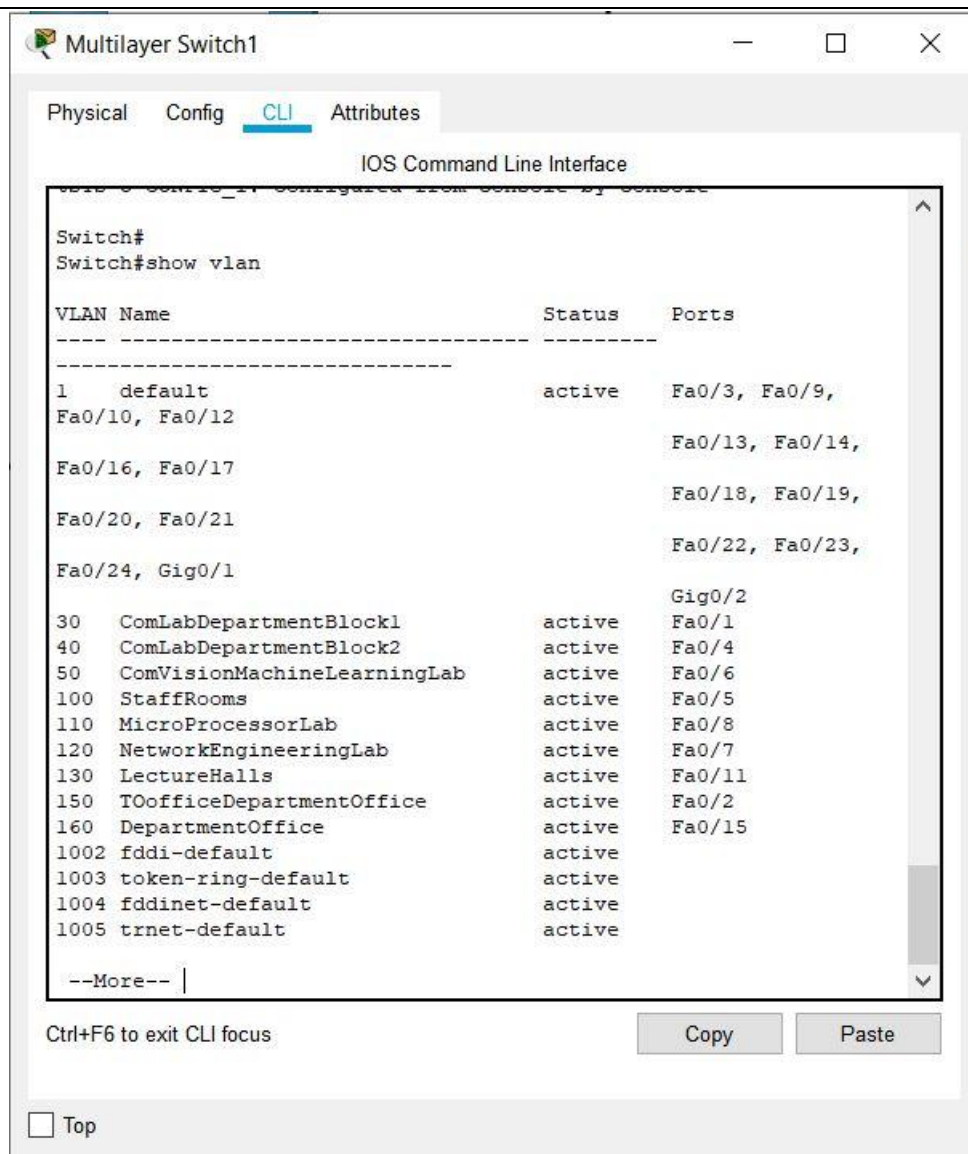


Figure : Show vlans after assigning the interfaces for vlans



## Wifi configuration

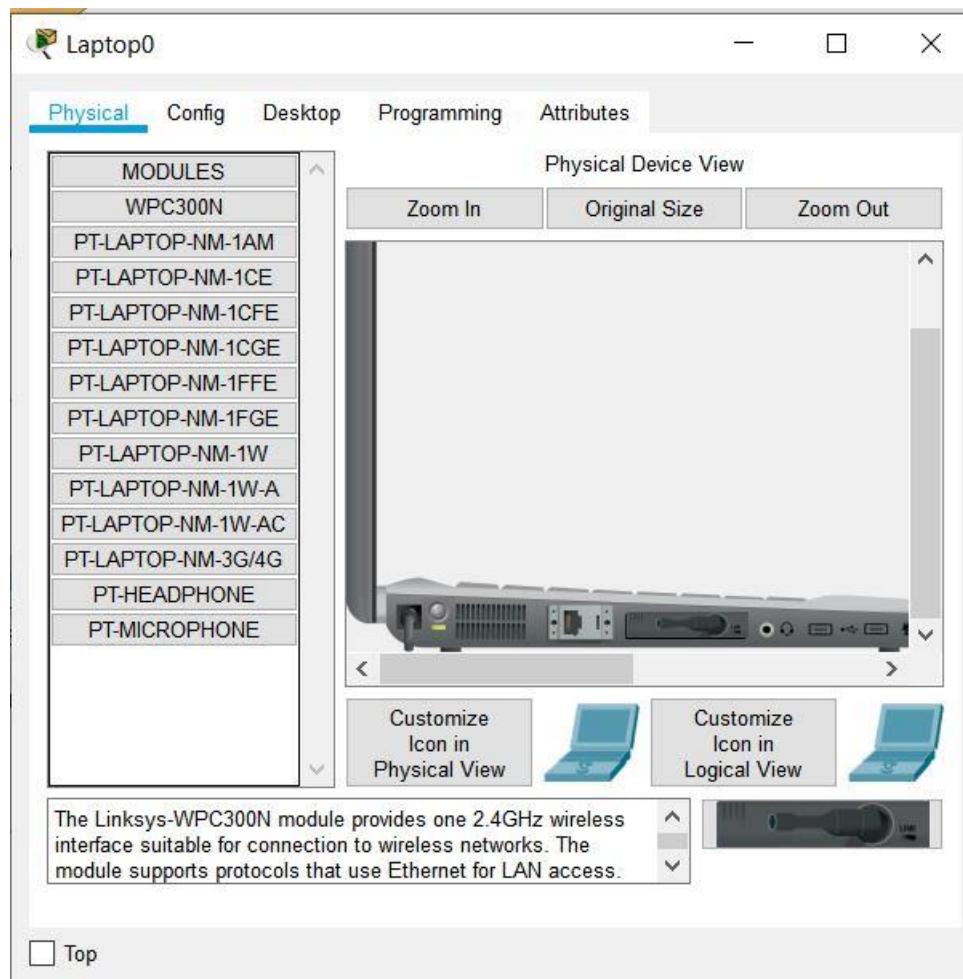


Figure : Assign physical terminal

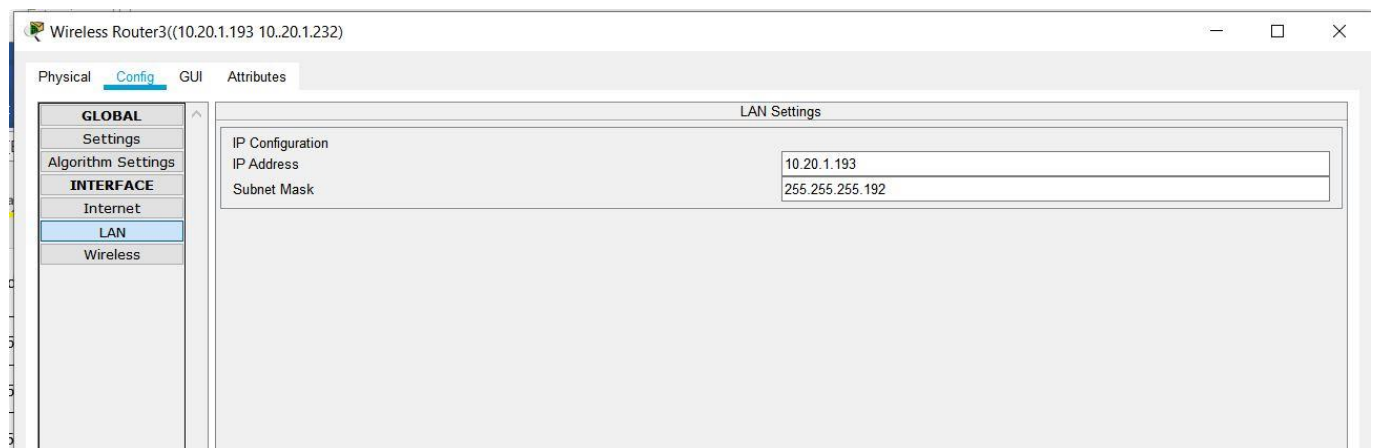


Figure : Wireless router LAN settings

Wireless Router3((10.20.1.193 10.20.1.232))

Physical Config **GUI** Attributes

**Setup** Setup Wireless Security Access Restrictions Applications & Gaming Administration Status

Basic Setup DDNS MAC Address Clone Advanced Routing

**Internet Setup**

Internet Connection type: Automatic Configuration - DHCP

Optional Settings (required by some internet service providers)

Host Name:

Domain Name:

MTU:  Size: 1500

**Network Setup**

Router IP

IP Address: 10 - 20 - 1 - 193

Subnet Mask: 255.255.255.192

DHCP Server Settings

DHCP Server: ☒ Enabled ☐ Disabled

DHCP Reservation

Start IP Address: 10.20.1.193

Maximum number of Users: 40

IP Address Range: 10.20.1.193 - 232

Client Lease Time: 0 minutes (0 means one day)

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**Figure : Network Setup for wireless**

Wireless Router3((10.20.1.193 10.20.1.232))

Physical **Config** GUI Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

Internet

LAN

**Wireless**

**Wireless Settings**

SSID: LobbyArea

2.4 GHz Channel: 6 - 2.437GHz

Authentication

☐ Disabled ☒ WEP ☐ WPA-PSK ☐ WPA2-PSK ☐ WPA2

WEP Key: 2020185185

PSK Pass Phrase:

RADIUS Server Settings

IP Address:

Shared Secret:

Encryption Type: 40/64-Bits (10 Hex digits)

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**Figure : Assign WEP key**

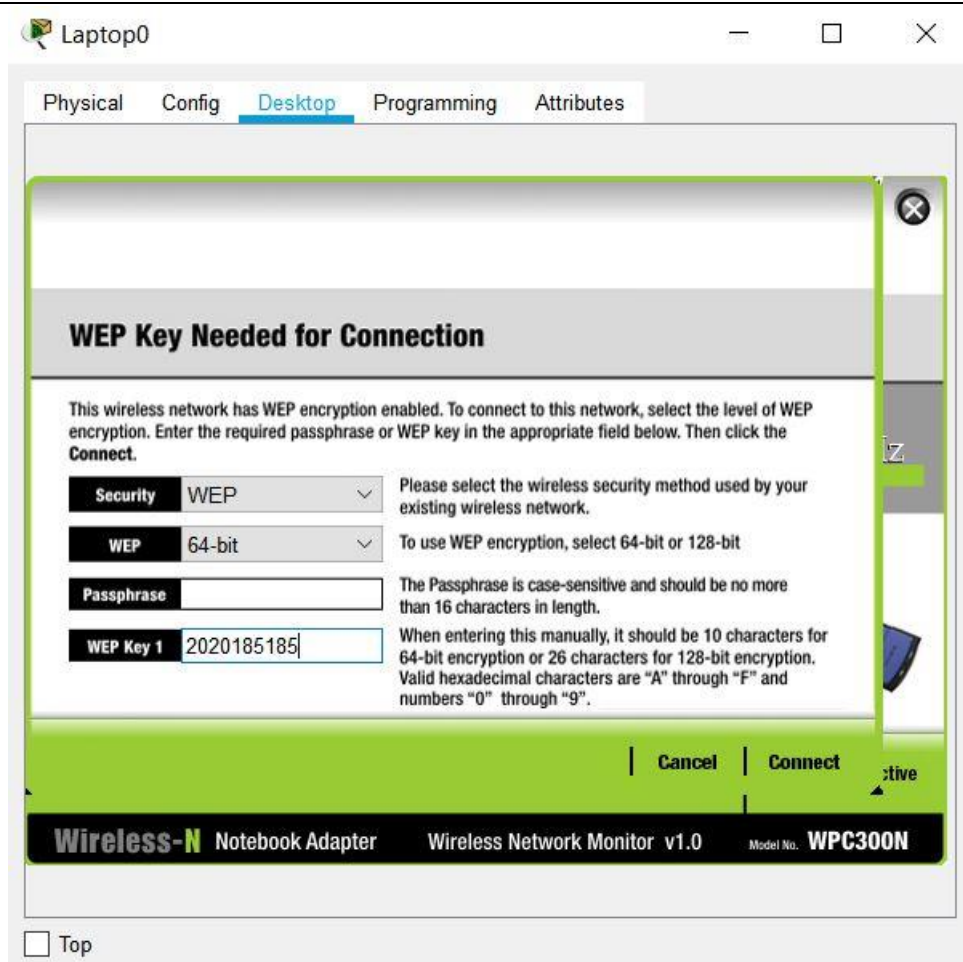


Figure : Connect Wireless

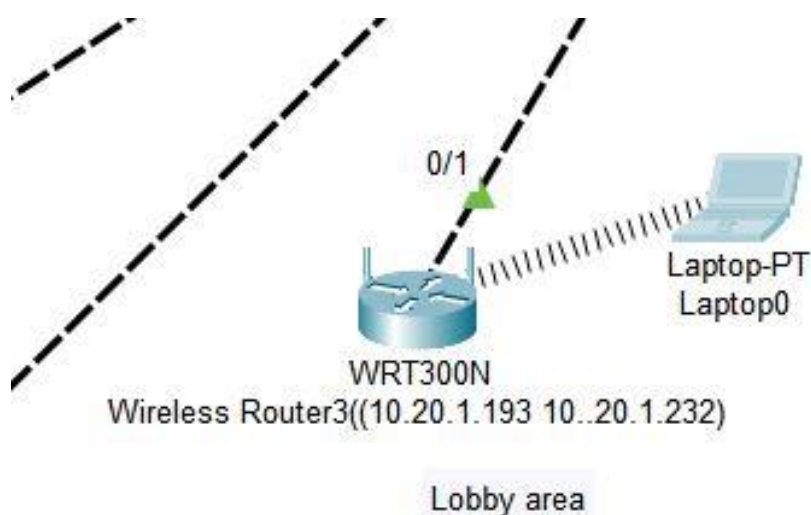


Figure : Access shown in network diagram

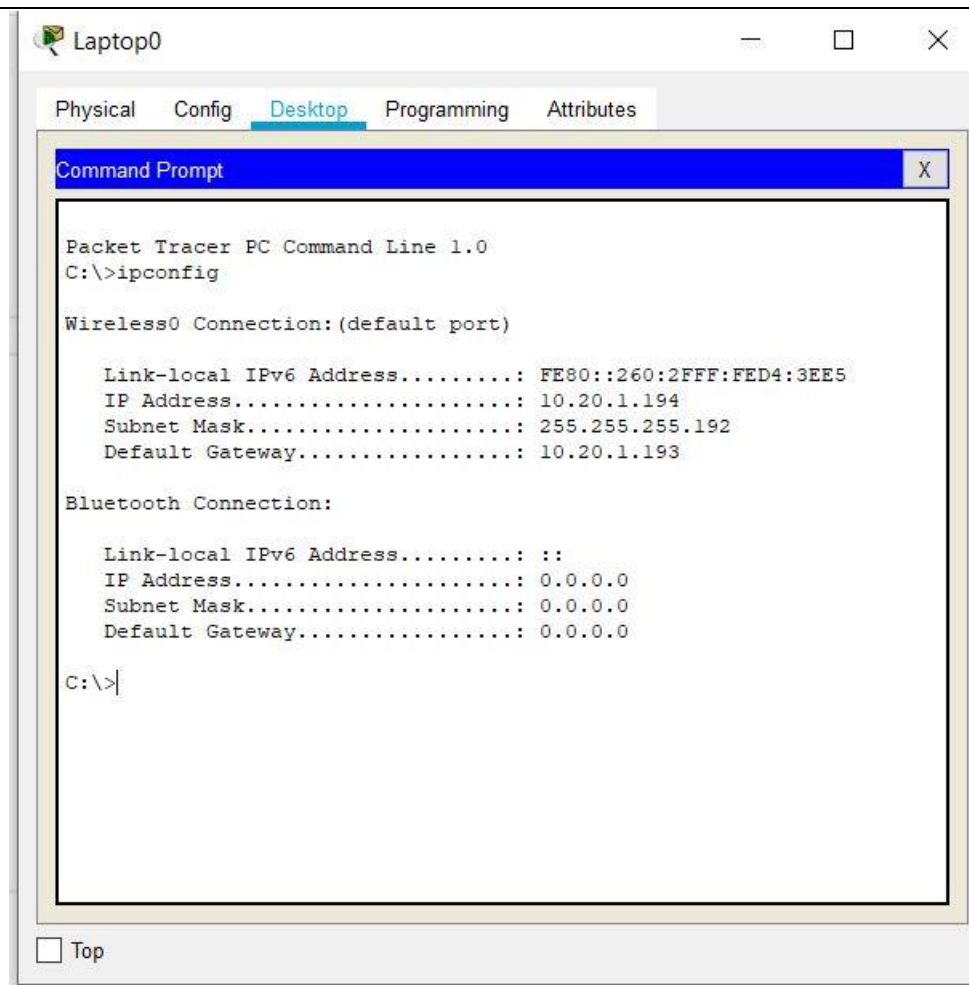


Figure : ipconfig for the laptop connected through wireless

#### DISCUSSION

The above network set up was built based on the requirements provided. Here we use minimum number of switches and routers to minimize the additional costs. Routers and switches are more expensive. And for end devices we want more ip addresses to allocate. But on other way better transmission speeds can get by using multiple routers as a single router can only serve so many devices at a time. Having multiple Wi-Fi routers helps share the load caused by several devices requesting packets simultaneously. This is a limitation of this setup.