

# **ASSIGNMENT 1**

**EC4060**

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2021/E/006

GROUP CG1

SEMESTER 4

14 DEC 2023

These tables outline the components needed for each department, including the number of PCs, printers, and WiFi access points in each room or place.

1. Management Office:

<b>Room/Place</b>	<b>Number of PCs</b>	<b>Number of Printers</b>	<b>Number of WiFi</b>
<b>CEO Office</b>	1	0	1
<b>Staff Office</b>	1	0	1
<b>Board Room</b>	2	0	1
<b>Lobby</b>	0	0	1
<b>Printing Room</b>	0	2	0

2. Admin Department:

<b>Room/Place</b>	<b>Number of PCs</b>	<b>Number of Printers</b>	<b>Number of WiFi</b>
<b>Finance Section</b>	15	0	0
<b>Human Resource</b>	25	0	0
<b>Assistant Section</b>	10	0	0
<b>Printing Room</b>	0	2	0

3. Technology Department:

<b>Room/Place</b>	<b>Number of PCs</b>	<b>Number of Printers</b>	<b>Number of WiFi</b>
<b>Meeting Room</b>	2	0	1
<b>R&amp;D Section</b>	25	0	0
<b>Design Section</b>	125	0	0
<b>Test Section</b>	20	0	0

4. Operations Department:

<b>Room/Place</b>	<b>Number of PCs</b>	<b>Number of Printers</b>	<b>Number of WiFi</b>
<b>Branding Section</b>	8	0	0
<b>Reporting Section</b>	10	0	0
<b>Sales Section</b>	40	0	2

5. Marketing Department:

<b>Room/Place</b>	<b>Number of PCs</b>	<b>Number of Printers</b>	<b>Number of WiFi</b>
<b>Marketing Strategies</b>	5	0	0
<b>Public Relations (PR)</b>	10	0	0

## IP ADDRESS ALLOCATION TABLE FOR COMPANY DEPARTMENTS

Overview:

The table below illustrates the optimal IP address allocation for various departments within the organization, ensuring efficient utilization of the provided IP address range (10.10.0.0/16). Each department is subdivided into sections, each assigned a specific VLAN (Virtual Local Area Network) for network segmentation.

DEPARTMENT	SECTIONS	V L A N N O	VLAN ID	REQU IRED SIZE	ALLO CATE D SIZE	USABLE IP ADDRESS	SUBNET MASK	DEFAULT GATEWAY ID	NETWORK ADDRESS	CIDR	BROADCAST ADDRESS
Technology Department	DESIGN	10	10.10.0.0/25	125	126	10.10.0.1 - 10.10.0.126	255.255.255.128	10.10.0.1	10.10.0.0	/25	10.10.0.127
Operations Department	BRANDS,REPORT,SALES	20	10.10.0.128/26	58	62	10.10.0.129 - 10.10.0.190	255.255.255.192	10.10.0.129	10.10.0.128	/26	10.10.0.191
Admin Department	FINANCE,HR,ASSISTANT SECTION,PRINTING	30	10.10.0.192/26	52	62	10.10.0.193 - 10.10.0.254	255.255.255.192	10.10.0.193	10.10.0.192	/26	10.10.0.255
Technology Department	MEETING,RND,TEST	40	10.10.1.0/26	47	62	10.10.1.1 - 10.10.1.62	255.255.255.192	10.10.1.1	10.10.1.0	/26	10.10.1.63
Marketing Department	PUBLIC RELATION	50	10.10.1.64/28	10	14	10.10.1.65 - 10.10.1.78	255.255.255.240	10.10.1.65	10.10.1.64	/28	10.10.1.79
Management Office	CEO,STAFF,BOARD,PRINTING	60	10.10.1.80/28	9	14	10.10.1.81 - 10.10.1.94	255.255.255.240	10.10.1.81	10.10.1.80	/28	10.10.1.95
Marketing Department	MARKETING STRTERGIES	70	10.10.1.96/29	5	6	10.10.1.97 - 10.10.1.102	255.255.255.248	10.10.1.97	10.10.1.96	/29	10.10.1.103
Management Office	LOBBY	80	10.10.1.104/30	1	2	10.10.1.105 - 10.10.1.106	255.255.255.252	10.10.1.105	10.10.1.104	/30	10.10.1.107

- Each department is assigned a unique VLAN for efficient network segmentation.
- Subnet masks are optimized to meet the required sizes for each section within a department.
- The default gateway is specified for each VLAN to ensure proper routing.
- The CIDR notation indicates the subnet size in slash notation.
- The "Usable IP Address Range" represents the range of IP addresses available for devices within each section.

## **DETAILED ALLOCATION:**

- **Technology Department (VLAN 10):**
  - DESIGN Section:
    - VLAN ID: 10
    - IP Range: 10.10.0.0/25
    - Usable IP Address Range: 10.10.0.1 - 10.10.0.126
    - Subnet Mask: 255.255.255.128
    - Default Gateway: 10.10.0.1
- **Operations Department (VLAN 20):**
  - BRANDS, REPORT, SALES Sections:
    - VLAN ID: 20
    - IP Range: 10.10.0.128/26
    - Usable IP Address Range: 10.10.0.129 - 10.10.0.190
    - Subnet Mask: 255.255.255.192
    - Default Gateway: 10.10.0.129
- **Admin Department (VLAN 30):**
  - FINANCE, HR, ASSISTANT SECTION, PRINTING Sections:
    - VLAN ID: 30
    - IP Range: 10.10.0.192/26
    - Usable IP Address Range: 10.10.0.193 - 10.10.0.254
    - Subnet Mask: 255.255.255.192
    - Default Gateway: 10.10.0.193
- **Technology Department (VLAN 40):**
  - MEETING, R&D, TEST Sections:
    - VLAN ID: 40
    - IP Range: 10.10.1.0/26
    - Usable IP Address Range: 10.10.1.1 - 10.10.1.62
    - Subnet Mask: 255.255.255.192
    - Default Gateway: 10.10.1.1
- **Marketing Department (VLAN 50):**
  - PUBLIC RELATION Section:
    - VLAN ID: 50
    - IP Range: 10.10.1.64/28
    - Usable IP Address Range: 10.10.1.65 - 10.10.1.78
    - Subnet Mask: 255.255.255.240
    - Default Gateway: 10.10.1.65

- **Management Office (VLAN 60):**
  - **CEO, STAFF, BOARD, PRINTING Sections:**
    - VLAN ID: 60
    - IP Range: 10.10.1.80/28
    - Usable IP Address Range: 10.10.1.81 - 10.10.1.94
    - Subnet Mask: 255.255.255.240
    - Default Gateway: 10.10.1.81
- **Marketing Department (VLAN 70):**
  - **MARKETING STRATEGIES Section:**
    - VLAN ID: 70
    - IP Range: 10.10.1.96/29
    - Usable IP Address Range: 10.10.1.97 - 10.10.1.102
    - Subnet Mask: 255.255.255.248
    - Default Gateway: 10.10.1.97
- **Management Office (VLAN 80):**
  - **LOBBY Section:**
    - VLAN ID: 80
    - IP Range: 10.10.1.104/30
    - Usable IP Address Range: 10.10.1.105 - 10.10.1.106
    - Subnet Mask: 255.255.255.252
    - Default Gateway: 10.10.1.105

## **BUILDING STRUCTURE AND DEPARTMENT ALLOCATION:**

### **Building Overview:**

- The newly constructed three-story building has the following dimensions:
  - Length: 60 meters
  - Width: 30 meters
  - Height: Each floor is 4 meters.

### **Floor-wise Department Allocation:**

#### **1. Ground Floor:**

- **Management Office:**
  - CEO Office
  - Staff Office
  - Board Room
  - Lobby (Public WiFi)
  - Printing Room
- **Admin Department:**
  - Finance Section
  - Human Resource (HR)
  - Assistant Section
  - Printing Room

#### **2. First Floor:**

- **Operations Department:**
  - Brands Section
  - Reporting Section
  - Sales Section
- **Marketing Department:**
  - Marketing Strategies Section
  - Public Relations (PR)

#### **3. Second Floor:**

- **Technology Department:**
  - Design Section
  - Meeting Room
  - R&D Section
  - Test Section

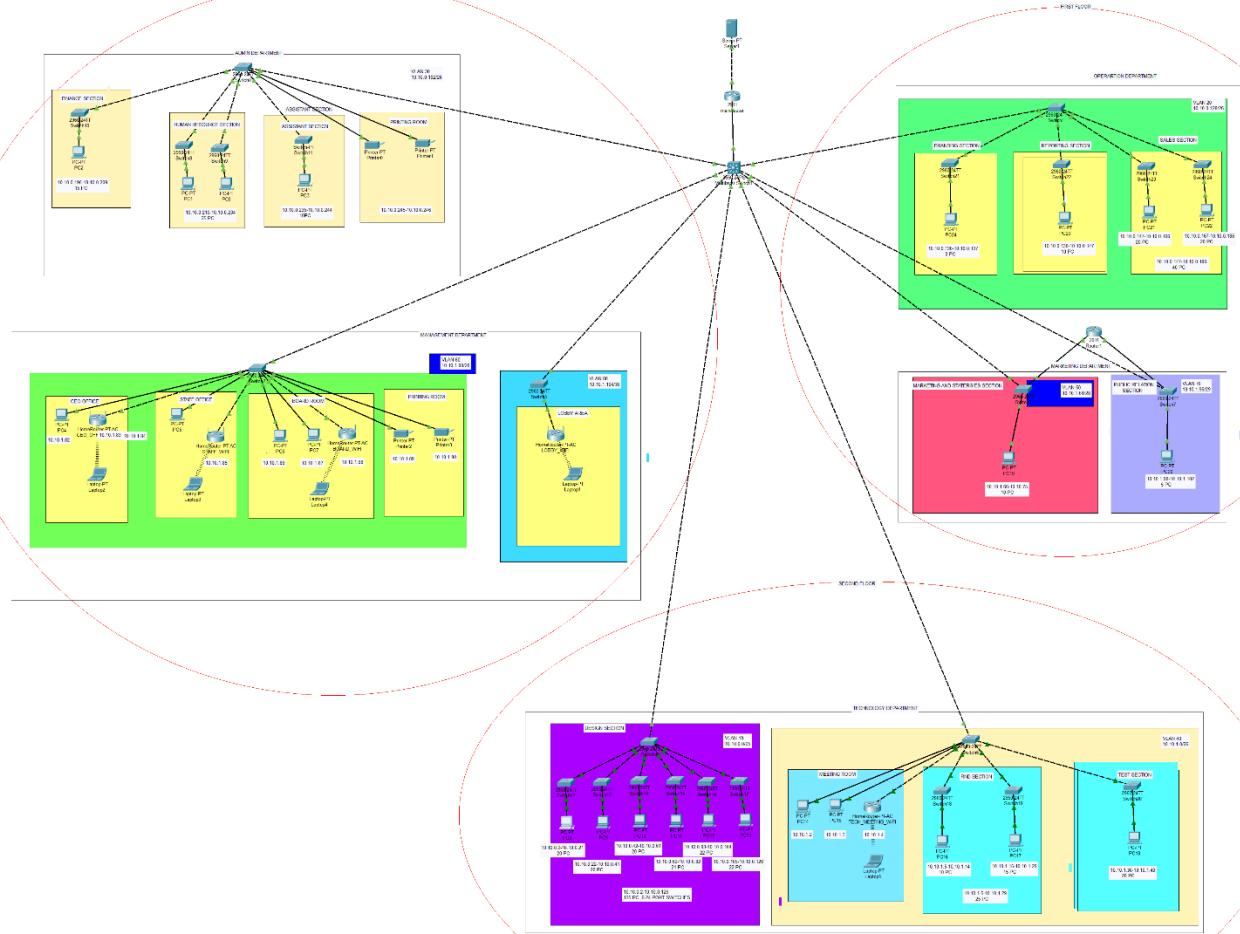
### **Department and Floor Relationship:**

- **Ground Floor:** Management and administrative functions are centralized.
- **First Floor:** Operational and marketing activities are housed together.
- **Second Floor:** Technology-related departments, including design and research, are situated on this floor.

### **Design Rationale:**

- The floor-wise allocation is designed to enhance workflow efficiency and collaboration among departments with similar functions.
- Each floor has its dedicated VLANs and IP address allocations, optimizing network segmentation and security.
- Public WiFi is available in common areas like the lobby for guest access.

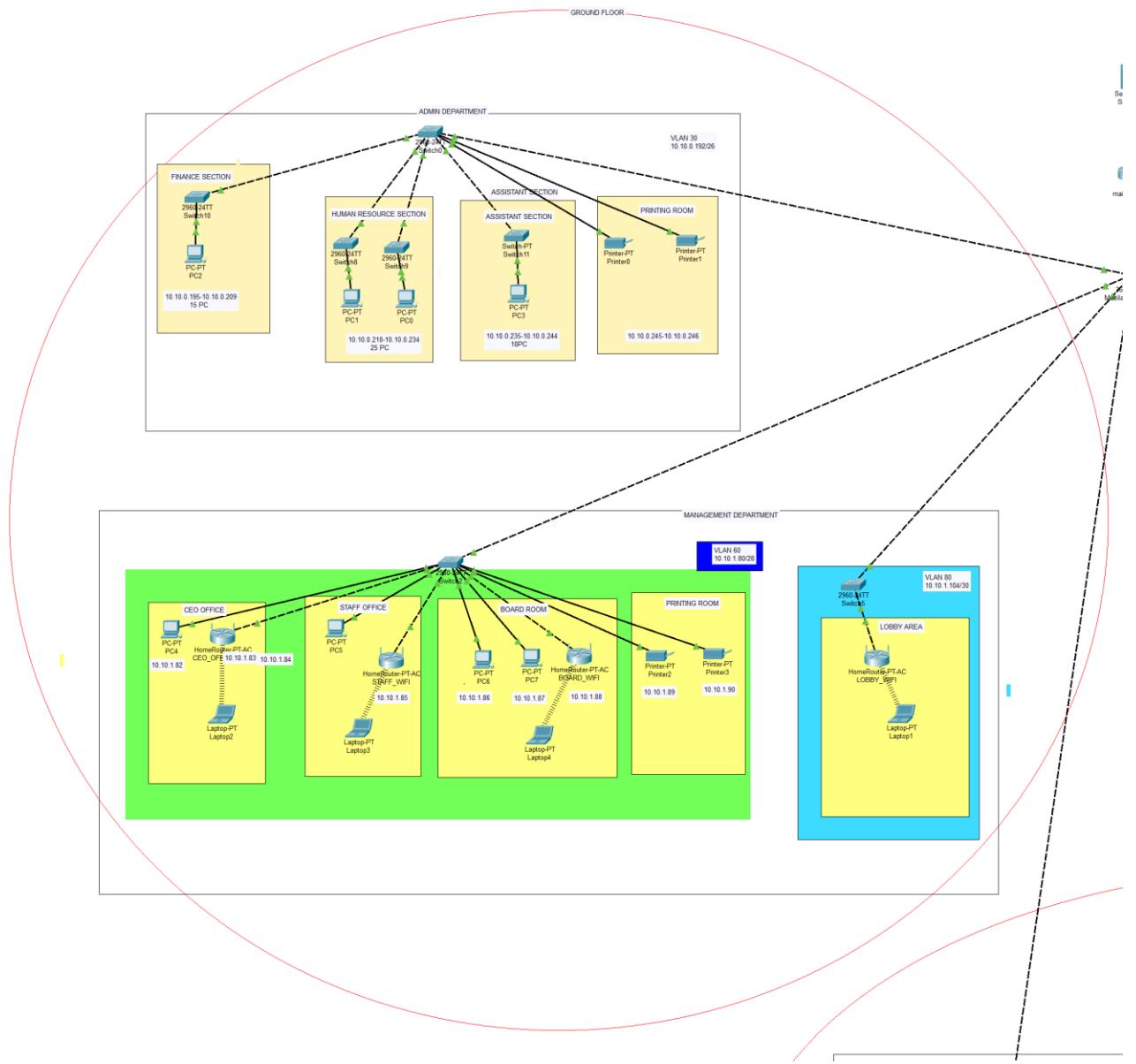
## Full Design Overview:



*Overview of the Entire Network Design*

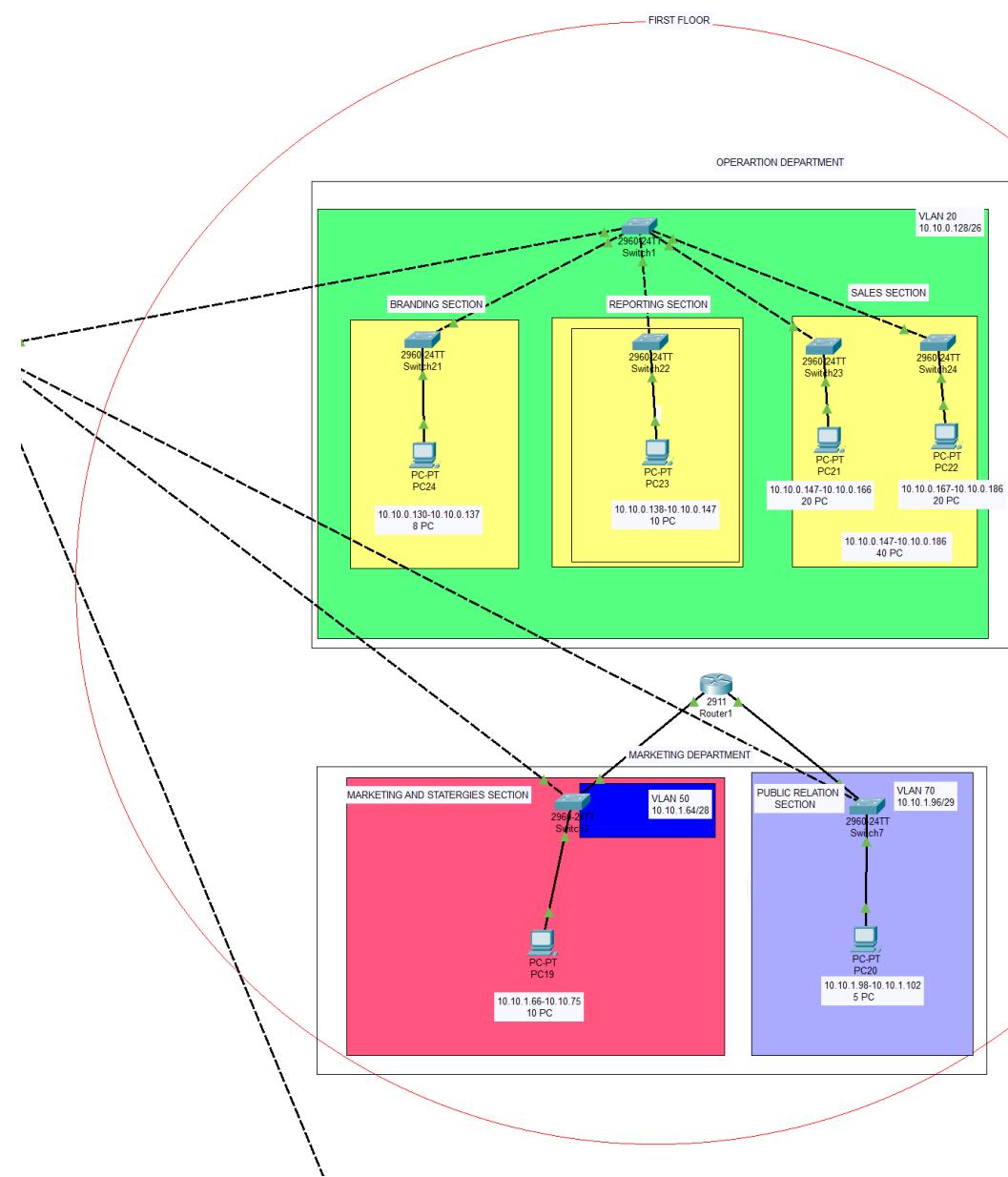
## Floor-wise Screenshots:

- **Floor 1:**



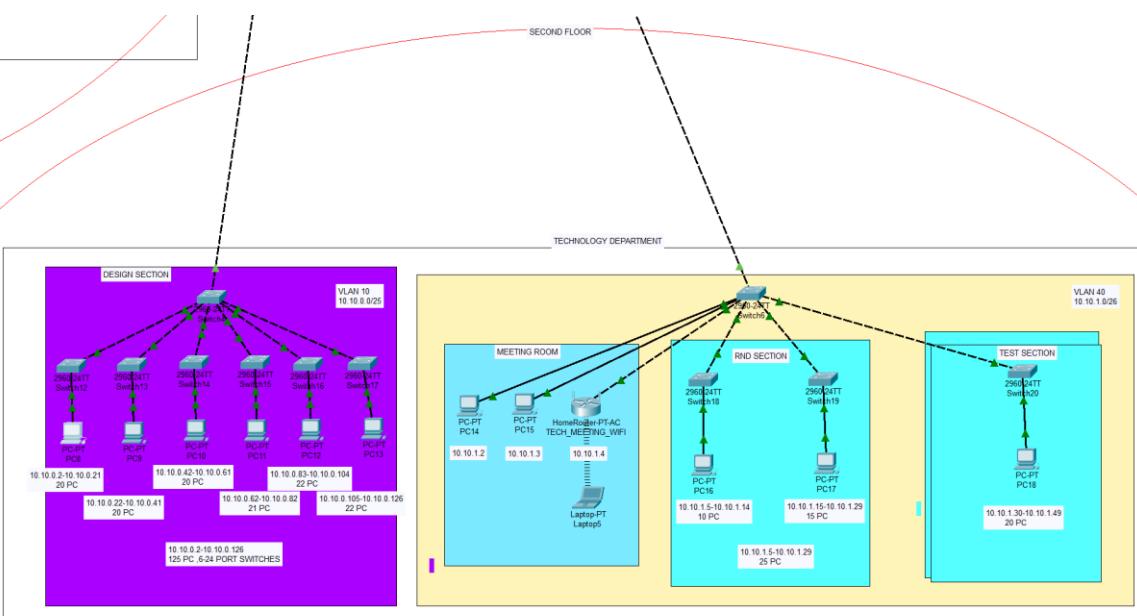
Floor 1 Network Topology

- **Floor 2:**



Floor 2 Network Topology

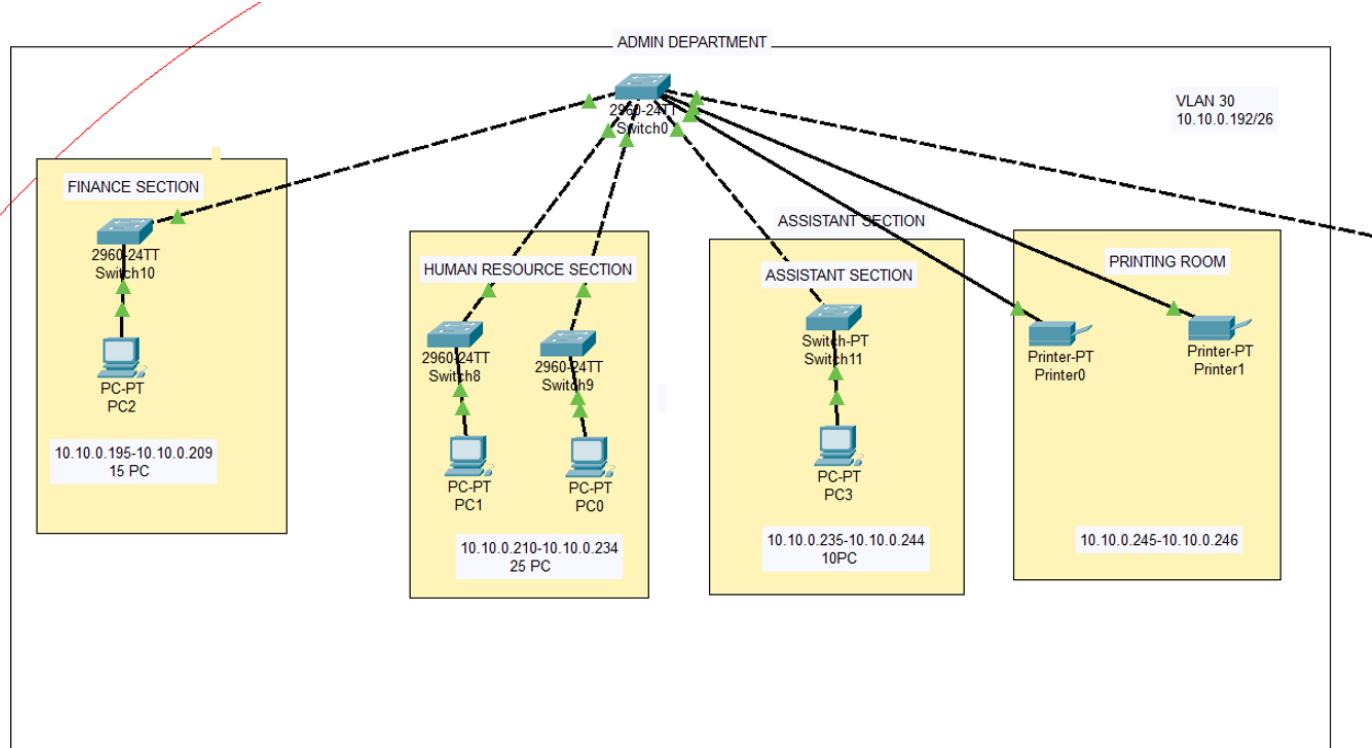
- **Floor 3:**



Floor 3 Network Topology

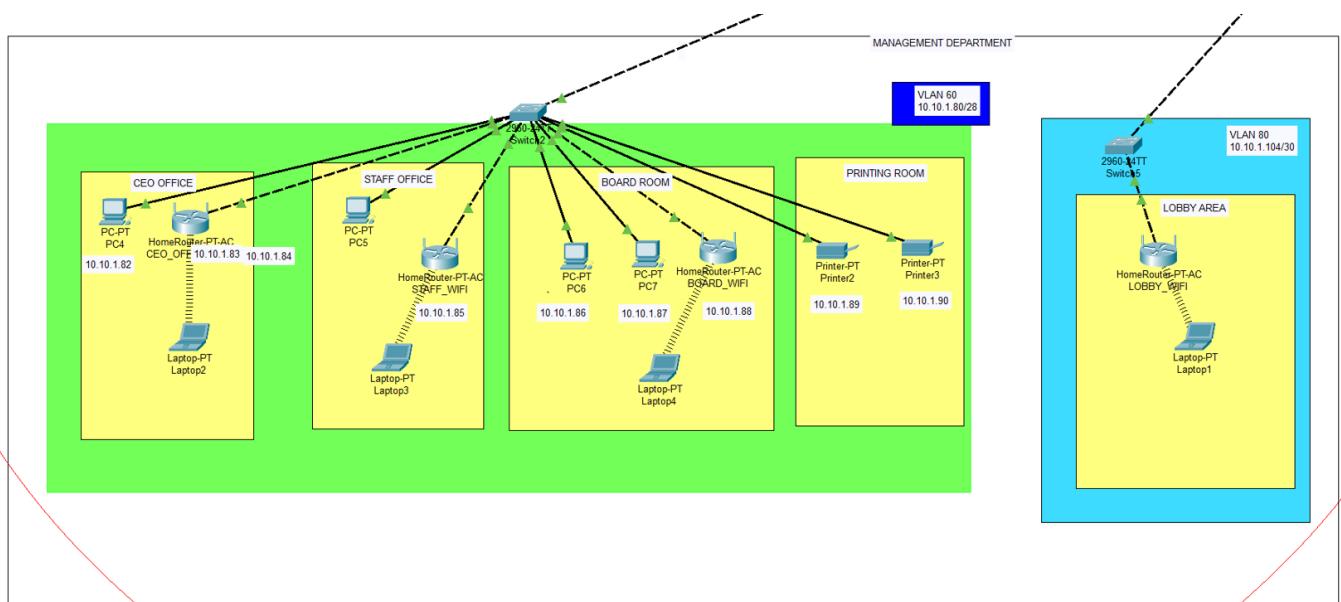
- **Department-wise Screenshots:**

- **Department 1:**



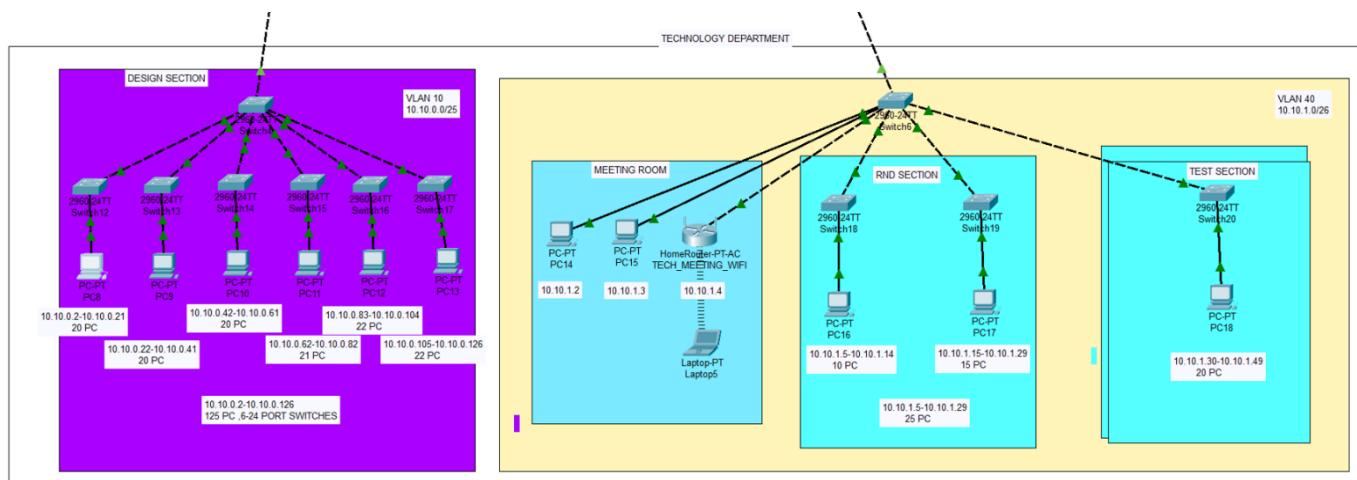
Department 1 Network Configuration

- **Department 2:**



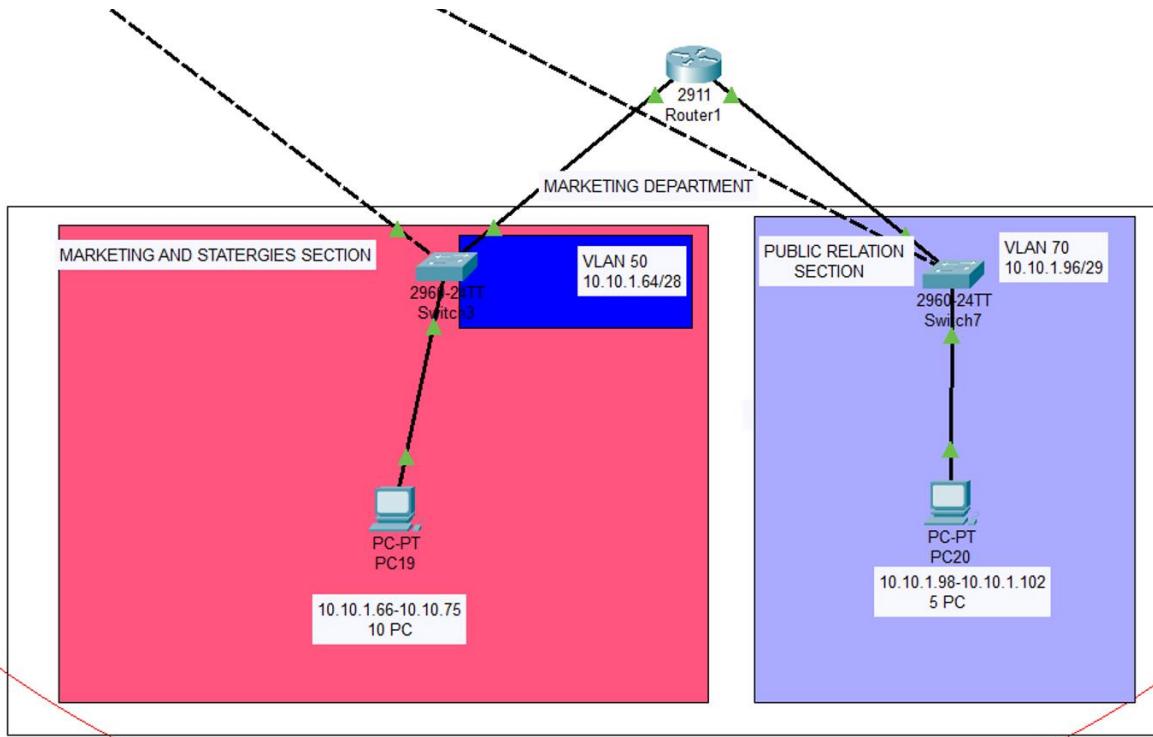
Department 2 Network Configuration

- **Department 3:**



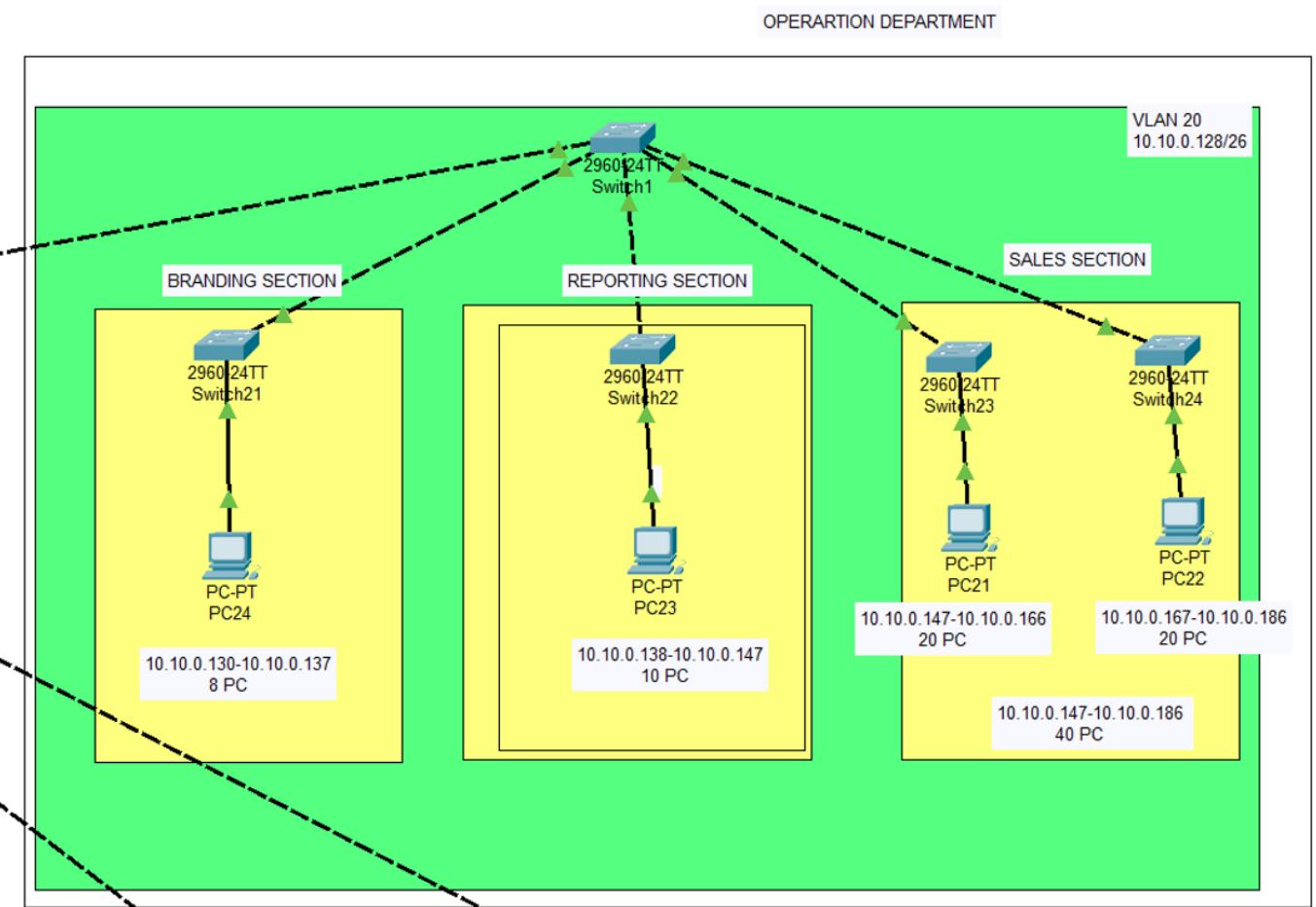
Department 3 Network Configuration

- **Department 4:**



Department 4 Network Configuration

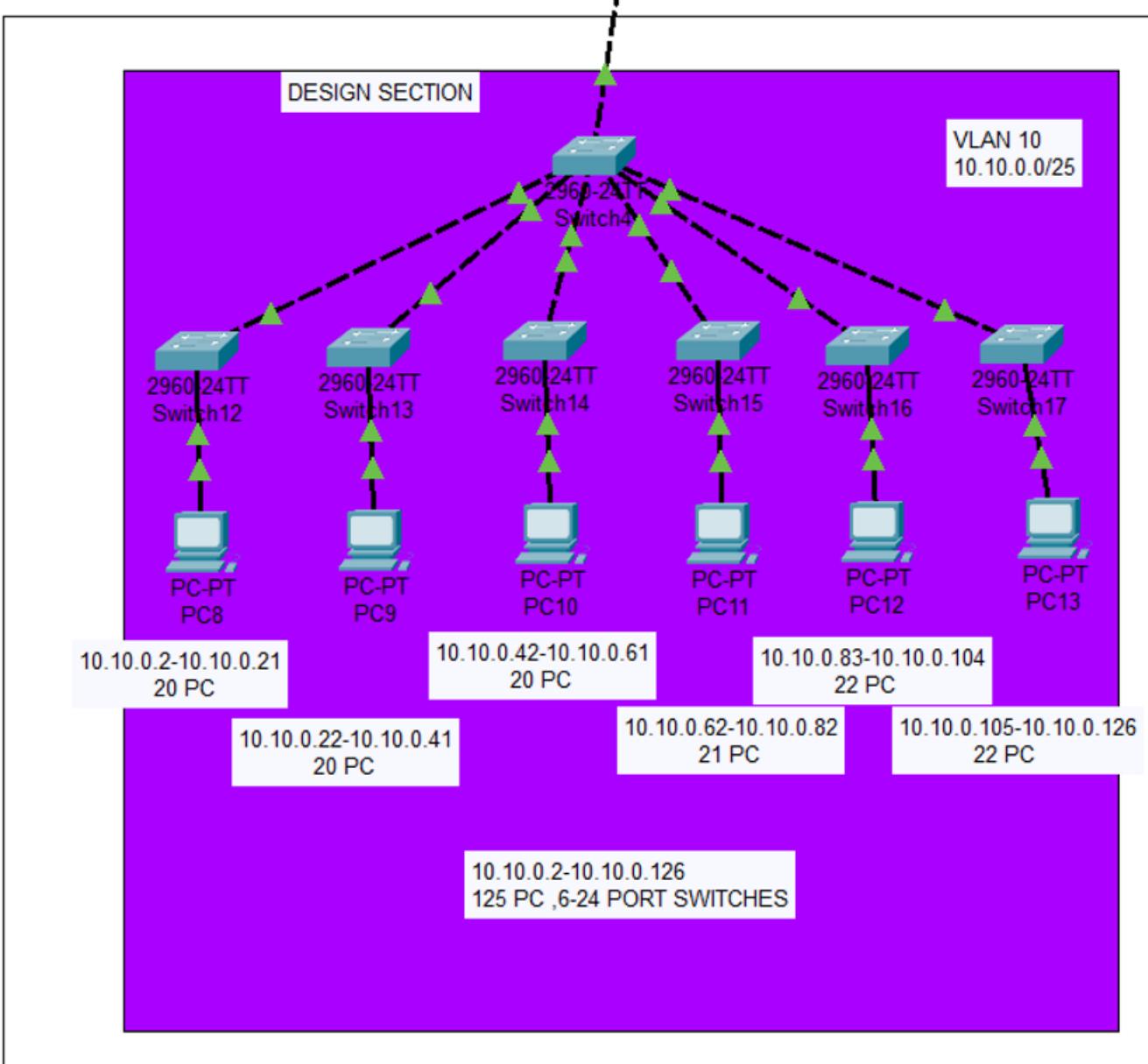
- **Department 5:**



Department 5 Network Configuration

- VLAN-wise Screenshots:

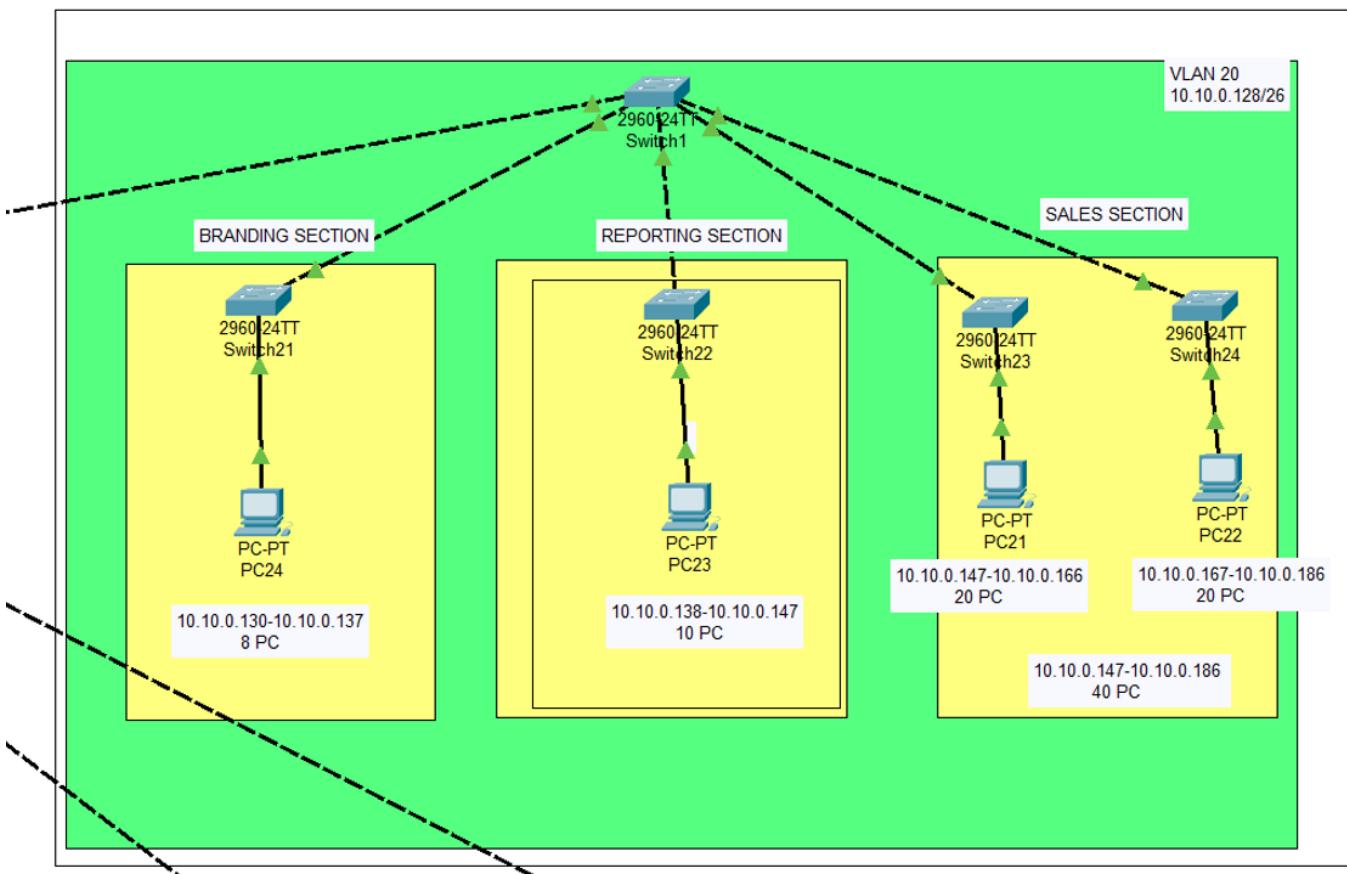
- VLAN 10:



VLAN 10 Configuration

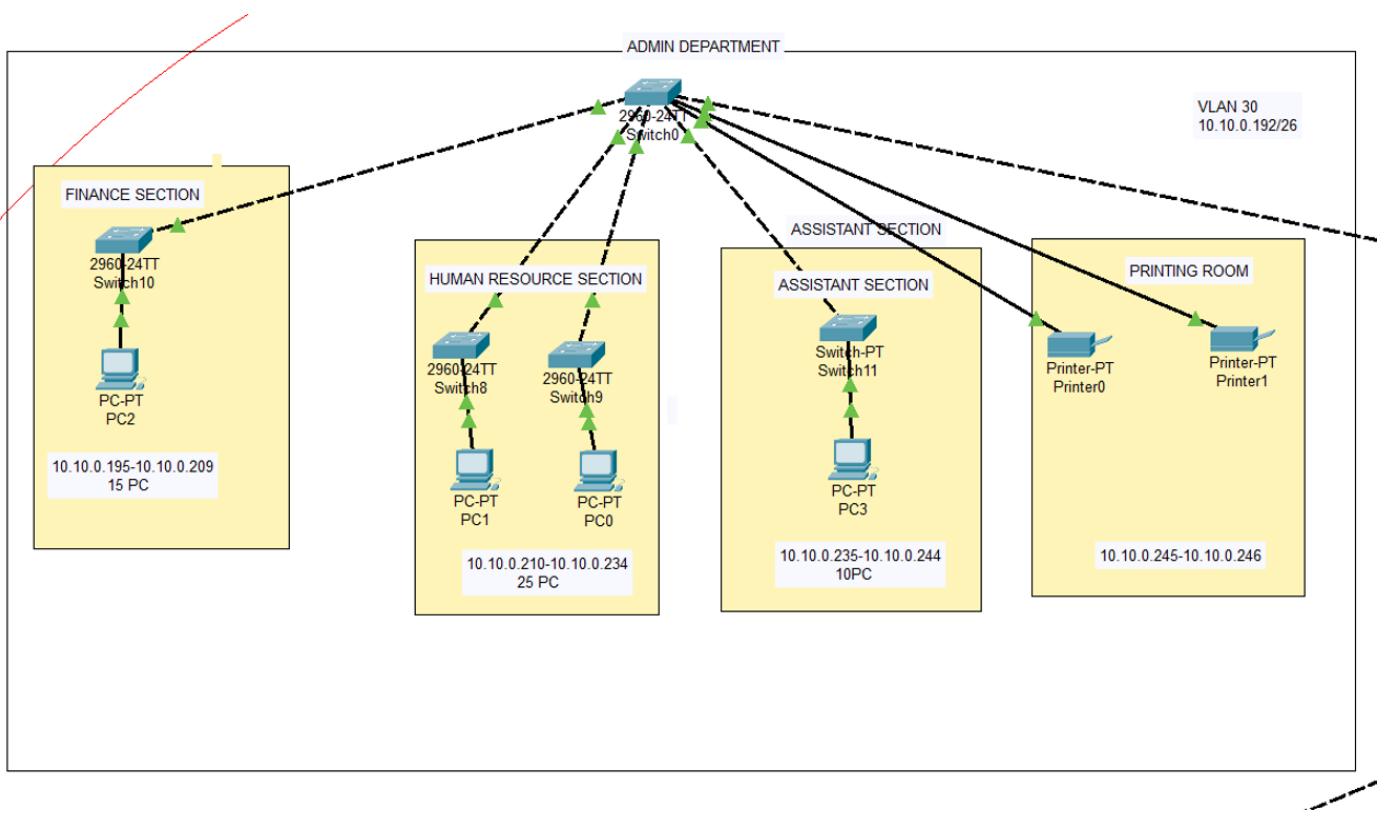
- VLAN 20:**

OPERARTION DEPARTMENT



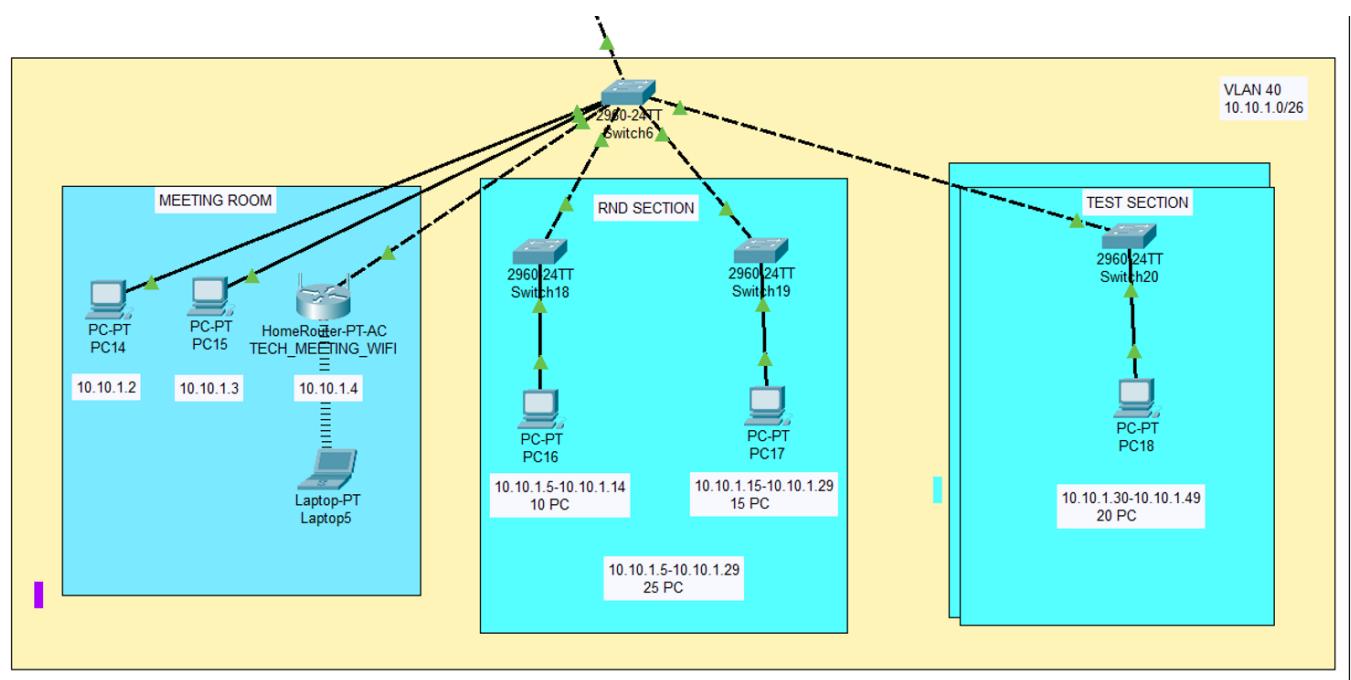
VLAN 20 Configuration

- VLAN 30:**



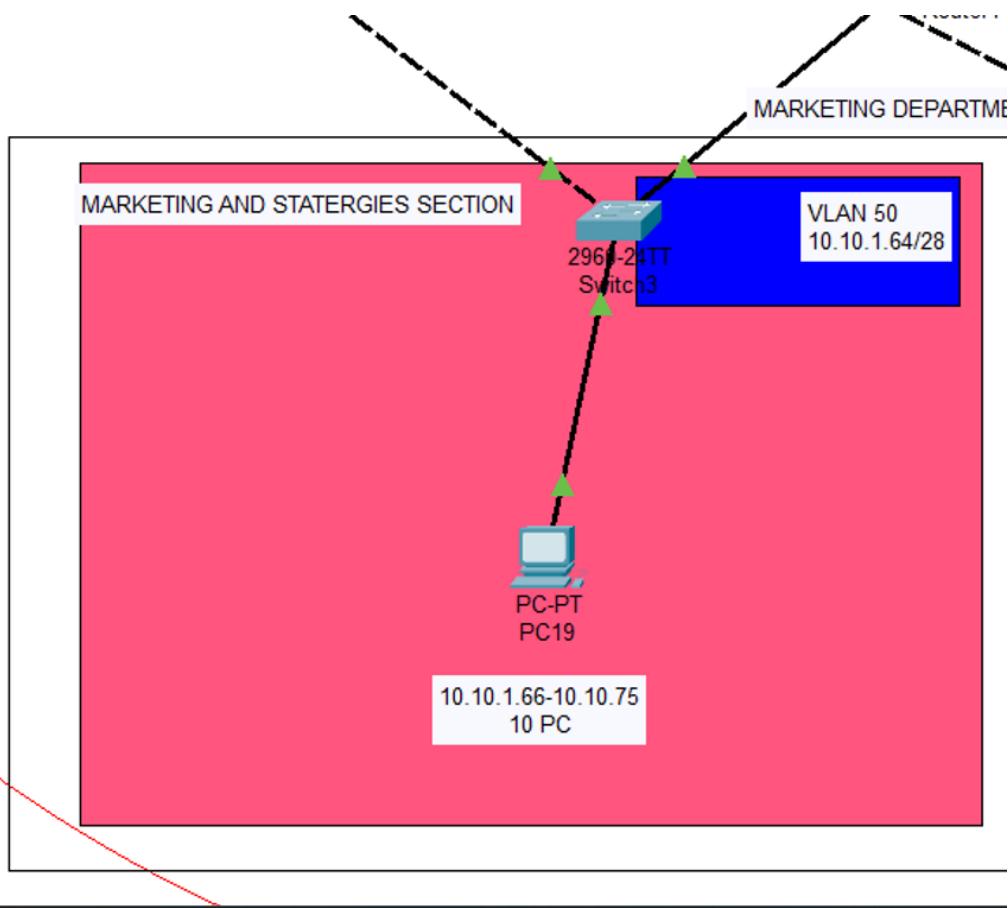
VLAN 30 Configuration

- VLAN 40:**



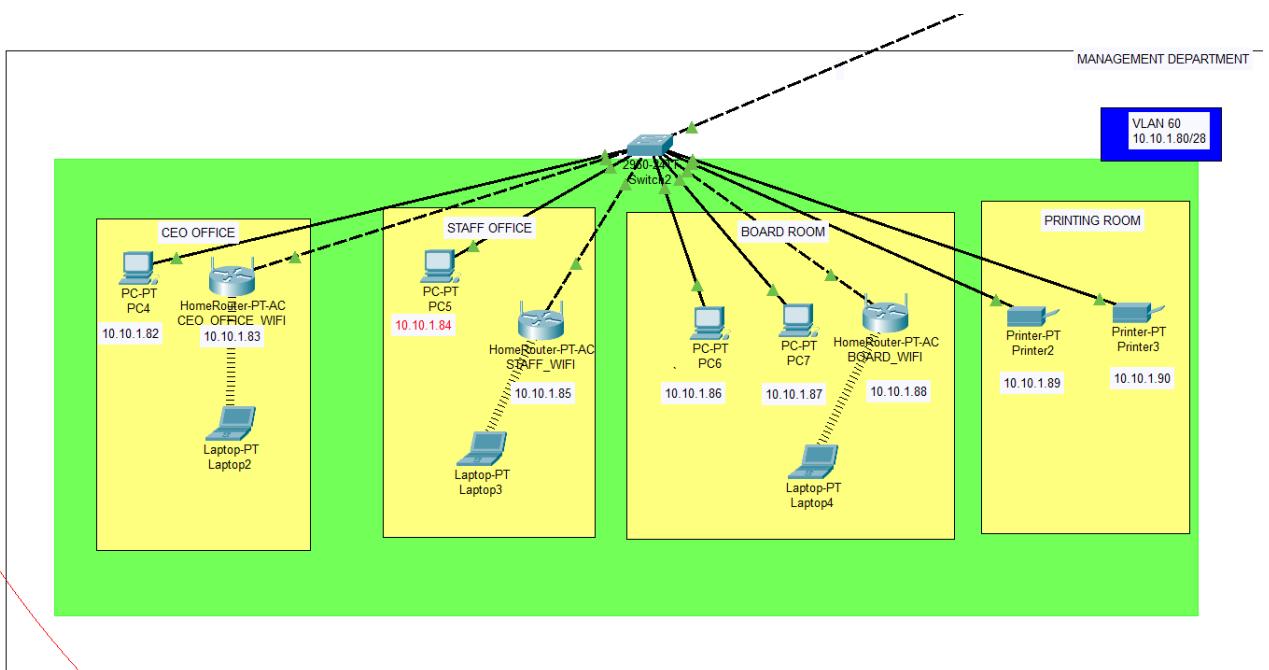
VLAN 40 Configuration

- **VLAN 50:**



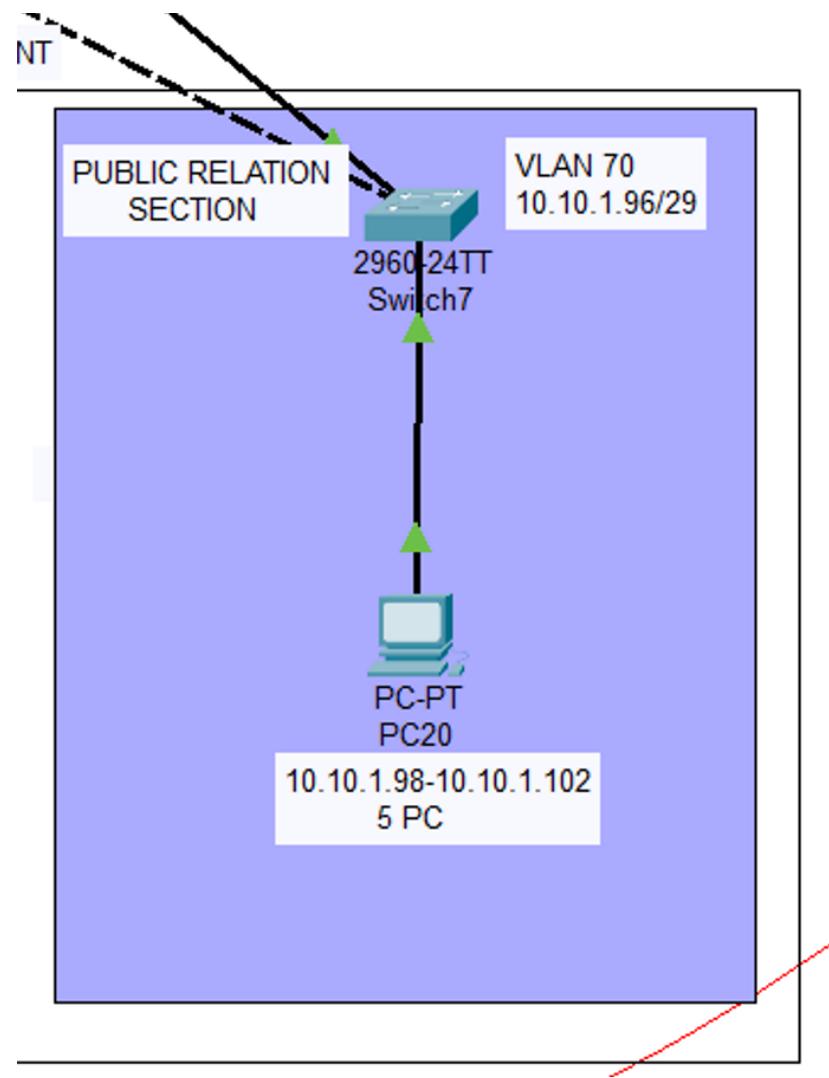
VLAN 50 Configuration

- **VLAN 60:**



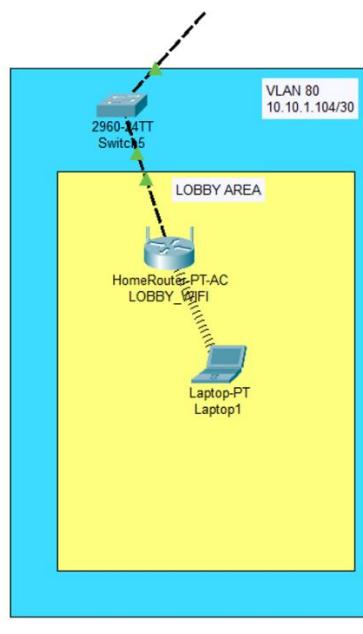
VLAN 60 Configuration

- **VLAN 70:**



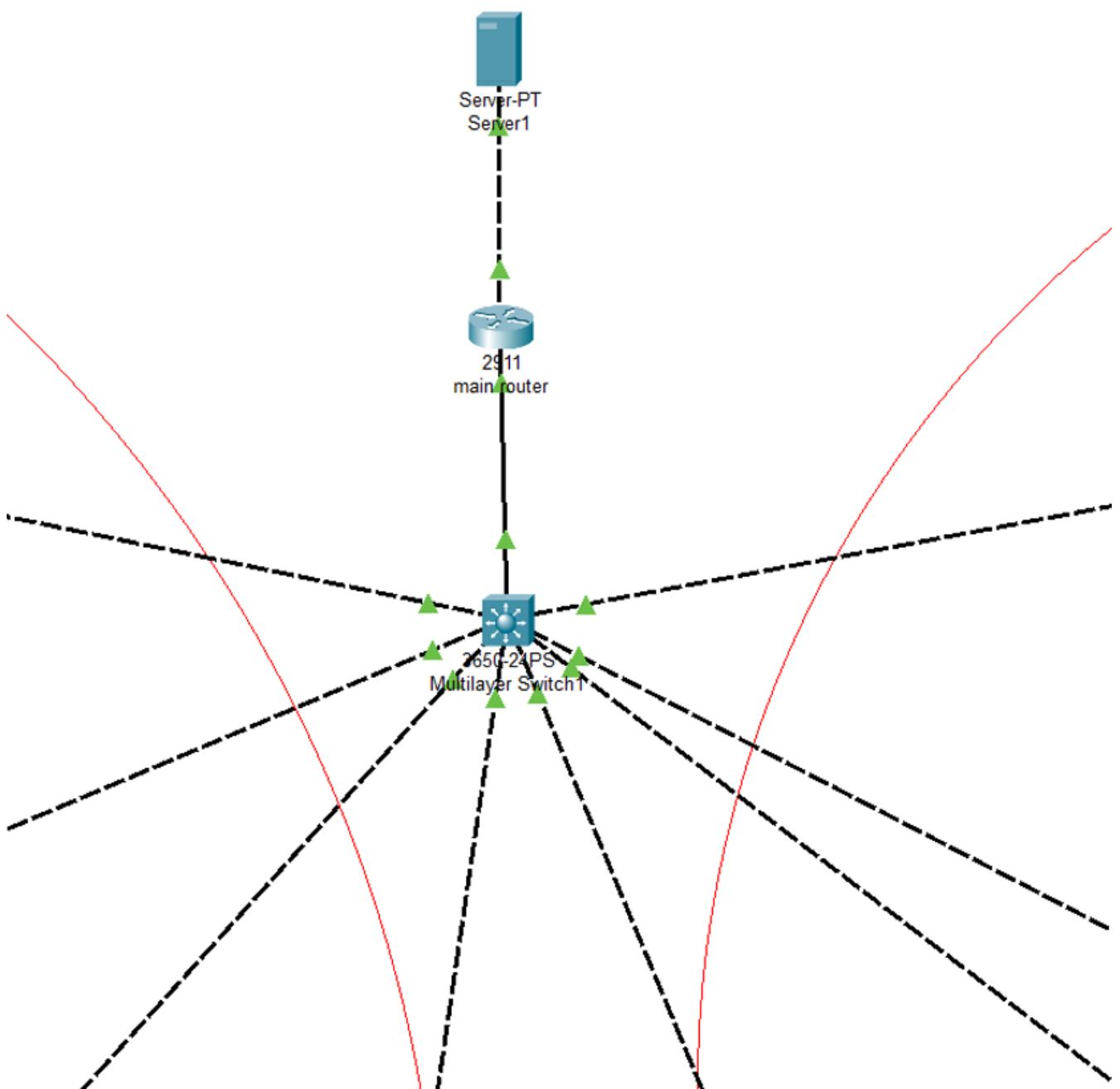
VLAN 70 Configuration

- **VLAN 80:**



VLAN 80 Configuration

- Main router , server , multi-layer switch



## **NETWORK DESIGN CONSIDERATIONS AND SECURITY REQUIREMENTS:**

### 1. Interconnectivity within Departments:

- **Consideration:**
  - Each department is interconnected internally for seamless communication and collaboration.

### 2. Access to Printers:

- **Consideration:**
  - Printers in the Admin Department can only be accessed by computers within the Admin Department.
  - Printers in the Management Office can only be accessed by computers within the Management Office.

### 3. Lobby Area (VLAN 80) Restrictions:

- **Consideration:**
  - VLAN 80 (Lobby Area) is separated to ensure that devices in this VLAN cannot access printers in the Admin Department.

### 4. Minimizing IP Address Usage:

- **Consideration:**
  - VLAN 50 and VLAN 70 are separated to minimize IP address usage while meeting the connectivity requirements of these departments.

### 5. Interlinking VLANs with a Router:

- **Requirement:**
  - VLAN 50 and VLAN 70 must be interlinked using a router to facilitate communication between these two departments.
  - VLAN 10 (Test and Design Section) and VLAN 40 (Technology) should be interconnected to support collaboration within the Technology Department.

### 6. Security Measures:

- **Requirement:**
  - Security measures should be implemented to restrict access between different VLANs and ensure that each department's network is isolated for security reasons.
  - Access control lists (ACLs) or firewall rules can be configured to enforce security policies between VLANs.

### 7. Traffic Isolation and Optimization:

- **Consideration:**
  - VLAN segmentation and IP address allocation are designed to optimize network traffic, ensuring that each department has its dedicated network space.

### 8. Router Configuration for Inter-VLAN Routing:

- **Requirement:**
  - Router configuration should include inter-VLAN routing to enable communication between VLANs while enforcing security policies.

## **BRIEF NETWORK DESIGN OVERVIEW:**

In our comprehensive network design for the IT center, we have established a structured and secure infrastructure to meet the specific needs of the organization. Here are key highlights:

### **1. VLAN Segmentation:**

- Implemented 8 VLANs (VLAN 10 to VLAN 80) to isolate network traffic and enhance security.

### **2. Core Layer Server:**

- Placed a central server at the core layer to streamline data sharing and collaboration across departments.

### **3. Multilayer Switch and Access Switches:**

- Connected a multilayer switch to the router at the distribution layer.
- Established dedicated access switches for each department at the access layer.

### **4. End Devices Configuration:**

- Assigned specific IP addresses and gateway IDs to PCs, printers, and other devices within each VLAN.

### **5. Inter-VLAN Connectivity:**

- Configured the router for inter-VLAN routing, allowing seamless communication between different departments.

### **6. WiFi Access Points:**

- Set up WiFi access points for each section with password protection, ensuring secure wireless connectivity.

### **7. Security Measures:**

- Enforced security through VLAN segmentation, limiting access between departments for enhanced network security.

## **ACCESS CONTROL LIST**

### **INTER-VLAN ACCESS CONTROL LIST (ACL) MATRIX**

	VLAN 10	VLAN 20	VLAN 30	VLAN 40	VLAN 50	VLAN 60	VLAN 70	VLAN 80
VLAN 10	Green	Red	Red	Green	Red	Red	Red	Red
VLAN 20	Red	Green	Red	Red	Red	Red	Red	Red
VLAN 30	Red	Red	Green	Red	Red	Red	Red	Red
VLAN 40	Green	Red	Red	Green	Red	Red	Red	Red
VLAN 50	Red	Red	Red	Red	Green	Red	Green	Red
VLAN 60	Red	Red	Red	Red	Red	Green	Red	Red
VLAN 70	Red	Red	Red	Red	Green	Red	Green	Red
VLAN 80	Red	Green						

*Visual representation of VLAN communication permissions within the network. Green cells indicate accessible VLANs, while red cells signify restricted access between VLANs.*

## **NETWORK CONFIGURATION**

### **1.ROUTER CONFIGURATION**

A breakdown of the configuration for router interfaces, including VLAN assignments and IP addresses.

#### **ROUTER VLAN CONFIGURATION TABLE**

VLAN NO	Default Gateway/ Allocated IP Address for the Router	Subnet Mask for the VLAN	Switch Port
10	10.10.0.1	255.255.255.128	GigabitEthernet1/0/4
20	10.10.0.129	255.255.255.192	GigabitEthernet1/0/8
30	10.10.0.193	255.255.255.192	GigabitEthernet1/0/1
40	10.10.1.1	255.255.255.192	GigabitEthernet1/0/5
50	10.10.1.65	255.255.255.240	GigabitEthernet1/0/6
60	10.10.1.81	255.255.255.240	GigabitEthernet1/0/2
70	10.10.1.97	255.255.255.248	GigabitEthernet1/0/7
80	10.10.1.105	255.255.255.252	GigabitEthernet1/0/3

main router

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router#config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0.10
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 10.10.0.1 255.255.255.128
Router(config-subif)# exit
Router(config)#interface GigabitEthernet0/0.20
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 10.10.0.129 255.255.255.192
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.30
Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 10.10.0.193 255.255.255.192
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.40
Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip address 10.10.1.1 255.255.255.192
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.50
Router(config-subif)#encapsulation dot1Q 50
Router(config-subif)#ip address 10.10.1.65 255.255.255.240
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.60
Router(config-subif)#encapsulation dot1Q 60
Router(config-subif)# ip address 10.10.1.81 255.255.255.240
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.70
Router(config-subif)#encapsulation dot1Q 70
Router(config-subif)#ip address 10.10.1.97 255.255.255.248
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.80
Router(config-subif)#encapsulation dot1Q 80
Router(config-subif)# ip address 10.10.1.105 255.255.255.252
Router(config-subif)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Top

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main router

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 10.10.0.193 255.255.255.192
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.40
Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip address 10.10.1.1 255.255.255.192
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.50
Router(config-subif)#encapsulation dot1Q 50
Router(config-subif)#ip address 10.10.1.65 255.255.255.240
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.60
Router(config-subif)#encapsulation dot1Q 60
Router(config-subif)# ip address 10.10.1.81 255.255.255.240
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.70
Router(config-subif)#encapsulation dot1Q 70
Router(config-subif)#ip address 10.10.1.97 255.255.255.248
Router(config-subif)#exit
Router(config)#interface GigabitEthernet0/0.80
Router(config-subif)#encapsulation dot1Q 80
Router(config-subif)# ip address 10.10.1.105 255.255.255.252
Router(config-subif)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0  unassigned     YES unset up        up
GigabitEthernet0/0.10 10.10.0.1   YES manual up       up
GigabitEthernet0/0.20 10.10.0.129 YES manual up       up
GigabitEthernet0/0.30 10.10.0.193 YES manual up       up
GigabitEthernet0/0.40 10.10.1.1   YES manual up       up
GigabitEthernet0/0.50 10.10.1.65 YES manual up       up
GigabitEthernet0/0.60 10.10.1.81 YES manual up       up
GigabitEthernet0/0.70 10.10.1.97 YES manual up       up
GigabitEthernet0/0.80 10.10.1.105 YES manual up       up
GigabitEthernet0/1    unassigned     YES unset up        up
GigabitEthernet0/2    unassigned     YES unset administratively down down
Vlan1               unassigned     YES unset administratively down down
Router#
```

Top

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Allocated IP address for the router is the first usable IP address, also known as the default gateway.

```
Router#show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0  unassigned     YES unset up        up
GigabitEthernet0/0.10 10.10.0.1    YES manual up       up
GigabitEthernet0/0.20 10.10.0.129  YES manual up       up
GigabitEthernet0/0.30 10.10.0.193  YES manual up       up
GigabitEthernet0/0.40 10.10.1.1    YES manual up       up
GigabitEthernet0/0.50 10.10.1.65   YES manual up       up
GigabitEthernet0/0.60 10.10.1.81   YES manual up       up
GigabitEthernet0/0.70 10.10.1.97   YES manual up       up
GigabitEthernet0/0.80 10.10.1.105  YES manual up       up
GigabitEthernet0/1    unassigned     YES unset administratively down down
GigabitEthernet0/2    unassigned     YES unset administratively down down
Vlan1               unassigned     YES unset administratively down down
Router#
```

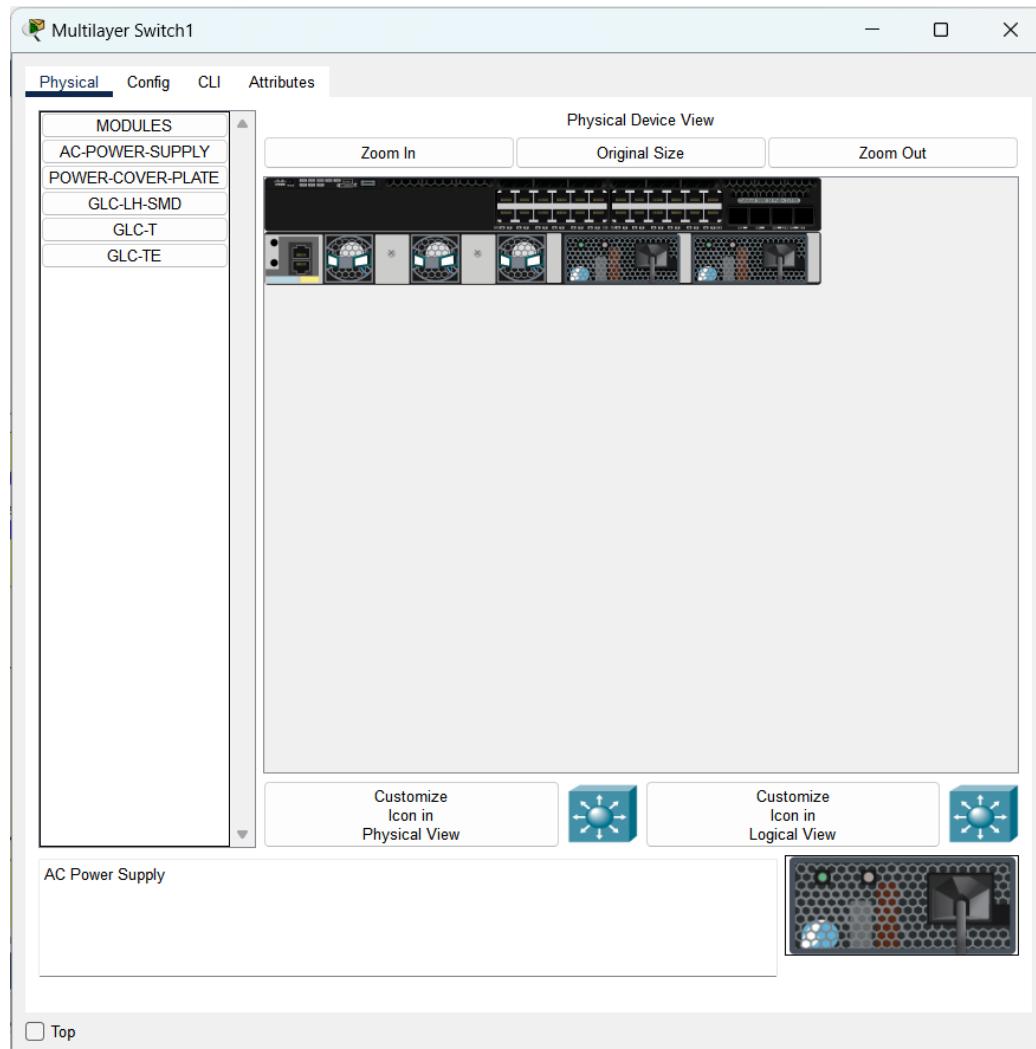
```
Device Name: main router
Device Model: 2911
Hostname: Router

Port      Link  VLAN  IP Address      IPv6 Address      MAC Address
GigabitEthernet0/0  Up   --    <not set>  <not set>  0006.2A21.CD01
GigabitEthernet0/0.10 Up   --    10.10.0.1/25  <not set>  0006.2A21.CD01
GigabitEthernet0/0.20 Up   --    10.10.0.129/26 <not set>  0006.2A21.CD01
GigabitEthernet0/0.30 Up   --    10.10.0.193/26 <not set>  0006.2A21.CD01
GigabitEthernet0/0.40 Up   --    10.10.1.1/26   <not set>  0006.2A21.CD01
GigabitEthernet0/0.50 Up   --    10.10.1.65/28  <not set>  0006.2A21.CD01
GigabitEthernet0/0.60 Up   --    10.10.1.81/28  <not set>  0006.2A21.CD01
GigabitEthernet0/0.70 Up   --    10.10.1.97/29  <not set>  0006.2A21.CD01
GigabitEthernet0/0.80 Up   --    10.10.1.105/30 <not set>  0006.2A21.CD01
GigabitEthernet0/1    Up   --    <not set>    <not set>  0006.2A21.CD02
GigabitEthernet0/2    Down  --    <not set>    <not set>  0006.2A21.CD03
Vlan1               Down  1     <not set>    <not set>  0002.4A11.0005

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > main router
```

A summary of the router's interface status obtained from the show ip interface brief command, highlighting the operational and protocol status of each interface.

## **2. CONFIGURING THE MULTILAYER SWITCH**



### *Turning on the Multilayer Switch*

VLAN assignments for the specified switch ports:

Switch Port	VLAN
GigabitEthernet1/0/1	VLAN 30
GigabitEthernet1/0/2	VLAN 60
GigabitEthernet1/0/3	VLAN 80
GigabitEthernet1/0/4	VLAN 10
GigabitEthernet1/0/5	VLAN 40
GigabitEthernet1/0/6	VLAN 50
GigabitEthernet1/0/7	VLAN 70
GigabitEthernet1/0/8	VLAN 20

# Multilayer Switch1

Physical    Config    **CLI**    Attributes

## IOS Command Line Interface

```
Switch>
Switch>config t
^
% Invalid input detected at '^' marker.

Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name VLAN10
Switch(config-vlan)#int gig1/0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#vlan 20
Switch(config-vlan)#int gig1/0/8
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan20
^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name VLAN30
Switch(config-vlan)#exit
Switch(config)#int gig1/0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#vlan 40
Switch(config-vlan)#name VLAN40
Switch(config-vlan)#exit
Switch(config)#int gig1/0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#exit
Switch(config)#vlan 50
Switch(config-vlan)#name VLAN50
Switch(config-vlan)#exit
Switch(config)#int gig1/0/6
```

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Multilayer Switch1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch(config-if)#exit
Switch(config)#vlan 50
Switch(config-vlan)#name VLAN50
Switch(config-vlan)#exit
Switch(config)#int gig1/0/6
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan50
^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport access vlan 50
Switch(config-if)#exit
Switch(config)#vlan 60
Switch(config-vlan)#name VLAN60
Switch(config-vlan)#exit
Switch(config)#int gig1/0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan60
^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport access vlan 60
Switch(config-if)#exit
Switch(config)#vlan 70
Switch(config-vlan)#name VLAN70
Switch(config-vlan)#exit
Switch(config)#int gig1/0/7
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 70
Switch(config-if)#exit
Switch(config)#vlan 80
Switch(config-vlan)#name VLAN80
Switch(config-vlan)#exit
Switch(config)#int gig1/0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 80
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

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Multilayer Switch1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch(config)#vlan 70
Switch(config-vlan)#name VLAN70
Switch(config-vlan)#exit
Switch(config)#int gig1/0/7
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 70
Switch(config-if)#exit
Switch(config)#vlan 80
Switch(config-vlan)#name VLAN80
Switch(config-vlan)#exit
Switch(config)#int gig1/0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 80
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name Status Ports
---- -----
1   default    active Gig1/0/10, Gig1/0/11, Gig1/0/12, Gig1/0/13
                           Gig1/0/14, Gig1/0/15, Gig1/0/16, Gig1/0/17
                           Gig1/0/18, Gig1/0/19, Gig1/0/20, Gig1/0/21
                           Gig1/0/22, Gig1/0/23, Gig1/0/24, Gig1/1/1
                           Gig1/1/2, Gig1/1/3, Gig1/1/4
10  VLAN10    active Gig1/0/4
20  VLAN20    active Gig1/0/8
30  VLAN30    active Gig1/0/1
40  VLAN40    active Gig1/0/5
50  VLAN50    active Gig1/0/6
60  VLAN60    active Gig1/0/2
70  VLAN70    active Gig1/0/7
80  VLAN80    active Gig1/0/3
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active

VLAN Type SAID      MTU Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
--More--
```

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Device Name: Multilayer Switch1

Device Model: 3650-24PS

Hostname: Switch

Port	Link	VLAN	IP Address	IPv6 Address	MAC Address
GigabitEthernet1/0/1	Up	30	<not set>	<not set>	00E0.B089.3601
GigabitEthernet1/0/2	Up	60	<not set>	<not set>	00E0.B089.3602
GigabitEthernet1/0/3	Up	80	<not set>	<not set>	00E0.B089.3603
GigabitEthernet1/0/4	Up	10	<not set>	<not set>	00E0.B089.3604
GigabitEthernet1/0/5	Up	40	<not set>	<not set>	00E0.B089.3605
GigabitEthernet1/0/6	Up	50	<not set>	<not set>	00E0.B089.3606
GigabitEthernet1/0/7	Up	70	<not set>	<not set>	00E0.B089.3607
GigabitEthernet1/0/8	Up	20	<not set>	<not set>	00E0.B089.3608
GigabitEthernet1/0/9	Up	--	<not set>	<not set>	00E0.B089.3609
GigabitEthernet1/0/10	Down	1	<not set>	<not set>	00E0.B089.360A
GigabitEthernet1/0/11	Down	1	<not set>	<not set>	00E0.B089.360B
GigabitEthernet1/0/12	Down	1	<not set>	<not set>	00E0.B089.360C
GigabitEthernet1/0/13	Down	1	<not set>	<not set>	00E0.B089.360D
GigabitEthernet1/0/14	Down	1	<not set>	<not set>	00E0.B089.360E
GigabitEthernet1/0/15	Down	1	<not set>	<not set>	00E0.B089.360F
GigabitEthernet1/0/16	Down	1	<not set>	<not set>	00E0.B089.3610
GigabitEthernet1/0/17	Down	1	<not set>	<not set>	00E0.B089.3611
GigabitEthernet1/0/18	Down	1	<not set>	<not set>	00E0.B089.3612
GigabitEthernet1/0/19	Down	1	<not set>	<not set>	00E0.B089.3613
GigabitEthernet1/0/20	Down	1	<not set>	<not set>	00E0.B089.3614
GigabitEthernet1/0/21	Down	1	<not set>	<not set>	00E0.B089.3615
GigabitEthernet1/0/22	Down	1	<not set>	<not set>	00E0.B089.3616
GigabitEthernet1/0/23	Down	1	<not set>	<not set>	00E0.B089.3617
GigabitEthernet1/0/24	Down	1	<not set>	<not set>	00E0.B089.3618
GigabitEthernet1/1/1	Down	1	<not set>	<not set>	0006.2AD5.8801
GigabitEthernet1/1/2	Down	1	<not set>	<not set>	0006.2AD5.8802
GigabitEthernet1/1/3	Down	1	<not set>	<not set>	0006.2AD5.8803
GigabitEthernet1/1/4	Down	1	<not set>	<not set>	0006.2AD5.8804
Vlan1	Down	1	<not set>	<not set>	0030.F2A6.0433

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Multilayer Switch1

*Final Configuration: VLAN Assignment on Multilayer Switch*

### **3.CONFIGURING MULTILAYER SWITCH FOR INTERVLAN COMMUNICATION (ROUTER ON A STICK)**

configuring VLAN 10 and VLAN 40 to communicate with each other through a trunk port on the multilayer switch

Configuring Multilayer Switch for InterVLAN Communication (Same Department - VLAN 10 and VLAN 40)

#### **Configure Multilayer Switch:**

```
Switch>en
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int gig1/0/9
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,40
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

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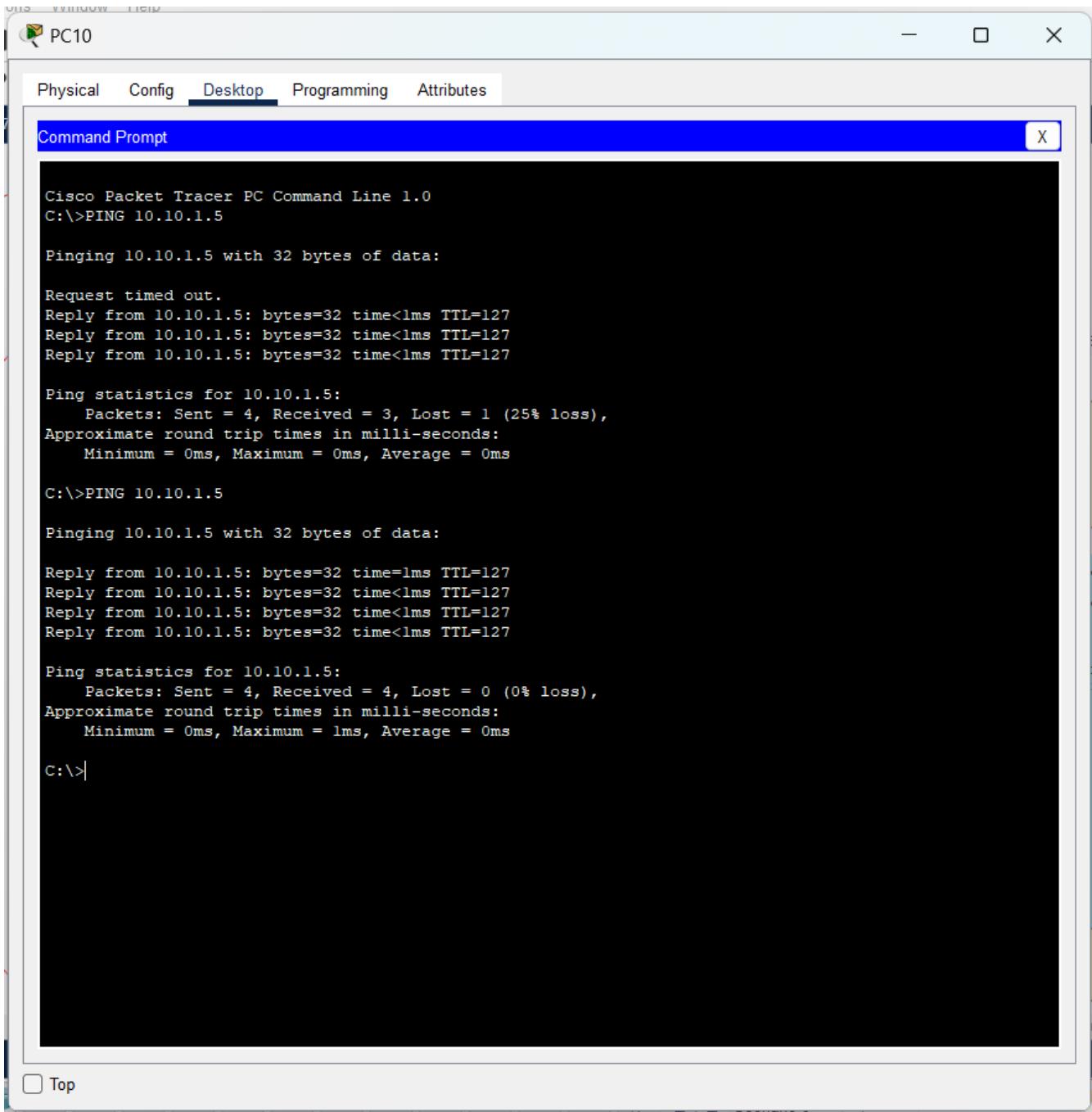
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#### **Configure Router:**

```
Router(config)-----.
Router(config)#int gig0/0.10
Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip add 10.10.0.1 255.255.255.128
Router(config-subif)#ex
Router(config)#int gig0/0.40
Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip add 10.10.1.1 255.255.255.192
Router(config-subif)#ex
```

## **Ping from a VLAN10 PC to VLAN 40 PC**



The screenshot shows a Cisco Packet Tracer interface with a window titled "PC10". The "Desktop" tab is selected in the top menu bar. A "Command Prompt" window is open, showing the output of a ping command. The output is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.5

Pinging 10.10.1.5 with 32 bytes of data:

Request timed out.
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127

Ping statistics for 10.10.1.5:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>PING 10.10.1.5

Pinging 10.10.1.5 with 32 bytes of data:

Reply from 10.10.1.5: bytes=32 time=1ms TTL=127
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127
Reply from 10.10.1.5: bytes=32 time<1ms TTL=127

Ping statistics for 10.10.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

## **EXPLANATION:**

- The Multilayer Switch's interface (gigabitEthernet1/0/9) is configured as a trunk port, allowing VLANs 10 and 40.
- The Router's subinterfaces (gigabitEthernet1/0/0.10 and gigabitEthernet1/0/0.40) are configured with encapsulation for their respective VLANs.
- IP addresses are assigned to the subinterfaces, facilitating interVLAN routing.
- This configuration allows communication between VLAN 10 and VLAN 40, considering they belong to the same department.

#### **4. CONFIGURING THE VLAN SWITCH**

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/8, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/8, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up
%LINK-3-UPDOWN: Interface FastEthernet0/8, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

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 mode access
Switch(config-if-range)#switchport access vlan 60
Switch(config-if-range)#do wr
Building configuration...
[OK]
Switch(config-if-range)#

```

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##### *Assigning All Ports to VLAN 60 on Switch*

For Switch 2 (VLAN 20), Switch 3 (VLAN 30), ..., Switch 8 (VLAN 80), repeated the process with the corresponding VLAN numbers.

Device Name: Switch2  
Custom Device Model: 2960 IOS15  
Hostname: Switch

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	60	--	0090.0C7E.CD01
FastEthernet0/2	Up	60	--	0090.0C7E.CD02
FastEthernet0/3	Up	60	--	0090.0C7E.CD03
FastEthernet0/4	Up	60	--	0090.0C7E.CD04
FastEthernet0/5	Up	60	--	0090.0C7E.CD05
FastEthernet0/6	Up	60	--	0090.0C7E.CD06
FastEthernet0/7	Up	60	--	0090.0C7E.CD07
FastEthernet0/8	Up	60	--	0090.0C7E.CD08
FastEthernet0/9	Up	60	--	0090.0C7E.CD09
FastEthernet0/10	Up	60	--	0090.0C7E.CD0A
FastEthernet0/11	Down	60	--	0090.0C7E.CD0B
FastEthernet0/12	Down	60	--	0090.0C7E.CD0C
FastEthernet0/13	Down	60	--	0090.0C7E.CD0D
FastEthernet0/14	Down	60	--	0090.0C7E.CD0E
FastEthernet0/15	Down	60	--	0090.0C7E.CD0F
FastEthernet0/16	Down	60	--	0090.0C7E.CD10
FastEthernet0/17	Down	60	--	0090.0C7E.CD11
FastEthernet0/18	Down	60	--	0090.0C7E.CD12
FastEthernet0/19	Down	60	--	0090.0C7E.CD13
FastEthernet0/20	Down	60	--	0090.0C7E.CD14
FastEthernet0/21	Down	60	--	0090.0C7E.CD15
FastEthernet0/22	Down	60	--	0090.0C7E.CD16
FastEthernet0/23	Down	60	--	0090.0C7E.CD17
FastEthernet0/24	Down	60	--	0090.0C7E.CD18
GigabitEthernet0/1	Down	1	--	0090.0C7E.CD19
GigabitEthernet0/2	Down	1	--	0090.0C7E.CD1A
Vlan1	Down	1	<not set>	000A.F3B4.34B9

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch2

Device Name: Switch0  
Custom Device Model: 2960 IOS15  
Hostname: Switch

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	30	--	0006.2A3E.A301
FastEthernet0/2	Up	30	--	0006.2A3E.A302
FastEthernet0/3	Up	30	--	0006.2A3E.A303
FastEthernet0/4	Up	30	--	0006.2A3E.A304
FastEthernet0/5	Up	30	--	0006.2A3E.A305
FastEthernet0/6	Up	30	--	0006.2A3E.A306
FastEthernet0/7	Up	30	--	0006.2A3E.A307
FastEthernet0/8	Down	30	--	0006.2A3E.A308
FastEthernet0/9	Down	30	--	0006.2A3E.A309
FastEthernet0/10	Down	30	--	0006.2A3E.A30A
FastEthernet0/11	Down	30	--	0006.2A3E.A30B
FastEthernet0/12	Down	30	--	0006.2A3E.A30C
FastEthernet0/13	Down	30	--	0006.2A3E.A30D
FastEthernet0/14	Down	30	--	0006.2A3E.A30E
FastEthernet0/15	Down	30	--	0006.2A3E.A30F
FastEthernet0/16	Down	30	--	0006.2A3E.A310
FastEthernet0/17	Down	30	--	0006.2A3E.A311
FastEthernet0/18	Down	30	--	0006.2A3E.A312
FastEthernet0/19	Down	30	--	0006.2A3E.A313
FastEthernet0/20	Down	30	--	0006.2A3E.A314
FastEthernet0/21	Down	30	--	0006.2A3E.A315
FastEthernet0/22	Down	30	--	0006.2A3E.A316
FastEthernet0/23	Down	30	--	0006.2A3E.A317
FastEthernet0/24	Down	30	--	0006.2A3E.A318
GigabitEthernet0/1	Down	1	--	0006.2A3E.A319
GigabitEthernet0/2	Down	1	--	0006.2A3E.A31A
Vlan1	Down	1	<not set>	0001.43DD.C1ED

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch0

Device Name: Switch3  
Custom Device Model: 2960 IOS15  
Hostname: Switch

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	50	--	00D0.BA75.2901
FastEthernet0/2	Up	50	--	00D0.BA75.2902
FastEthernet0/3	Up	--	--	00D0.BA75.2903
FastEthernet0/4	Down	50	--	00D0.BA75.2904
FastEthernet0/5	Down	50	--	00D0.BA75.2905
FastEthernet0/6	Down	50	--	00D0.BA75.2906
FastEthernet0/7	Down	50	--	00D0.BA75.2907
FastEthernet0/8	Down	50	--	00D0.BA75.2908
FastEthernet0/9	Down	50	--	00D0.BA75.2909
FastEthernet0/10	Down	50	--	00D0.BA75.290A
FastEthernet0/11	Down	50	--	00D0.BA75.290B
FastEthernet0/12	Down	50	--	00D0.BA75.290C
FastEthernet0/13	Down	50	--	00D0.BA75.290D
FastEthernet0/14	Down	50	--	00D0.BA75.290E
FastEthernet0/15	Down	50	--	00D0.BA75.290F
FastEthernet0/16	Down	50	--	00D0.BA75.2910
FastEthernet0/17	Down	50	--	00D0.BA75.2911
FastEthernet0/18	Down	50	--	00D0.BA75.2912
FastEthernet0/19	Down	50	--	00D0.BA75.2913
FastEthernet0/20	Down	50	--	00D0.BA75.2914
FastEthernet0/21	Down	50	--	00D0.BA75.2915
FastEthernet0/22	Down	50	--	00D0.BA75.2916
FastEthernet0/23	Down	50	--	00D0.BA75.2917
FastEthernet0/24	Down	50	--	00D0.BA75.2918
GigabitEthernet0/1	Down	1	--	00D0.BA75.2919
GigabitEthernet0/2	Down	1	--	00D0.BA75.291A
Vlan1	Down	1	<not set>	0060.5C4A.4A7B

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch3

Device Name: Switch5  
Custom Device Model: 2960 IOS15  
Hostname: Switch

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	80	--	00D0.FF2C.5101
FastEthernet0/2	Up	80	--	00D0.FF2C.5102
FastEthernet0/3	Down	80	--	00D0.FF2C.5103
FastEthernet0/4	Down	80	--	00D0.FF2C.5104
FastEthernet0/5	Down	80	--	00D0.FF2C.5105
FastEthernet0/6	Down	80	--	00D0.FF2C.5106
FastEthernet0/7	Down	80	--	00D0.FF2C.5107
FastEthernet0/8	Down	80	--	00D0.FF2C.5108
FastEthernet0/9	Down	80	--	00D0.FF2C.5109
FastEthernet0/10	Down	80	--	00D0.FF2C.510A
FastEthernet0/11	Down	80	--	00D0.FF2C.510B
FastEthernet0/12	Down	80	--	00D0.FF2C.510C
FastEthernet0/13	Down	80	--	00D0.FF2C.510D
FastEthernet0/14	Down	80	--	00D0.FF2C.510E
FastEthernet0/15	Down	80	--	00D0.FF2C.510F
FastEthernet0/16	Down	80	--	00D0.FF2C.5110
FastEthernet0/17	Down	80	--	00D0.FF2C.5111
FastEthernet0/18	Down	80	--	00D0.FF2C.5112
FastEthernet0/19	Down	80	--	00D0.FF2C.5113
FastEthernet0/20	Down	80	--	00D0.FF2C.5114
FastEthernet0/21	Down	80	--	00D0.FF2C.5115
FastEthernet0/22	Down	80	--	00D0.FF2C.5116
FastEthernet0/23	Down	80	--	00D0.FF2C.5117
FastEthernet0/24	Down	80	--	00D0.FF2C.5118
GigabitEthernet0/1	Down	1	--	00D0.FF2C.5119
GigabitEthernet0/2	Down	1	--	00D0.FF2C.511A
Vlan1	Down	1	<not set>	000D.BD60.B70A

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch5

Device Name: Switch4  
Custom Device Model: 2960 IOS15  
Hostname: Switch

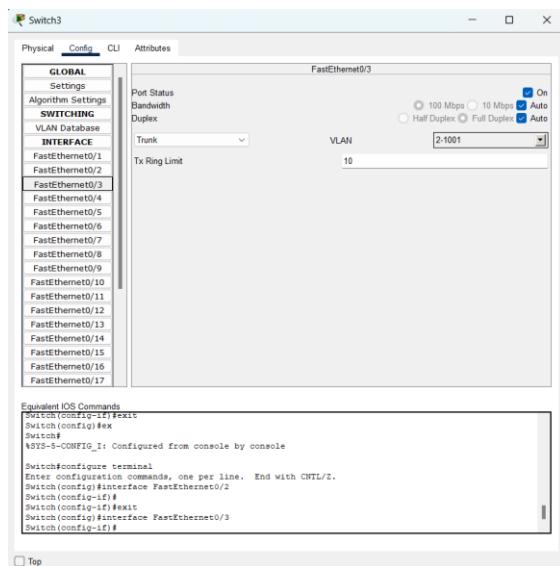
Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	10	--	0060.2F08.C601
FastEthernet0/2	Up	10	--	0060.2F08.C602
FastEthernet0/3	Up	10	--	0060.2F08.C603
FastEthernet0/4	Up	10	--	0060.2F08.C604
FastEthernet0/5	Up	10	--	0060.2F08.C605
FastEthernet0/6	Up	10	--	0060.2F08.C606
FastEthernet0/7	Up	10	--	0060.2F08.C607
FastEthernet0/8	Down	10	--	0060.2F08.C608
FastEthernet0/9	Down	10	--	0060.2F08.C609
FastEthernet0/10	Down	10	--	0060.2F08.C60A
FastEthernet0/11	Down	10	--	0060.2F08.C60B
FastEthernet0/12	Down	10	--	0060.2F08.C60C
FastEthernet0/13	Down	10	--	0060.2F08.C60D
FastEthernet0/14	Down	10	--	0060.2F08.C60E
FastEthernet0/15	Down	10	--	0060.2F08.C60F
FastEthernet0/16	Down	10	--	0060.2F08.C610
FastEthernet0/17	Down	10	--	0060.2F08.C611
FastEthernet0/18	Down	10	--	0060.2F08.C612
FastEthernet0/19	Down	10	--	0060.2F08.C613
FastEthernet0/20	Down	10	--	0060.2F08.C614
FastEthernet0/21	Down	10	--	0060.2F08.C615
FastEthernet0/22	Down	10	--	0060.2F08.C616
FastEthernet0/23	Down	10	--	0060.2F08.C617
FastEthernet0/24	Down	10	--	0060.2F08.C618
GigabitEthernet0/1	Down	1	--	0060.2F08.C619
GigabitEthernet0/2	Down	1	--	0060.2F08.C61A
Vlan1	Down	1	<not set>	0010.119A.A87B

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Switch4

## **5.CONFIGURING THE ROUTER FOR INTERVLAN CONNECTION FOR MARKETING DEPARTMENT**

*For Switch Connected to VLAN 50:*

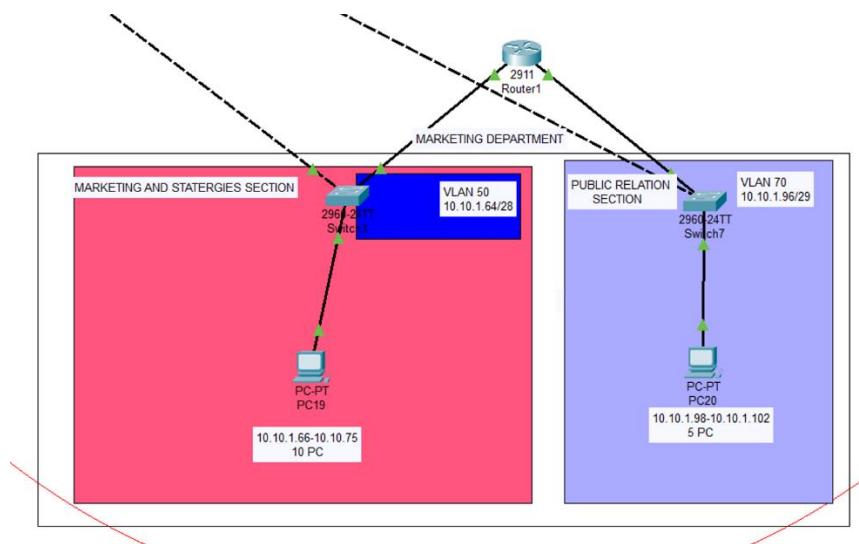
```
Switch(config)#interface FastEthernet0/3
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#ex
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```



*For Switch Connected to VLAN 70:*

```
Switch(config)#interface FastEthernet0/3
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#ex
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

*Configuring Router for VLAN 50 and VLAN 70:*



Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
-----
Remote SPAN VLANs
-----
Primary Secondary Type          Ports
-----
Router# Router#show vlan
VLAN Name                      Status   Ports
-----
1    default                     active
1002 fddi-default               active
1003 token-ring-default         active
1004 fdnet-default              active
1005 trnet-default              active

VLAN Type   SAID      MTU   Parent RingNo BridgeNo Stp   BrdgMode Transl Trans2
-----
1    enet    100001   1500   -     -     -     -     0     0
1002 fddi   101002   1500   -     -     -     -     0     0
1003 tr    101003   1500   -     -     -     -     0     0
1004 fdnet  101004   1500   -     -     -     ieee  0     0
1005 trnet  101005   1500   -     -     -     ibm   0     0

VLAN Type   SAID      MTU   Parent RingNo BridgeNo Stp   BrdgMode Transl Trans2
-----
Remote SPAN VLANs
-----
Router#show ip interface brief
Interface           IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0  unassigned      YES unset up        up
GigabitEthernet0/0.50 10.10.1.65  YES manual up       up
GigabitEthernet0/1  unassigned      YES unset up       up
GigabitEthernet0/1.70 10.10.1.97  YES manual up       up
GigabitEthernet0/2  unassigned      YES unset up        down
Vlan1              unassigned      YES unset administratively down down
Router#
```

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**Copy**    **Paste**

## EXPLANATION:

- The Router's subinterfaces (gigabitEthernet0/0.50 and gigabitEthernet1/0.70) are configured with encapsulation for their respective VLANs.
- IP addresses are assigned to the subinterfaces, facilitating interVLAN routing for VLAN 50 and VLAN 70.
- FastEthernet0/3 ports of the switches connected to the Router's GigabitEthernet interface via trunk links will carry both VLANs (50 and 70).

PC19

Physical Config Desktop Programming Attributes

Command Prompt X

```
Ping statistics for 10.10.1.98:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>PING 10.10.1.98

Pinging 10.10.1.98 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.98:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>PING 10.10.1.98

Pinging 10.10.1.98 with 32 bytes of data:

Request timed out.
Reply from 10.10.1.98: bytes=32 time=lms TTL=127
Reply from 10.10.1.98: bytes=32 time<lms TTL=127
Reply from 10.10.1.98: bytes=32 time<lms TTL=127

Ping statistics for 10.10.1.98:
  Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>PING 10.10.1.98

Pinging 10.10.1.98 with 32 bytes of data:

Reply from 10.10.1.98: bytes=32 time<lms TTL=127
Reply from 10.10.1.98: bytes=32 time<lms TTL=127
Reply from 10.10.1.98: bytes=32 time=7ms TTL=127
Reply from 10.10.1.98: bytes=32 time=7ms TTL=127

Ping statistics for 10.10.1.98:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
  Minimum = 0ms, Maximum = 7ms, Average = 3ms

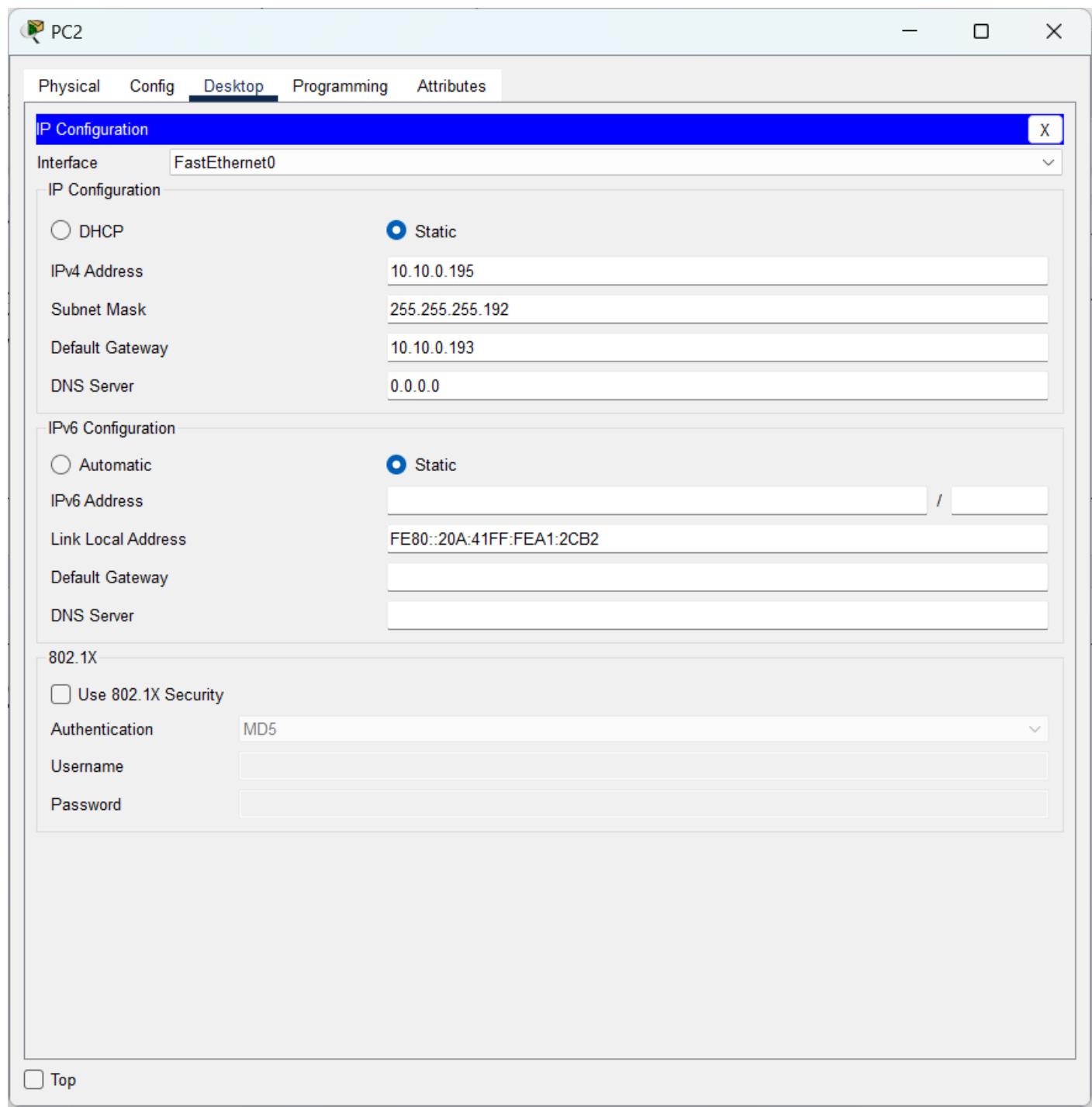
C:\>
```

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PING FROM VLAN 50 PC TO VLAN 70 (PACKET SENT SUCCESSFUL AFTER CONNECTING ROUTER)

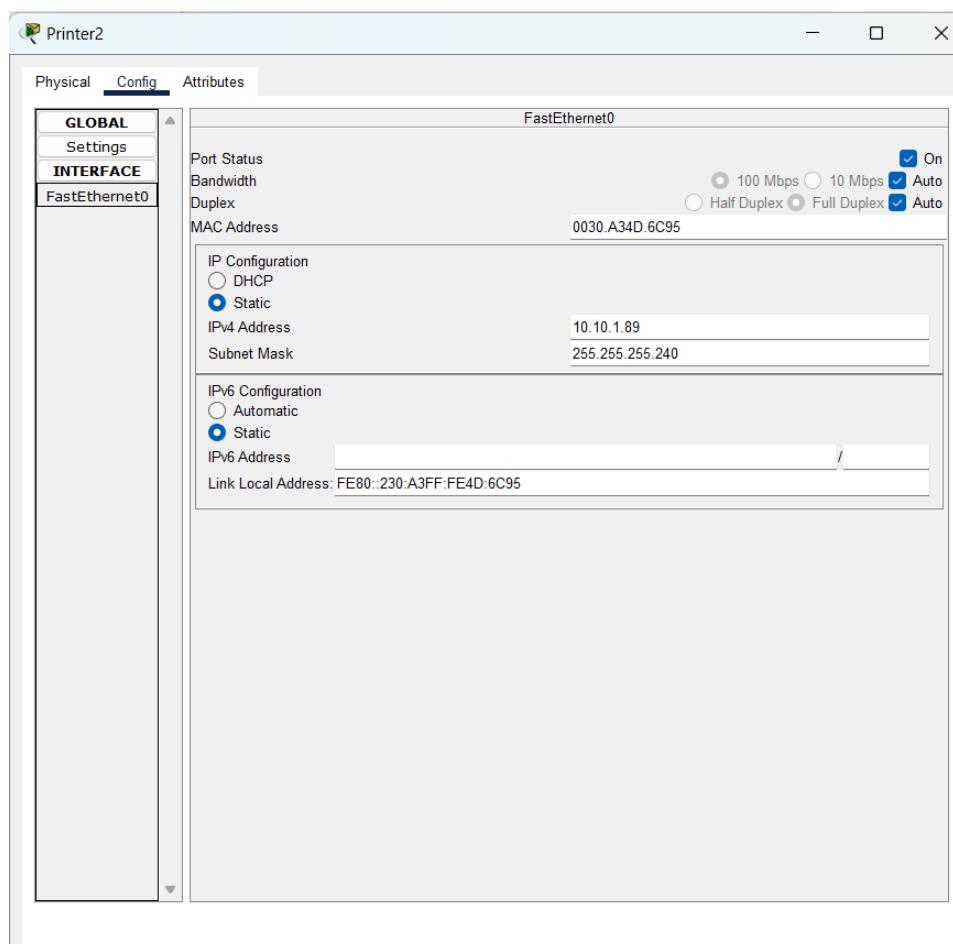
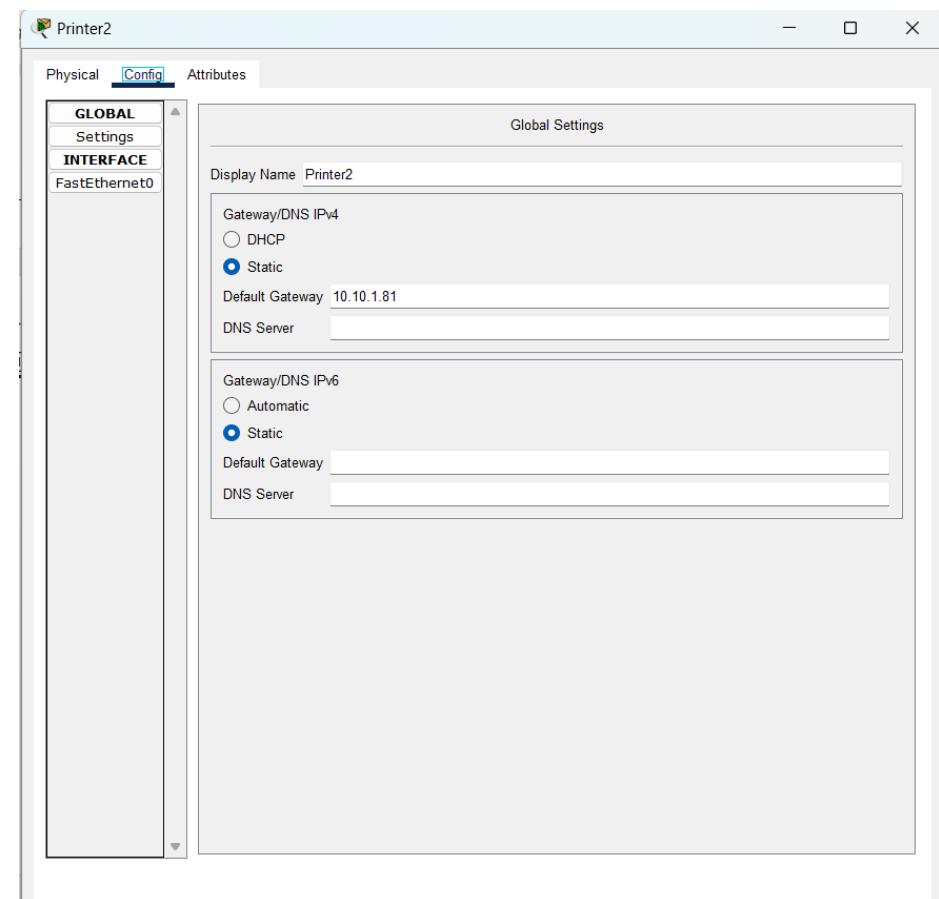
## **6.CONFIGURING PC(IP ADDRESS ,SUBNET MASK,DEFAULT GATEWAY)**

Configuring PC settings involves setting up the IP address, subnet mask, and default gateway. Below are the steps for configuring these settings on a PC



Likewise, Each PC in the network was configured with specific IP addresses, subnet masks, and default gateways according to the department it belongs to.

## **7.CONFIGURING PRINTER ( IP ADDRESS ,SUBNET MASK,DEFAULT GATEWAY )**

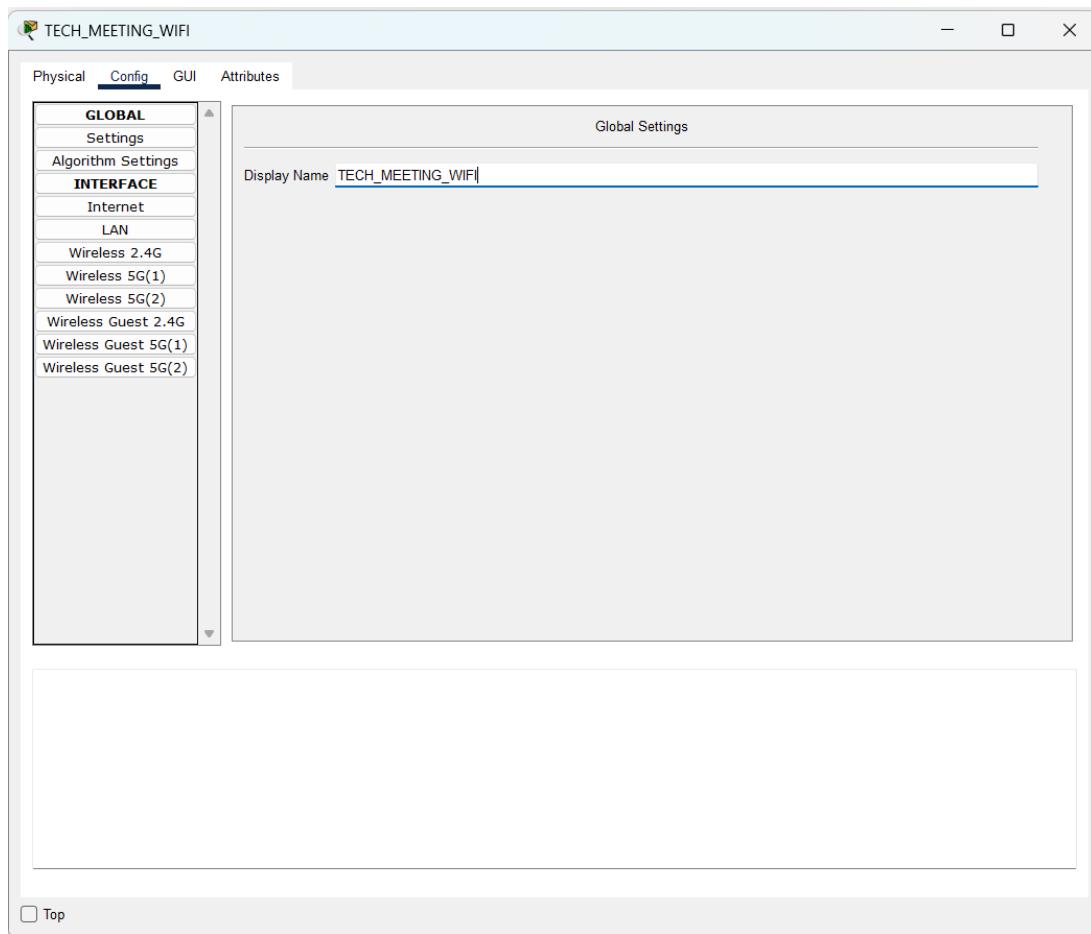


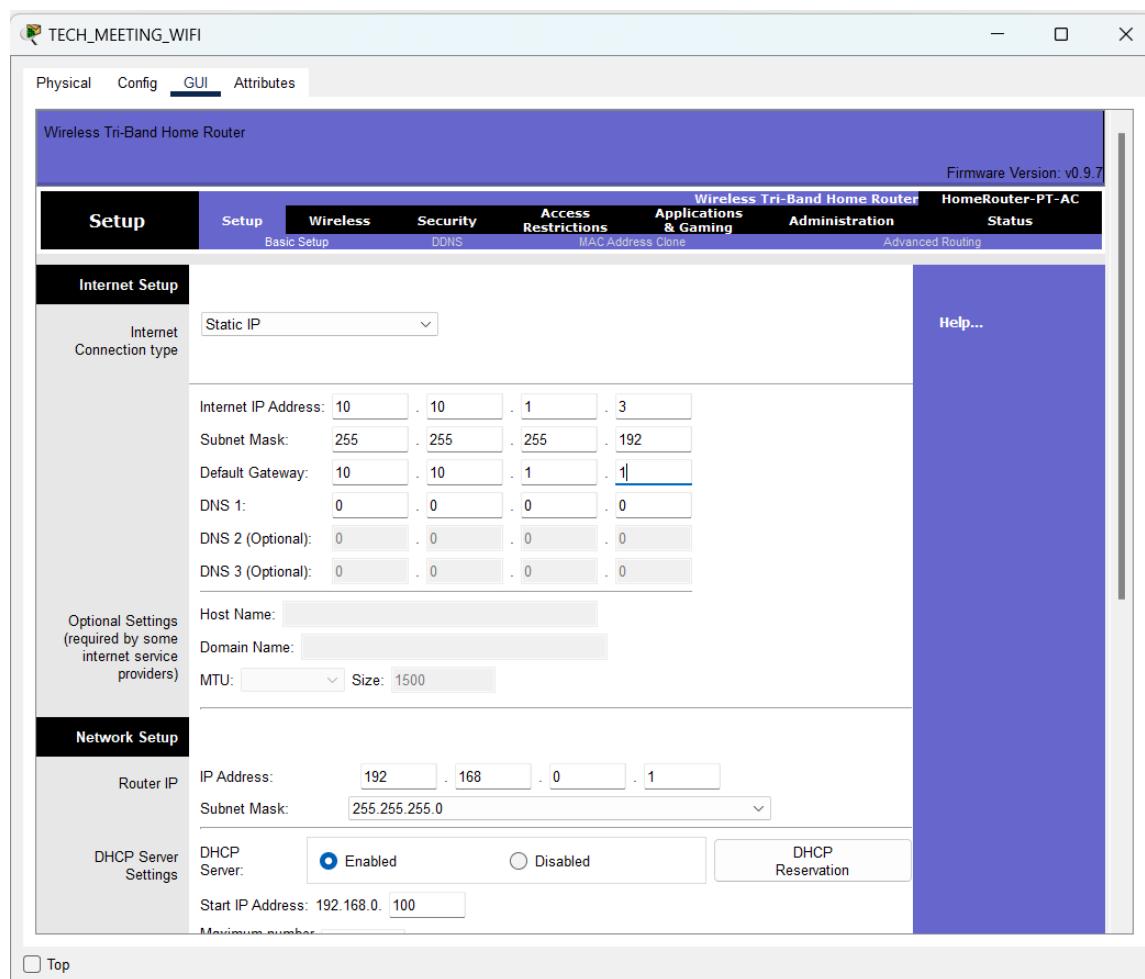
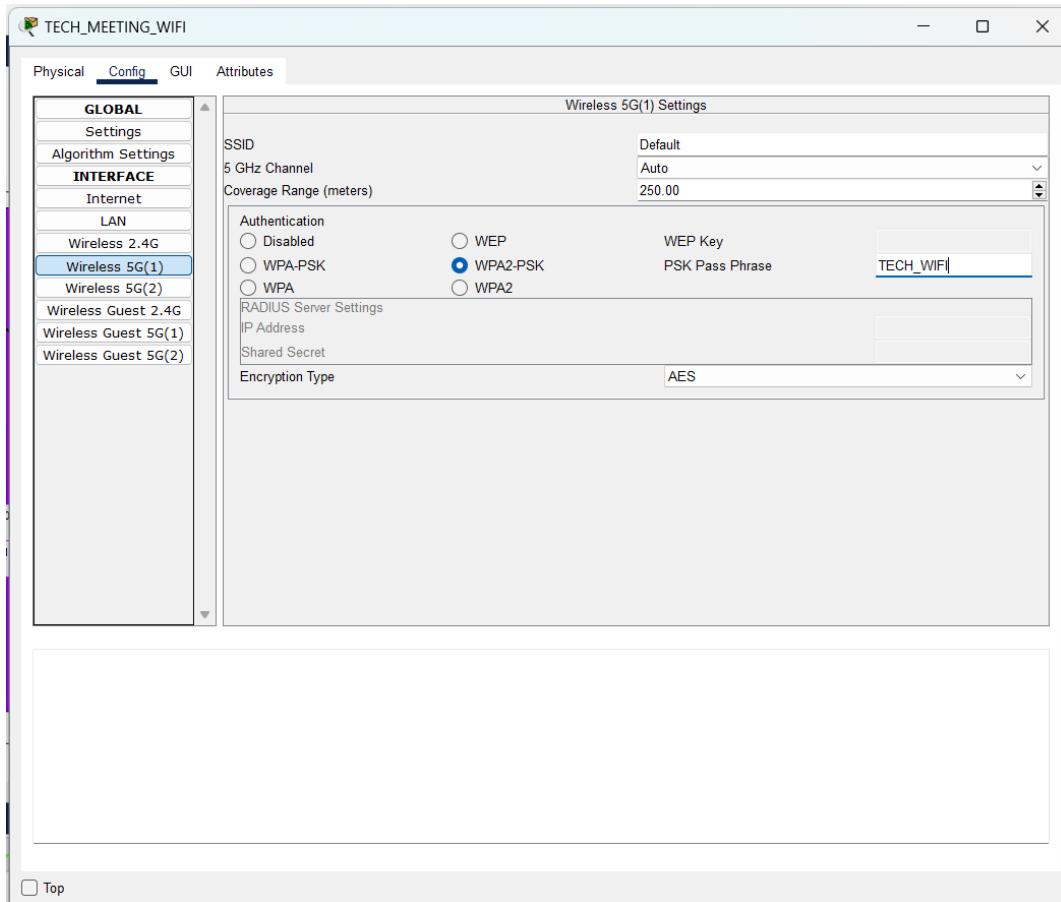
Likewise, all the printers in the network were configured according to their allocated IP address.

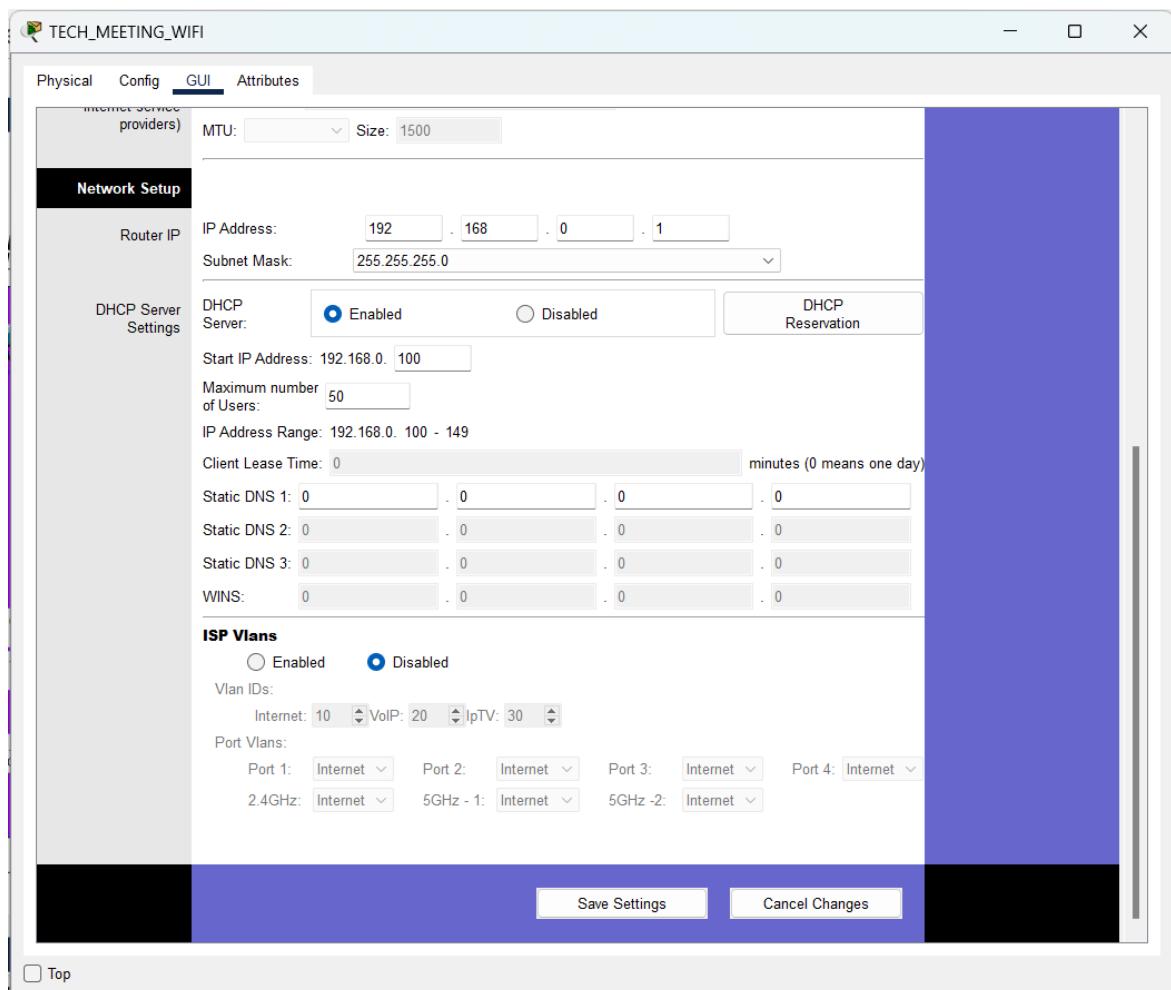
## **8.CONFIGURING HOME ROUTER**

### **Configuring Home Router for Tech Meeting Room WiFi:**

- Configured WiFi security with WPA2-PSK (Pre-Shared Key) for enhanced security.
- Assigned a unique Pre-Shared Key (PSK) passphrase for the Tech Meeting Room WiFi network.
- Assigned static IP addresses to devices connecting to the Tech Meeting Room WiFi network.
- Successfully connected a laptop to the WiFi network using the assigned passphrase.







Laptop5

Physical Config Desktop Programming Attributes

**WPA2-Personal Needed for Connection**

This wireless network has WPA2-Personal enabled. To connect to this network, enter the required passphrase in the appropriate field below. Then click the **Connect** button.

**Security** WPA2-Personal Please select the wireless security method used by your existing wireless network.

**Pre-shared Key** TECH\_WIFI\_1234 Please enter a Pre-shared Key that is 8 to 63 characters in length.

| Cancel | Connect | Active

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC300N

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**Link Information** **Connect** **Profiles**

**Back** **Statistics** **Save to Profile**

**2.4GHz**

**Wireless Network Status**

<b>Radio Band</b>	20MHz	<b>Network Type</b>	Mixed B/G/N
<b>Wireless Network Name</b>	TECH_WIFI	<b>IP Address</b>	192.168.0.101
<b>Wireless Mode</b>	Infrastructure	<b>Subnet Mask</b>	255.255.255.0
<b>Wide Channel</b>	N/A	<b>Default Gateway</b>	192.168.0.1
<b>Standard Channel</b>	1 - 2.412GHz	<b>DNS1</b>	0.0.0.0
<b>Security</b>	WPA2-Personal	<b>MAC Address</b>	0002.17C3.6B08
<b>Authentication</b>	Auto		

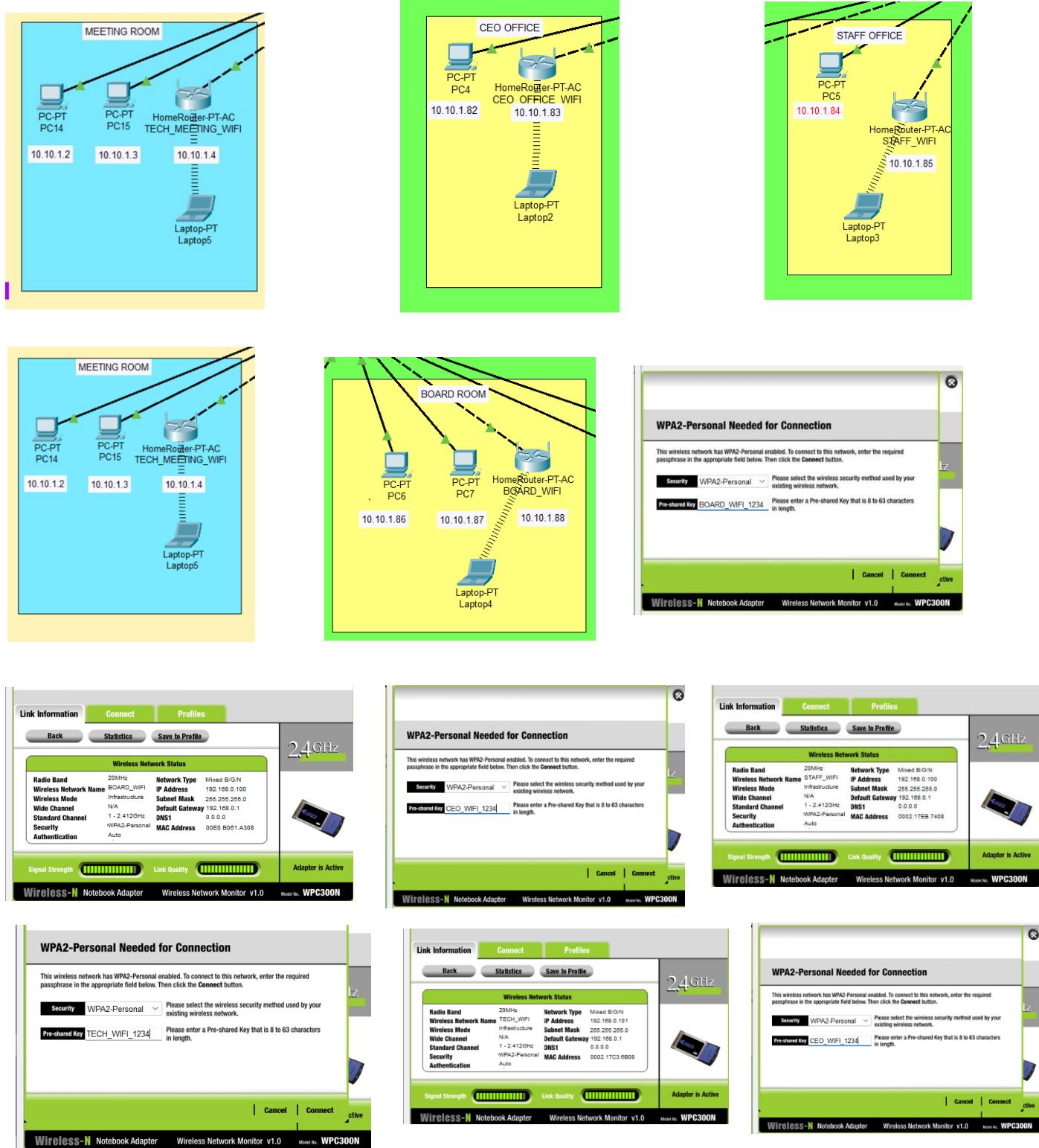
**Signal Strength**  **Link Quality**  **Adapter is Active**

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC300N

Similar configurations were applied to other WiFi networks in different departments to ensure secure and reliable wireless connectivity.

Wifi name	Password
Lobby_WIFI	Lobby_abcd_1234
Tech_meeting_WIFI	Tech_WIFI
CEO_WIFI	CEO_WIFI_1234
STAFF_WIFI	STAFF_WIFI_1234
BOARD_WIFI	BOARD_WIFI_1234

Each WiFi network is associated with a unique password to ensure secure access. Devices such as laptops were connected to these networks using the provided passwords.



## 9.ADMIN BUILDING PRINTER ACCESS

Successful Ping from Same Department (VLAN 30) PC:

The screenshot shows a Cisco Packet Tracer window titled "PC2". The "Desktop" tab is selected. A "Command Prompt" window is open, displaying the output of a ping command. The text in the window is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:>PING 10.10.0.245

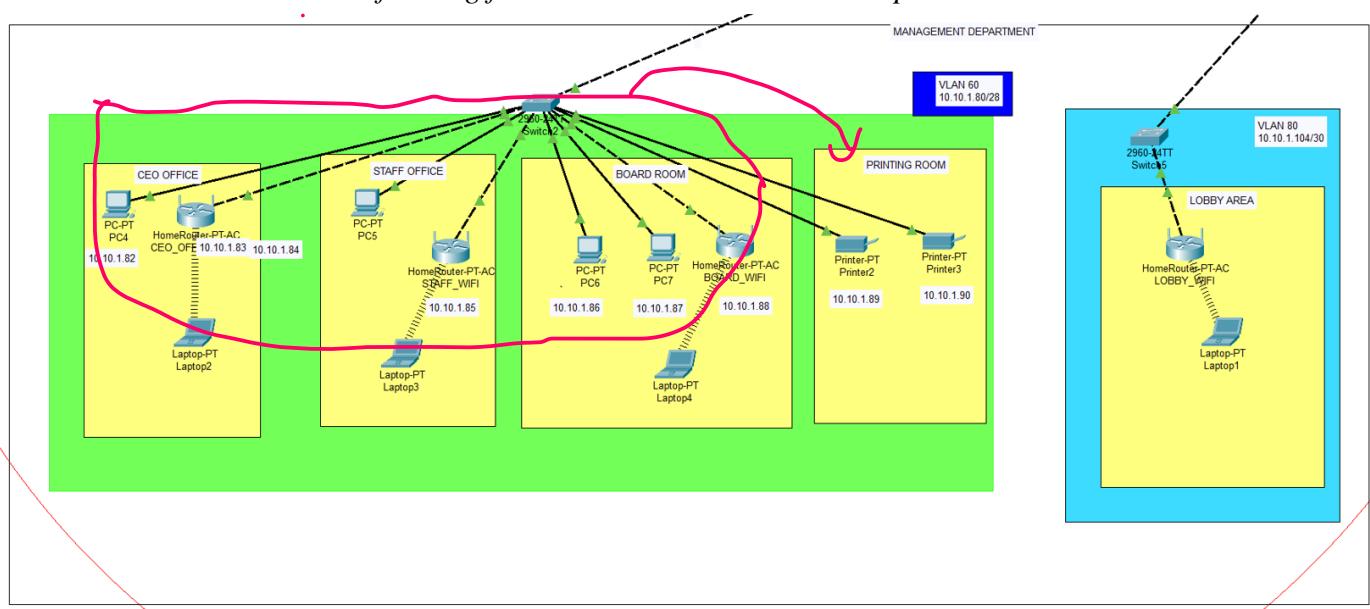
Pinging 10.10.0.245 with 32 bytes of data:

Reply from 10.10.0.245: bytes=32 time<1ms TTL=128
Reply from 10.10.0.245: bytes=32 time<1ms TTL=128
Reply from 10.10.0.245: bytes=32 time<1ms TTL=128
Reply from 10.10.0.245: bytes=32 time=5ms TTL=128

Ping statistics for 10.10.0.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 5ms, Average = 1ms

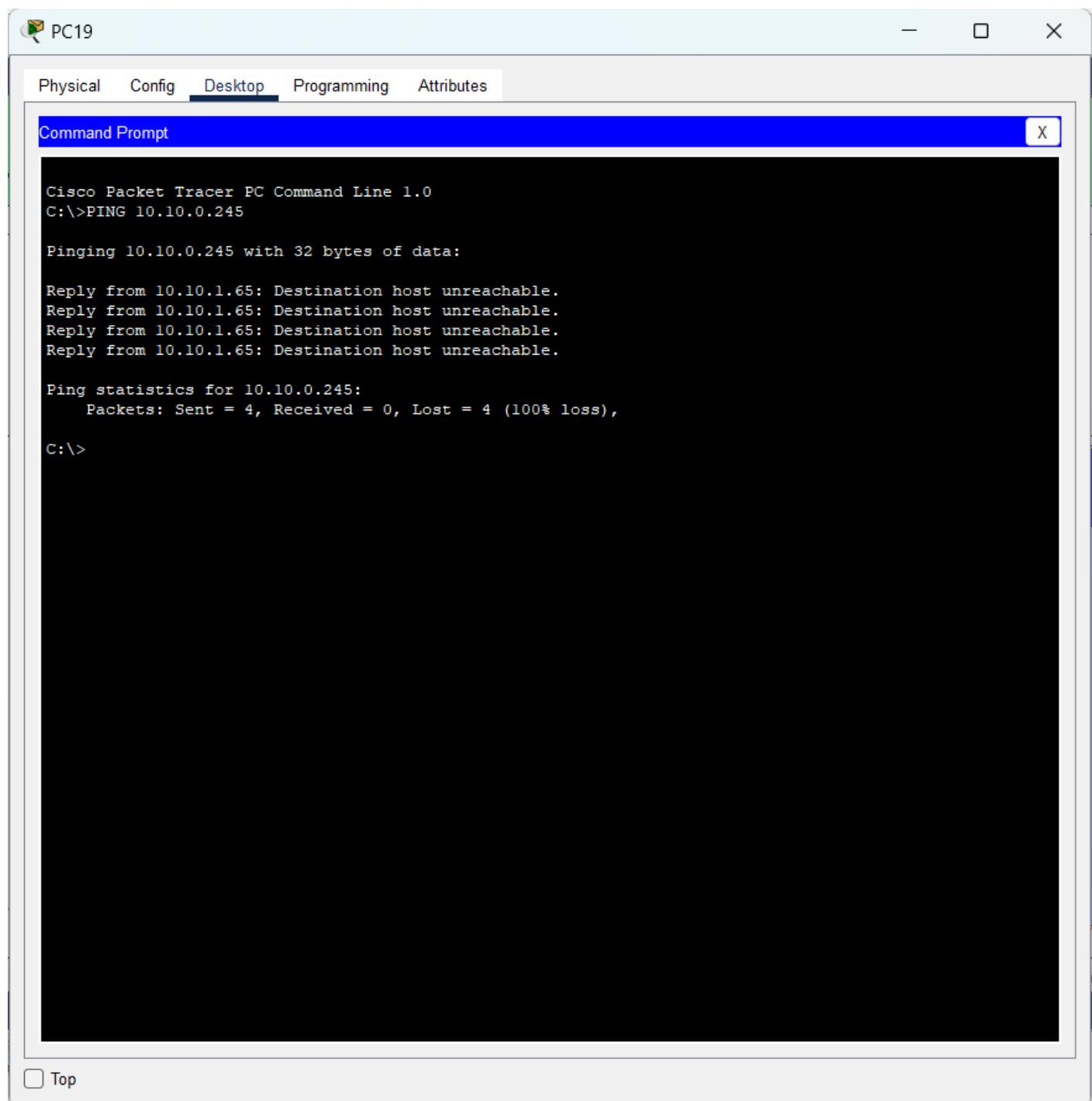
C:>
```

*Successful Ping from VLAN 30 PC to Admin Department Printer*



**Explanation:** The screenshot shows a successful ping from a PC in the Admin Department (VLAN 30) to the Admin Department's printer. This verifies that devices within the same department can access the printer.

#### Unsuccessful Ping from Different Department (Marketing, VLAN 50) PC:



The screenshot shows a Cisco Packet Tracer interface titled "PC19". The "Desktop" tab is selected in the top navigation bar. A "Command Prompt" window is open, displaying the following output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.0.245

Pinging 10.10.0.245 with 32 bytes of data:

Reply from 10.10.1.65: Destination host unreachable.

Ping statistics for 10.10.0.245:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

The command prompt window has a blue header bar with the title "Command Prompt". The bottom left corner of the window contains a "Top" button.

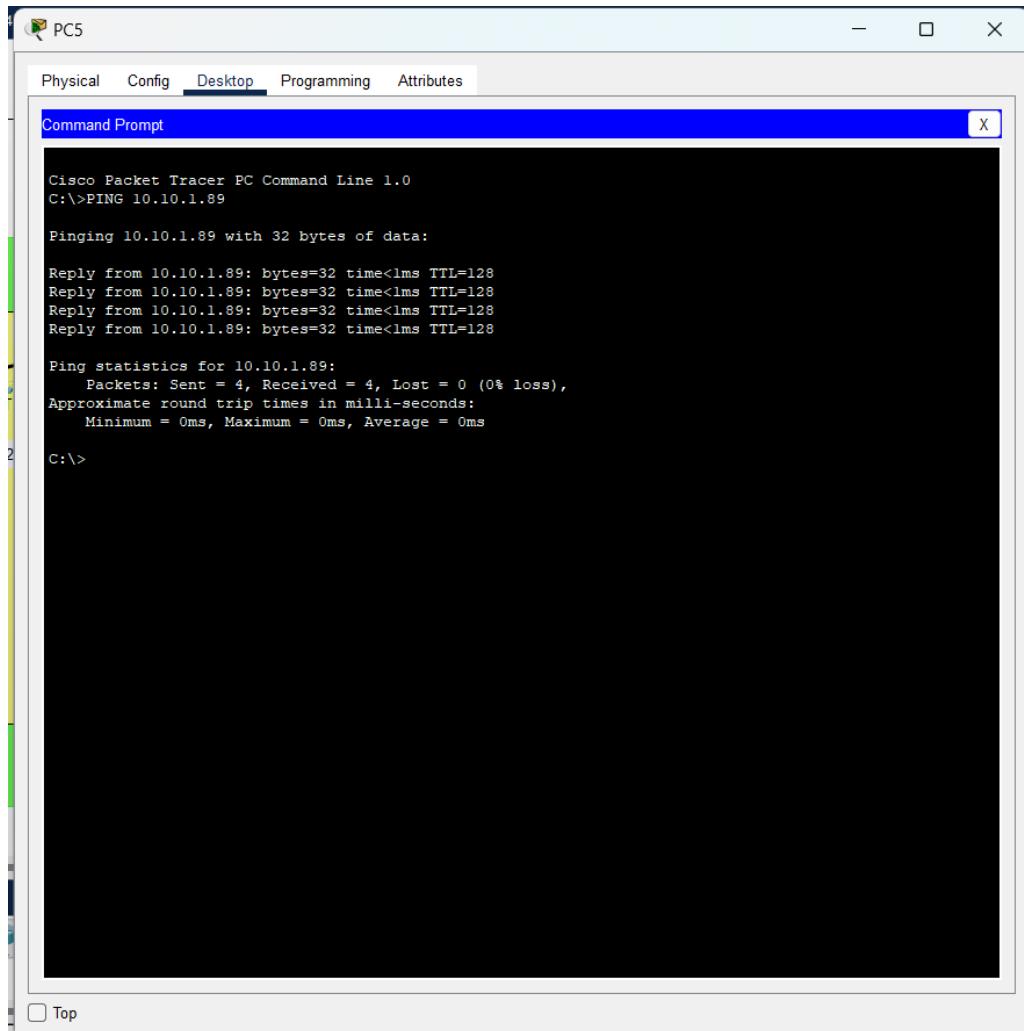
#### *Unsuccessful Ping from VLAN 50 PC to Admin Department Printer*

**Explanation:** The screenshot demonstrates an unsuccessful ping attempt from a PC in the Marketing Department (VLAN 50) to the Admin Department's printer. This showcases the network's access control, preventing cross-department communication.

The access control settings ensure that printers in the Admin Department can only be accessed by devices within the same department (VLAN 30) for enhanced security.

## **10.MANAGEMENT BUILDING PRINTER ACCESS**

**Successful Ping from Same Department (VLAN 60) PCs:**



The screenshot shows a Cisco Packet Tracer interface with a window titled "Command Prompt". The window displays the output of a ping command. The text in the window reads:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.89

Pinging 10.10.1.89 with 32 bytes of data:

Reply from 10.10.1.89: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.1.89:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

*Successful Ping from VLAN 60 PCs to Management Department Printers*

**Explanation:** The screenshot demonstrates successful pings from PCs within the Management Department (VLAN 60) to printers located in the same department. This confirms that devices within the same VLAN and department can access the printers.

## Unsuccessful Ping from Same Department (VLAN 80) PCs (Lobby Public WiFi):

The screenshot shows a window titled "Laptop1" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is selected. Inside the window, a Command Prompt window is open with a blue title bar labeled "Command Prompt". The command line shows the user entering "PING 10.10.1.89" and receiving a response indicating destination host unreachable for four consecutive attempts. The ping statistics show 100% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.89

Pinging 10.10.1.89 with 32 bytes of data:

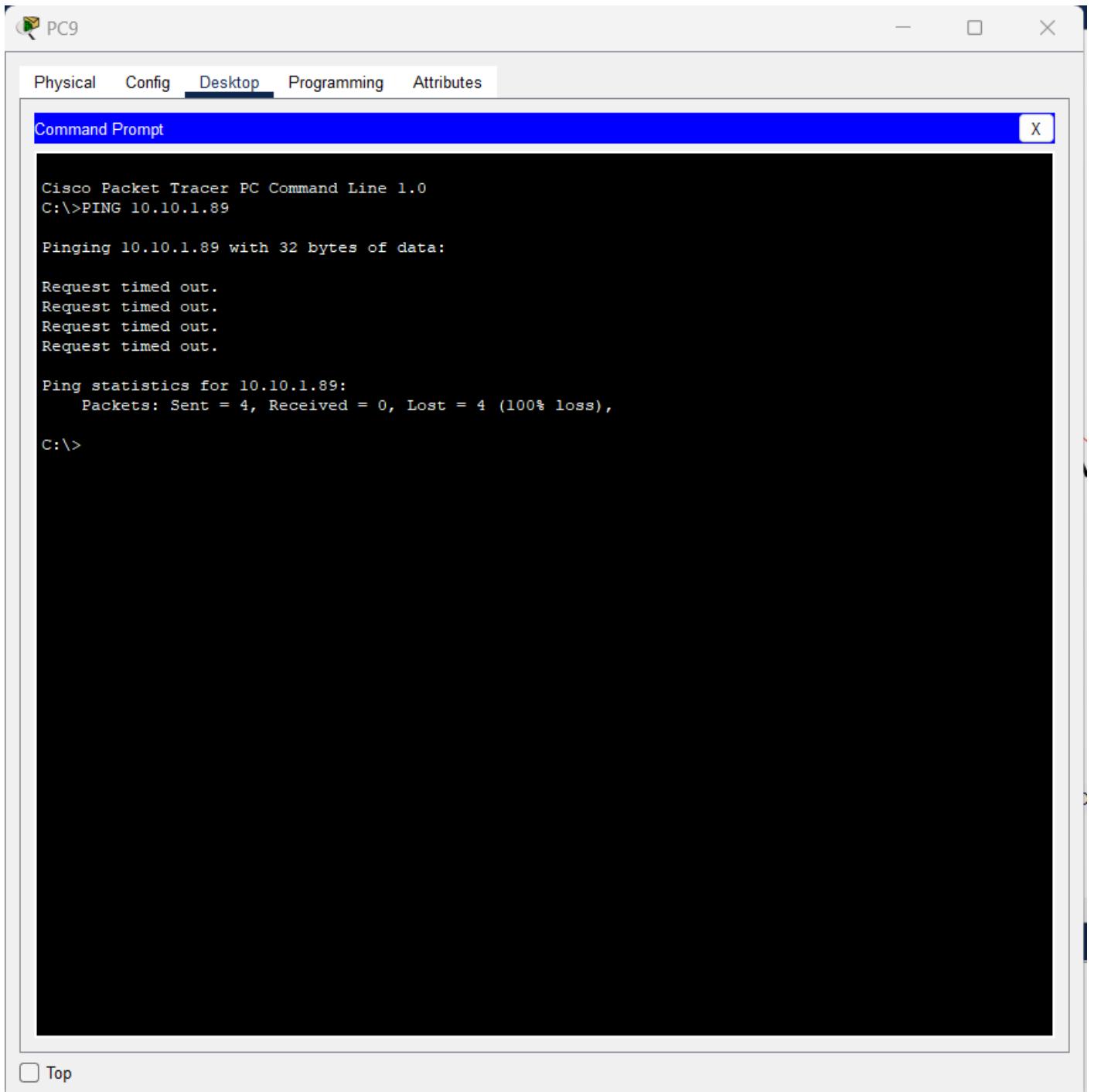
Reply from 192.168.0.1: Destination host unreachable.

Ping statistics for 10.10.1.89:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

*Unsuccessful Ping from VLAN 80 PCs to Management Department Printers*

**Explanation:** The screenshot showcases unsuccessful ping attempts from PCs in the Lobby area (VLAN 80) to printers in the Management Department. This illustrates the access control, preventing cross-departmental communication even within the same building.

## Unsuccessful Ping from Another Department (VLAN 10) PCs:



The screenshot shows a Cisco Packet Tracer interface titled "PC9". A tab bar at the top includes "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". Below this is a window titled "Command Prompt" with a blue header bar and a white body. The command line output is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:>PING 10.10.1.89

Pinging 10.10.1.89 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.89:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:>
```

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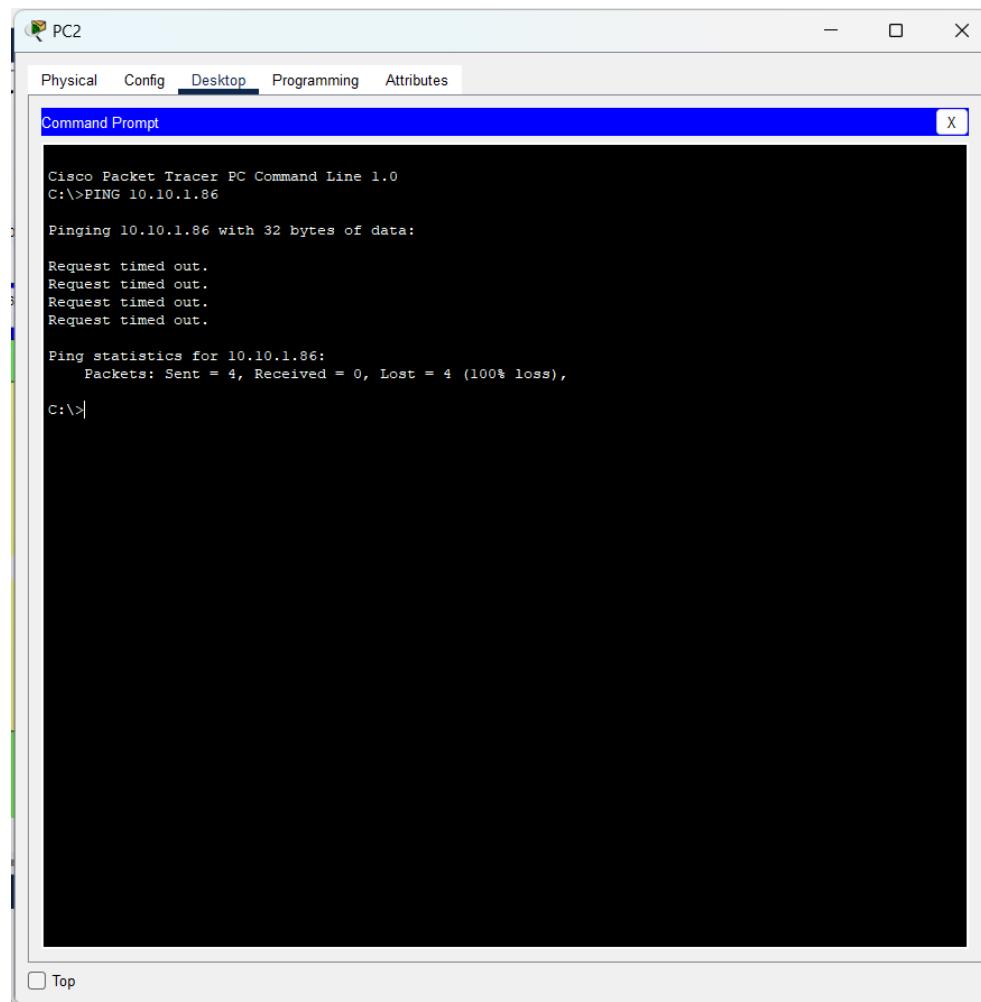
### *Unsuccessful Ping from VLAN 10 PCs to Management Department Printers*

The screenshot exhibits unsuccessful ping attempts from PCs in another department (VLAN 10) to printers in the Management Department. This validates the strict network segmentation, ensuring isolation between different departments.

The access control settings are designed to restrict printer access based on both VLAN and department, enforcing security measures and maintaining departmental isolation.

**Printers available at the management department can only be accessed by the computer installed at the admin department.**

## **11.MANAGEMENT OFFICE PC ACCESS FROM DIFFERENT DEPARTMENTS**



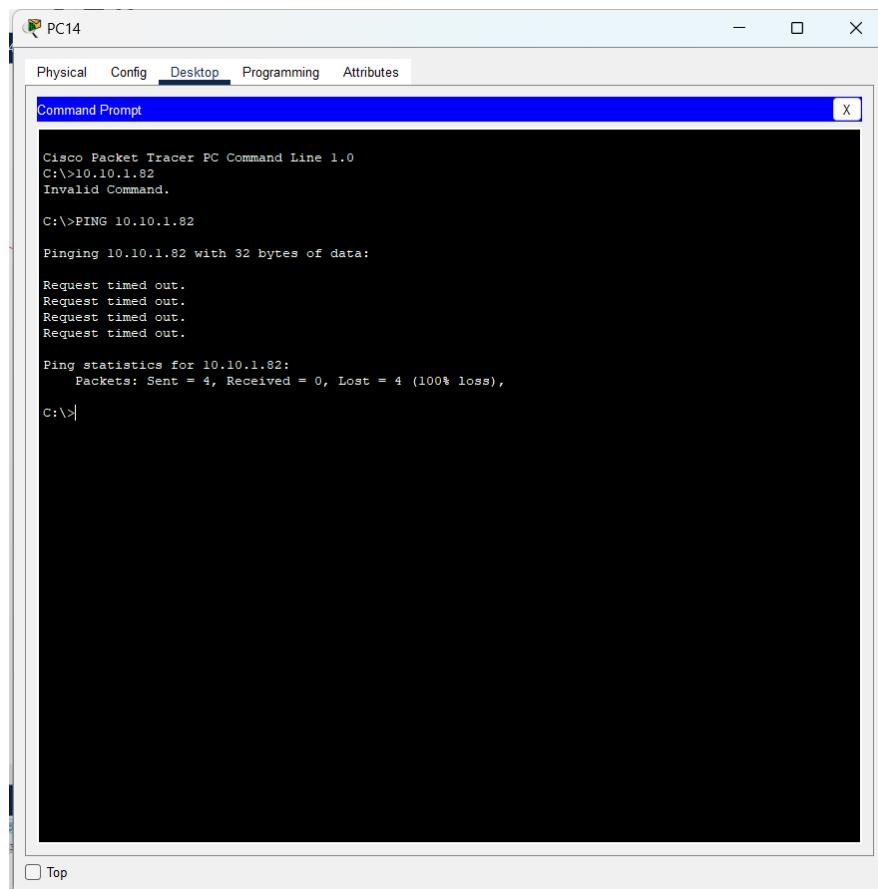
```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.86

Pinging 10.10.1.86 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.86:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

**Management Office Pc Access From Admin Department(PING UNSUCCESSFUL)**



```
Cisco Packet Tracer PC Command Line 1.0
C:\>10.10.1.82
Invalid Command.

C:\>PING 10.10.1.82

Pinging 10.10.1.82 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.82:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

**Management Office Pc Access From Technology Department ( PING UNSUCCESSFUL)**

PC24

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.82

Pinging 10.10.1.82 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.82:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

### Management Office Pc Access From Operation Department ( PING UNSUCCESSFUL)

PC20

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.82

Pinging 10.10.1.82 with 32 bytes of data:

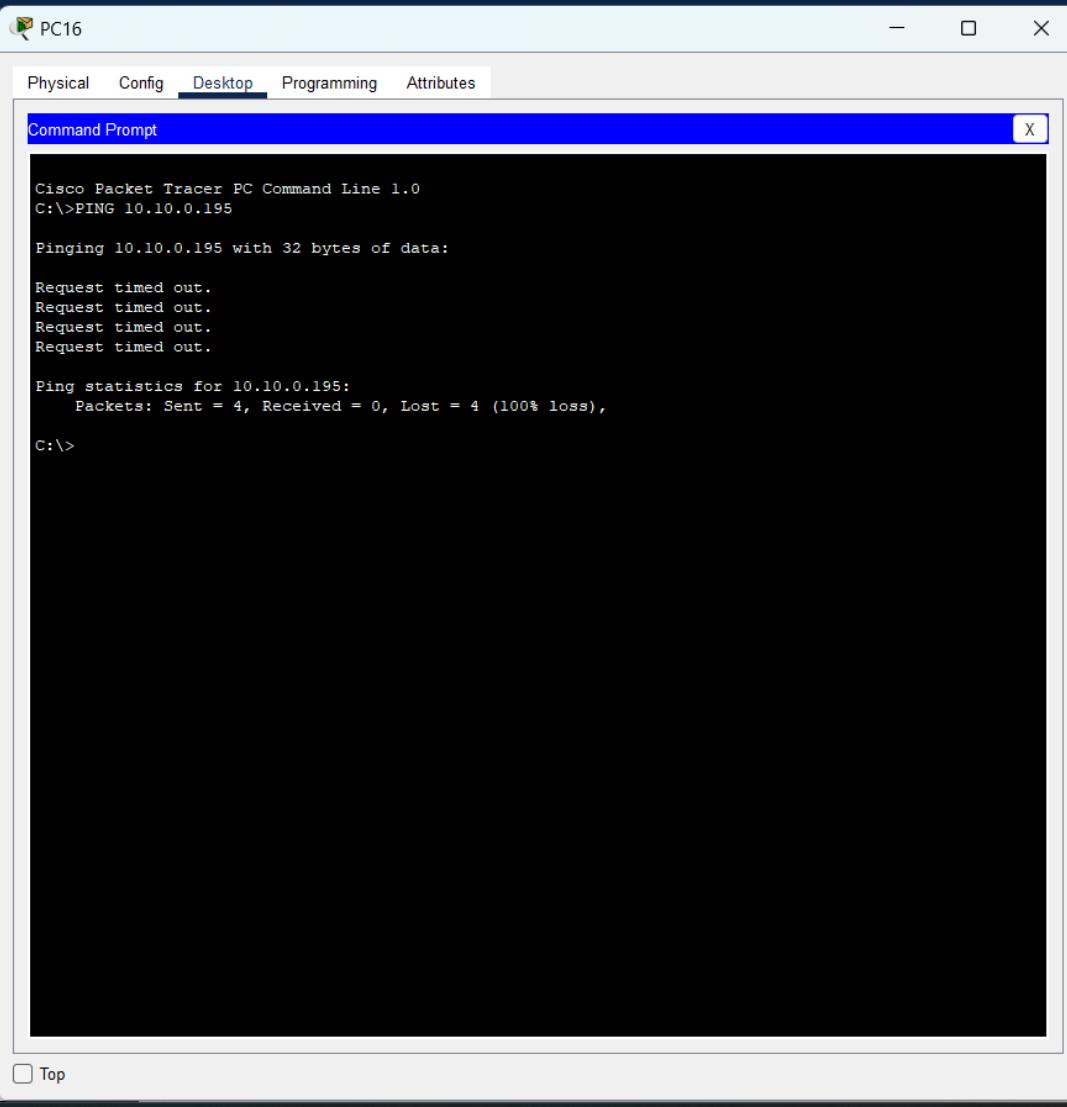
Reply from 10.10.1.97: Destination host unreachable.

Ping statistics for 10.10.1.82:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

### Management Office Pc Access From Marketing Department ( PING UNSUCCESSFUL)

Computers available at management office cant be accessed from other departments such as admin, technology, operations, marketing

## **12. ADMIN OFFICE PC ACCESS FROM DIFFERENT DEPARTMENTS**



PC16

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.0.195

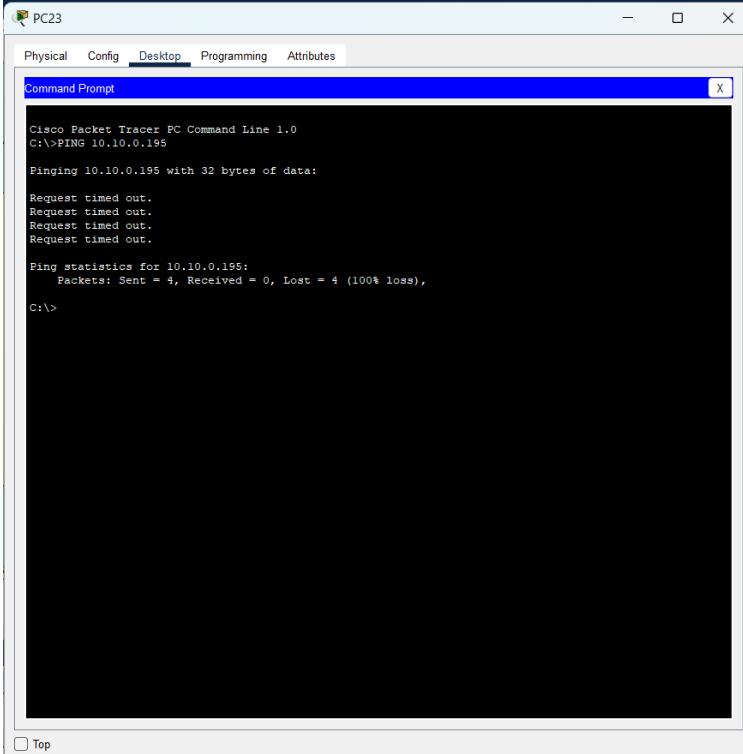
Pinging 10.10.0.195 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.0.195:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

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**Admin Office Pc Access From technology Department (PING UNSUCCESSFUL)**



PC23

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.0.195

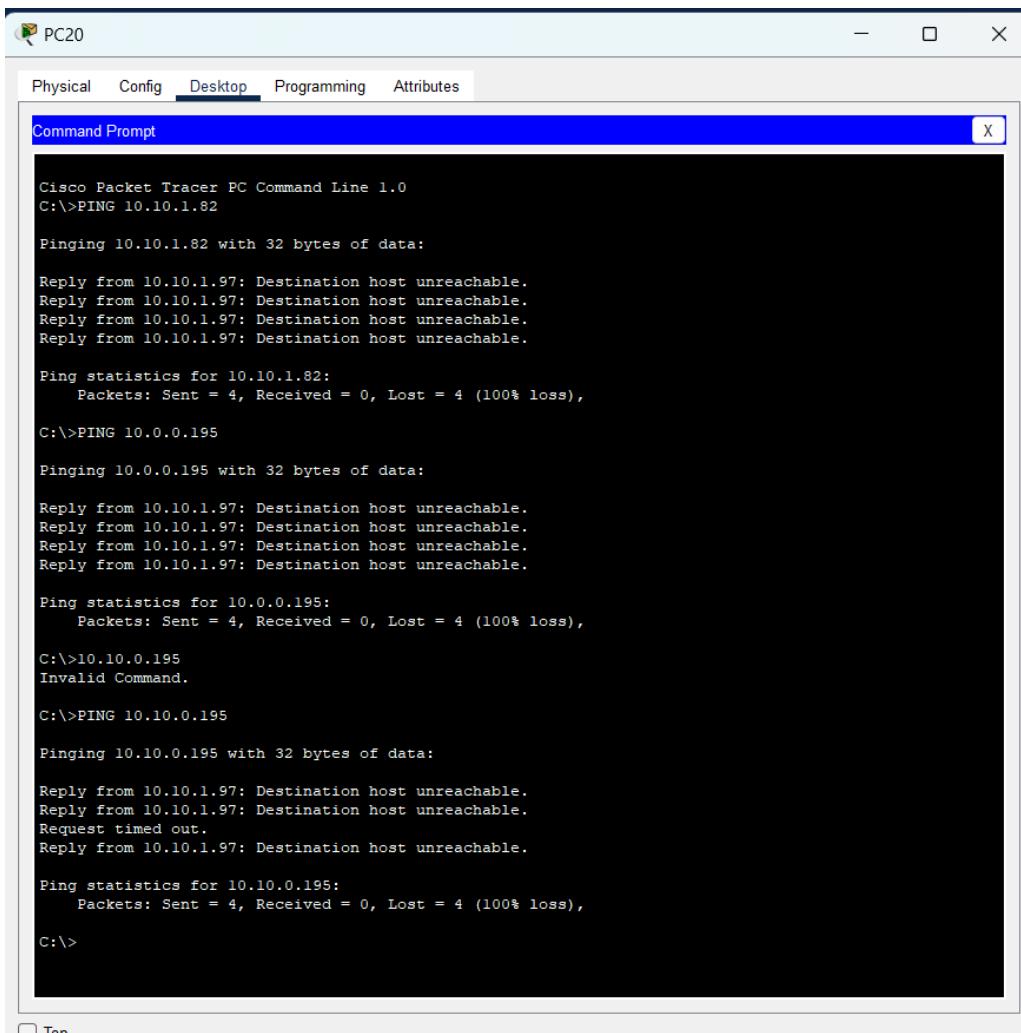
Pinging 10.10.0.195 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.0.195:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

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**Admin Office Pc Access From operation Department (PING UNSUCCESSFUL)**



The screenshot shows a Cisco Packet Tracer window titled "PC20". The tab bar at the top has tabs for "Physical", "Config", "Desktop" (which is selected), "Programming", and "Attributes". Below the tabs is a "Command Prompt" window with a blue header bar containing the title "Command Prompt" and a close button "X". The main area of the command prompt shows the following text output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 10.10.1.82

Pinging 10.10.1.82 with 32 bytes of data:

Reply from 10.10.1.97: Destination host unreachable.

Ping statistics for 10.10.1.82:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>PING 10.0.0.195

Pinging 10.0.0.195 with 32 bytes of data:

Reply from 10.10.1.97: Destination host unreachable.

Ping statistics for 10.0.0.195:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>10.10.0.195
Invalid Command.

C:\>PING 10.10.0.195

Pinging 10.10.0.195 with 32 bytes of data:

Reply from 10.10.1.97: Destination host unreachable.
Reply from 10.10.1.97: Destination host unreachable.
Request timed out.
Reply from 10.10.1.97: Destination host unreachable.

Ping statistics for 10.10.0.195:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```

### **Admin Office Pc Access From marketing Department (PING UNSUCCESSFUL)**

Computers available at the admin department can't be accessed from the technology, operations and marketing departments

Each network node can only be accessed by the administrator, not others.