

# **BAHRIA UNIVERSITY CAMPUS**

## **NETWORKING SYSTEM**

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## **BAHRIA UNIVERSITY CAMPUS NETWOKRING SYSTEM**

### **ABSTRACT**

The University Campus Network Project aims to modernize the network infrastructure at Bahria University by upgrading and redesigning the existing system. The project addresses issues such as unreliable connectivity, inadequate security measures, and limited scalability. Key aspects of the project include network segmentation, access control, enhanced security measures, wireless connectivity, network services, redundancy, and high availability. Documentation, monitoring, and reporting are integral components to ensure efficient management and proactive issue resolution. The project's objective is to optimize network performance, promote secure communication and collaboration, and provide seamless access to resources for students, faculty, and staff, thereby enhancing the overall network experience at the university.

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## CHAPTER 1

### INTRODUCTION

#### **1.1 Background**

This University Campus Network Scenario is about designing a network for a University in which various computers of different departments are set up so that they can interact and communicate with each other by interchanging data. To design a networking scenario for a University which connect various departments to each other's, it puts forward communication among different departments. Cisco Packet Tracer is used to design a systematic and well planned network, satisfying all the necessities of the University Campus. Cisco Packet Tracer come up with a network with good performance. There are Main Block , Admin Block , Engineering Block, Sir Syed Block, Edhi Block, Iqbal Block, Quaid Block that can have access to have a communication.

#### **1.2 Literature Review**

- i) **Network Design Principles:** Stallings (2015) emphasizes the importance of performance, reliability, and scalability in educational networks. High-speed data transfer, minimal downtime, and accommodating growing user numbers are vital for academic and administrative activities.
- ii) **Simulation Tools:** Alotaibi (2018) highlights the benefits of simulation tools like Cisco Packet Tracer. They enable virtual testing and optimization of network configurations, aiding in identifying potential issues and refining designs without physical hardware.
- iii) **Security Considerations:** Wang et al. (2016) stress the significance of multi-layered security measures in campus networks. Implementing firewalls, intrusion detection systems, and robust authentication protocols is crucial for safeguarding sensitive data and complying with privacy regulations.

### **1.3 Problem Statement**

The current network infrastructure at Bahria University is outdated and inadequate to meet the growing demands of the campus community. The network suffers from various issues, including unreliable connectivity, limited security measures, and insufficient capability. These problems hinder effective communication, collaboration, and access to resources for students, faculty, and staff. Therefore, there is a need to revamp and upgrade the university's network infrastructure to address these challenges and provide a robust, secure, and scalable network that meets the evolving needs of the campus community. The goal is to ensure reliable connectivity, enhanced network security, efficient traffic flow, and seamless access to network services across the campus.

### **1.4 Aims and Objectives**

- i) The main objective of the proposed network is to update the existing network and also enhance its capabilities and increase the flexibility of the network which will eventually provide good security.
- ii) Enhance speed, stability, and minimize downtime to support high-bandwidth applications and ensure consistent connectivity.
- iii) Enable efficient communication and centralized access to shared resources across all university departments.
- iv) Design the network to easily scale for future expansion, accommodating more users, devices, and applications without significant reconfiguration.

### **1.5 Scope of Project**

The scope of the project includes designing and configuring the network infrastructure, implementing network security measures, ensuring redundancy and high availability, setting up network services, documenting the network design and configurations, conducting testing and troubleshooting, and considering scalability and future expansion. The project aims to establish a reliable, secure, and scalable campus network that supports seamless connectivity, network segmentation, user authentication, centralized services, and proactive monitoring. The scope may vary based on specific requirements and available resources.

## **1.6 Environmental Aspects of Project**

- i) Implement energy-efficient network equipment to reduce power consumption and minimize the carbon footprint of the university's IT infrastructure.
- ii) Ensure proper disposal and recycling of outdated network hardware to minimize electronic waste and its environmental impact.
- iii) Promote the use of virtualization and cloud computing to reduce the need for physical hardware, thereby conserving resources and reducing overall environmental impact.

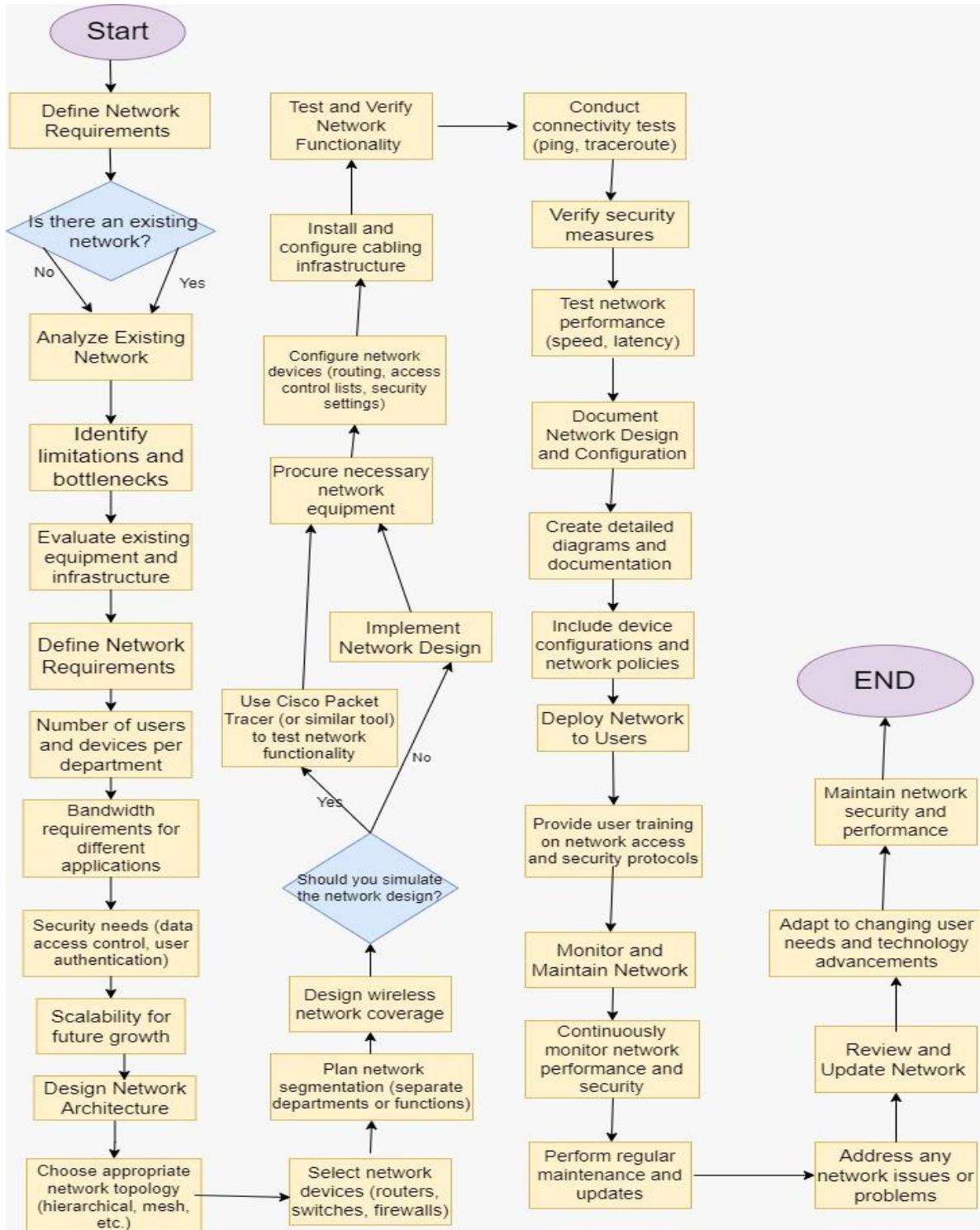
## CHAPTER 2

### DESIGN AND METHODOLOGY

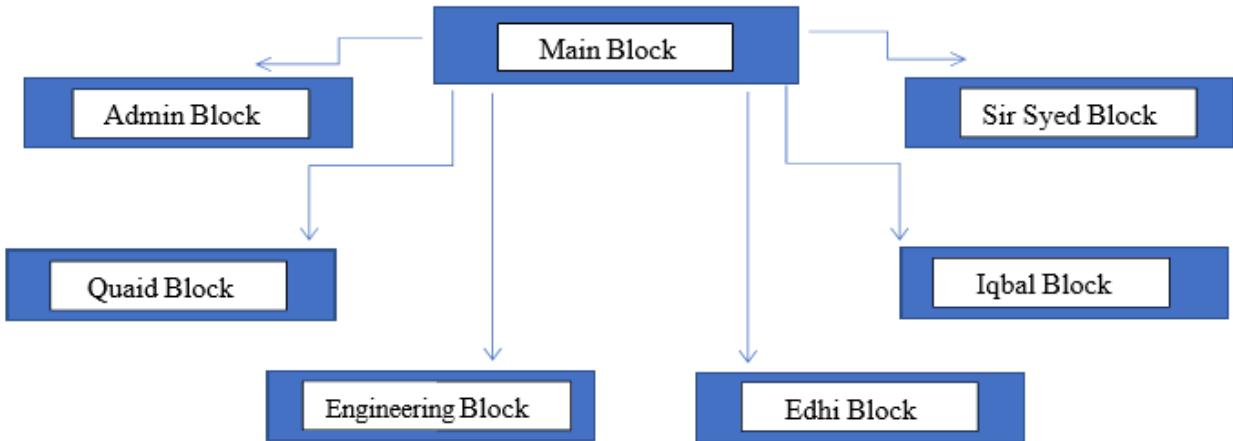
#### 2.1 Equipment / Materials Used



## 2.2 Flow Chart



### 2.3 Circuit Diagram



**3****3.2 DESIGN IMPLIMENTATION****3.2.1 Project Time Line**

- i) Planning: Define objectives, scope, and requirements.
- ii) Requirements Gathering: Gather networking requirements from departments.
- iii) Design: Develop network architecture and security protocols.
- iv) Testing: Use simulation tools to test network configurations.
- v) Implementation: Procure hardware, install, and configure network equipment.
- vi) Training: Provide training for IT staff on network management.
- vii) Deployment: Roll out new network infrastructure across departments.
- viii) Post-Deployment Review: Evaluate project success and gather feedback.

**3.2 Implementation**

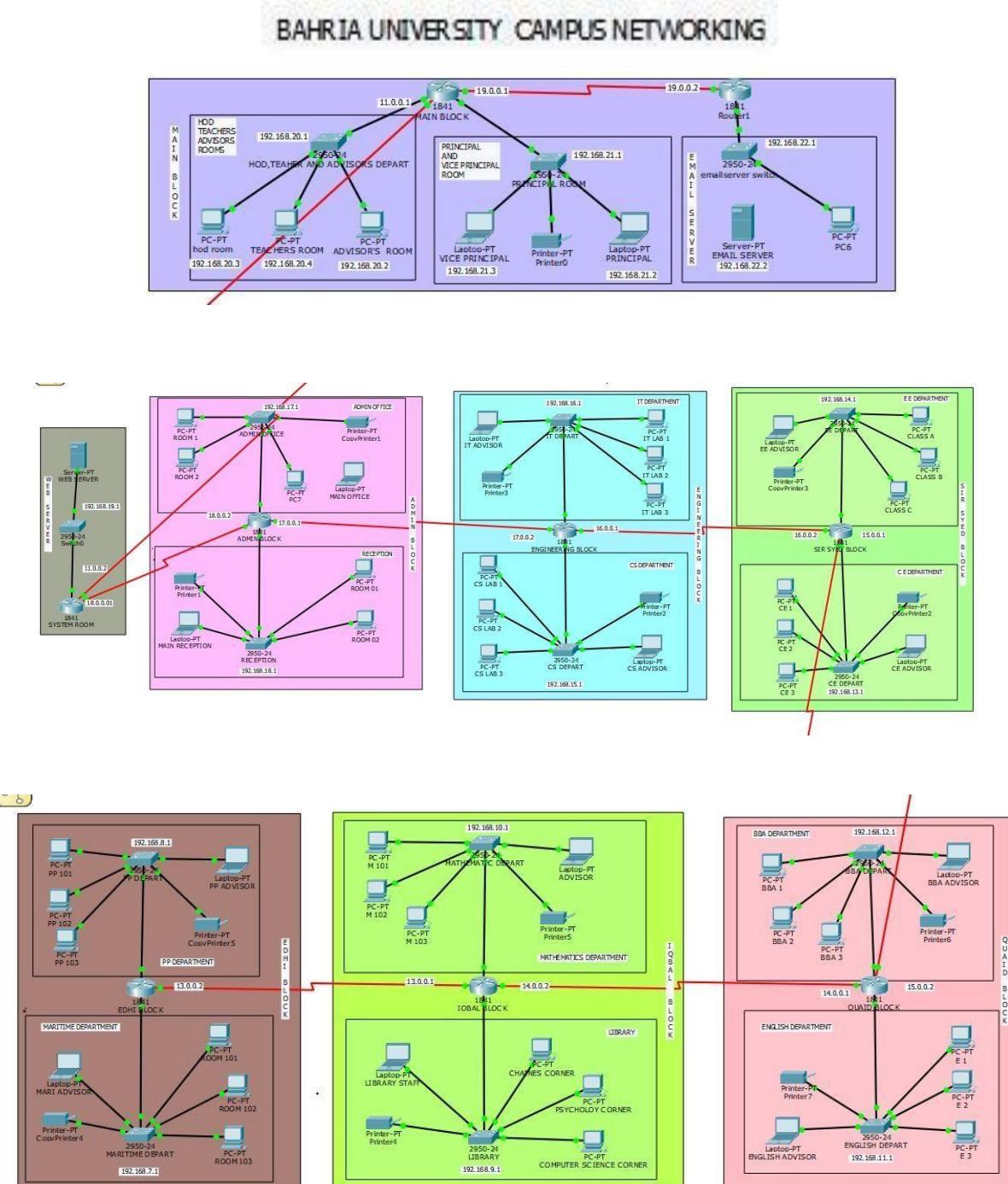
- i) **Main Block** has two routers which are then divided into three rooms having two switches each.
- ii) First switch has three rooms that is HOD, Teachers and Advisor.
- iii) Second switch has two switches which is then divided into two rooms of Principal,Vice Principal.
- iv) Second router has one switch that is connected with server to provide email services.We have given IPs to them dynamically and they are in VLAN 1 by default.
- v) ACL is applied on the second router by which student advisor cannot communicate with email server and principal.
- vi) Port is secured in Email server and PCs of the principal is static.
- vii) Router of the main block is then connected to the router of **Web Server**. Secret and Privileged mode password is applied to web server.
- viii) Server is then attached to **Admin Block** and given IPs to the PCs dynamically and then it is sub divided into admin office and reception and given port security and static IPs.

- ix) **Engineering** Block is then divided into CS and IT department and they can communicate with each other. Port Security and permanent Mac address are applied to them.
- x) **Sir Syed** Block has two departments EE and CE. Protective password is applied to them.
- xi) **Quaid** Block has two departments that is English and BBA. Port security and protective password are applied to them.
- xii) Similar is the case for **Edhi** bock and **Iqbal** block.
- xiii) Every Block can communicate with each other except for main block.

## 4

## 4.2 RESULTS AND DISCUSSIONS

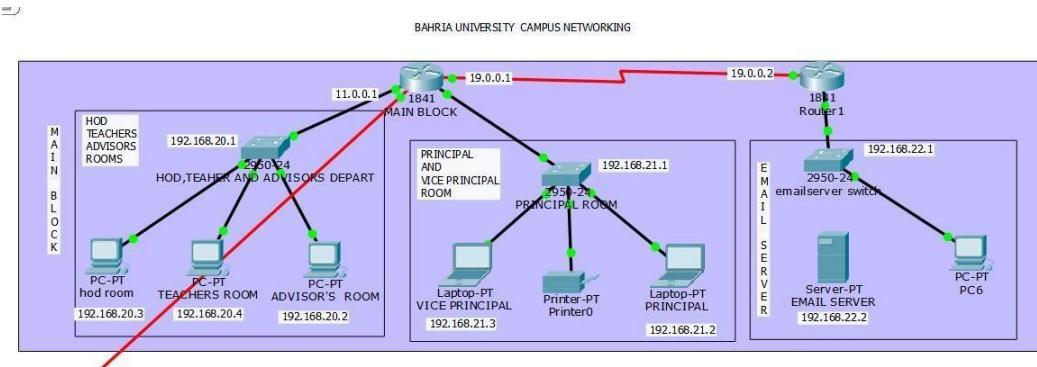
## 4.2.1 Results



## MAIN BLOCK:

Main Block is divided into sub-department. One switch provides the HOD, Teacher and Adviser connection. Second switch provides the connectivity for Principal and Vice Principal. And the third switch provides the Email connectivity. Router are connected through RIP trunking mode. ACL is applied

Too.



## DYNAMIC IPS

MAIN BLOCK

Physical Config CLI

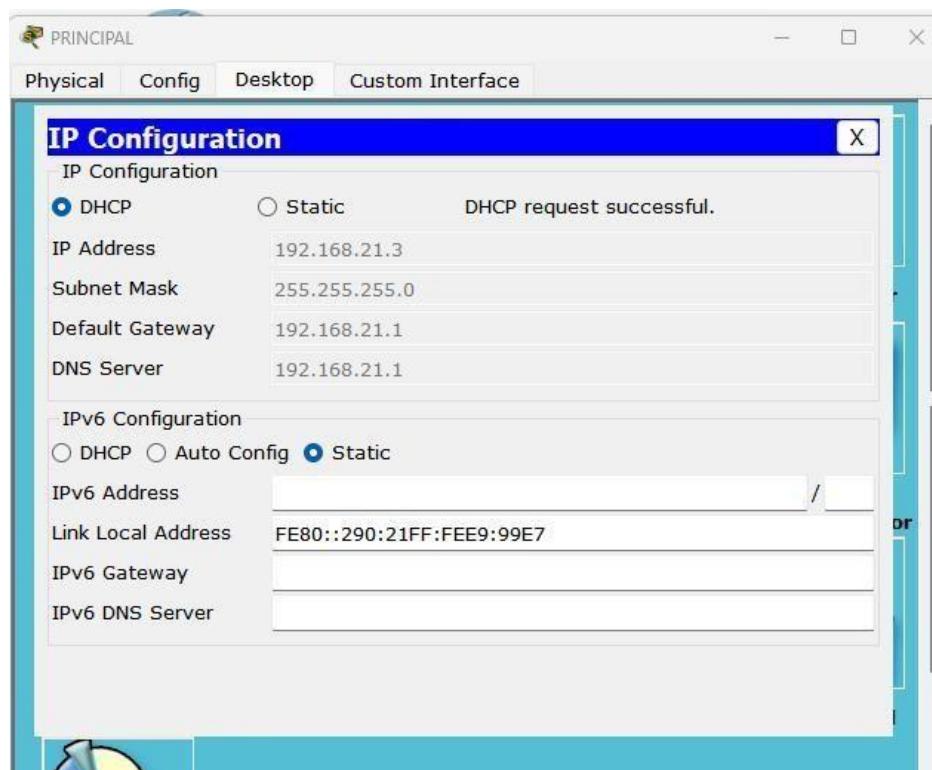
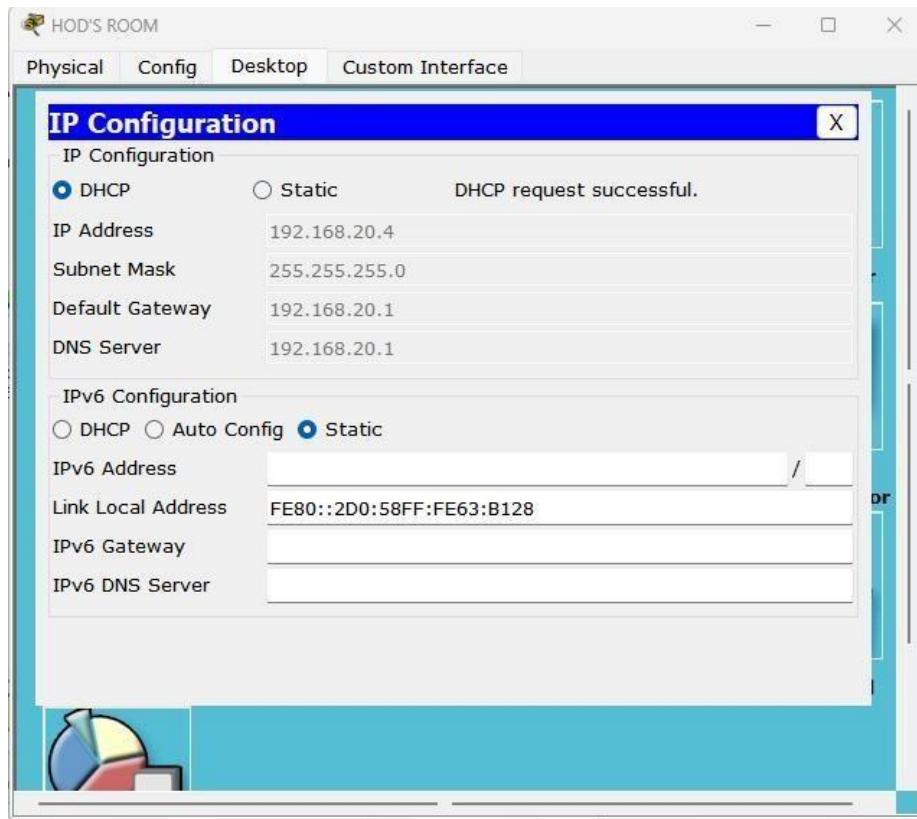
IOS Command Line Interface

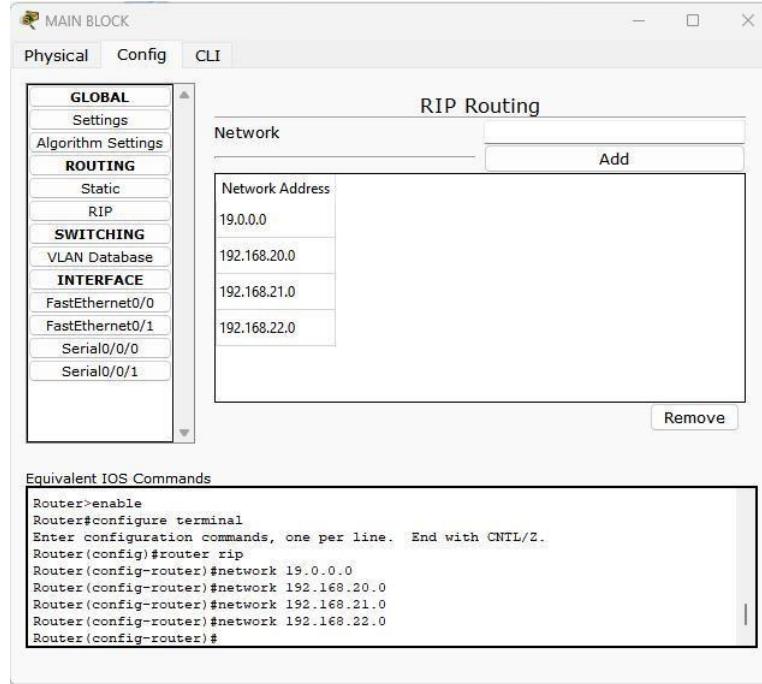
```

Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#
Router(config-if)#EX
Router(config)#EX
Router#EX
%SYS-5-CONFIG_I: Configured from console by console
Router#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool HTA-pool
Router(dhcp-config)#network 192.168.20.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.20.1
Router(dhcp-config)#dns-server 192.168.20.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
(OK)
Router(config)#ip dhcp pool principal-pool
Router(dhcp-config)#network 192.168.21.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.21.1
Router(dhcp-config)#dns-server 192.168.21.1
Router(dhcp-config)#ex

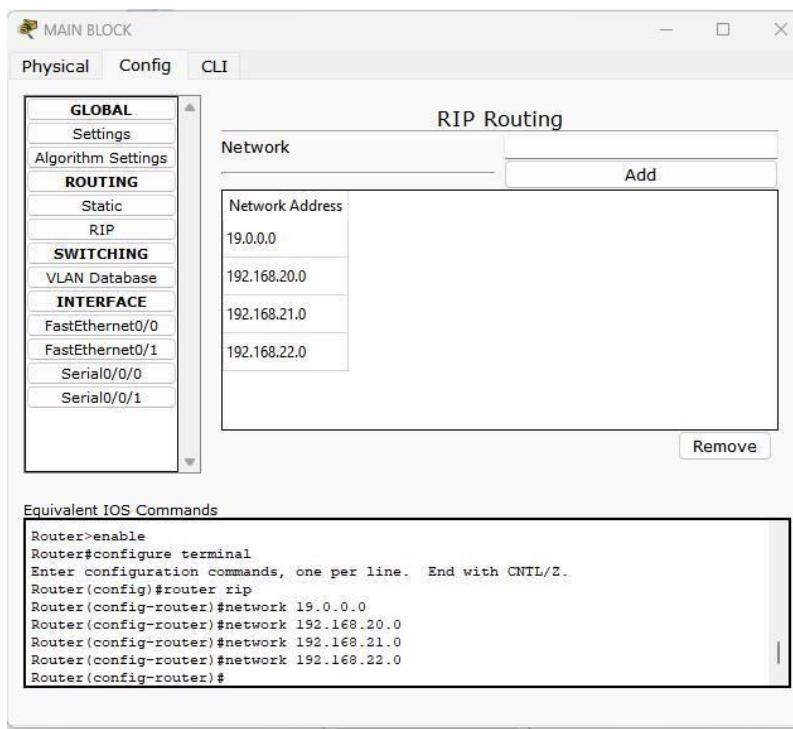
```

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## APPLY ACL FOR THE DISCONNECTIVITY BETWEEN ADVISORS AND PRINCIPAL



## APPLY ACL FOR THE DISCONNECTIVITY BETWEEN ADVISORS AND EMAIL

## SERVER

**MAIN BLOCK**

Physical    Config    CLI

**IOS Command Line Interface**

```

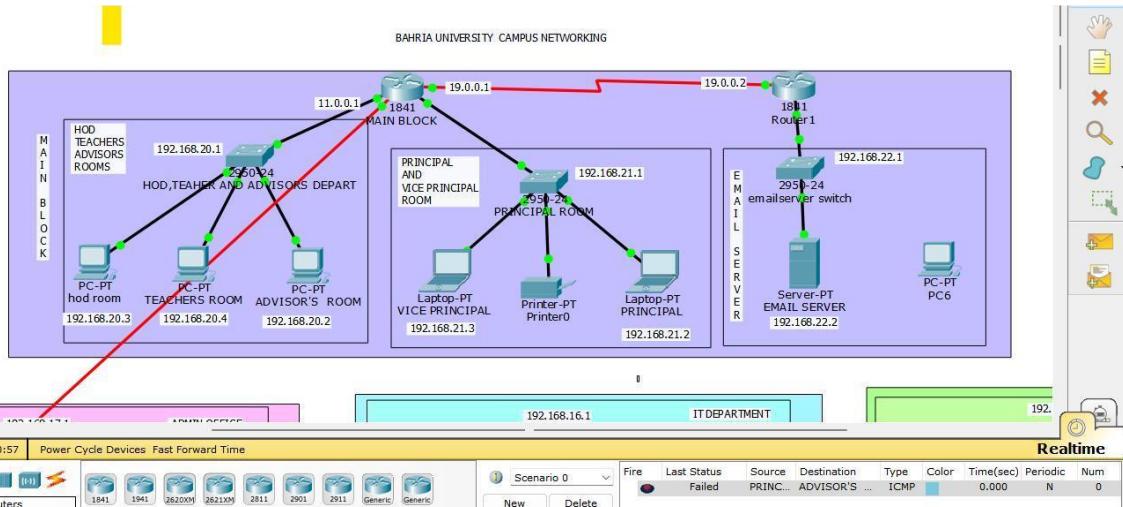
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 19.0.0.0
Router(config-router)#network 192.168.20.0
Router(config-router)#network 192.168.21.0
Router(config-router)#network 192.168.22.0
Router(config-router)##DHCPD-4-PING_CONFLICT: DHCP address conflict: server
pinged 192.168.21.1.
##DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.20.1.

Router(config-router)#
Router(config-router)#EX
Router(config)#access-list 10 deny 192.168.20.2
Router(config)#access-list 10 deny 192.168.21.2
Router(config)#access-list 10 permit any
Router(config)#int fa0/1
Router(config-if)#ip access-group 10 in
Router(config-if)#ex
Router(config)#ex
Router#
##SYS-5-CONFIG_I: Configured from console by console

Router#sh access-list
Standard IP access list 10
 10 deny host 192.168.20.2
 20 deny host 192.168.21.2
 30 permit any
Router#

```

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**APPLYACL FOR THE DISCONNECTIVITY BETWEEN ADVISORS AND EMAIL SERVER**

## SERVER

Router1

Physical Config CLI

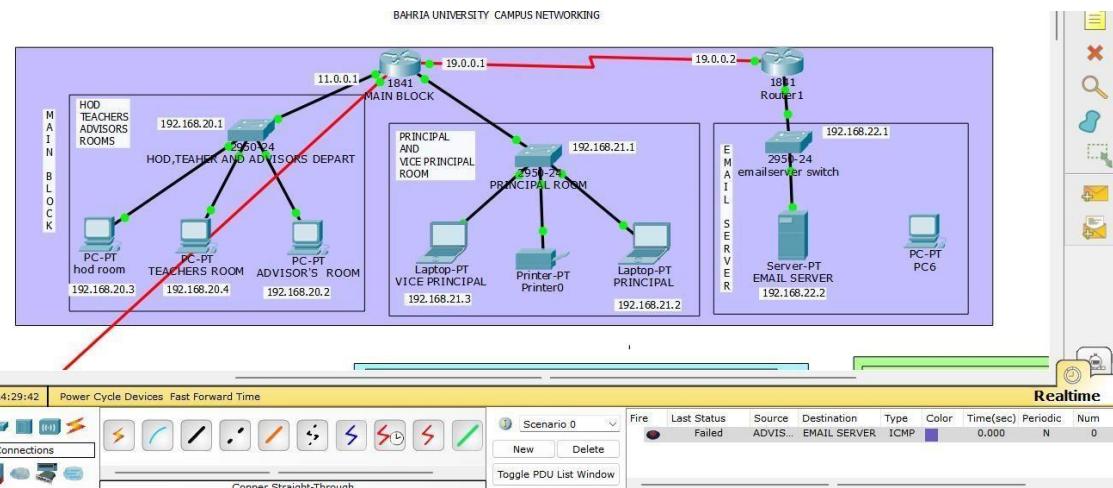
IOS Command Line Interface

```
%LINK-3-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 19.0.0.0
Router(config-router)#network 192.168.20.0
Router(config-router)#network 192.168.21.0
Router(config-router)#network 192.168.22.0
Router(config-router)#exit
Router(config)#access-list 30 deny 192.168.20.2
Router(config)#access-list 30 deny 192.168.22.2
Router(config)#access-list 30 permit any
Router(config)#interface serial0/0/0
Router(config-if)#ip access-group 30 in
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show access-list
Standard IP access list 30
  10 deny host 192.168.20.2
  20 deny host 192.168.22.2
  30 permit any
Router#
```

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## MAC ADDRESS STATIC:

### 4.2.2 Principal and vice principal

PRINCIPAL ROOM

Physical Config CLI

IOS Command Line Interface

```

Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0010.1161.6e3d    DYNAMIC   Fa0/2
1     0030.a364.4a02    DYNAMIC   Fa0/1
1     0090.21e9.99e7    DYNAMIC   Fa0/4

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#mac-address-table static 0010.1161.6e3d vlan 1 int fa 0/2
Switch(config)#ex
Switch#
SYS-5-CONFIG_I: Configured from console by console

Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0010.1161.6e3d    STATIC    Fa0/2
1     0030.a364.4a02    DYNAMIC   Fa0/1
1     0090.21e9.99e7    DYNAMIC   Fa0/4

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.

```

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PRINCIPAL ROOM

Physical Config CLI

IOS Command Line Interface

```

Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0010.1161.6e3d    STATIC    Fa0/2
1     0030.a364.4a02    DYNAMIC   Fa0/1
1     0090.21e9.99e7    DYNAMIC   Fa0/4

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#mac-address-table static 0090.21e9.99e7 vlan 1 int fa 0/4
Switch(config)#ex
Switch#
SYS-5-CONFIG_I: Configured from console by console

Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0010.1161.6e3d    STATIC    Fa0/2
1     0030.a364.4a02    DYNAMIC   Fa0/1
1     0090.21e9.99e7    STATIC    Fa0/4

Switch#

```

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## PORT SECURITY:

#### 4.2.3 For Email Server:

emailserver switch

Physical    Config    CLI

IOS Command Line Interface

```
* invalid input detected at '^' marker.

Switch(config)#switchport mode access
               ^
% Invalid input detected at '^' marker.

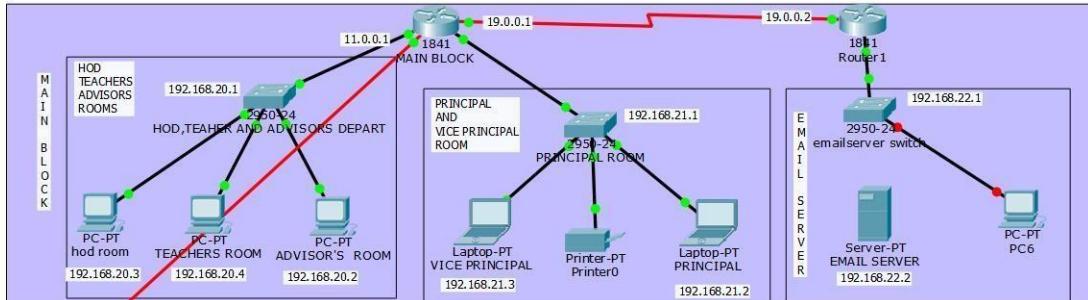
Switch(config)#int fa 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security
Switch(config-if)#switchport port-security maximum 1
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#ex
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#sh port-security
Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security Action
(Count) (Count) (Count)
-----
Fa0/2      1      0      0      Shutdown

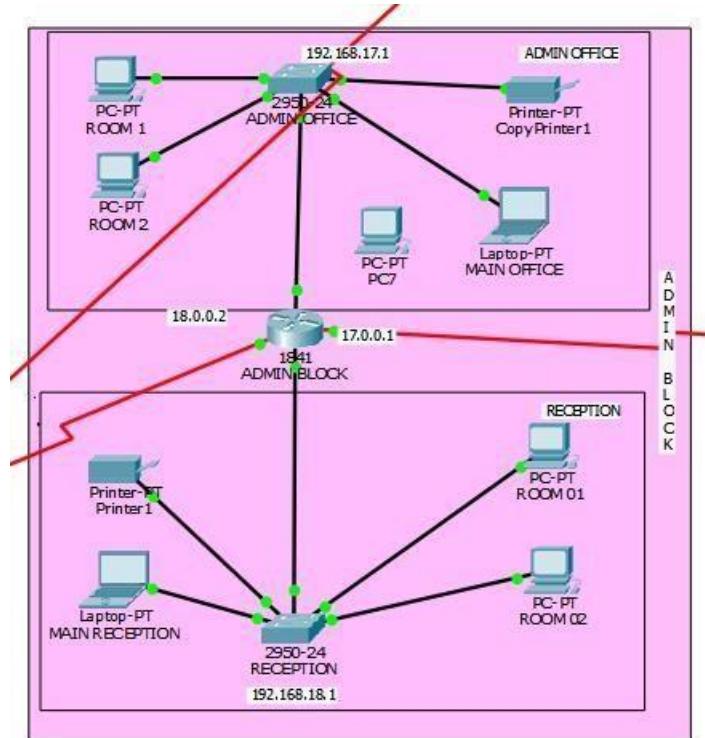
Switch#sh port-security
Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security Action
(Count) (Count) (Count)
-----
Fa0/2      1      1      0      Shutdown

Switch#
```

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ADMIN BLOCK:



## DYNAMIC IPS

ADMIN BLOCK

Physical Config CLI

IOS Command Line Interface

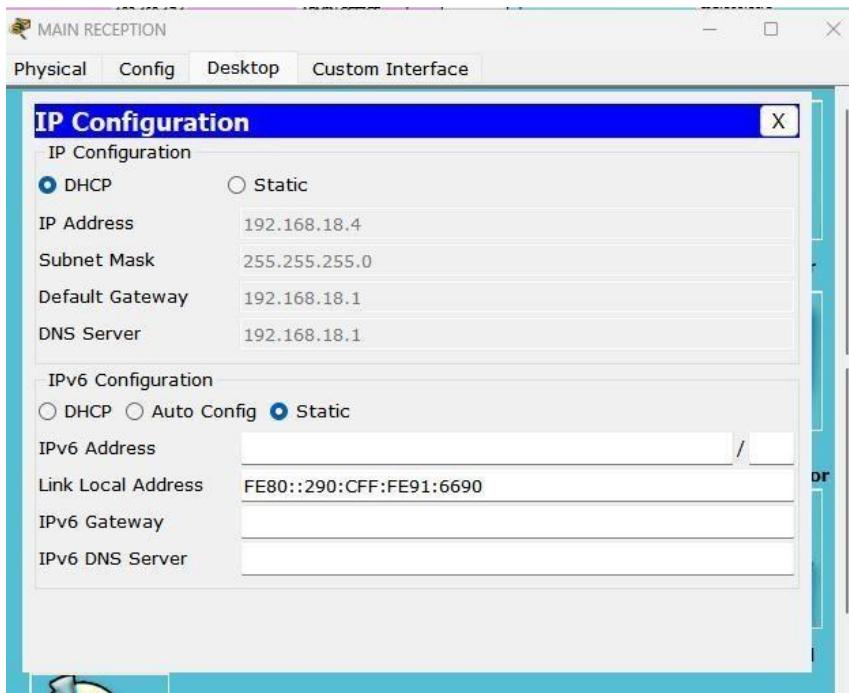
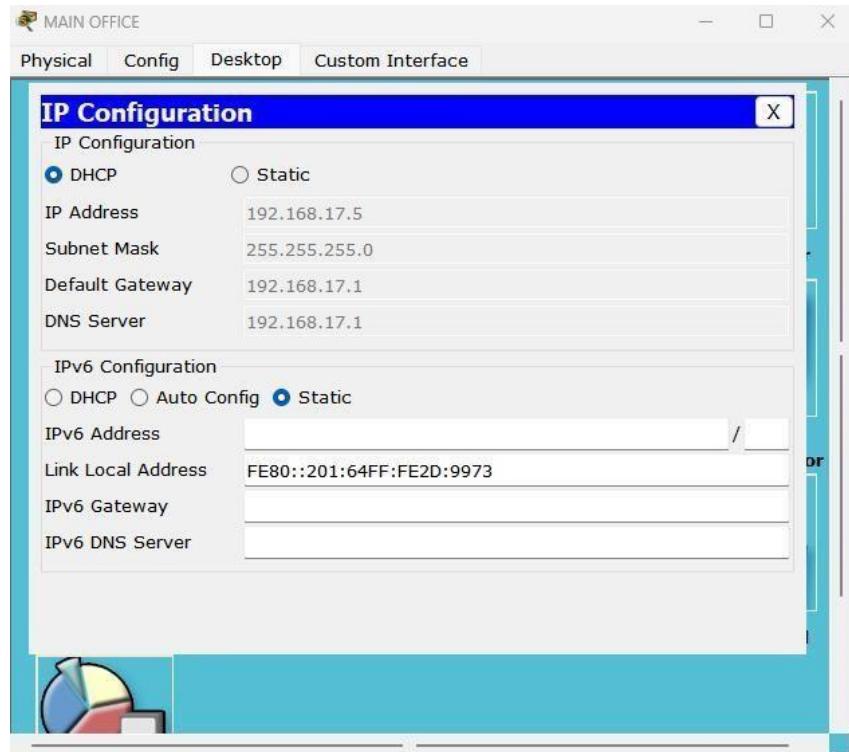
```

Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#
Router(config)#ip dhcp pool admin-pool
Router(dhcp-config)#network 192.168.18.0 255.255.255.0
^
* Invalid input detected at '^' marker.

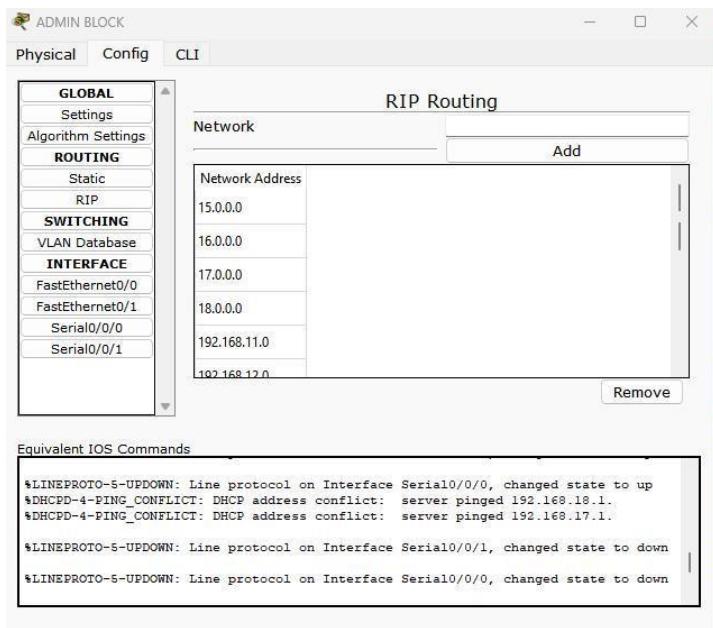
Router(dhcp-config)#network 192.168.18.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.18.1
Router(dhcp-config)#dns-server 192.168.18.1
Router(dhcp-config)#
Router(config)#exit
Router(config)#do wr
Building configuration...
[OK]
Router(config)#ip dhcp pool reception-pool
Router(dhcp-config)#network 192.168.17.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.17.1
Router(dhcp-config)#dns-server 192.168.17.1
Router(dhcp-config)#
Router(config)#exit
Router(config)#do wr
Building configuration...
[OK]
Router(config)#

```

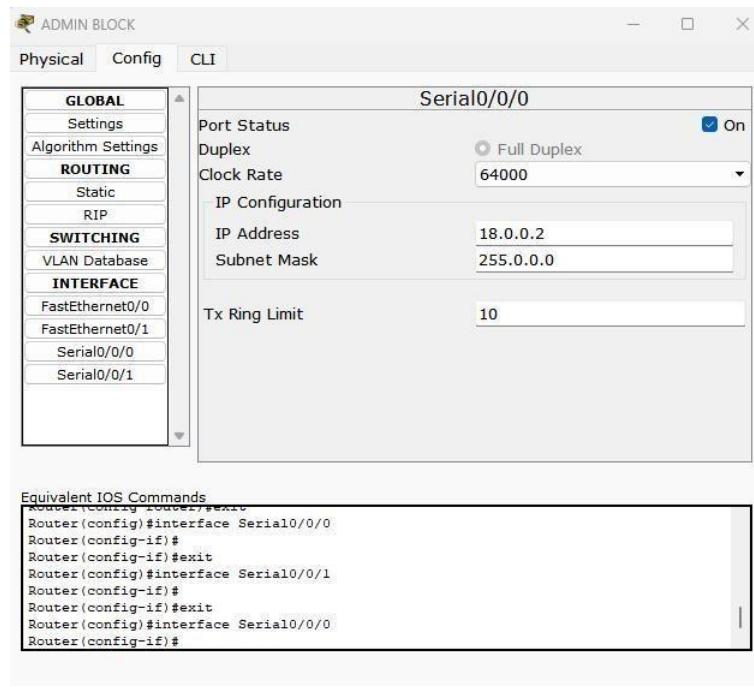
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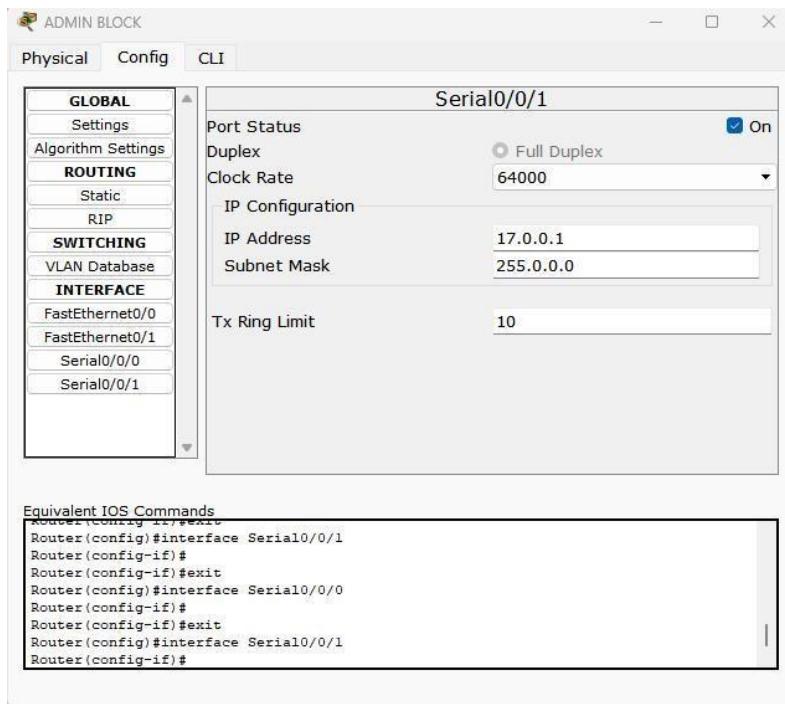
## RIP ROUTING



SERIAL0/0/0

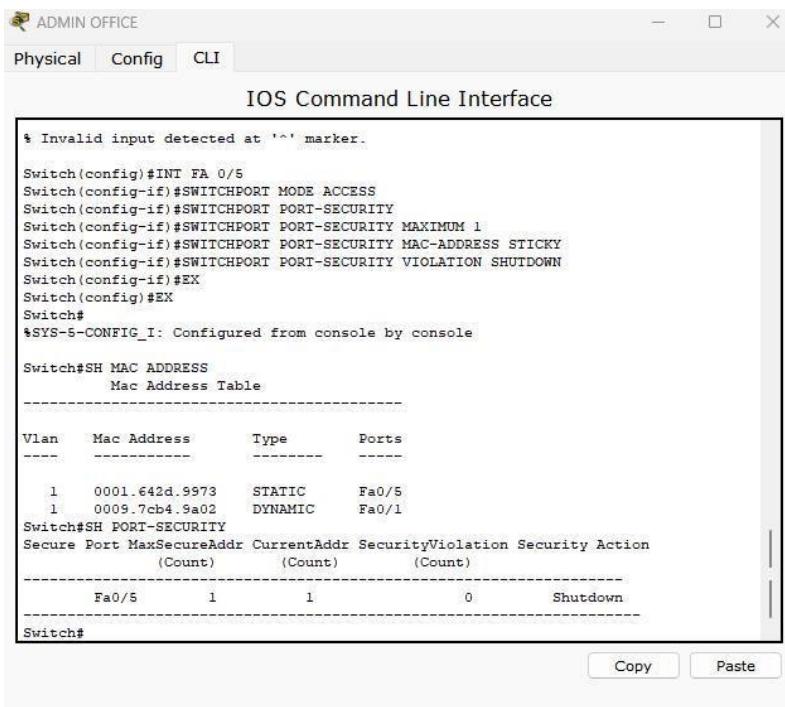


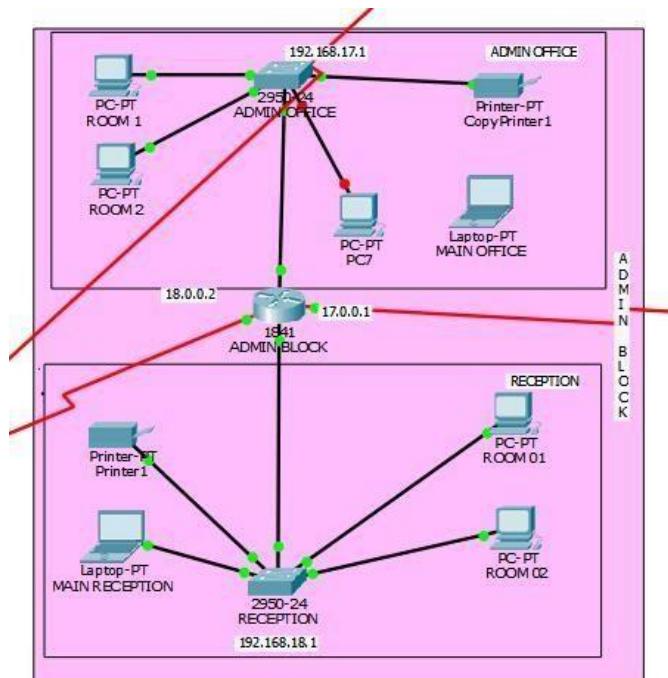
SERIAL0/0/1



#### **4.2.4 PORT SECURE**

## **MAIN OFFICE:**





Realtime									
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	
	Failed	PC7	ROOM 2	ICMP		0.000	N	0	

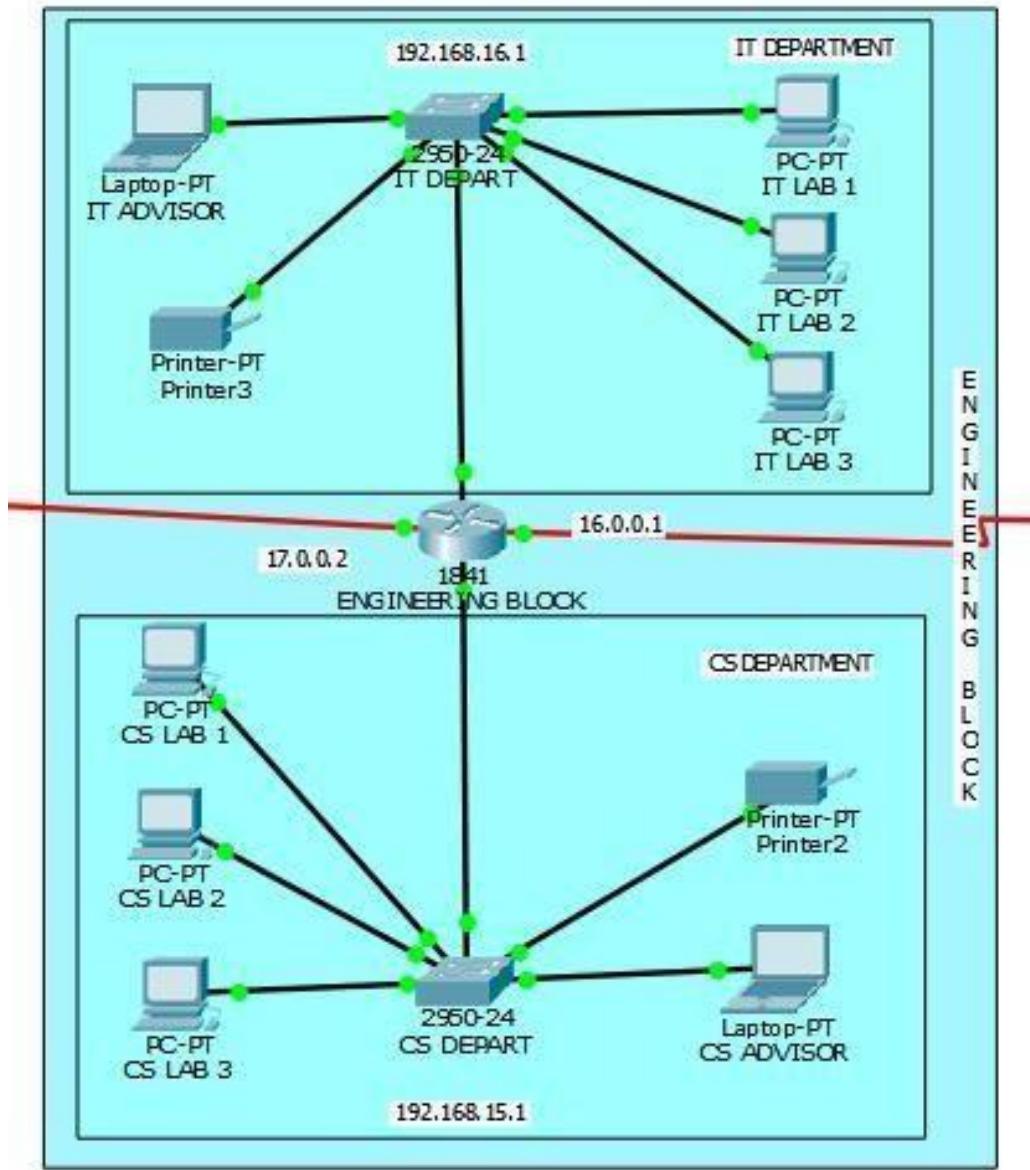
### PERMENENT MAC ADDRESS OF MAIN RECEPTION:

```

RECEPTION
Physical Config CLI
IOS Command Line Interface

Switch#SH MAC-ADDRESS-TABLE
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0009.7cb4.9a01    DYNAMIC   Fa0/1
1     0040.0b0d.67bd    DYNAMIC   Fa0/3
1     0090.0c91.6690    DYNAMIC   Fa0/5
1     0090.2bc5.87a6    DYNAMIC   Fa0/2
Switch#CONFIG T
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#MAC-ADDRESS-TABLE STATIC 0090.0c91.6690 VLAN 1 INT FA 0/5
Switch(config)#EX
Switch#
*SYS-5-CONFIG_I: Configured from console by console
Switch#SH MAC-ADDRESS-TABLE
Mac Address Table
-----
Vlan   Mac Address      Type      Ports
----  -----
1     0009.7cb4.9a01    DYNAMIC   Fa0/1
1     0040.0b0d.67bd    DYNAMIC   Fa0/3
1     0090.0c91.6690    STATIC    Fa0/5
1     0090.2bc5.87a6    DYNAMIC   Fa0/2
Switch#

```

**ENGINEERING BLOCK:****DYNAMIC IPS:**

Engineering Block

**Physical Config CLI**

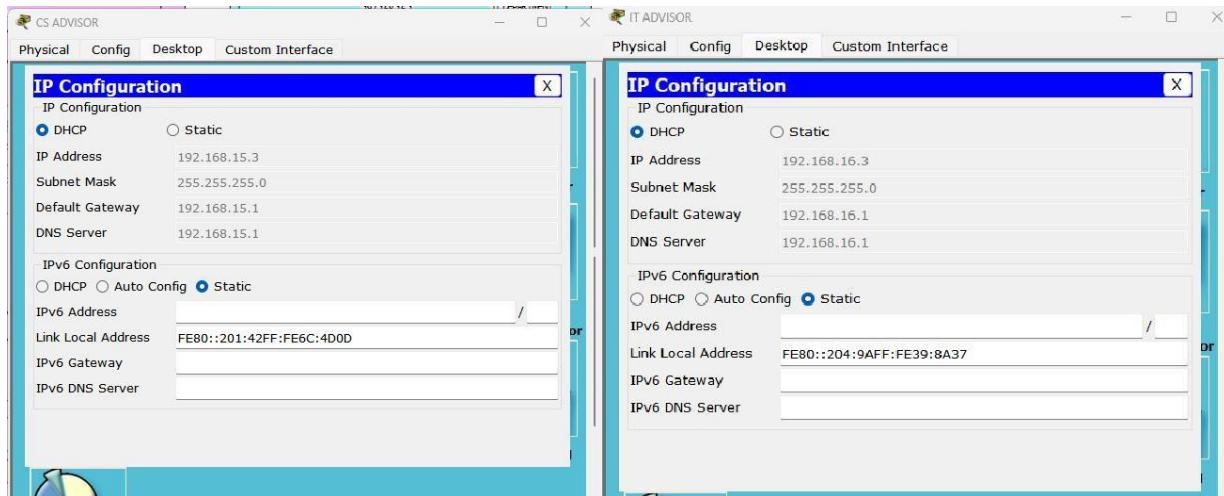
**IOS Command Line Interface**

```

Router#config t
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up
clock rate 64000
This command applies only to DCE interfaces
Router(config-if)#ex
Router(config)#ip dhcp pool
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
% Incomplete command.
Router(config)#IP DHCP POOL ITDEPART-POOL
Router(dhcp-config)#network 192.168.16.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.16.1
Router(dhcp-config)#dns-server 192.168.16.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
[OK]
Router(config)#ip dhcp pool csdepart-pool
Router(dhcp-config)#network 192.168.15.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.15.1
Router(dhcp-config)#dns-server 192.168.15.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
[OK]
Router(config)#

```

**Copy Paste**



## RIPROUTING:

Engineering Block

**Physical Config CLI**

**RIP Routing**

Network	Add
15.0.0.0	
16.0.0.0	
17.0.0.0	
18.0.0.0	
19.0.0.0	
10.168.11.0	Remove

**Equivalent IOS Commands**

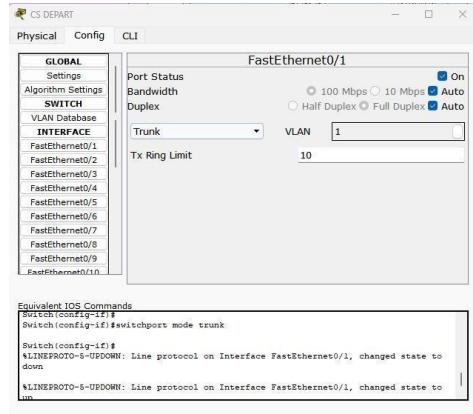
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

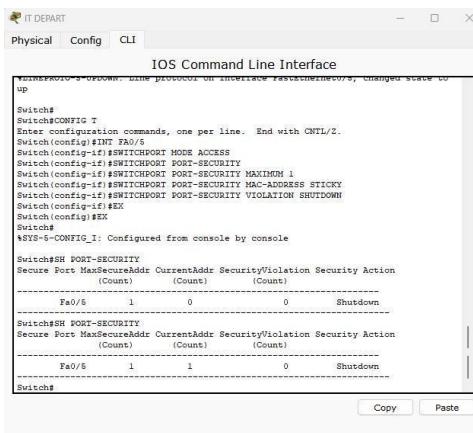
Router>enable
Router>configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)router rip
Router(config-router)#

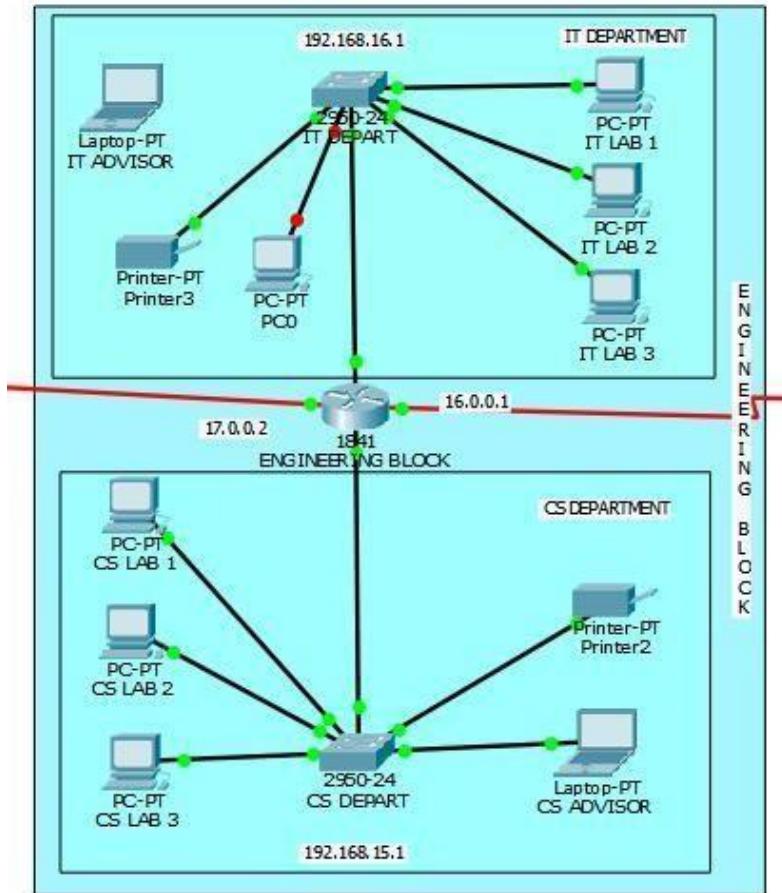
```

## TRUNKING PORT:



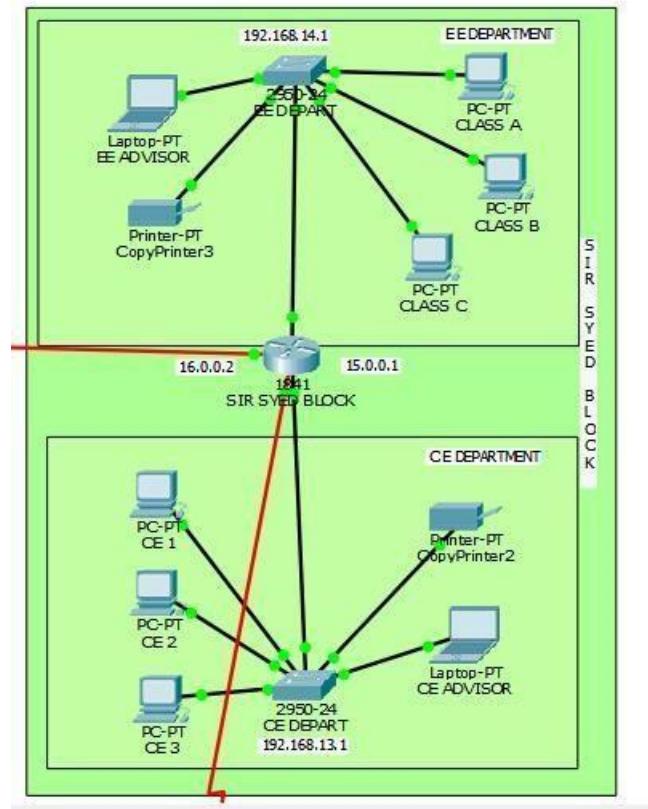
## PORT SECURE: ITADVISOR





Realtime									
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	
<span style="color: red;">●</span>	Failed	PC0	IT LAB 1	ICMP	<span style="background-color: blue;">█</span>	0.000	N	0	

## SIR SYED BLOCK:



## DYNAMIC IPS:

SIR SYED BLOCK

Physical    Config    CLI

IOS Command Line Interface

```

Router(config)#Router#exit
Router(config)#interface Serial0/0/0
Router(config-if)#exit
Router(config-if)#exit
Router(config-if)#interface FastEthernet0/1
Router(config-if)#exit
Router(config-if)#exit
Router(config-if)#interface FastEthernet0/0
Router(config-if)#EX
Router(config)#ip dhcp pool eedepart-pool
Router(dhcp-config)#network 192.168.14.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.14.1
Router(dhcp-config)#dns-server 192.168.14.1
Router(config)#do wr
Building configuration...
[OK]
Router(config)#ip dhcp pool cedepart-pool
Router(dhcp-config)#network 192.168.13.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.13.1
Router(dhcp-config)#default router 192.168.13.1
^
* Invalid input detected at '^' marker.

Router(dhcp-config)#default-router 192.168.13.1
Router(dhcp-config)#dns-server 192.168.13.1
Router(dhcp-config)#ex
Router(config)#do we
Translating "we"...domain server (255.255.255.255)

```

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## RIPROUTING:

SIR SYED BLOCK

Physical Config CLI

IOS Command Line Interface

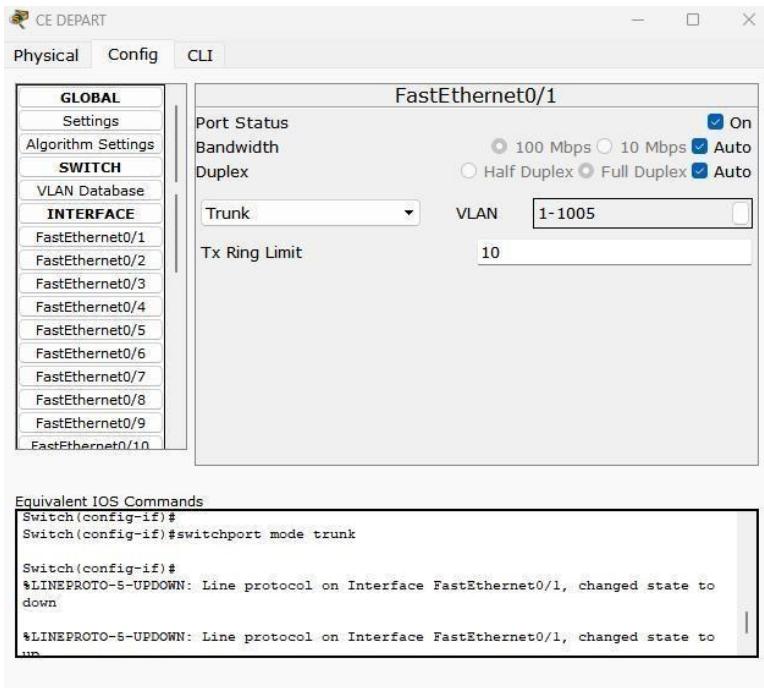
```

Router(config)#exit
Router(config)#router rip
Router(config-router)#network 16.0.0.0
Router(config-router)#network 17.0.0.0
Router(config-router)#network 18.0.0.0
Router(config-router)#network 192.168.13.0
Router(config-router)#network 192.168.14.0
Router(config-router)#network 192.168.15.0
Router(config-router)#network 192.168.16.0
Router(config-router)#network 192.168.17.0
Router(config-router)#network 192.168.18.0
Router(config-router)#network 192.168.19.0
Router(config-router)#ex
Router(config)#ip dhcp pool sederpart-pool
Router(dhcp-config)#network 192.168.14.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.14.1
Router(dhcp-config)#dns-server 192.168.14.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
[OK]
Router(config)#ip dhcp pool csdepart-pool
Router(dhcp-config)#network 192.168.13.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.13.1
Router(dhcp-config)#dns-server 192.168.13.1
Router(dhcp-config)#ex
Router(config)#do wr
Building configuration...
[OK]
Router(config)#

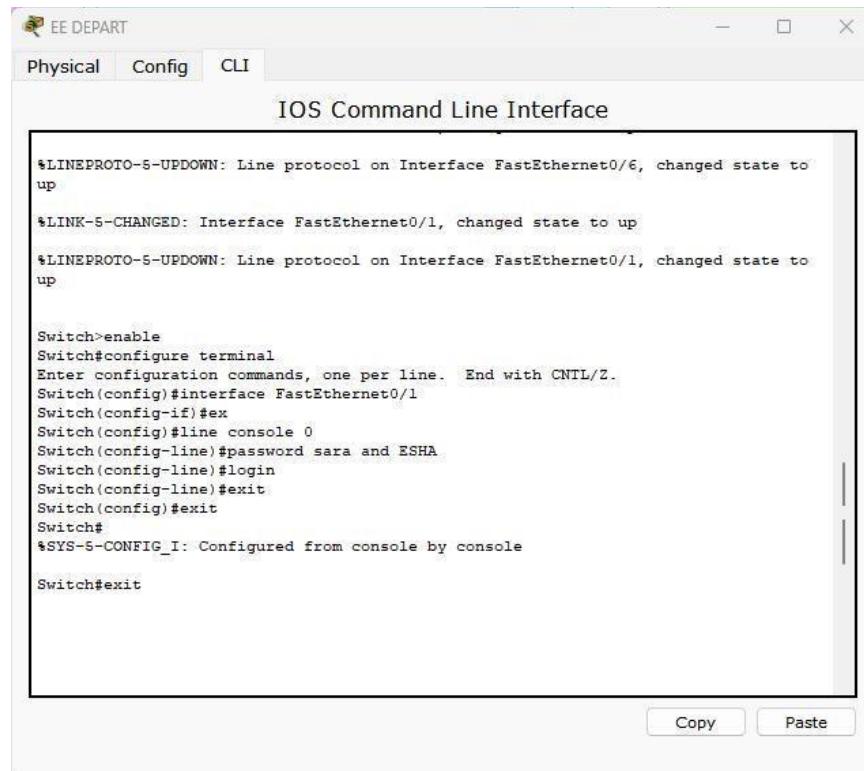
```

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## TRUNKING PORT ENABLE:



## Password protected department:



EE DEPART

Physical Config CLI

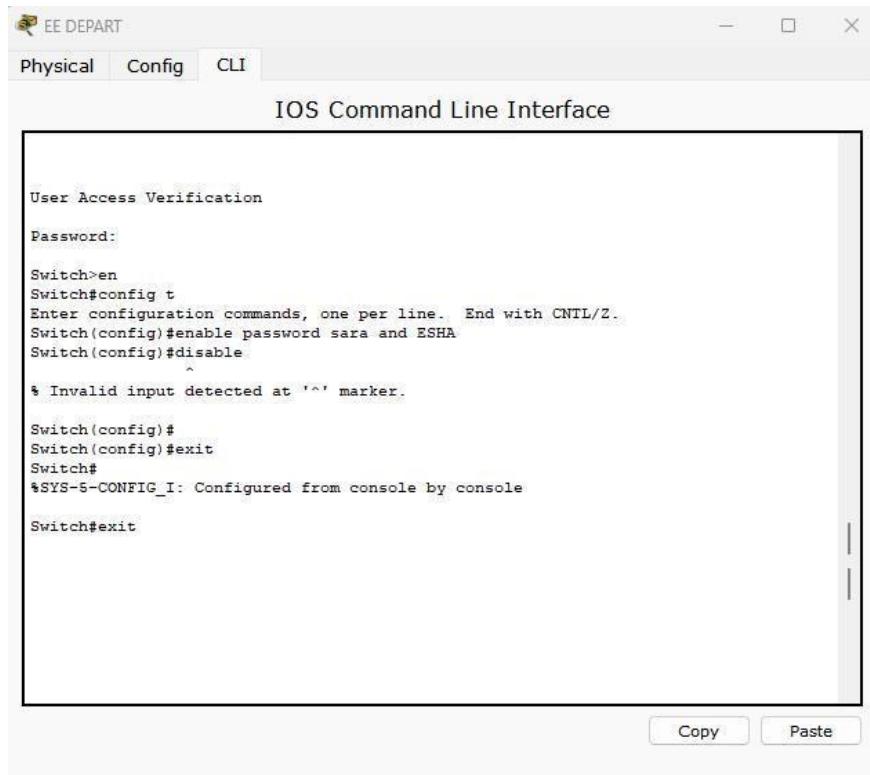
IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#ex
Switch(config-line)#line console 0
Switch(config-line)#password sara and ESHA
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#exit
```

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EE DEPART

Physical Config CLI

IOS Command Line Interface

```
User Access Verification
Password:

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable password sara and ESHA
Switch(config)#disable
^
% Invalid input detected at '^' marker.

Switch(config)#
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#exit
```

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```

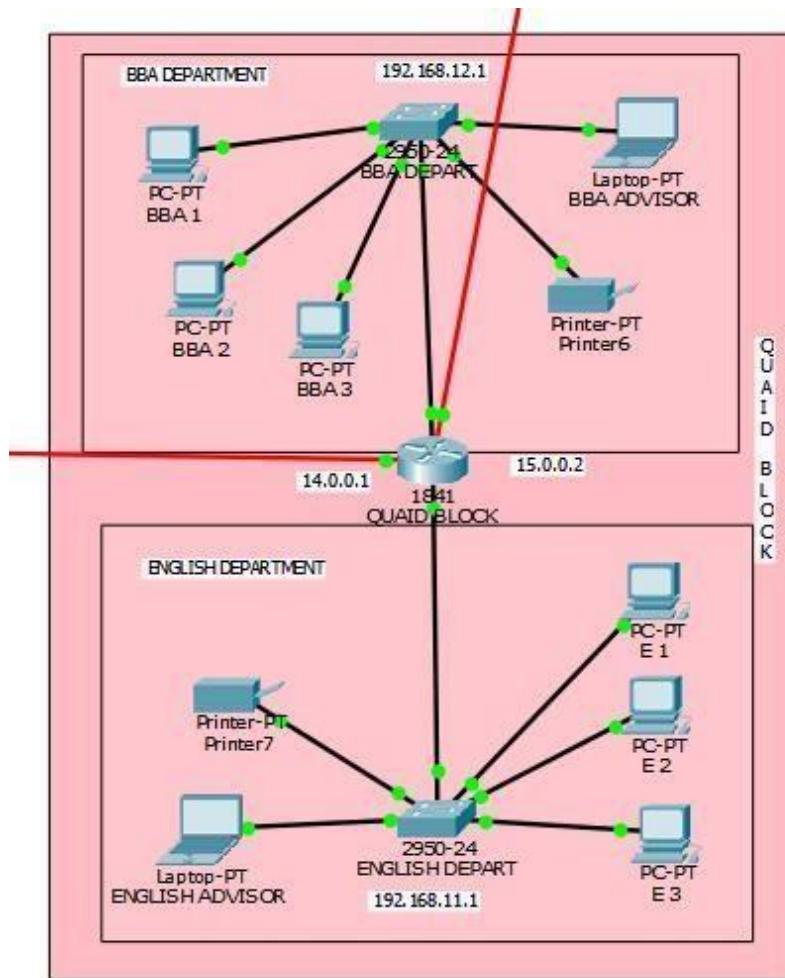
Press RETURN to get started.

User Access Verification
Password:
Switch>en
Password:
Switch>config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#

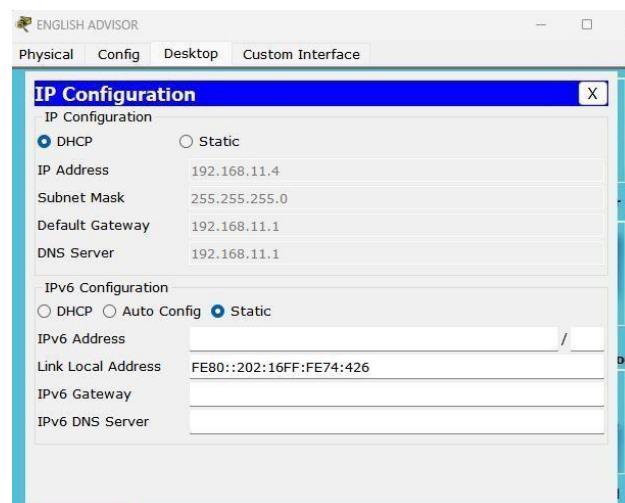
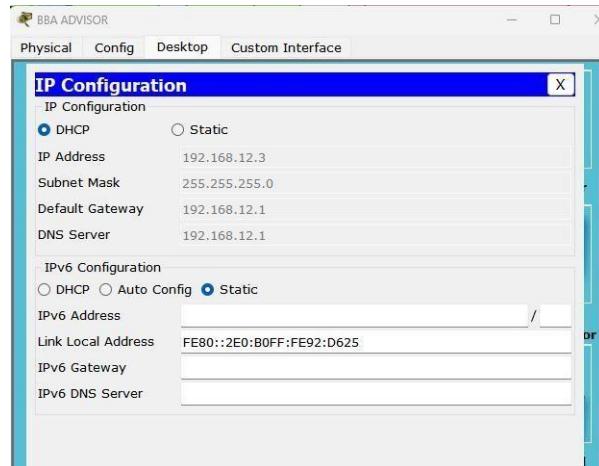
```

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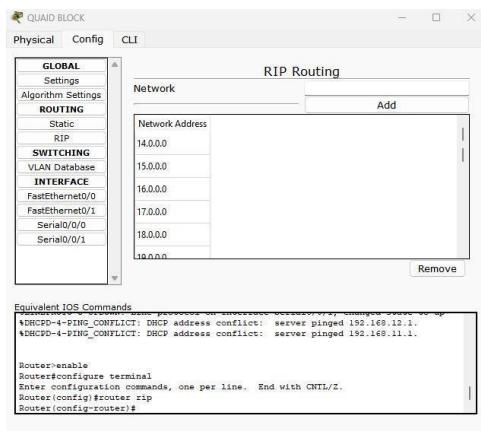
## 1. QUAID BLOCK:



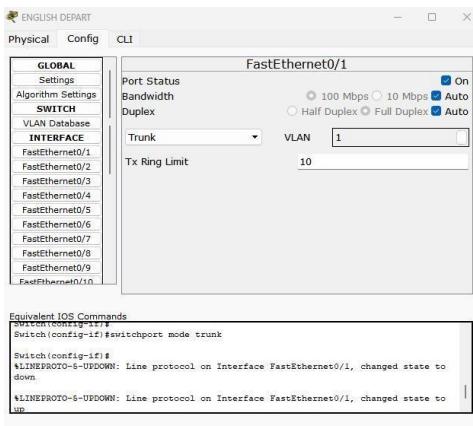
## Dynamic ips:



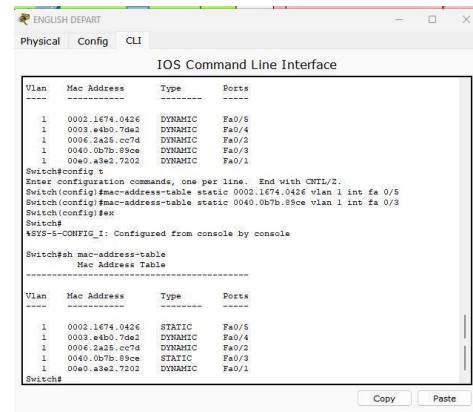
## Rip routing:



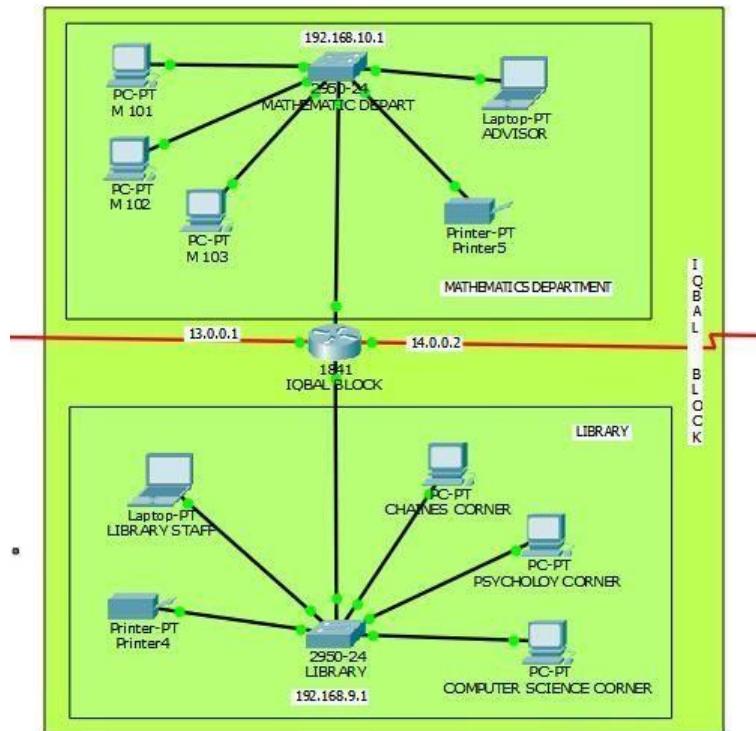
## Trunking port enable:



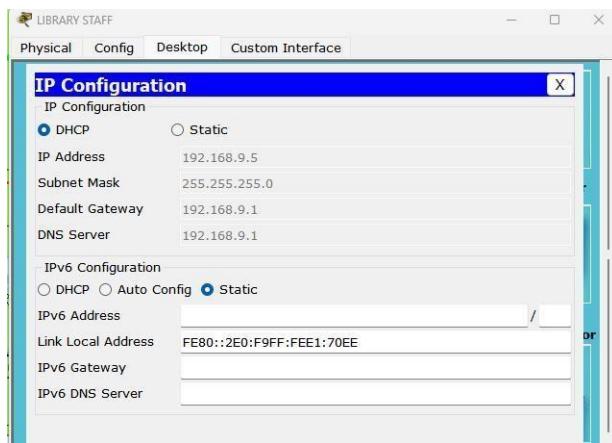
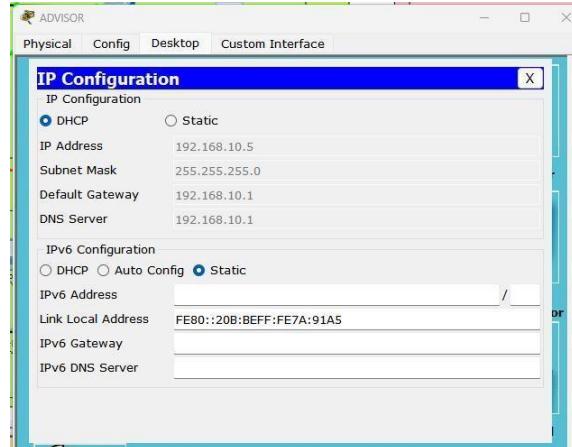
### **Permanent mac address table:**



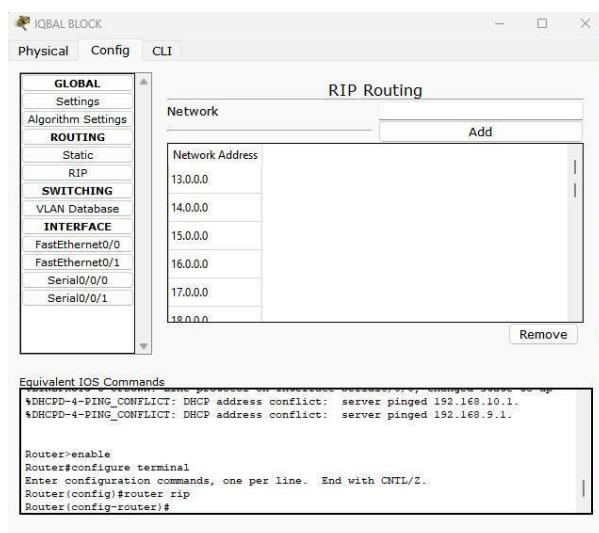
## **2. IQBAL BLOCK:**

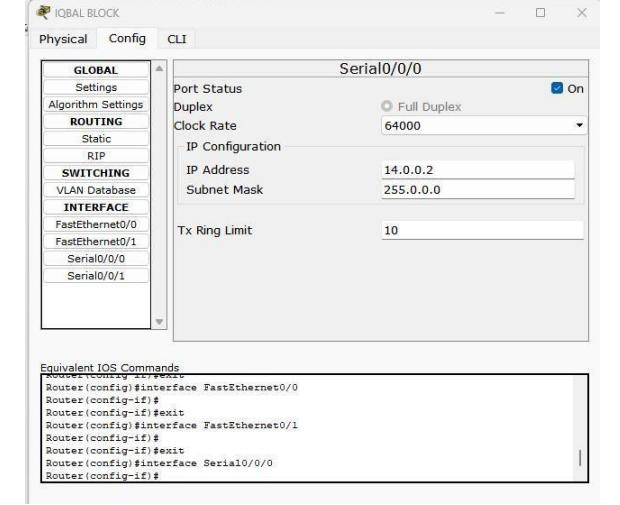
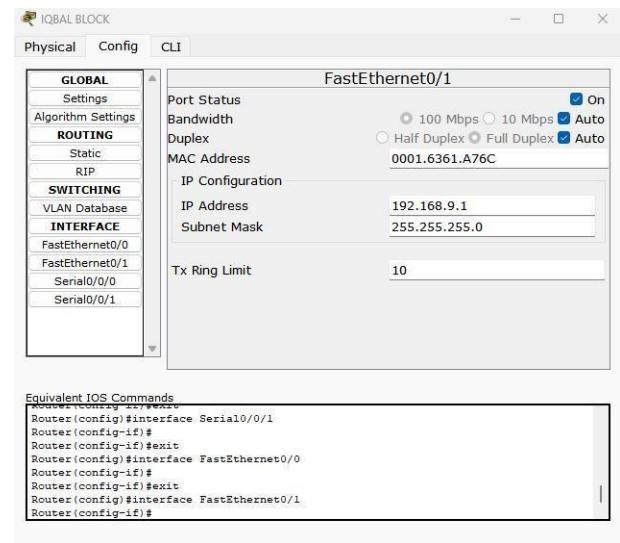
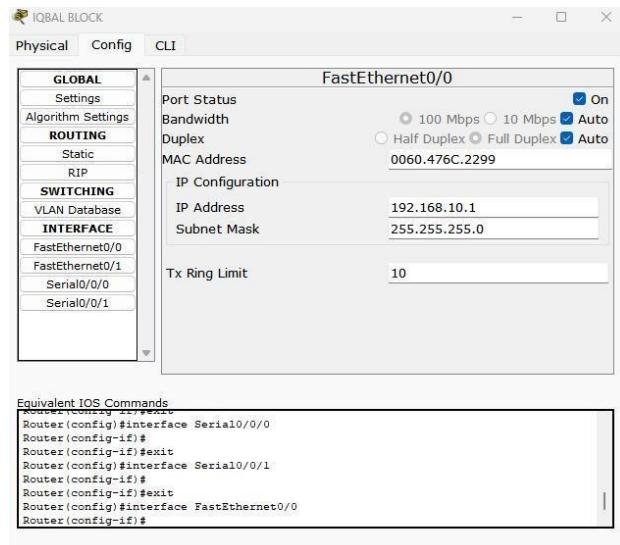


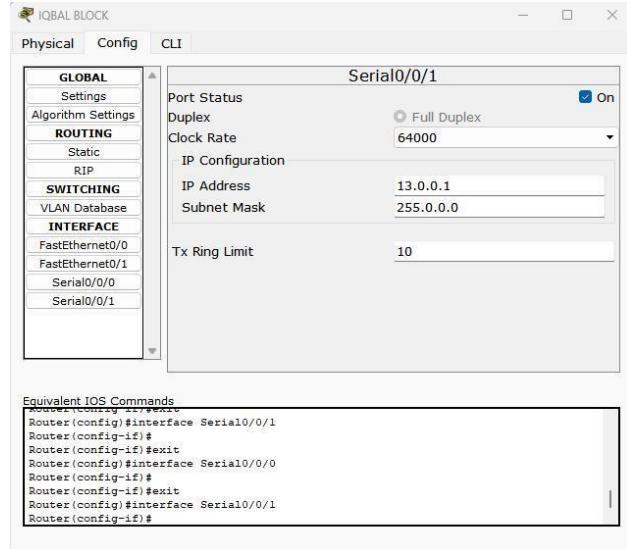
## Dynamic ips:



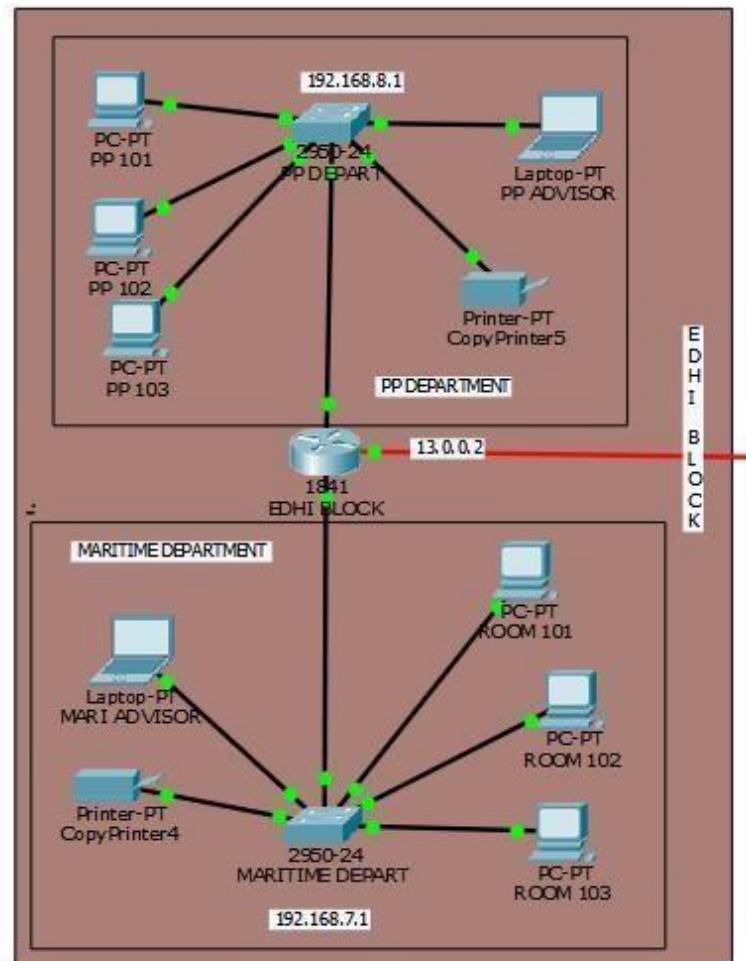
### Rip routing:







### 3. EDHI BLOCK:



## Dynamic ips:

**EDHI BLOCK**

Physical Config CLI

**IOS Command Line Interface**

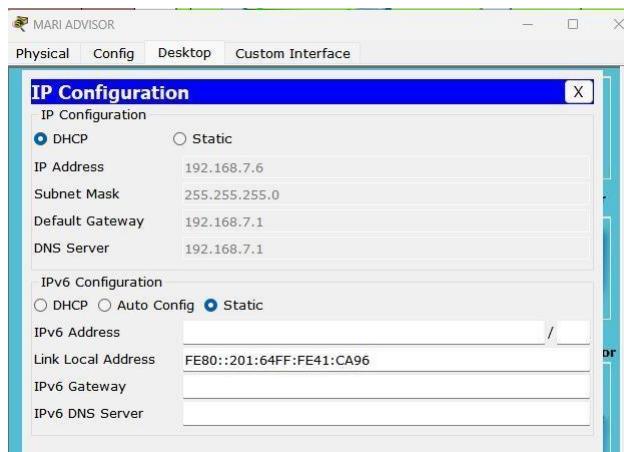
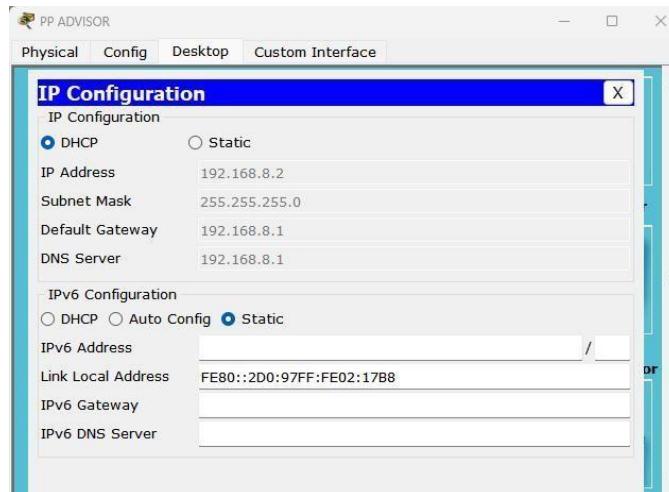
```

Router(config)#interface fastethernet0/1
Router(config-if)#no shutdown

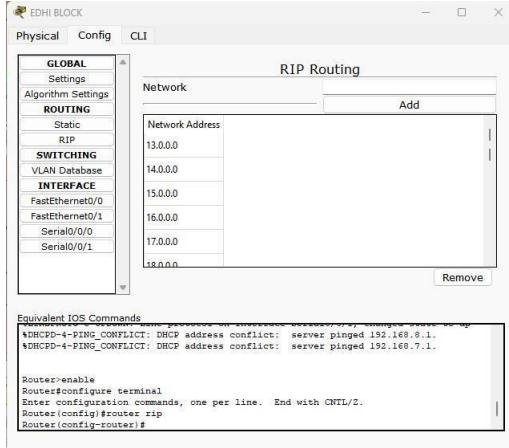
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
ip address 192.168.7.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#EX
Router(config)#! IP DHCP POOL MARINEPART-POOL
Router(dhcp-config)#!NETWORK 192.168.8.0 255.255.255.0
Router(dhcp-config)#!DEFAULT-ROUTER 192.168.8.1
Router(dhcp-config)#!DNS-SERVER 192.168.8.1
Router(dhcp-config)#!EX
Router(config)#!DO WR
Building configuration...
[OK]
Router(config)#!IP DHCP POOL MARINEPART-POOL
Router(dhcp-config)#!NETWORK 192.168.7.0 255.255.255.0
Router(dhcp-config)#!DEFAULT-ROUTER 192.168.7.1
Router(dhcp-config)#!DNS-SERVER 192.168.7.1
Router(dhcp-config)#!EX
Router(config)#!DO WR
Building configuration...
[OK]
Router(config)#

```

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## Rip routing:



## Port security for pp advisor:

The screenshot shows the 'IOS Command Line Interface' window in the PP DEPART software. It displays a series of configuration commands for port security on interface Fa0/5:

```

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#switchport mode access
* Invalid input detected at '^' marker.

Switch(config)#int fa 0/5
*LINK-5-CHANGED: Interface FastEthernet0/5, changed state to down
*LINEPROTO-0-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to down
*LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
*LINEPROTO-0-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up

Switch(config-if)#int fa 0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security
Switch(config-if)#switchport port-security maximum 1
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#

```

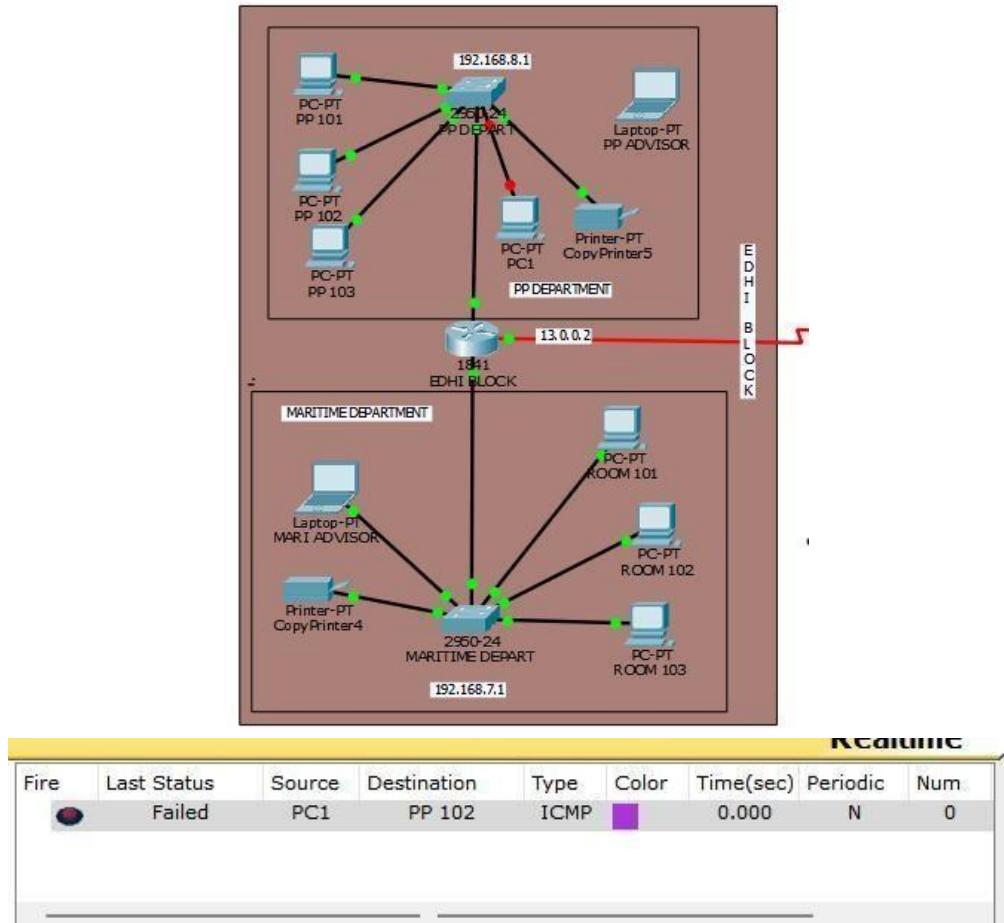
The screenshot continues the 'IOS Command Line Interface' window, showing the creation of a MAC address table and the display of its contents:

```

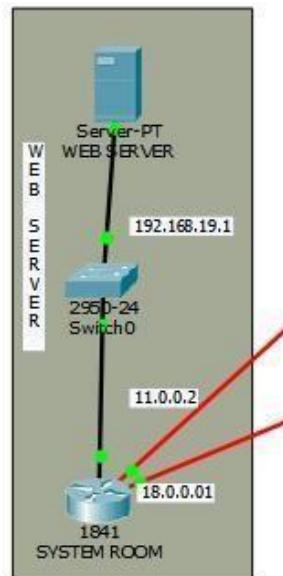
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#exit
Switch(config)#
$SYS-5-CONFIG_I: Configured from console by console

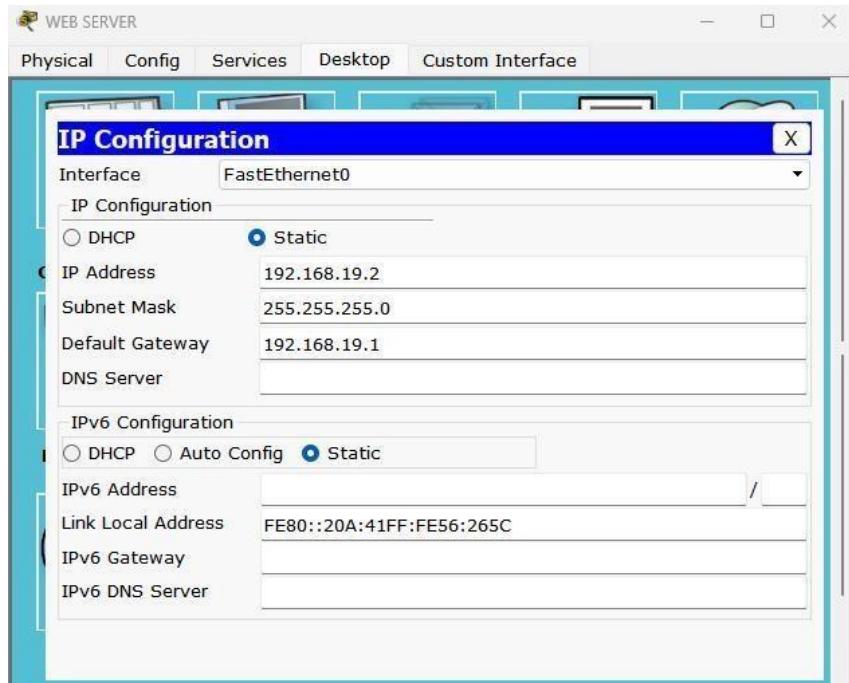
Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type       Ports
-----  -----
1     0060.3e03.0e01    DYNAMIC   Fa0/1
Switch#sh mac-address-table
Mac Address Table
-----
Vlan   Mac Address      Type       Ports
-----  -----
1     0060.70ea.b1f3    DYNAMIC   Fa0/2
1     00d0.9702.17b8    STATIC    Fa0/5
1     00e0.f753.a7c7    DYNAMIC   Fa0/4
Switch#

```



#### 4. System room:





**RIP Routing**

Network

Add
15.0.0.0
16.0.0.0
17.0.0.0
18.0.0.0
192.168.11.0
192.168.12.0

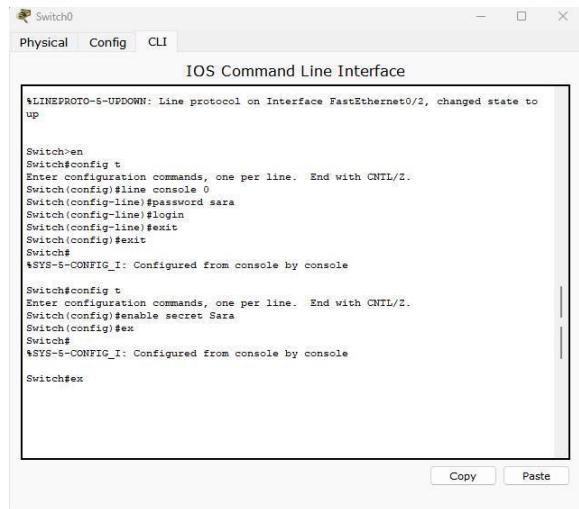
**Equivalent IOS Commands**

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state to up

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#

```

**Password protective:**



Switch0 Physical Config CLI  
IOS Command Line Interface

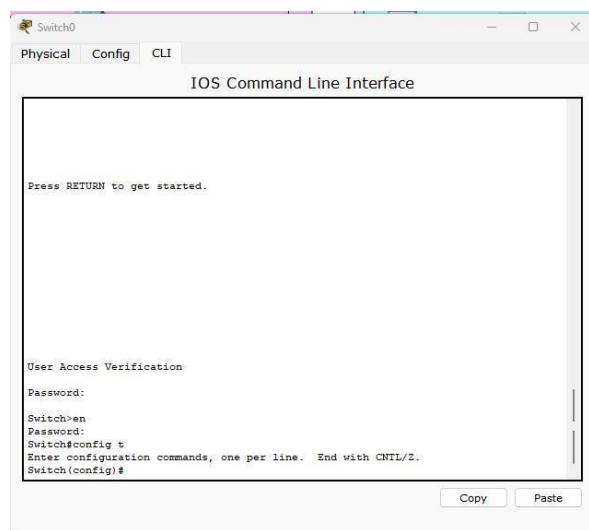
```
$LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#line console 0
Switch(config-line)#password sara
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#exit
Switch#
$SYS-5-CONFIG_I: Configured from console by console

Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable secret Sara
Switch(config)#exit
Switch#
$SYS-5-CONFIG_I: Configured from console by console

Switch#exit
```

Copy Paste



Switch0 Physical Config CLI  
IOS Command Line Interface

```
Press RETURN to get started.

User Access Verification
Password:
```

Switch>en
Password:
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#

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## 4.2 DISCUSSION

### 4.2.1 Accuracy:

The network's accuracy in meeting performance metrics and requirements was assessed through testing against predefined criteria.

**4.2.2 Errors:** Identified discrepancies between expected and actual performance were rectified through troubleshooting and adjustments.

**4.2.3 Limitations:** Budget, technology, and time constraints may have limited the scope or capabilities of the network implementation.

**4.2.4 Benefits:** The network facilitates improved communication, resource sharing, and security, enhancing overall productivity and efficiency.

**4.2.5 Reasons for Obtained Results:** Success stemmed from effective planning, implementation, and adherence to industry standards, with ongoing monitoring and maintenance ensuring continued performance.

**5****5.2 CONCLUSIONS AND RECOMMENDATIONS**

The designed University campus network in Cisco Packet Tracer provides a robust, secure, and scalable infrastructure to meet the networking needs of Bahria University. It ensures reliable connectivity, efficient traffic flow, and enhanced network security. The network design promotes effective communication and collaboration across various departments and offers a seamless user experience for students, faculty, and staff.

## REFERENCES

- [1] W. Stallings, *Network Security Essentials: Applications and Standards*, 6th ed. Pearson, 2015.
- [2] T. Alotaibi, "Using Cisco Packet Tracer for educational purposes," *Journal of Network and Computer Applications*, vol. 115, pp. 32-39, 2018.
- [3] Y. Wang, X. Liu, and J. Chen, "Security challenges and solutions in campus network design," *International Journal of Network Security*, vol. 18, no. 4, pp. 620-628, 2016.