EC 4060 Computer and data networks

SELF LEARNING ASSIGNMENT

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2020/E/070
SEMESTER 4
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NETWORK DIAGRAM
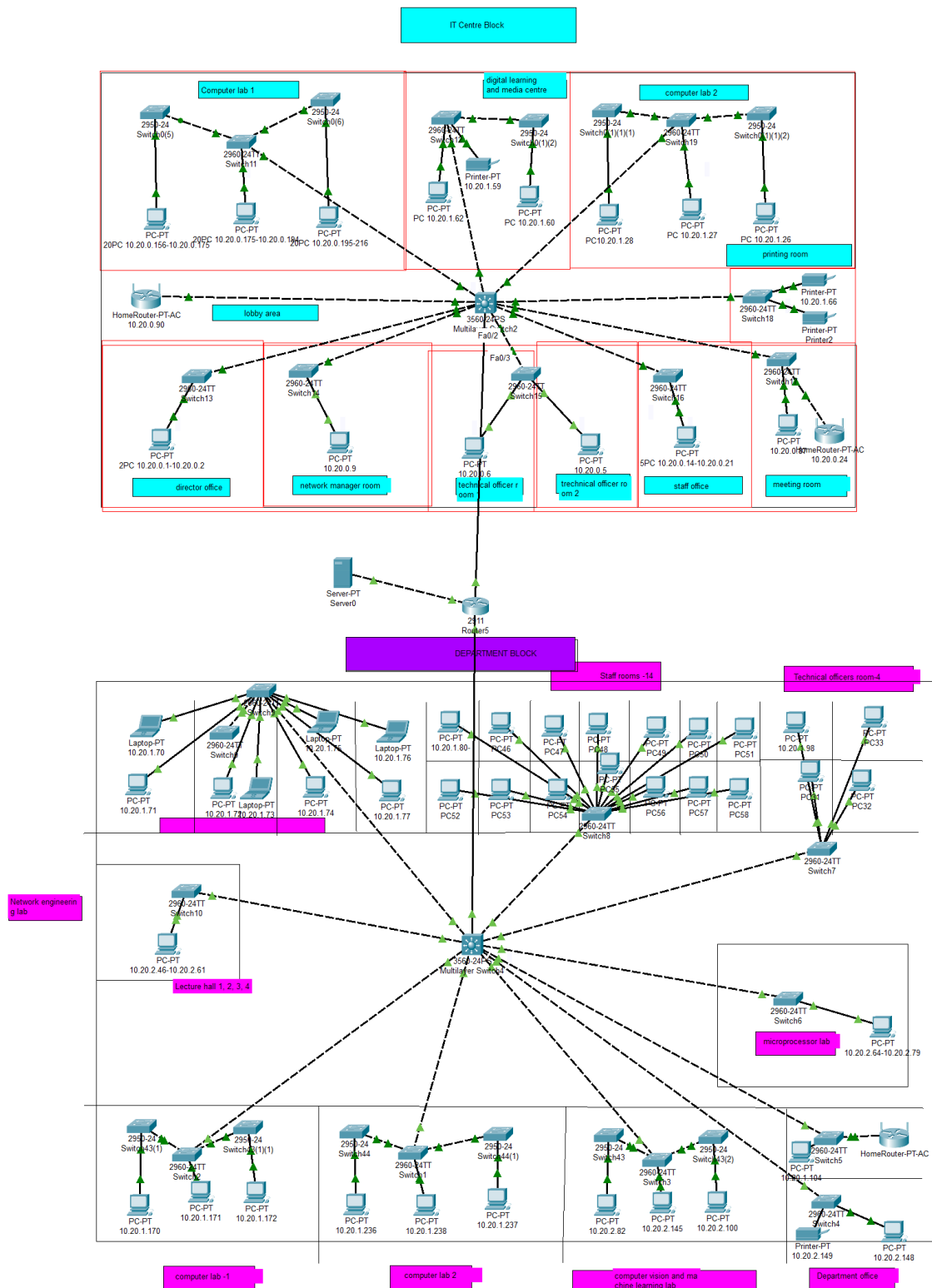

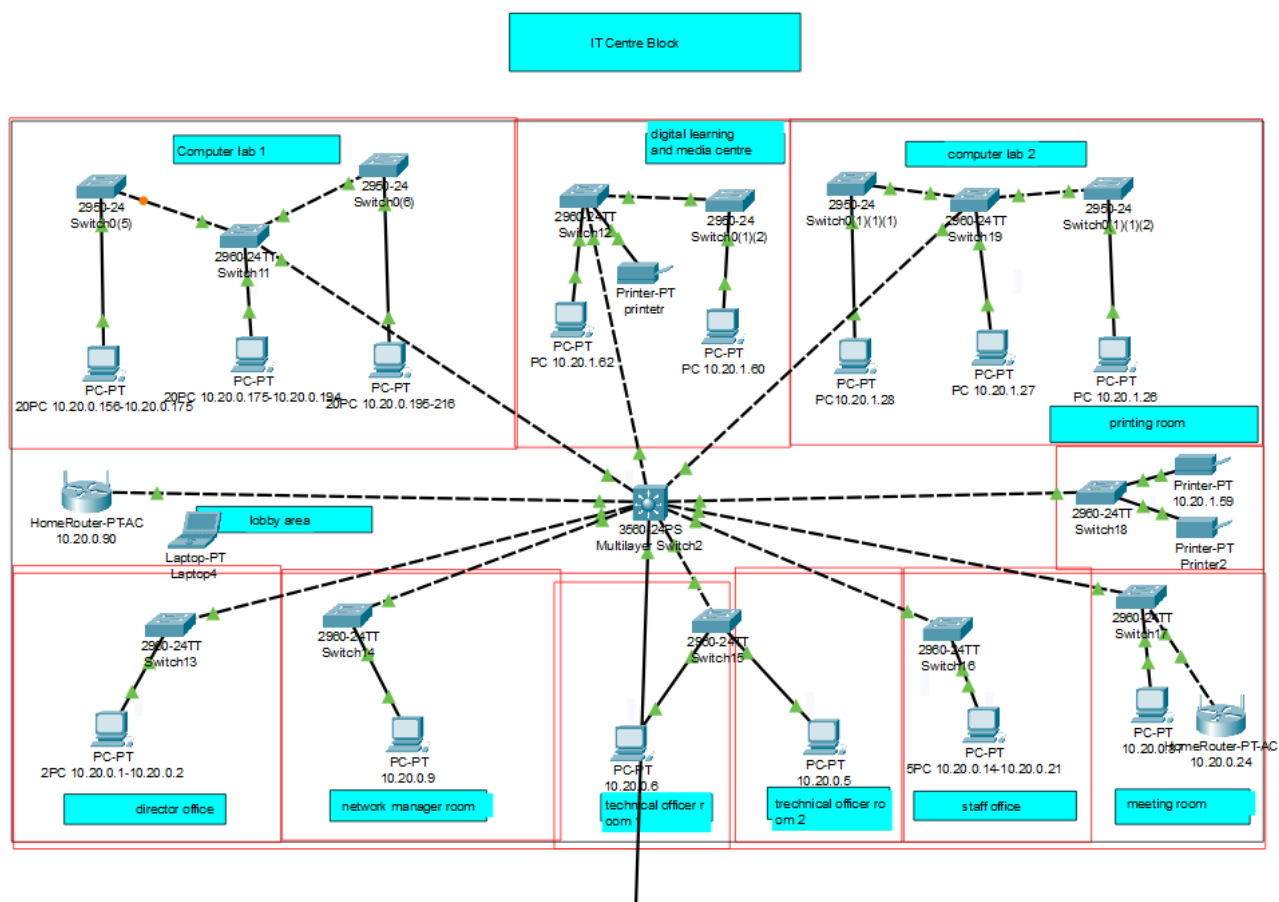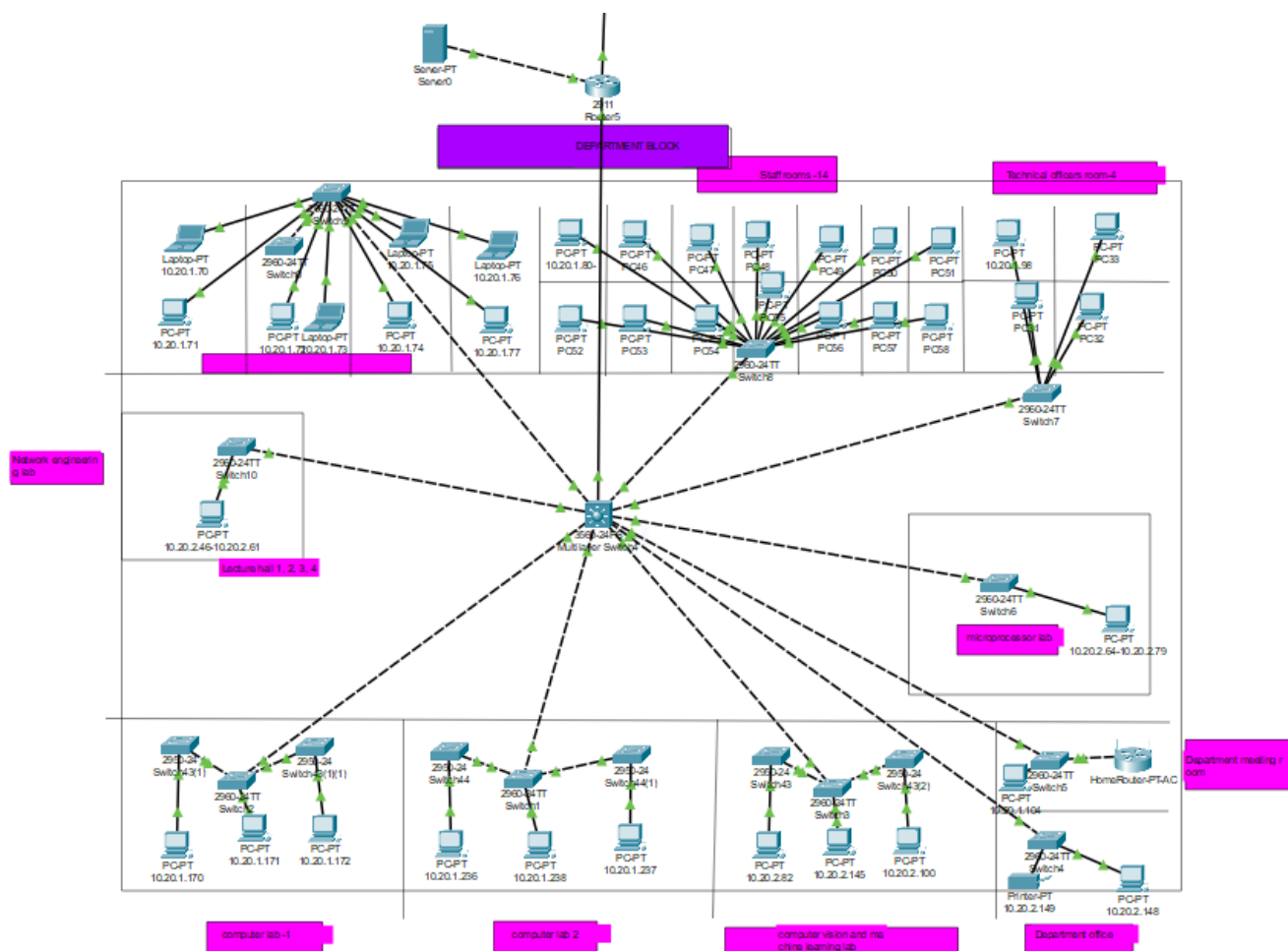*Figure 01: Network diagram*

Figure 02:Network diagram of it centre block

Figure 03: network diagram of department block

IT CENTER BLOCK

Place	No of connections
Director office	2
Technical officer room-2	2
Network manager room	1
Staff office	5
Meeting room	2-video,pc
Lobby area	1 wifi
Com lab1	60
Com lab 2	60
Digital learning and media center	31
Printing room	2

DEPARTMENT BLOCK

Place	Number of connections
lecture halls 4	8
staff rooms 14	14
technical officer room 4	4
department meeting room	2
com lab 1	50
com lab 2	50
network engineer lab	10
microprocessor la	12
computer vision and machine learning lab	50
department office	3

Vlan name	vlan number	needed size	allocated size	NETWORK ADDRESS	MASK	SUBNET MASK	IP RANGE	BROADCAST
Director office	10	2	2	10.20.0.0	/30	255.255.255.252	10.20.0.1-10.20.0.2	10.20.0.3
Technical officer room-2	20	2	2	10.20.0.4	/30	255.255.255.252	10.20.0.5-10.20.0.6	10.20.0.7
Network manager room	30	1	2	10.20.0.8	/30	255.255.255.252	10.20.0.9-10.20.0.10	10.20.0.12
Staff office	40	5	8	10.20.0.13	/29	255.255.255.248	10.20.0.14-10.20.0.21	10.20.0.22
Meeting room	50	2 + 50-	64	10.20.0.23	/26	255.255.255.192	10.20.0.24-10.20.0.87	10.20.0.88
Lobby area	60	50	64	10.20.0.89	/26	255.255.255.192	10.20.0.90-10.20.0.153	10.20.0.154
Com lab1	70	60	64	10.20.0.155	/26	255.255.255.192	10.20.0.156-10.20.0.219	10.20.0.220
Com lab 2	80	60	64	10.20.0.221	/26	255.255.255.192	10.20.0.222-10.20.1.29	10.20.1.30
Digital learning and media	90	31	32	10.20.1.31	/27	255.255.255.224	10.20.1.32-10.20.1.63	10.20.1.64
Printing room	100	2	2	10.20.1.65	/30	255.255.255.252	10.20.1.66-10.20.1.67	10.20.1.68
lecture halls 4	11	8	8	10.20.1.69	/29	255.255.255.248	10.20.1.70-10.20.1.77	10.20.1.78
staff rooms 14	22	14	16	10..20.1.79	/28	255.255.255.240	10.20.1.80-10.20.1.95	10.20.1.96
technical officer room 4	33	4	4	10.20.1.97	/30	255.255.255.252	10.20.1.98-10.20.1.101	10.20.1.102
department meeting room	44	2+50	64	10.20.1.103	/26	255.255.255.192	10.20.1.104-10.20.1.167	10.20.1.168
com lab 1	55	50	64	10.20.1.169	/26	255.255.255.192	10.20.1.170-10.20.1.233	10.10.234
com lab 2	66	50	64	10.20.1.235	/26	255.255.255.192	10.20.1.236-10.20.2.43	10.20.2.44
network engineer lab	77	10	16	10.20.2.45	/28	255.255.255.240	10.20.2.46-10.20.2.61	10.20.2.62

microprocessor lab	88	12	16	10.20.2.63	/28	255.255.255.240	10.20.2.64-10.20.2.79	10.20.2.80
vision and machinelab	99	50	64	10.20.2.81	/26	255.255.255.192	10.20.2.82-10.20.2.145	10.20.2.146
department office	109	3	4	10.20.2.147	/30	255.255.255.252	10.20.2.148-10.20.2.151	10.20.2.152

the required size for wireless devices are determined by assumption, since the seating capacity is not givrn

example : meeting room: 52

       Lobby area: 50

       Department meeting room: 52

CONFIGURING ROUTER

```
Router>enable
Router#conft t
          ^
% Invalid input detected at '^' marker.

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#line console 0
Router(config-line)#password 123
Router(config-line)#login
Router(config-line)#exit
Router(config)#line vty 0 4
Router(config-line)#password 123
Router(config-line)#login
Router(config-line)#exit
Router(config)#enable secret 123
Router(config)#banner motd "No unauthorised entry"
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#host name Main_Router
                    ^
% Invalid input detected at '^' marker.

Router(config)#hostname Main_Router
Main_Router(config)#exit
Main_Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Figure 04: Configuring router

ROUTER CONF FOR IT CENTER BLOCK:GIG0/0

```
Router5                                              —    □    ×

Physical   Config   CLI   Attributes
                        IOS Command Line Interface

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname main_Router
main_Router(config)#int gi0/0
main_Router(config-if)#no shut

main_Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

main_Router(config-if)#exit
main_Router(config)#int gi0/1
main_Router(config-if)#no shut

main_Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

main_Router(config-if)#exit
main_Router(config)#int gi0/0
main_Router(config-if)#int gi0/0.1
main_Router(config-subif)#encapsulation dot1Q 10
main_Router(config-subif)#ip address 10.20.0.1 255.255.255.252
%LINK-5-CHANGED: Interface GigabitEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.1, changed state to up

main_Router(config-subif)#int gi0/0.2
main_Router(config-subif)#encapsulation dot1Q 20
main_Router(config-subif)#ip address 10.20.0.5 255.255.255.252
%LINK-5-CHANGED: Interface GigabitEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.2, changed state to up

main_Router(config-subif)#int gi0/0.3
main_Router(config-subif)#encapsulation dot1Q 30
main_Router(config-subif)#ip address 10.20.0.9 255.255.255.252
%LINK-5-CHANGED: Interface GigabitEthernet0/0.3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.3, changed state to up

main_Router(config-subif)#int gi0/0.4
main_Router(config-subif)#encapsulation dot1Q 40
main_Router(config-subif)#ip address 10.20.0.14 255.255.255.248
%LINK-5-CHANGED: Interface GigabitEthernet0/0.4, changed state to up

                                              Copy        Paste

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```
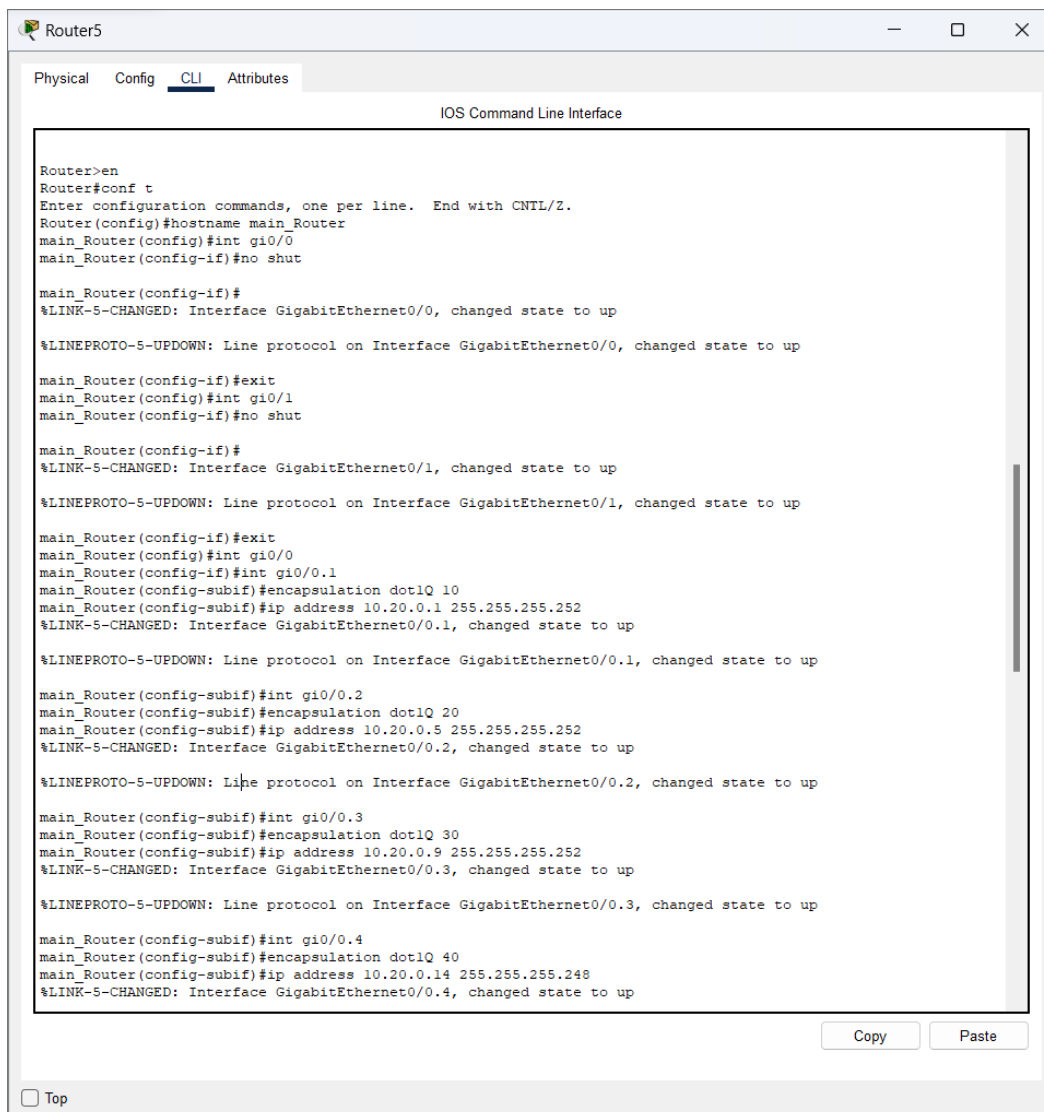
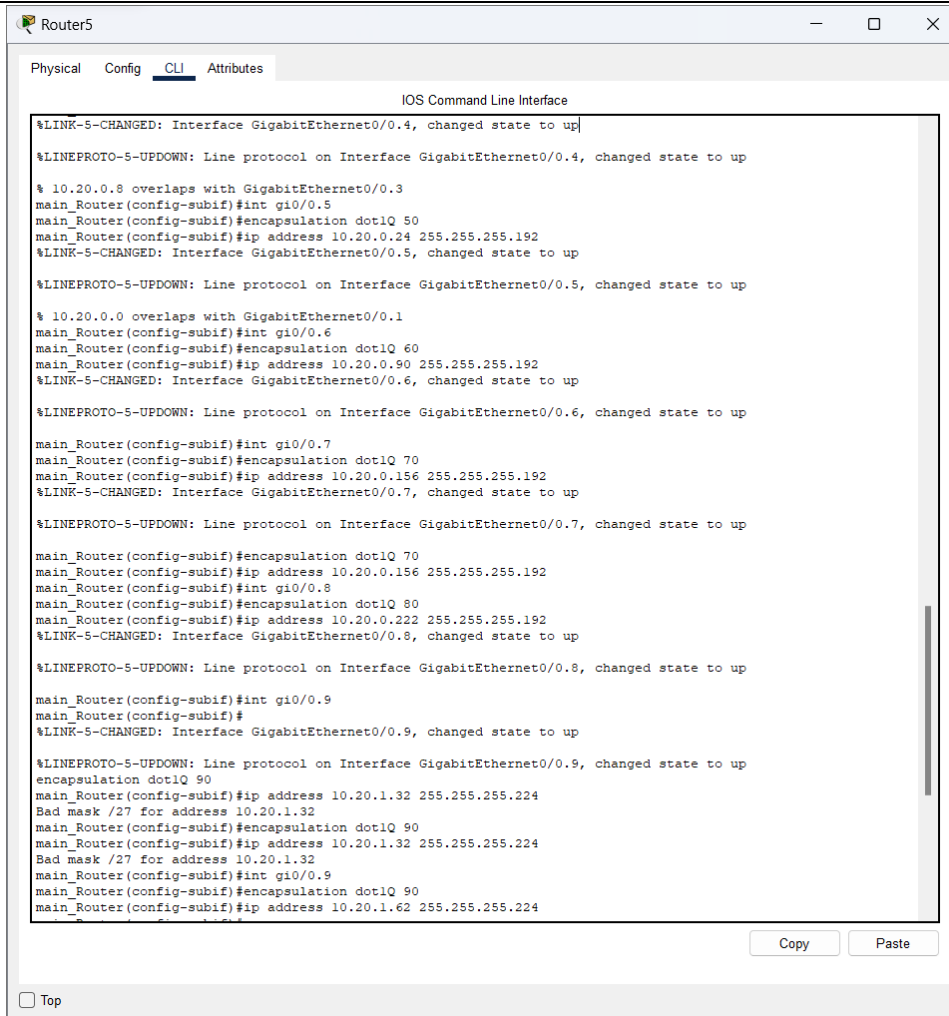*Figure 05: Configuring router gi0/0 for it center block*

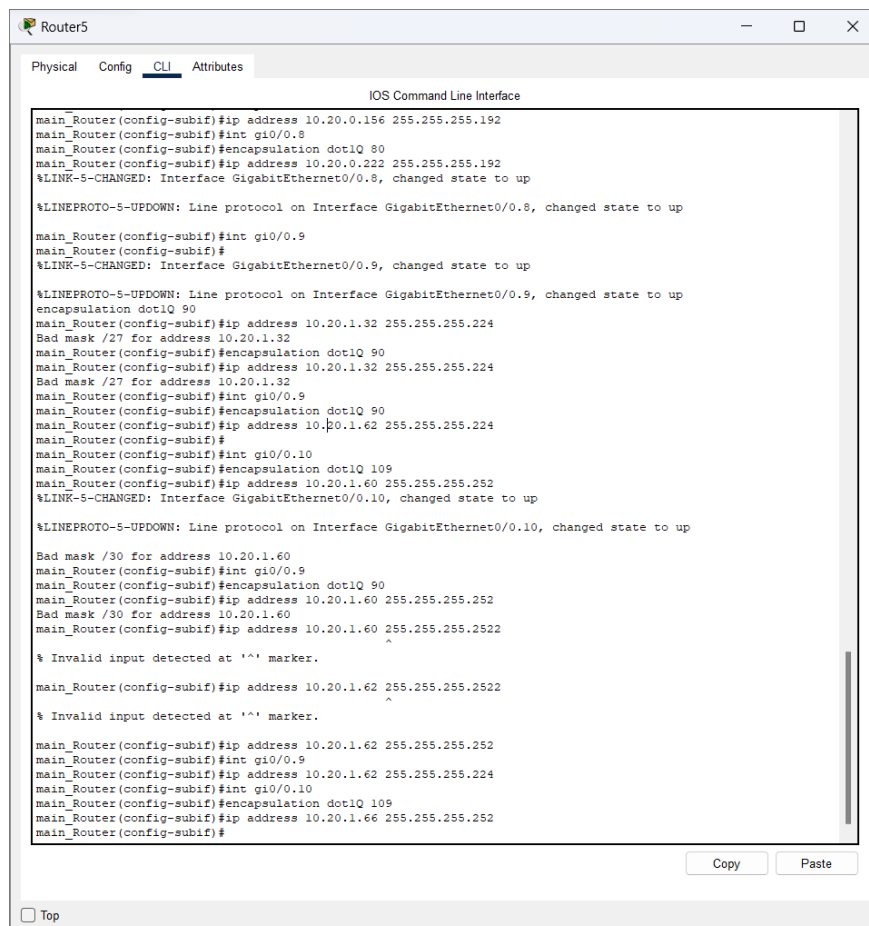Figure 06: Configuring router gi0/0 for it center block

Figure 07: Configuring router gi0/0 for it center block
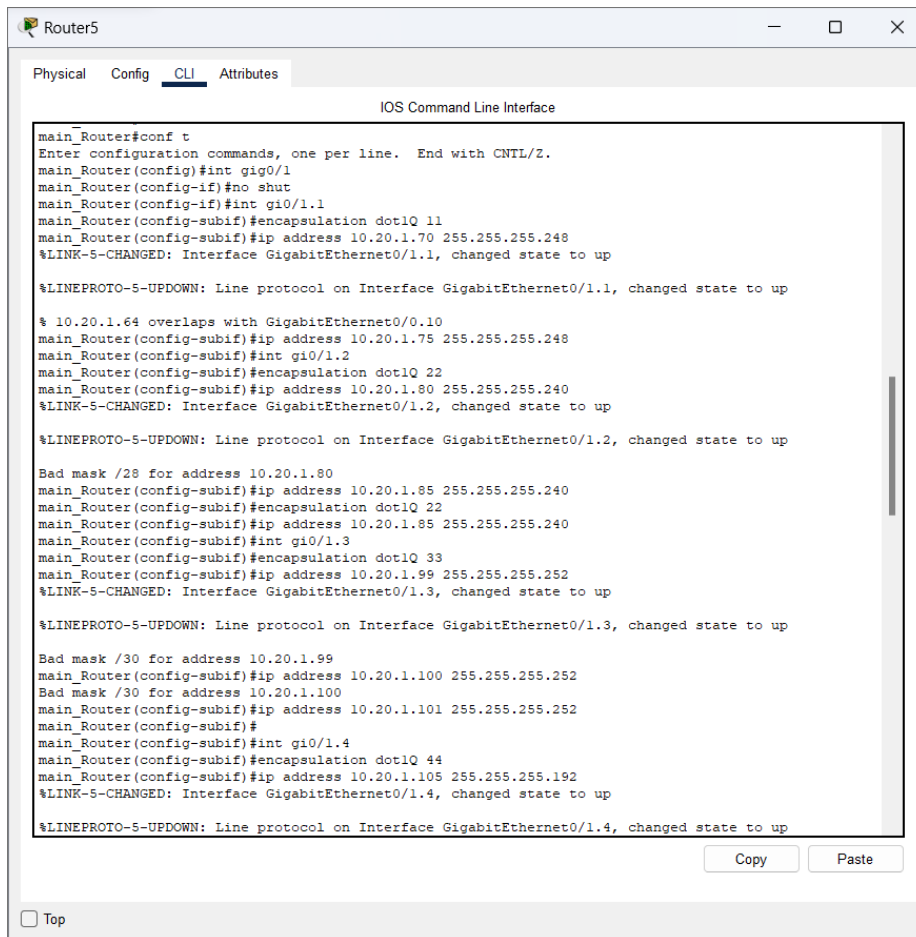
ROUTER CONFIGURING DEPARTMENT BLOCK : GIG0/1

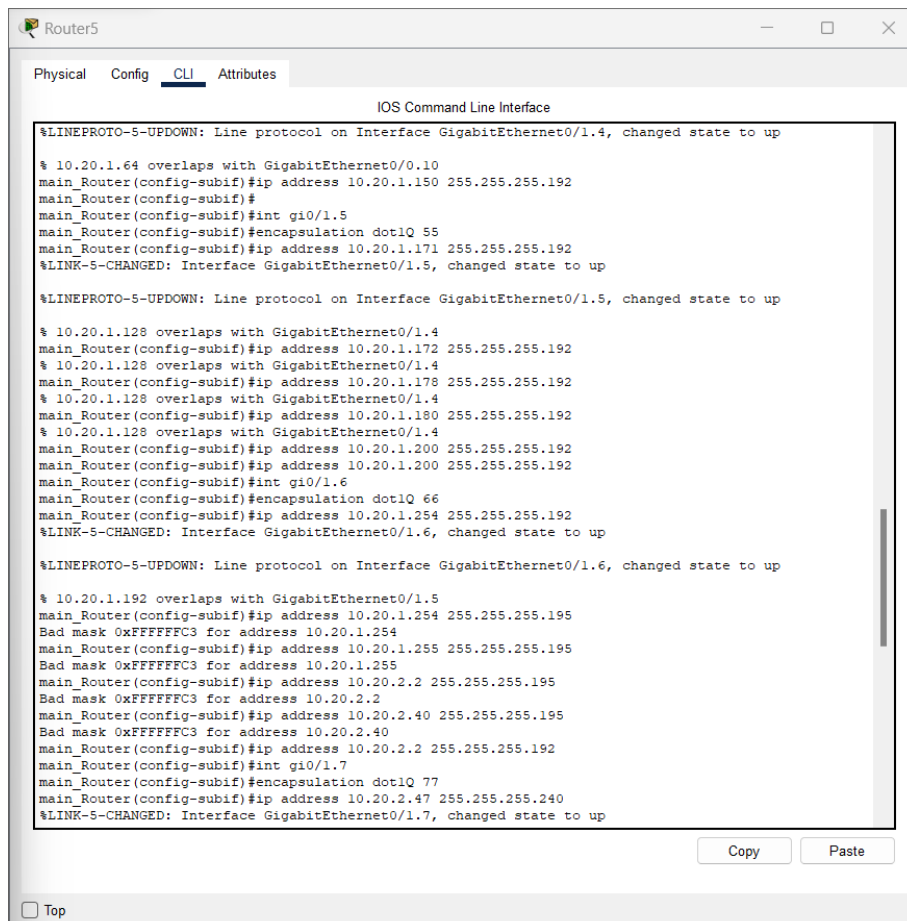*Figure 08: Configuring router gi0/1 for Department block*

Figure 09: Configuring router gi0/1 for Department block

CONFIGURING END DEVICE

Figure 10: Configuring end devices

Figure 11: Configuring end devices

SWITCH CONFIGURATIONS

DIRECTOR OFFICE

```
Switch(config-if-range)#switchport access vlan 1
Switch(config-if-range)#exit
Switch(config)#
Switch(config)#int range fa0/1-24
Switch(config-if-range)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
Switch(config-if-range)#
```

Figure 12: Configuring director office switch

NETWORK MANAGER OFFICE

```
Switch(config-if-range)#exit
Switch(config)#int range fa0/1-24
Switch(config-if-range)#switchport access vlan 33
% Access VLAN does not exist. Creating vlan 33
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#exit
Switch(config)#
```

Figure 13: Configuring network manager switch

STAFF OFFICE

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int range fa0/1-24
Switch(config-if-range)#switchport access vlan 44
% Access VLAN does not exist. Creating vlan 44
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#exit
Switch(config)#
```

Figure 14: Configuring staff office switch

COMLAB 2

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#in range fa0/1-24
Switch(config-if-range)#switchport access vlan 88
% Access VLAN does not exist. Creating vlan 88
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#exit
Switch(config)#
```

Figure 15: Configuring computer lab switch

DEPARTMENT OFFICE

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int range fa0/1-24
Switch(config-if-range)#switchport access vlan 109
% Access VLAN does not exist. Creating vlan 109
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#exit
Switch(config)#
```

Figure 16: Configuring department office switch

STAFF ROOM

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int range fa0/1-24
Switch(config-if-range)#switchport access vlan 22
% Access VLAN does not exist. Creating vlan 22
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#exit
Switch(config)#
```

Figure 17: Configuring staff office switch

PRINTING ROOM
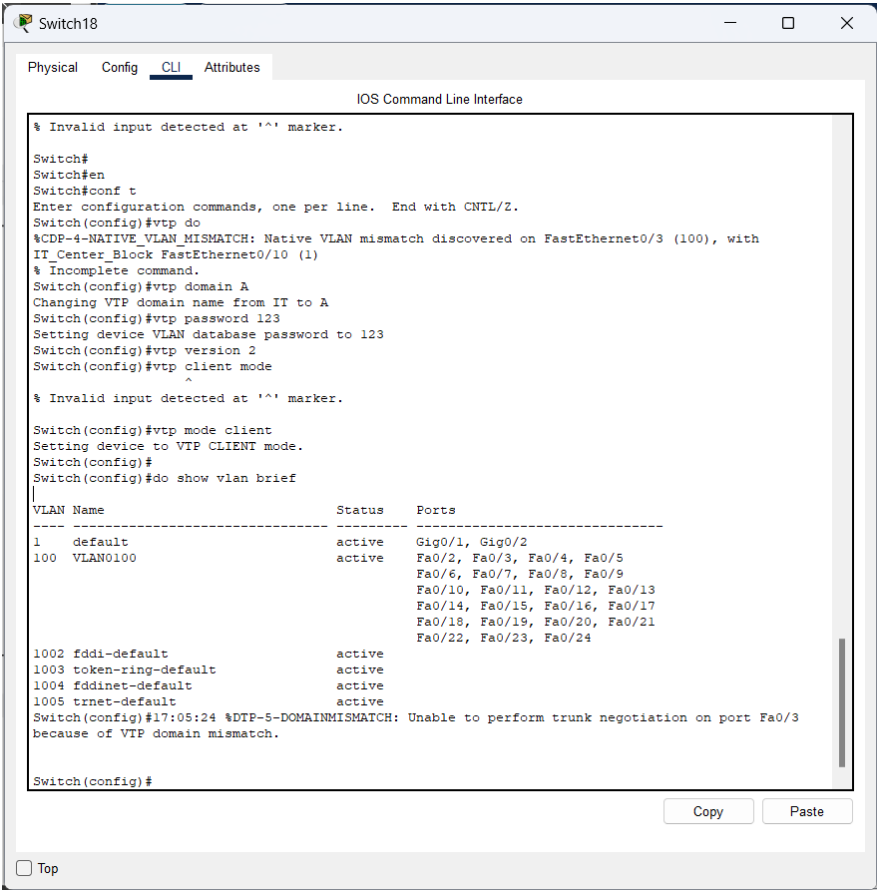
Figure 18: Configuring printing room switch

CONFIGURATION OF WIFI ROUTER

Figure 19: Configuring wifi router

Figure 20: Configuring wifi router

CONFIGURATION OF MULTILAYER SWITCHES

Figure 21: turning on the multilayer switch(drag and drop the ac power supply in empty slot)

ASSIGNING VLAN ON MULTILAYER SWITCHES

IT BLOCK CENTRE SWITCH CONFIGURATION

```
Multilayer Switch2                                        —    □    ✕

Physical   Config   CLI   Attributes

                    IOS Command Line Interface

Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname IT_Center_Block
IT_Center_Block(config)#vlan 1
IT_Center_Block(config-vlan)#Director_Office
                            ^
% Invalid input detected at '^' marker.

IT_Center_Block(config-vlan)#name Director_Office
Default VLAN 1 may not have its name changed.
IT_Center_Block(config-vlan)#vlan 10
IT_Center_Block(config-vlan)#name Director_Office
IT_Center_Block(config-vlan)#vlan 20
IT_Center_Block(config-vlan)#name Tech_Officer_Room
IT_Center_Block(config-vlan)#vlan 30
IT_Center_Block(config-vlan)#name Network_Manager_Room
IT_Center_Block(config-vlan)#vlan 40
IT_Center_Block(config-vlan)#name Staff_Office
IT_Center_Block(config-vlan)#vlan 50
IT_Center_Block(config-vlan)#Meeting_Room
                            ^
% Invalid input detected at '^' marker.

IT_Center_Block(config-vlan)#name Meeting_Room
IT_Center_Block(config-vlan)#vlan 60
IT_Center_Block(config-vlan)#name Lobby
IT_Center_Block(config-vlan)#vlan 70
IT_Center_Block(config-vlan)#name Com_Lab_1
IT_Center_Block(config-vlan)#vlan 80
IT_Center_Block(config-vlan)#Com_Lab_2
                            ^
% Invalid input detected at '^' marker.

IT_Center_Block(config-vlan)#name Com_Lab_2
IT_Center_Block(config-vlan)#vlan 90
IT_Center_Block(config-vlan)#name Digital_LEarning
IT_Center_Block(config-vlan)#vlan 100
IT_Center_Block(config-vlan)#name printing_Room
IT_Center_Block(config-vlan)#exit
IT_Center_Block(config)#exit
IT_Center_Block#
%SYS-5-CONFIG_I: Configured from console by console

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```

Figure 22: Assigning Vlan on multilayer switch

Figure 23: Assigning Vlan on multilayer switch(Show vlan brief)

DEPARTMENT BLOCK MULTILAYER SWITCH CONFIGURATION


```
Multilayer Switch4                                    —   □   ✕

Physical   Config   CLI   Attributes
                        IOS Command Line Interface

Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Department_Block
Department_Block(config)#vlan 11
Department_Block(config-vlan)#name lecture_Halls
Department_Block(config-vlan)#vlan 22
Department_Block(config-vlan)#name Tech_Off
Department_Block(config-vlan)#vlan 33
Department_Block(config-vlan)#name Dep_Meeting
Department_Block(config-vlan)#vlan 44
Department_Block(config-vlan)#vlan 22
Department_Block(config-vlan)#name Staff_Room
Department_Block(config-vlan)#vlan 33
Department_Block(config-vlan)#name Tech_Off
Department_Block(config-vlan)#vlan 44
Department_Block(config-vlan)#name Dep_Meeting
Department_Block(config-vlan)#vlan 55
Department_Block(config-vlan)#name Com_Lab_1
Department_Block(config-vlan)#vlan 66
Department_Block(config-vlan)#name com_Lab_2
Department_Block(config-vlan)#vlan 77
Department_Block(config-vlan)#name NEtwork_Engineer
Department_Block(config-vlan)#vlan 88
Department_Block(config-vlan)#name Microprocessor
Department_Block(config-vlan)#vlan 99
Department_Block(config-vlan)#Vision and machine
                              ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#name Vision and machine
                                          ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#vlan 109
Department_Block(config-vlan)#dep_office
                              ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#name dep_office
Department_Block(config-vlan)#

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```
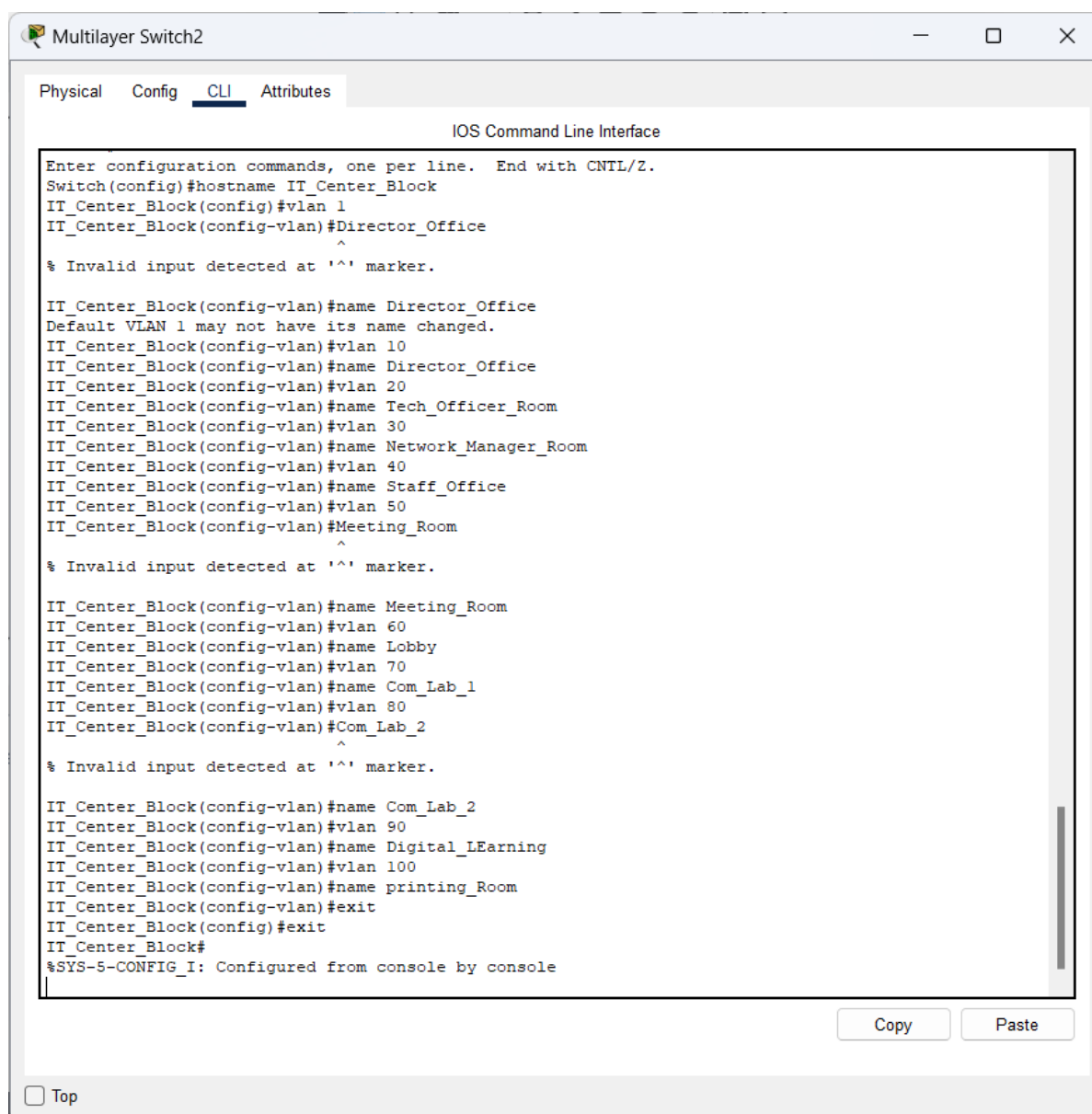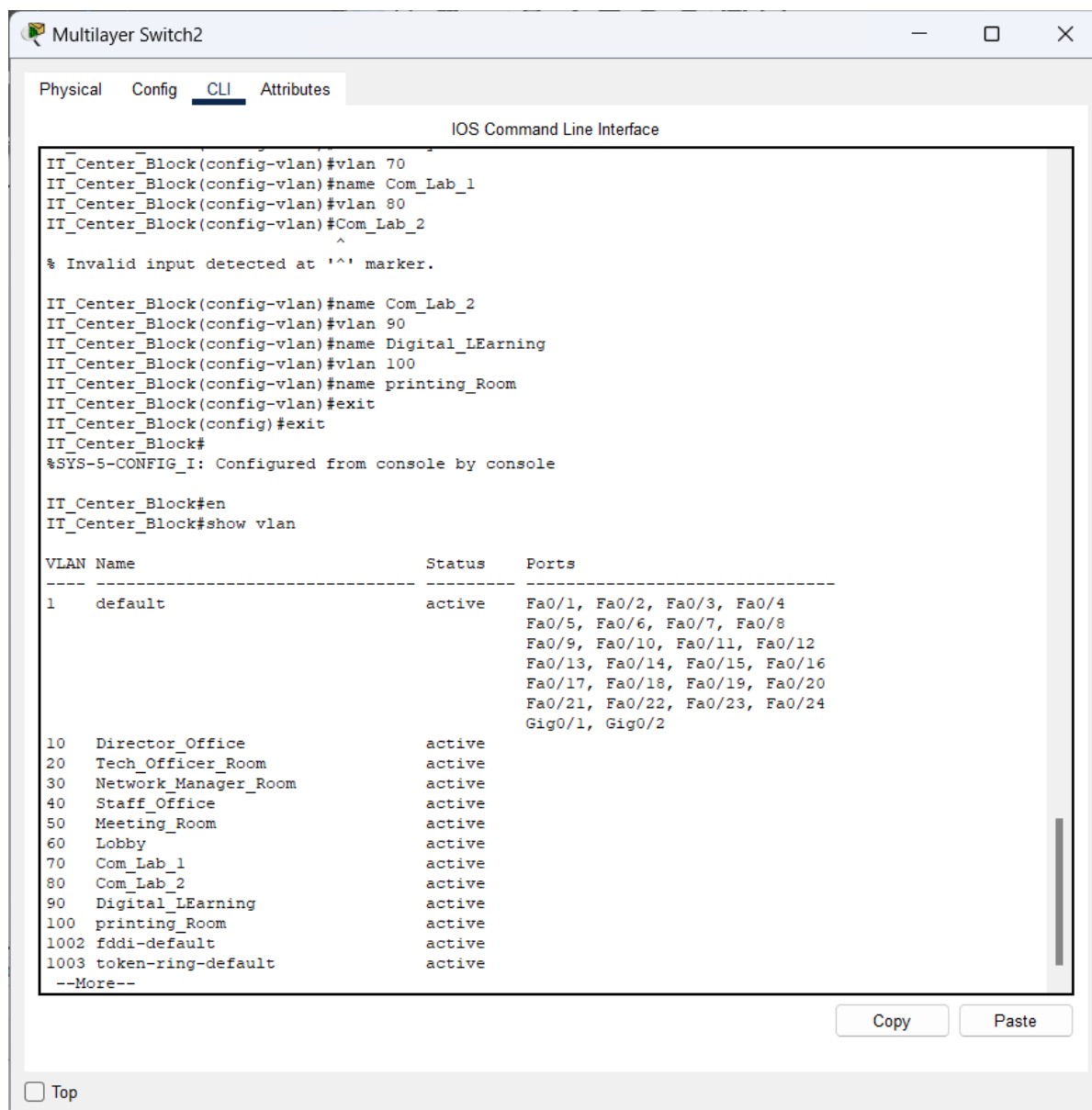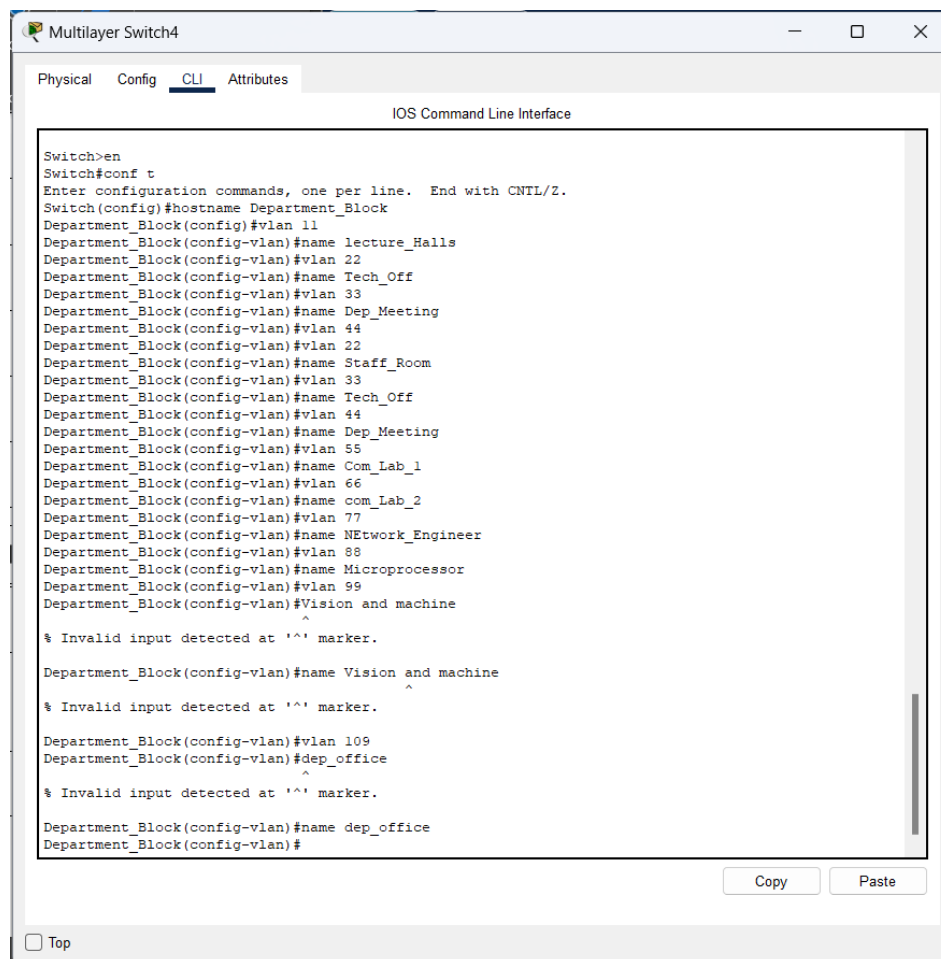
Figure 24: Assigning Vlan on multilayer switch


```
Multilayer Switch4                                    —   □   ✕

Physical   Config   CLI   Attributes
                        IOS Command Line Interface

                              ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#name Vision and machine
                                          ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#vlan 109
Department_Block(config-vlan)#dep_office
                              ^
% Invalid input detected at '^' marker.

Department_Block(config-vlan)#name dep_office
Department_Block(config-vlan)#exit
Department_Block(config)#exit
Department_Block#
%SYS-5-CONFIG_I: Configured from console by console

Department_Block#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
11   lecture_Halls                  active
22   Staff_Room                     active
33   Tech_Off                       active
44   Dep_Meeting                    active
55   Com_Lab_1                      active
66   com_Lab_2                      active
77   NEtwork_Engineer               active
88   Microprocessor                 active
99   VLAN0099                       active
109  dep_office                     active
1002 fddi-default                   active
1003 token-ring-default             active
--More--

                                          Copy        Paste

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```
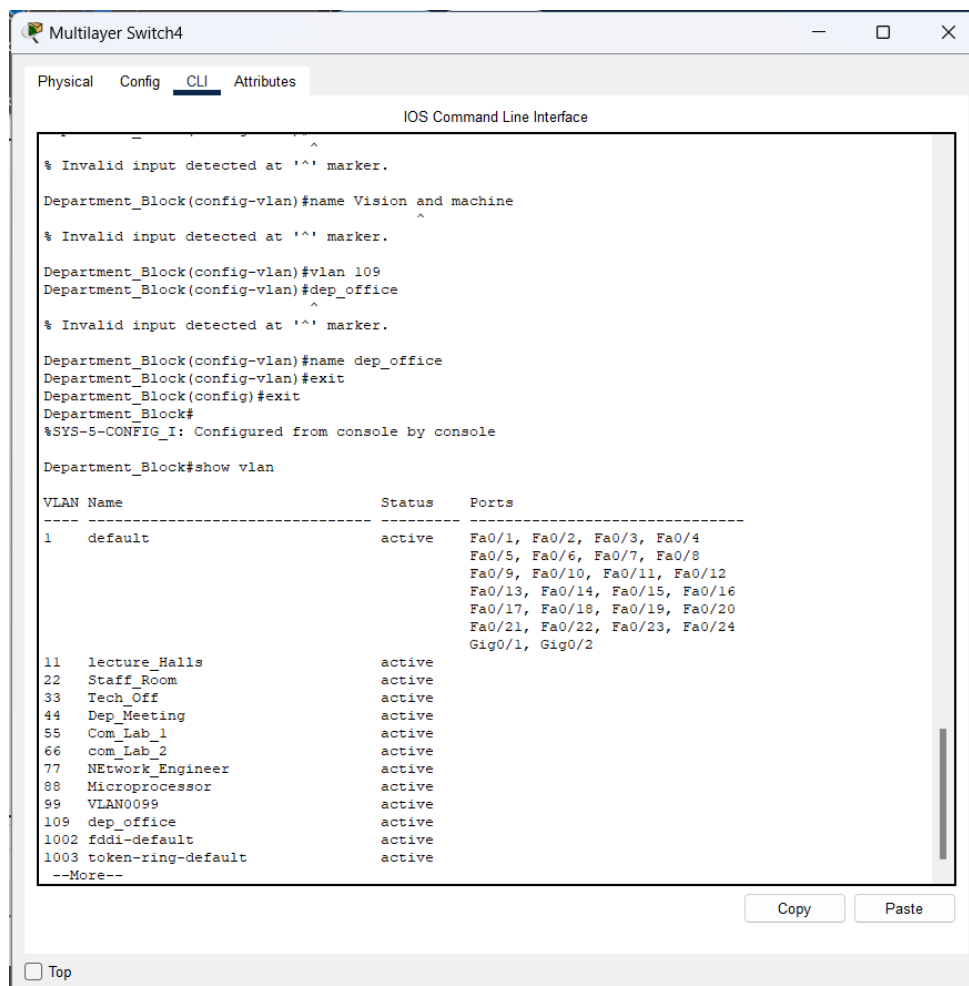
Figure 25: Assigning Vlan on multilayer switch(Show vlan brief)

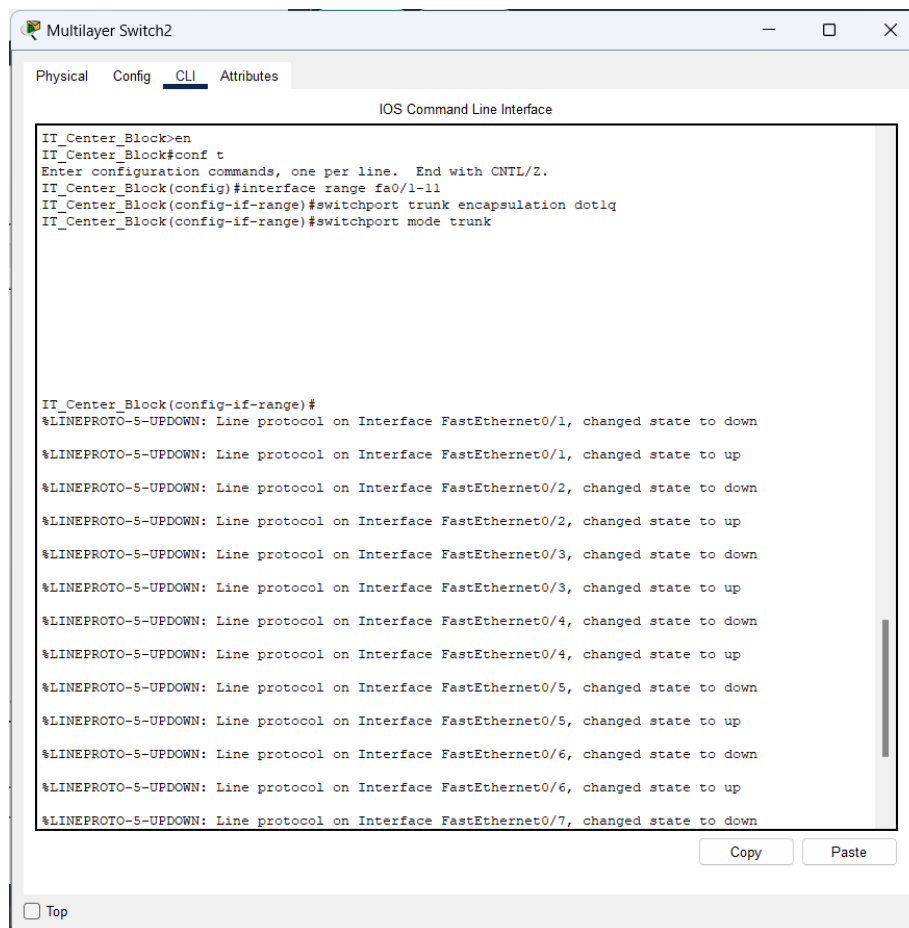## TRUNK CONFIGURATION ON IT CENTRE BLOCK

Figure 26: Trunk configuration

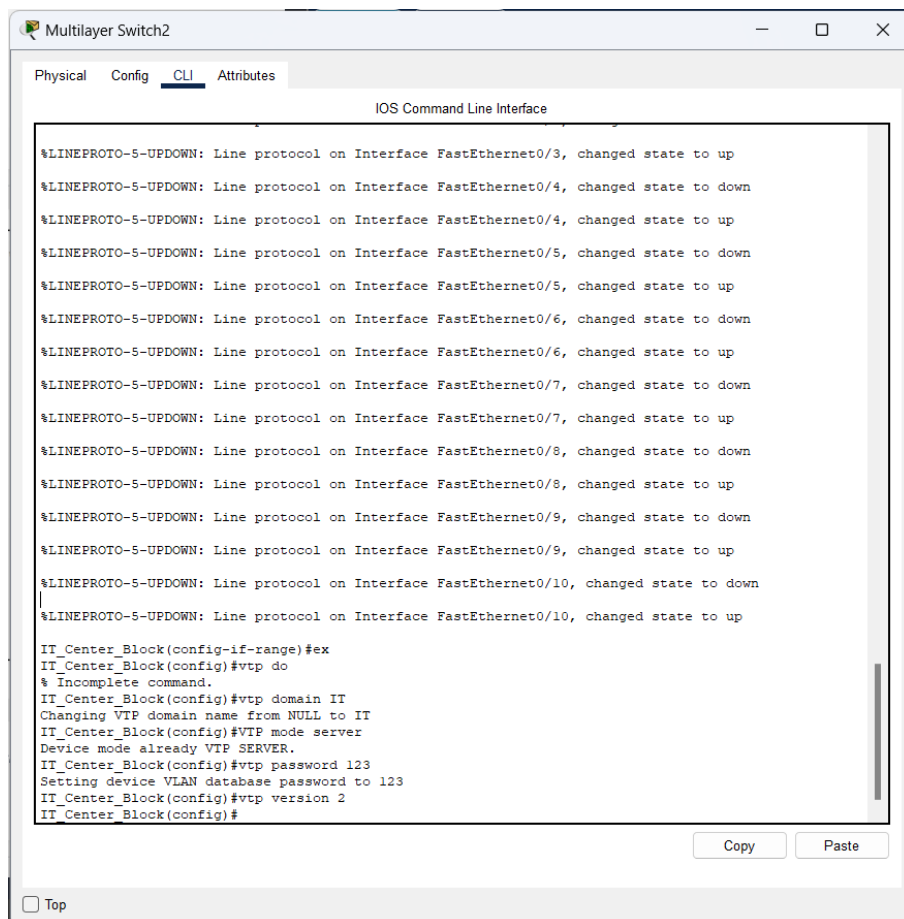## VTP CONFIGURATION ON IT CENTERE

Figure 27: vtp configuration

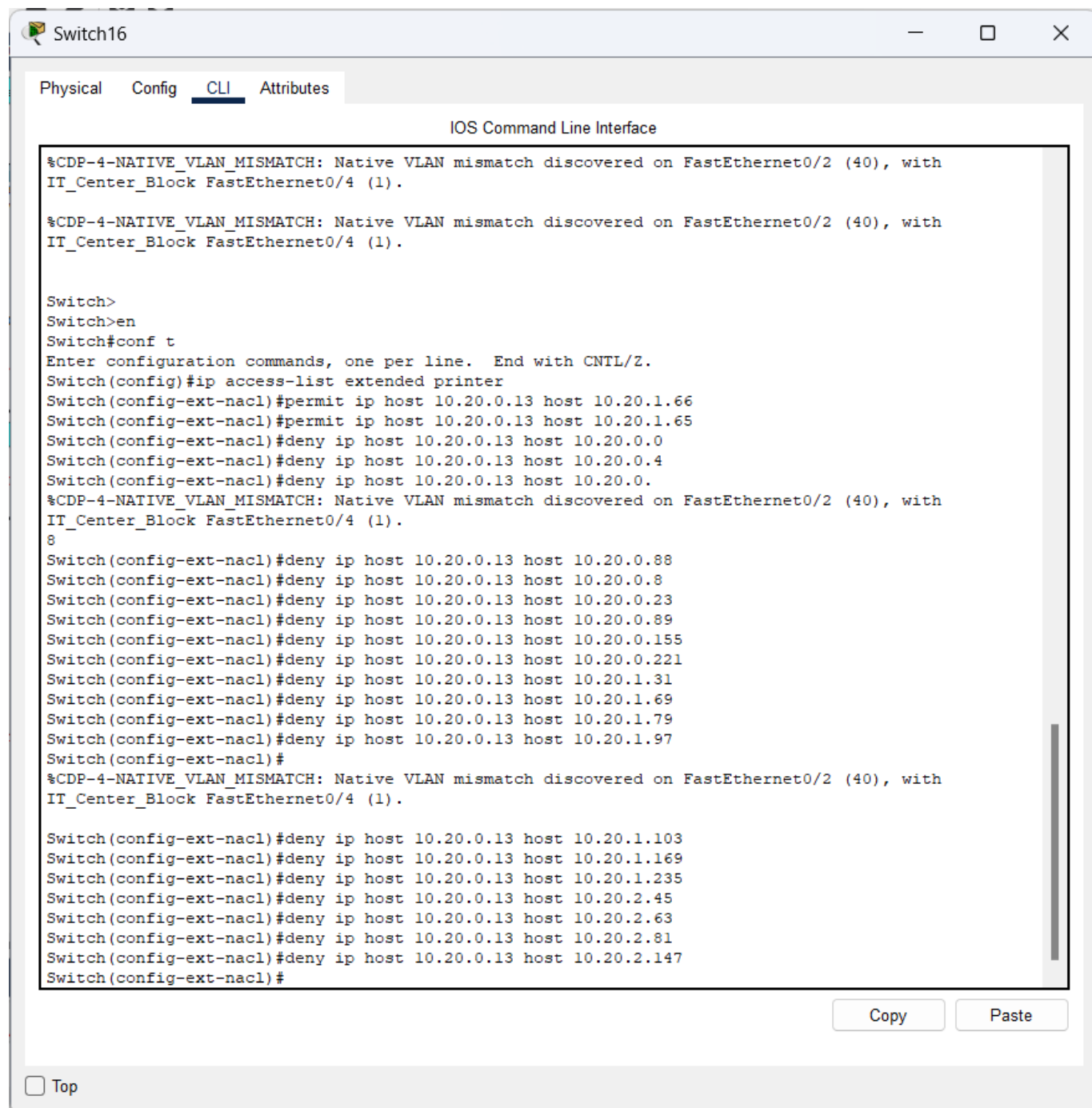**ALLOWING AND DENYING PRINTER ACCESS**

Figure 28: Allowing access to only staff office for printers

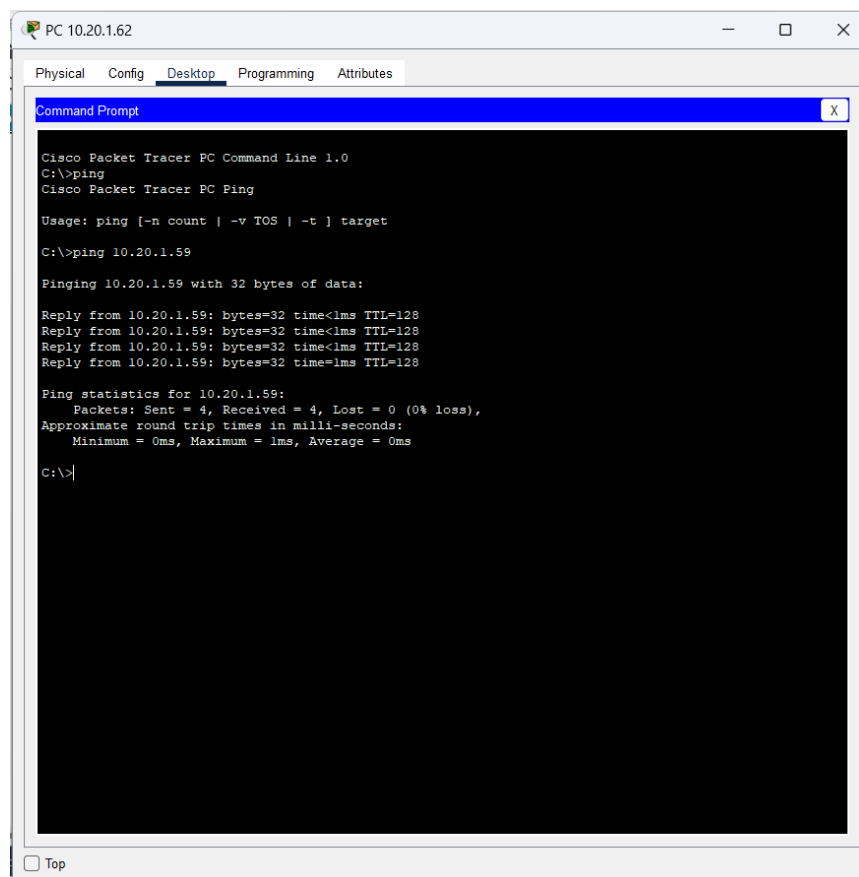**PINGING FROM STAFF OFFICE AND NOT PINGING FROM OTHER BLOCKS**

Figure 29: pinging from staff office works

Figure 30: pinging from other blocks doesn't work