# DATA COMMUNICATION AND NETWORKING II

## PROJECT TITLE

# CONFIGURING A SMALL ENTERPRISE NETWORK

## GROUP MEMBERS

RIMSHA LARAIB (B21110006107)

MEHAK FATIMA (B21110006057)

TAHRIM BILAL (B2111006153)

YUMNA MUBEEN (B21110006165)

SUBMITTED TO: **MA'AM ATTIA AGHA**

# OBJECTIVE

DESIGN AND CONFIGURE A SMALL ENTERPRISE NETWORK USING CISCO PACKET TRACER. THE NETWORK SHOULD INCLUDE MULTIPLE VLANS, ROUTING BETWEEN VLANS, DHCP, AND BASIC SECURITY USING ACCESS CONTROL LISTS (ACLS).

# REQUIREMENTS

1. Network Layout:
   - 3 departments (Sales, HR, IT) connected via a switch.
   - Separate VLANs for each department.
   - A router for inter-VLAN routing.
   - DHCP configuration for automatic IP addressing.
   - Implement a wireless network for guest access.

2. Devices:
   - PCs (4 per department)
   - Switches (Layer 2)
   - Router (Layer 3)
   - Access Point (Wireless)
   - DHCP Server
   - DNS Server (optional)

3. VLAN Configuration:
   -VLAN 10: Sales Department
   -VLAN 20: HR Department
   -VLAN 30: IT Department
   - Ensure that each department is on a separate VLAN with proper IP addressing.

4. Inter-VLAN Routing:
   - Configure routing on the Layer 3 router to allow communication between VLANs.

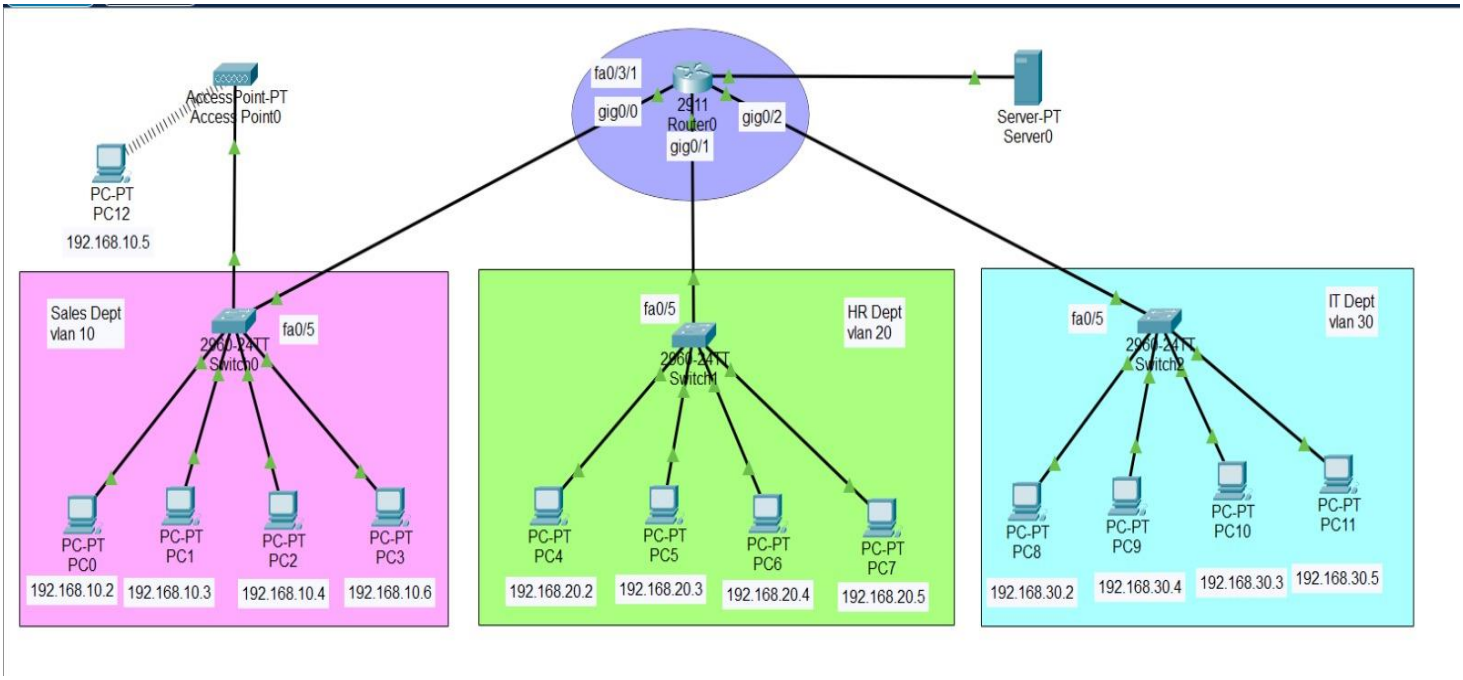
5. DHCP:
   - Set up a DHCP server to assign IP addresses dynamically to each department.
   - Ensure each department gets addresses from different subnets.

6. Access Control Lists (ACLs):
   - Implement an ACL to block HR VLAN from accessing IT VLAN resources.
   - Allow Sales VLAN to access only specific services (e.g., HTTP) on the IT VLAN.

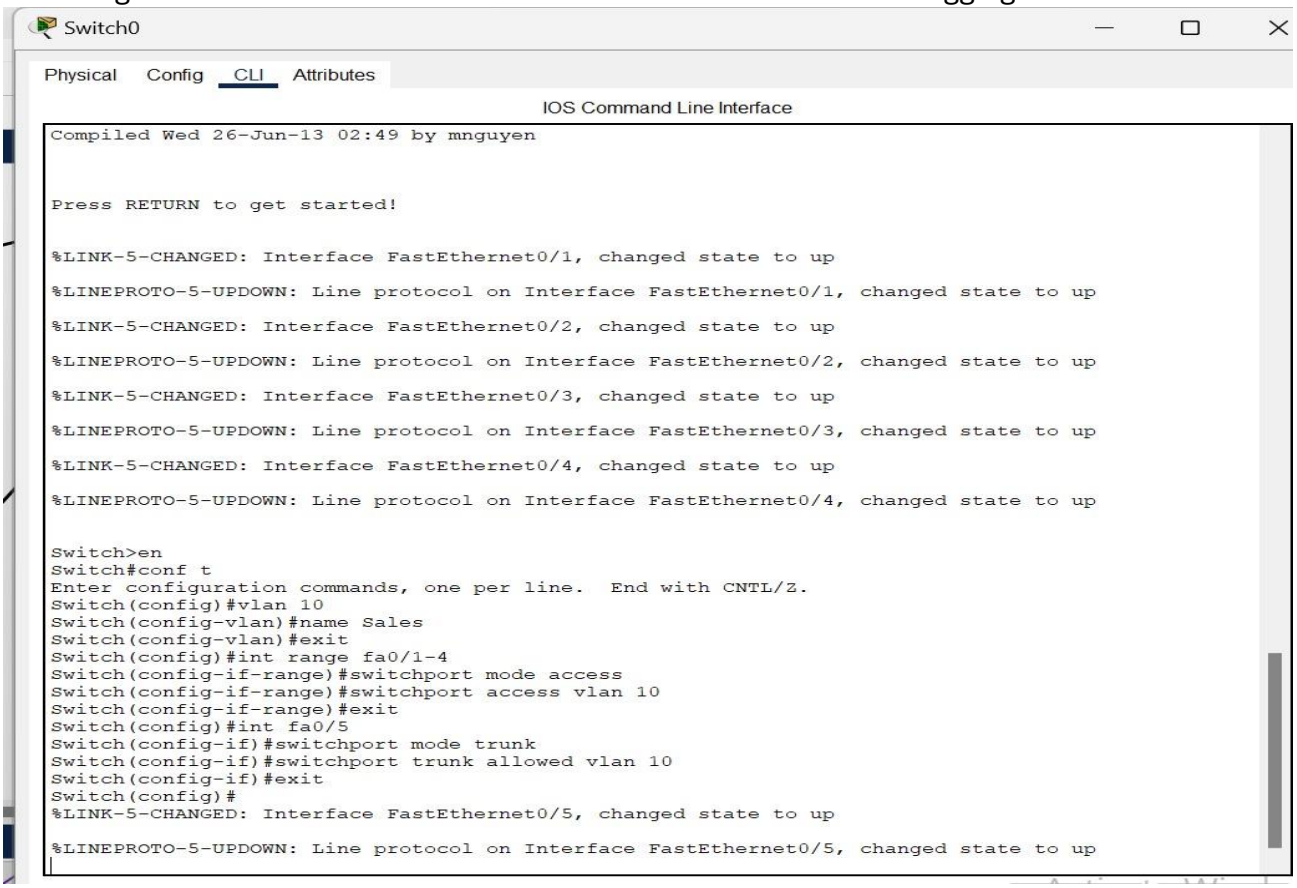
7. Wireless Setup:
   - Configure an access point for guest users.
   - Use WEP security for the wireless network.

# STEPS

1. **NETWORK DESIGN**:
   - Start by placing devices (PCs, switches, routers, access points) in Packet Tracer.
   - Interconnect them using appropriate cabling.




2. **VLAN CONFIGURATION**:
   - On the switches, create VLANs for each department and assign respective PCs to their VLANs.
   - Configure trunk links between switches and the router for VLAN tagging.



Switch1

Physical Config CLI Attributes

IOS Command Line Interface

```
Compiled Wed 26-Jun-13 02:49 by mnguyen


Press RETURN to get started!


%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up


Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 20
Switch(config-vlan)#name HR
Switch(config-vlan)#exit
Switch(config)#int range fa0/1-4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#int fa0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 20
Switch(config-if)#exit
Switch(config)#
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up

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

Switch2

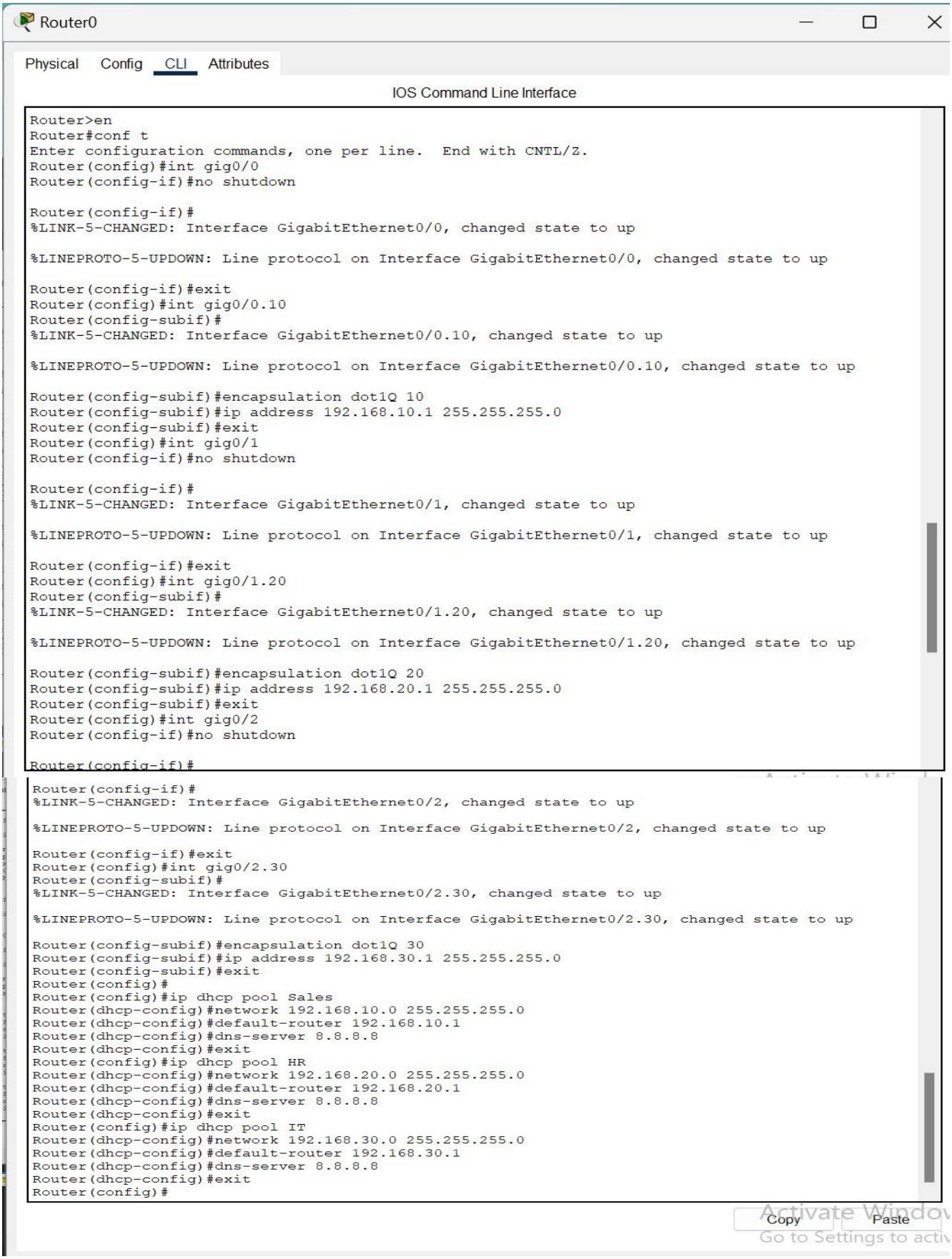
Physical Config CLI Attributes

IOS Command Line Interface

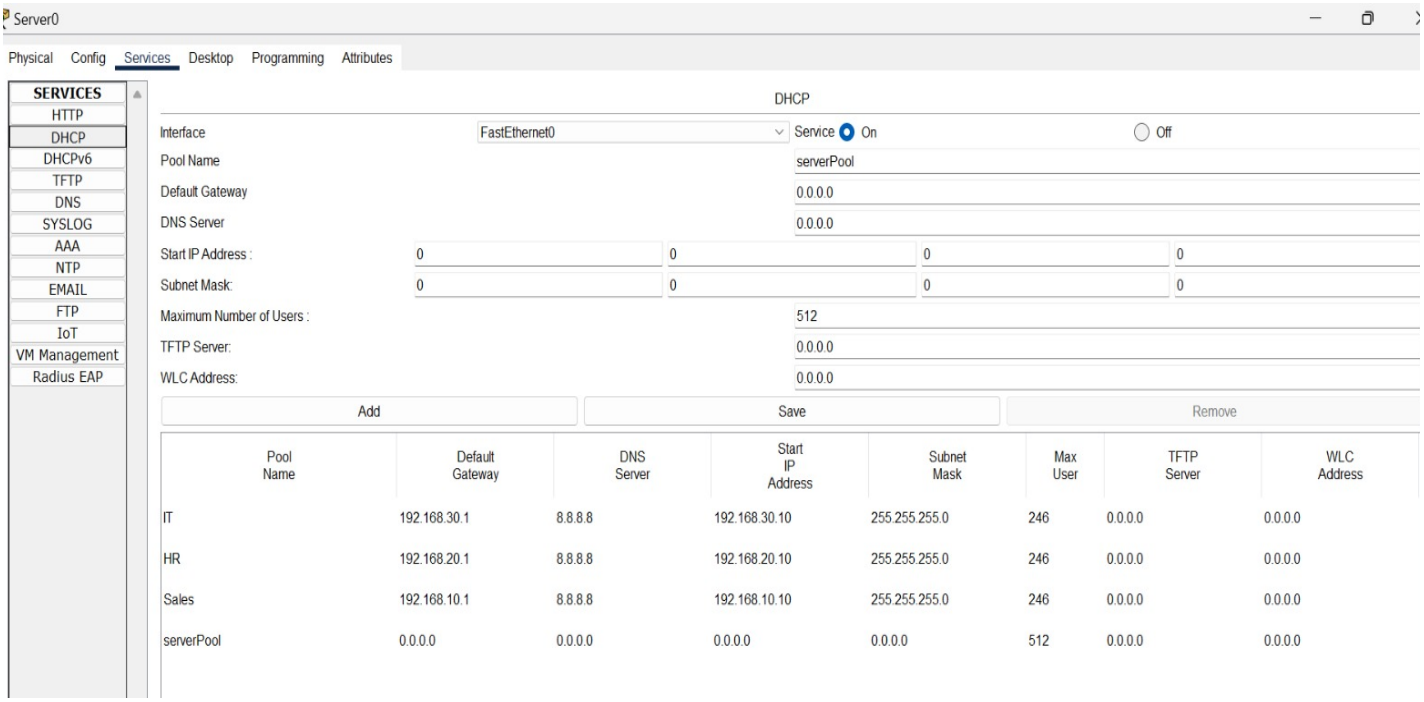
```
Compiled Wed 26-Jun-13 02:49 by mnguyen


Press RETURN to get started!


%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up

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

%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up


Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 30
Switch(config-vlan)#name IT
Switch(config-vlan)#exit
Switch(config)#int range fa0/1-4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#exit
Switch(config)#int fa0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 30
Switch(config-if)#exit
Switch(config)#
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up

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

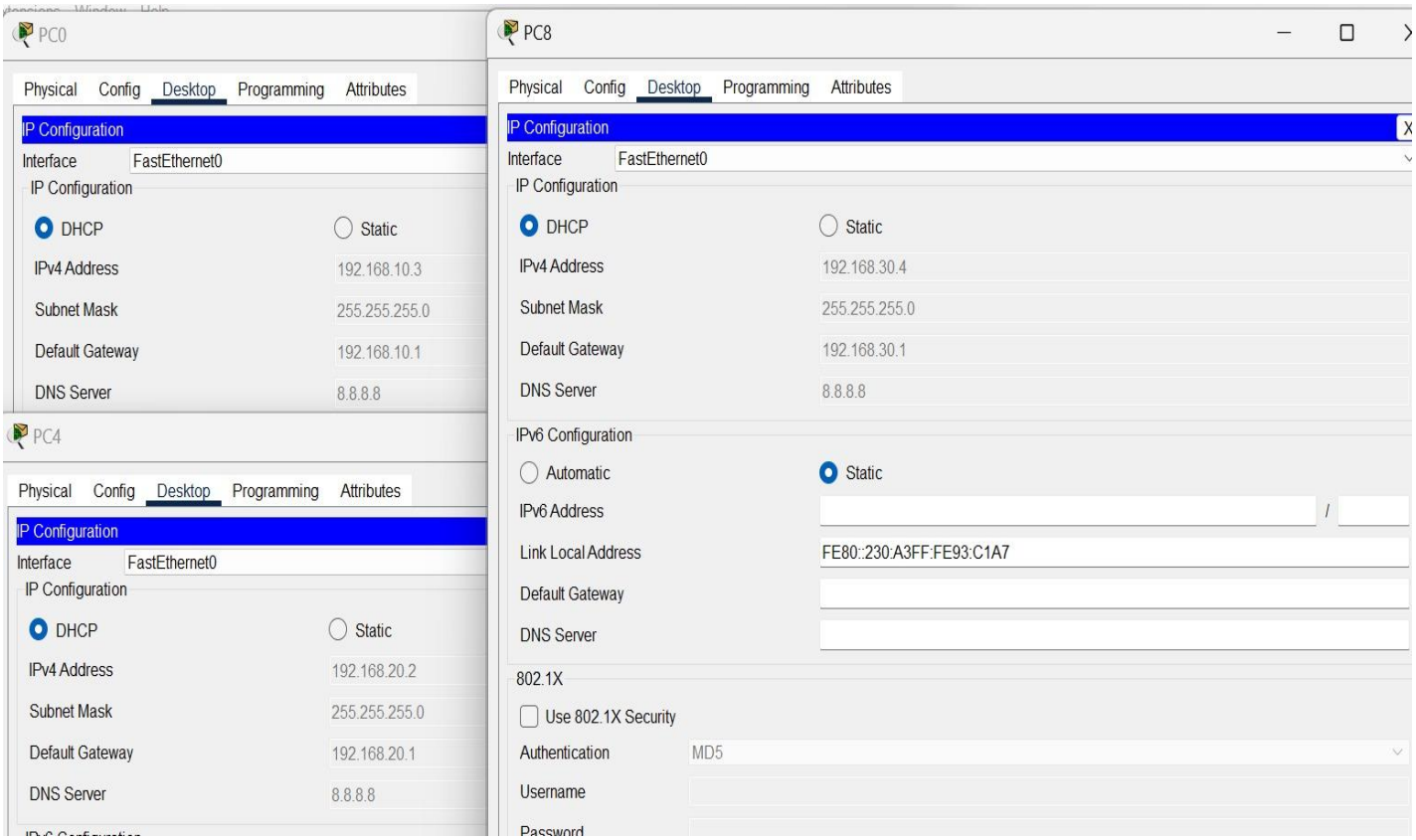
3**. INTER-VLAN ROUTING**:

- Enable inter-VLAN routing on the router by creating sub-interfaces for each VLAN.
- Assign IP addresses to these sub-interfaces from their respective subnets.



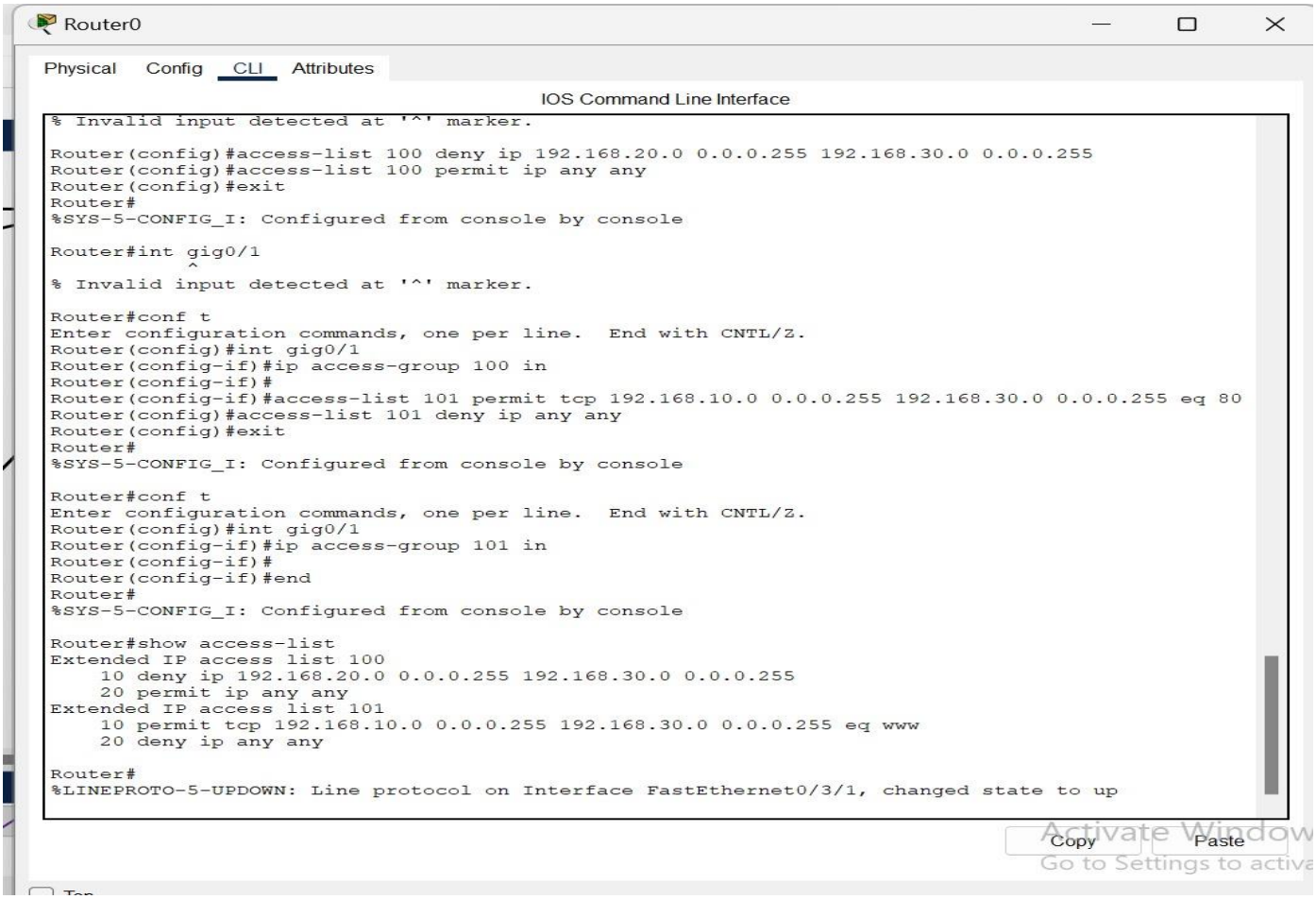
4. **DHCP SETUP**:
   - Configure the DHCP server with pools of IP addresses for each VLAN.
   - Ensure that each department gets IP addresses automatically from the correct pool.



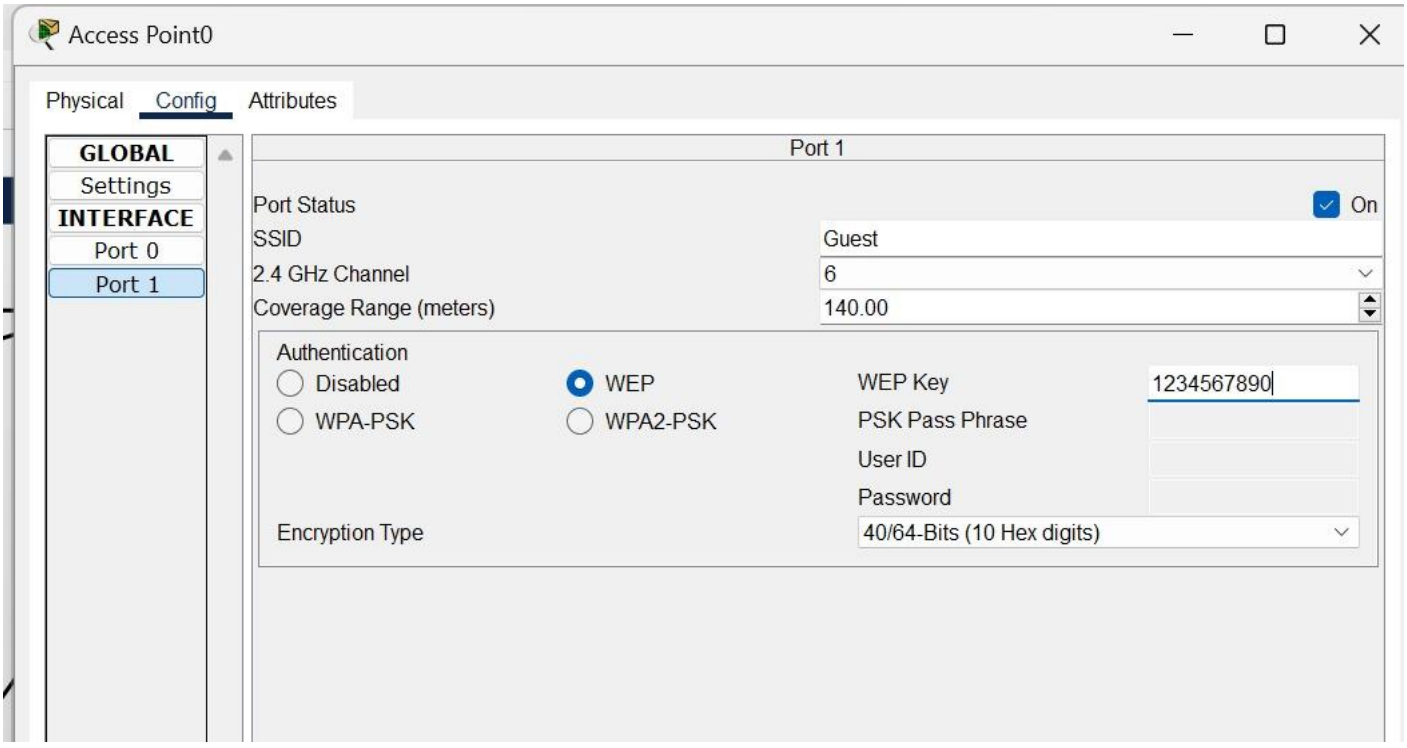
5**. ACL SETUP**:

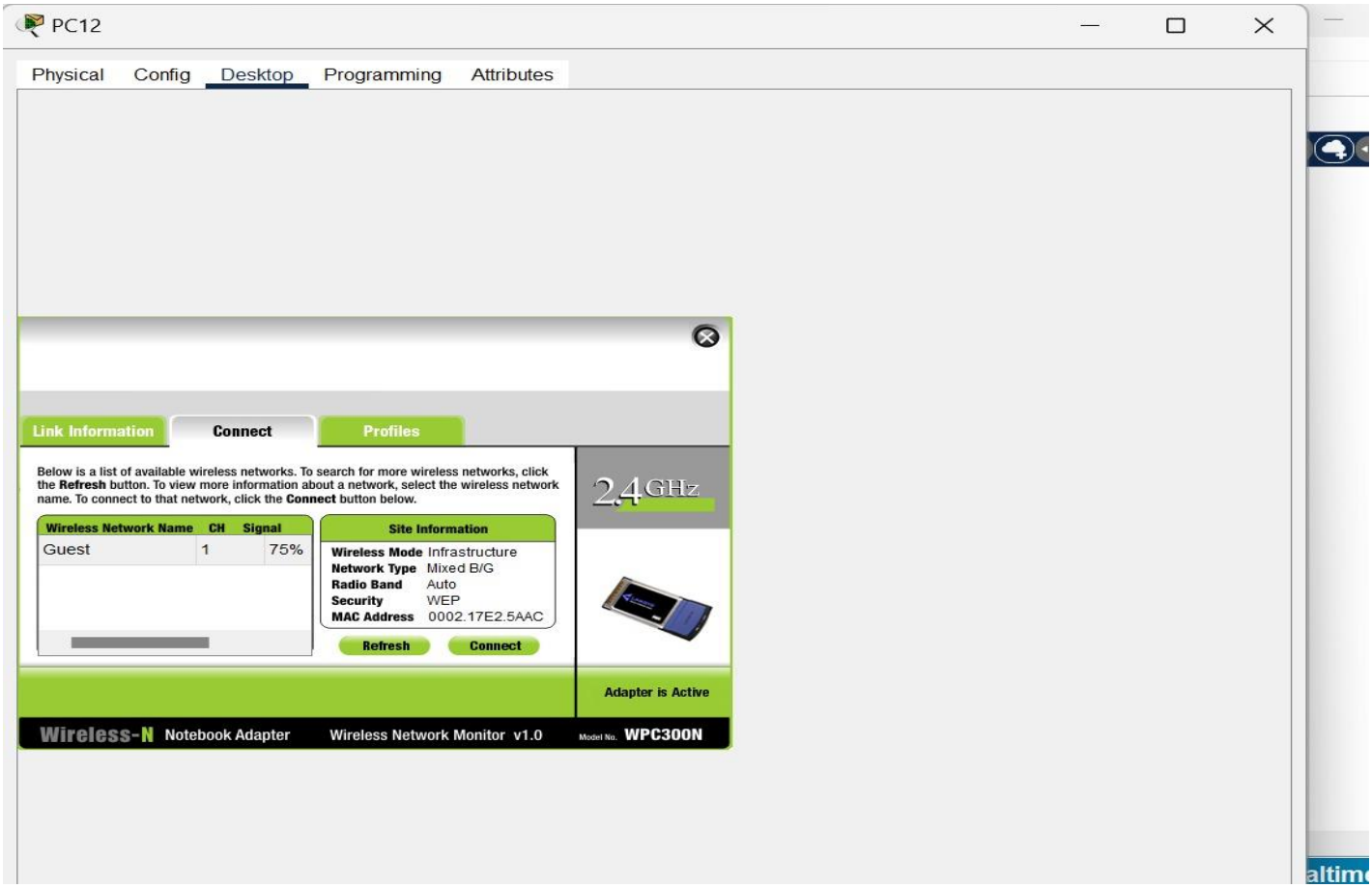
- Apply ACLs on the router to control traffic flow between VLANs.
- Block unauthorized access based on the requirements.




6. **WIRELESS NETWORK CONFIGURATION:**

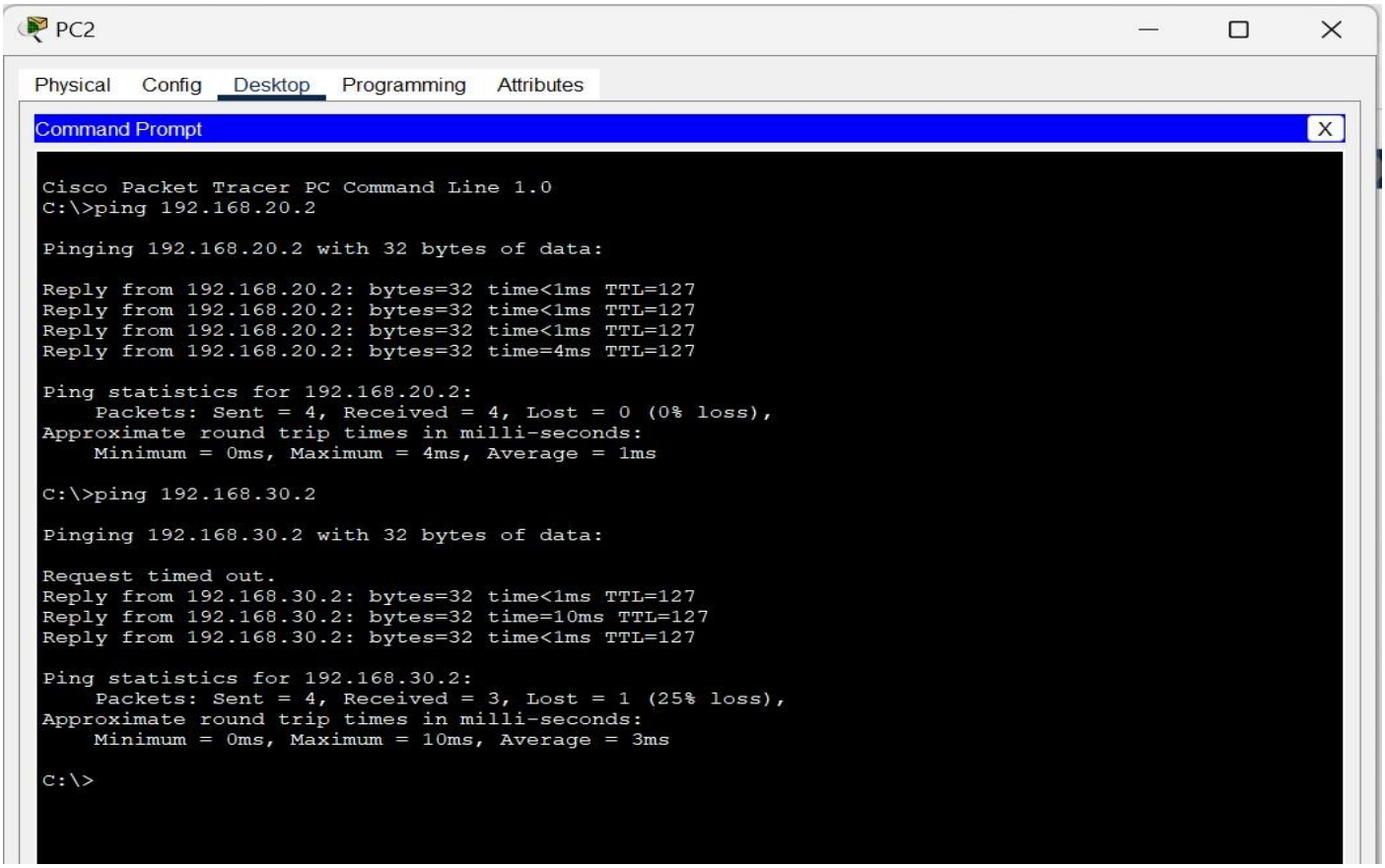
- Set up a wireless access point with SSID and WEP security for guest users.
- Test wireless connectivity by adding wireless PCs to the simulation.





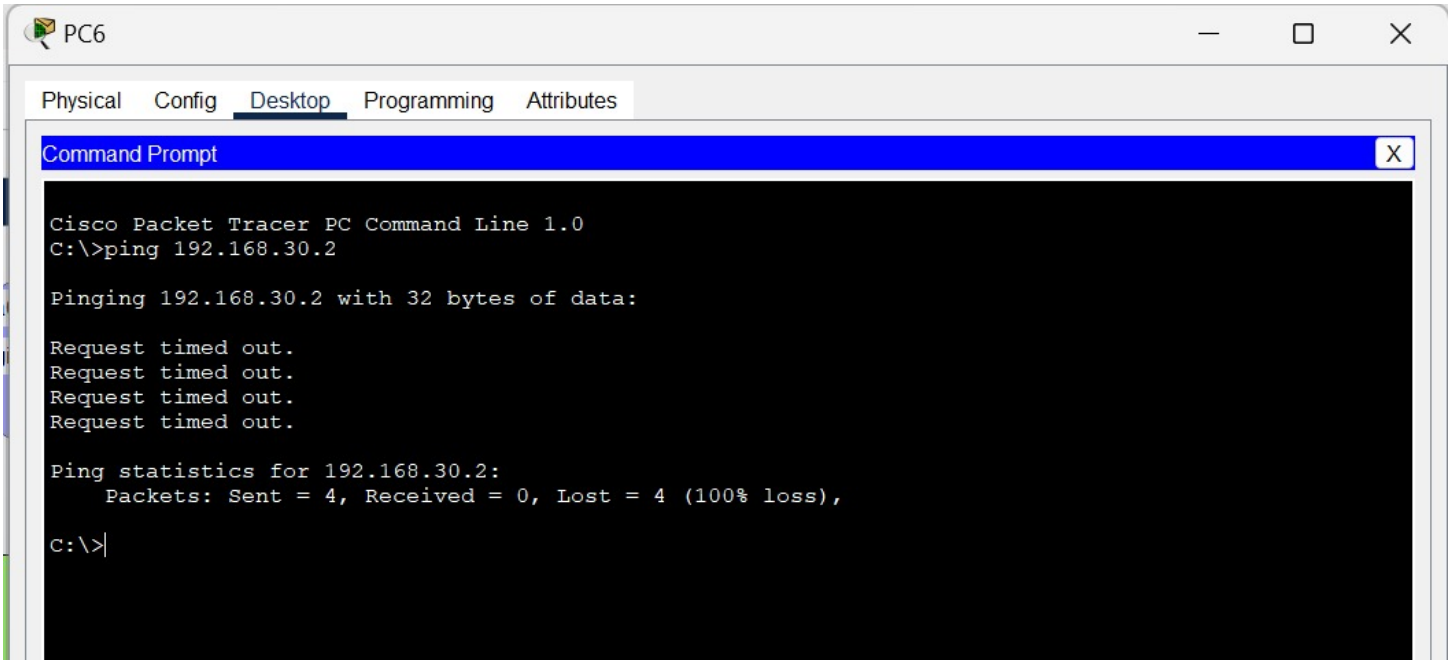

- **SCREENSHOTS ROUTING VERIFICATION USING THE PING COMMAND.**

## SALES TO HR AND IT



**- ACLS APPLIED AND FUNCTIONING AS EXPECTED.**

## HR CANNOT ACCESS IT




## SUMMARY

We have set up a network with three departments on separate VLANs (i.e: Sales, HR and IT) with inter-VLAN routing and have applied DHCP for dynamic IP assignment after that we have implemented guest Wi-Fi with WEP security and ACLs to restrict access between departments as required.