

**NetCraft: Building a Secure and Scalable Network**

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## **NetCraft: Building a Secure and Scalable Network**

This project focuses on the design and implementation of a secure, scalable, and well-structured enterprise network. The network is organized into four departments, each operating within its own subnet and connected through dedicated switches. All departmental networks are linked through a central router, enabling controlled inter-department communication and access to core network services.

### **Project Scope:**

- **Four departmental LANs:**
  - Administration (4 PCs)
  - Accounting (4 PCs)
  - IT Department (5 PCs)
  - HR Department (3 PCs)
- **Four switches** (one for each department)
- **One central router** for inter-network communication

### **Objectives:**

- Build a secure and scalable network topology that follows enterprise-level design standards
- Apply subnetting and VLAN segmentation to support future network growth
- Configure inter-VLAN routing to ensure full communication between departments
- Deploy essential network services, including DHCP, DNS, and a centralized file server

# 1. IP Addresses for All PCs Across Four Departments

This section documents the complete IP addressing scheme used in the network. Each department (HR, IT, Administration, and Accounting) has its own subnet, and each PC is assigned a unique static IP address, subnet mask, and default gateway. The purpose of this section is to ensure correct network segmentation and to verify that all devices in the enterprise network follow a consistent addressing plan.

## 1.1 HR Department (3 PCs)

PC no	IP Address	Subnet Mask	Default Gateway
PC0	192.168.1.2	255.255.255.0	192.168.1.1
PC1	192.168.1.3	255.255.255.0	192.168.1.1
PC2	192.168.1.4	255.255.255.0	192.168.1.1

## 1.2 IT Department (5 PCs)

PC no	IP Address	Subnet Mask	Default Gateway
PC3	192.168.2.2	255.255.255.0	192.168.2.1
PC4	192.168.2.3	255.255.255.0	192.168.2.1
PC5	192.168.2.4	255.255.255.0	192.168.2.1
PC6	192.168.2.5	255.255.255.0	192.168.2.1
PC7	192.168.2.6	255.255.255.0	192.168.2.1

## 1.3 Administration Department (4 PCs)

PC no	IP Address	Subnet Mask	Default Gateway
PC8	192.168.3.2	255.255.255.0	192.168.3.1
PC9	192.168.3.3	255.255.255.0	192.168.3.1
PC10	192.168.3.4	255.255.255.0	192.168.3.1
PC11	192.168.3.5	255.255.255.0	192.168.3.1

## 1.4 Accounting Department (4 PCs)

PC no	IP Address	Subnet Mask	Default Gateway
PC12	192.168.4.2	255.255.255.0	192.168.4.1

	PC no	IP Address	Subnet Mask	Default Gateway
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	PC13	192.168.4.3	255.255.255.0	192.168.4.1
--	------	-------------	---------------	-------------

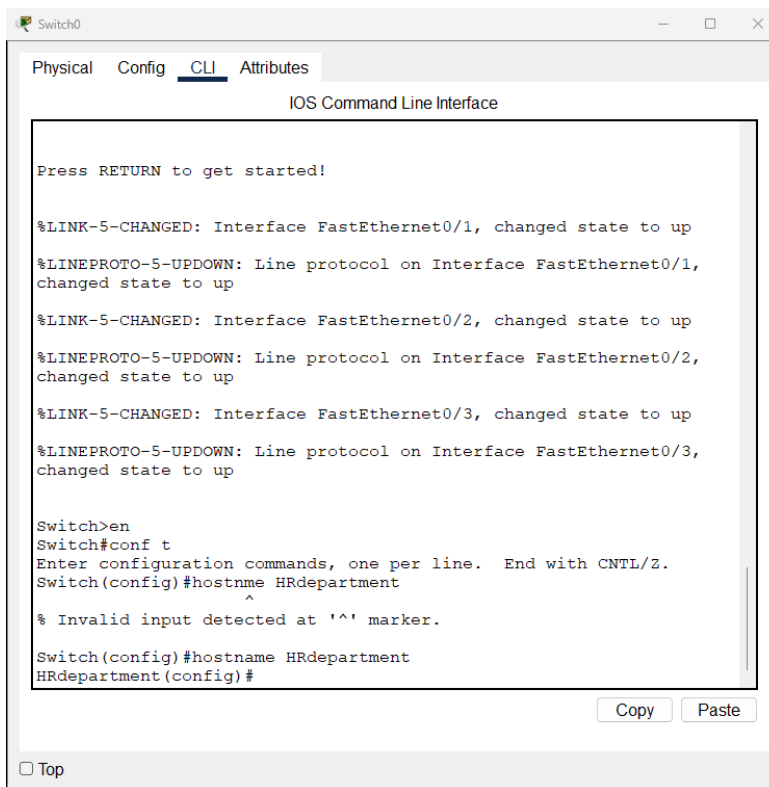
	PC14	192.168.4.4	255.255.255.0	192.168.4.1
--	------	-------------	---------------	-------------

	PC15	192.168.4.5	255.255.255.0	192.168.4.1
--	------	-------------	---------------	-------------

## 2. Change the Default Names of all Switches

This section explains how the default switch name was changed to a meaningful device name. Renaming the switch improves network organization, simplifies device identification, and aligns the switch with the HR department it serves. The new hostname helps administrators recognize the switch when managing configurations or troubleshooting.

### 2.1 Change the name from switch 0 to HRdepartment



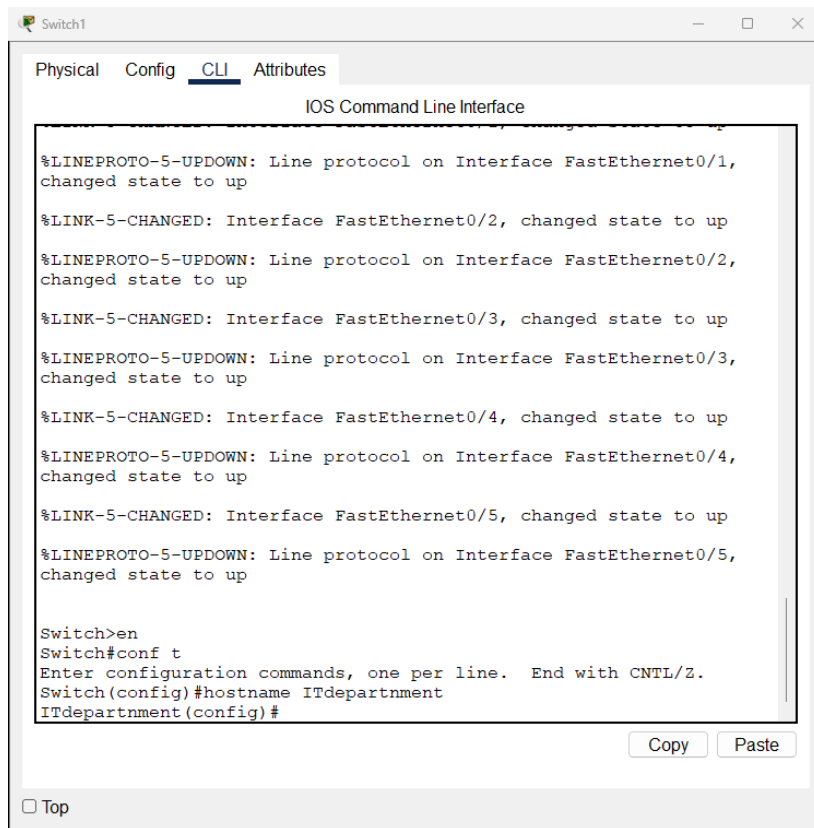
```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started!

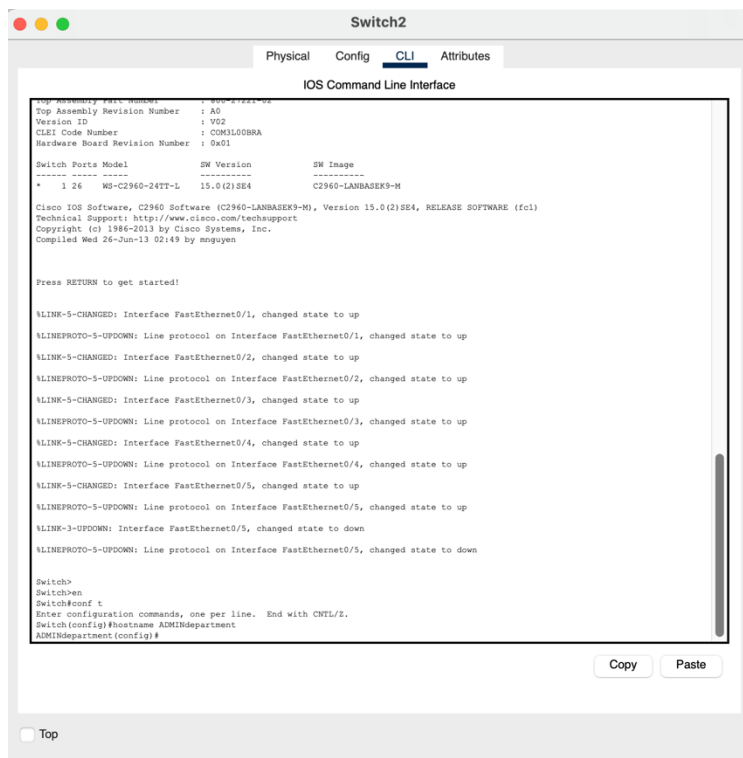
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to up

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname HRdepartment
Switch(config)#
% Invalid input detected at '^' marker.
Switch(config)#hostname HRdepartment
HRdepartment(config)#
```

### 2.2 Change the name from switch 1 to ITdepartment



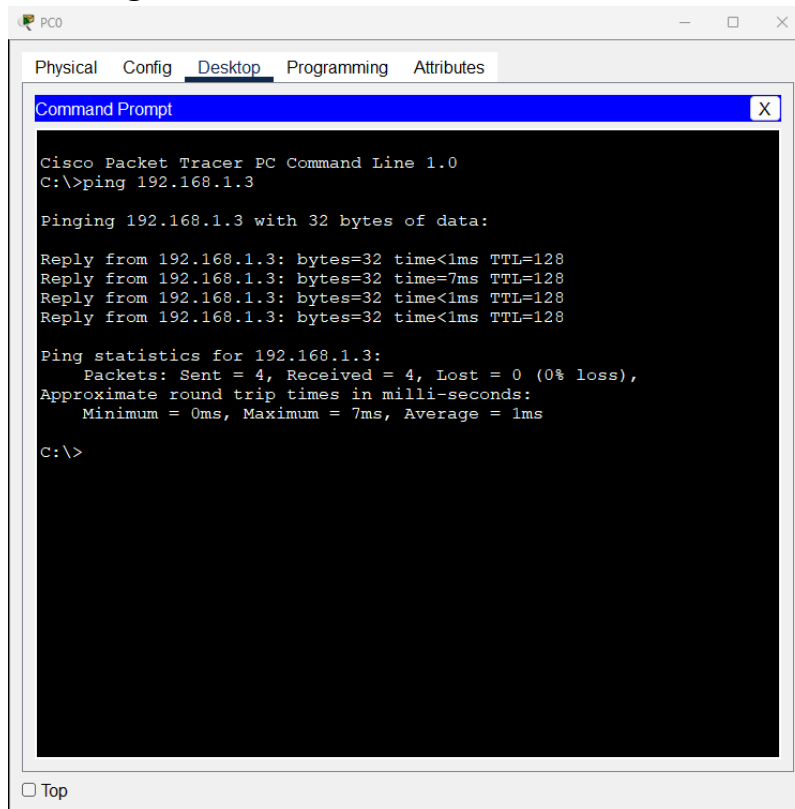
## 2.3 Change the name from switch 2 to ADMINdepartment



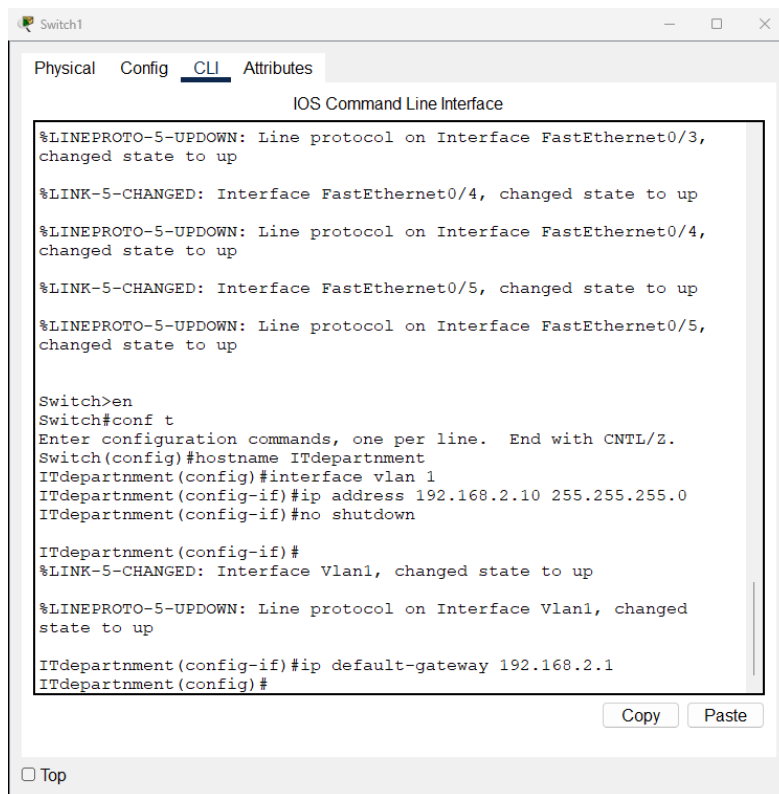
## 2.4 Change the name from switch 3 to ACCOUNTdepartment



### 3.1.1 Ping Command: Confirmation of Connection



## 3.2 ITdepartment Switch:



The screenshot shows the CLI window for a switch named 'Switch1'. The window has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' selected. The title bar says 'Switch1'. The main text area displays the following content:

```
IOS Command Line Interface

%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

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

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

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ITdepartment
ITdepartment(config)#interface vlan 1
ITdepartment(config-if)#ip address 192.168.2.10 255.255.255.0
ITdepartment(config-if)#no shutdown

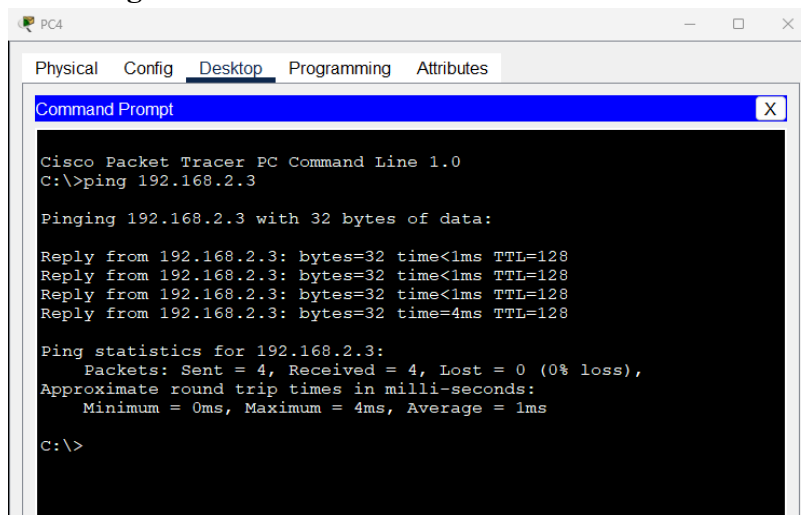
ITdepartment(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed
state to up

ITdepartment(config-if)#ip default-gateway 192.168.2.1
ITdepartment(config)#
```

At the bottom right of the text area are 'Copy' and 'Paste' buttons. At the bottom left is a 'Top' link.

### 3.2.1 Ping Command: Confirmation of Connection



The screenshot shows the 'Command Prompt' window for a PC named 'PC4'. The window has tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes', with 'Desktop' selected. The title bar says 'PC4'. The main text area displays the following content:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.3

Pinging 192.168.2.3 with 32 bytes of data:

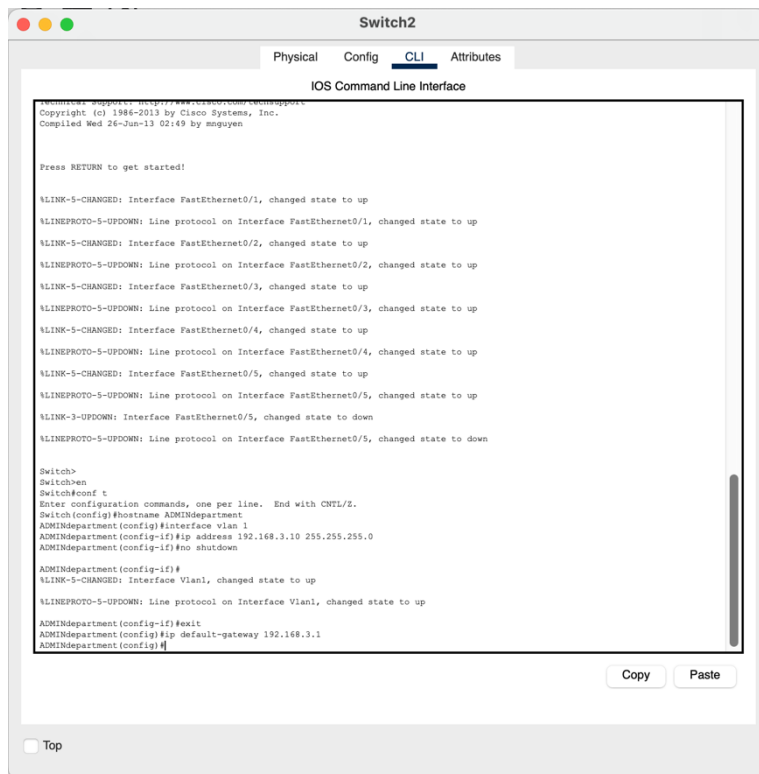
Reply from 192.168.2.3: bytes=32 time<1ms TTL=128
Reply from 192.168.2.3: bytes=32 time<1ms TTL=128
Reply from 192.168.2.3: bytes=32 time<1ms TTL=128
Reply from 192.168.2.3: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 4ms, Average = 1ms

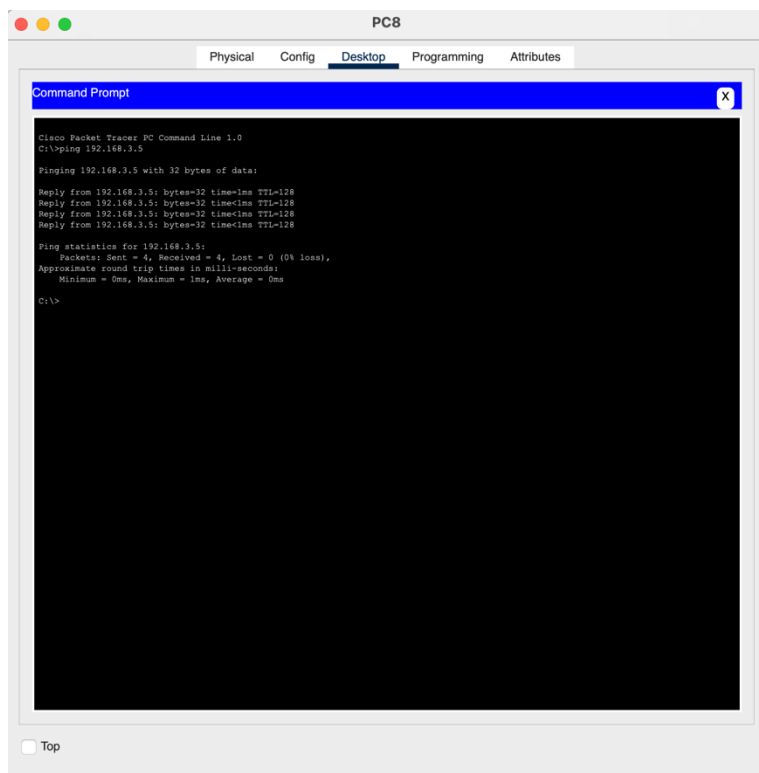
C:\>
```



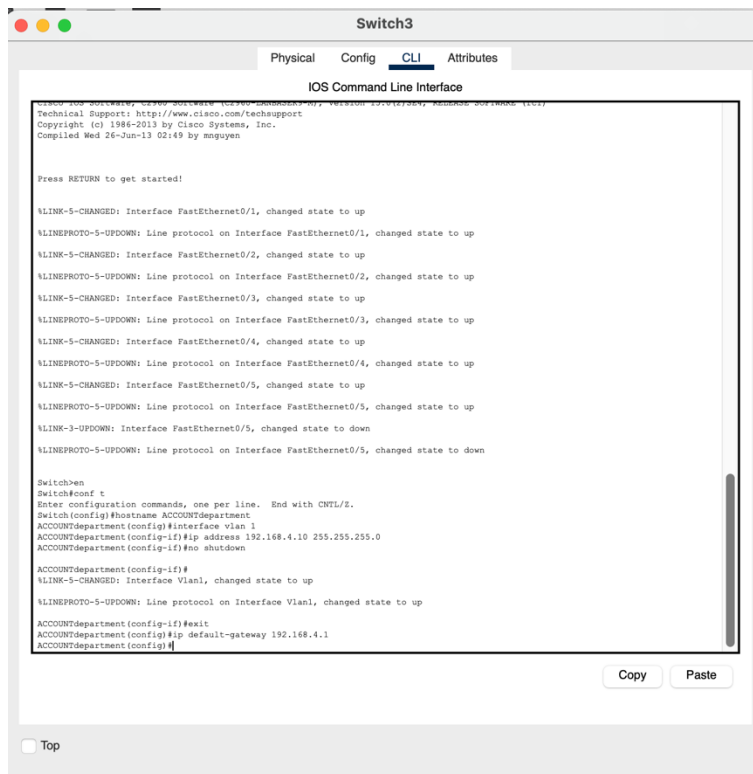
### 3.3 ADMINdepartment Switch:



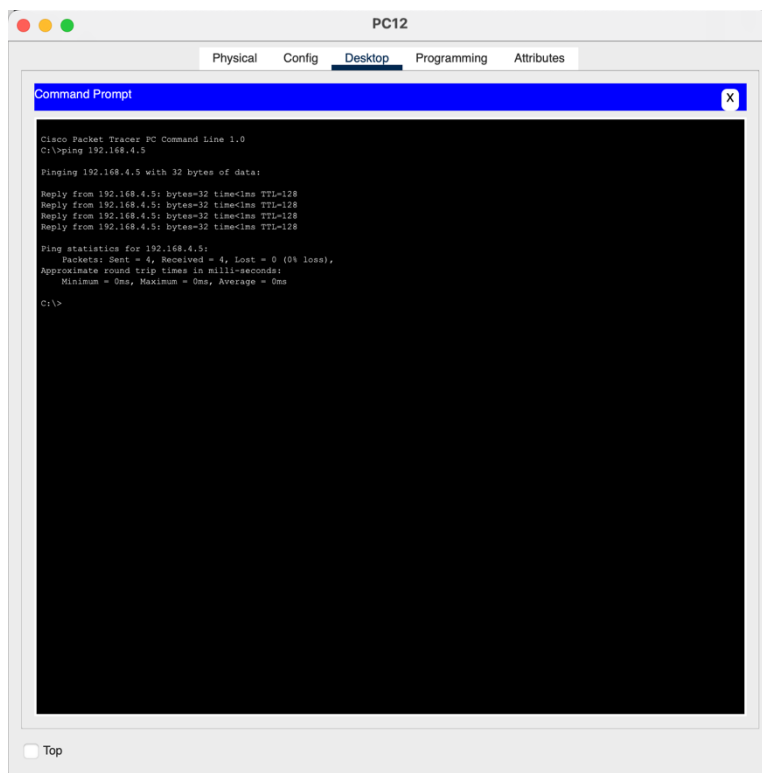
#### 3.3.1 Ping Command: Confirmation of Connection



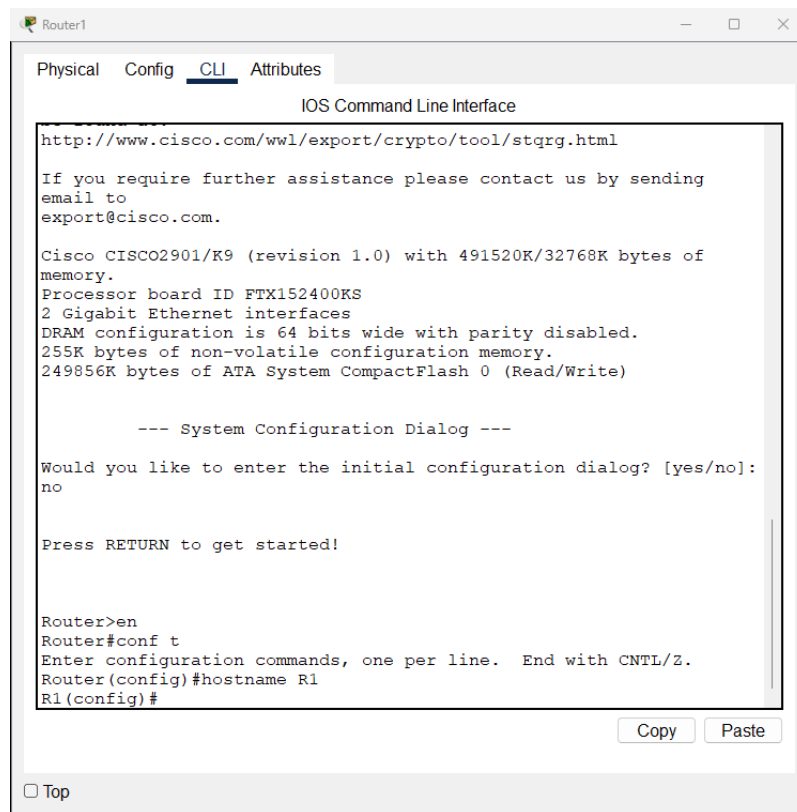
### 3.4 ACCOUNTdepartment Switch:



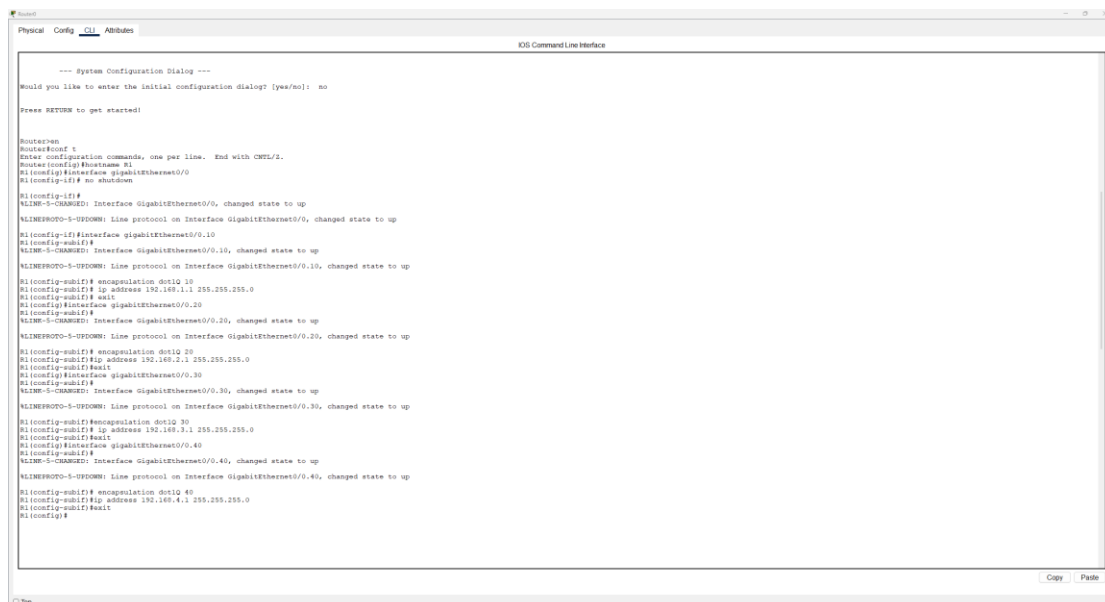
#### 3.4.1 Ping Command: Confirmation of Connection



## Changing the router name



## Router-on-a-Stick Configuration for Inter-VLAN Communication



## Core Switch VLAN Configuration

*The core switch is configured with multiple VLANs and trunk ports to support communication between different departments.*

```
Switch4
Physical Config CLI Attributes

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

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#hostname coreSwitch
coreSwitch(config)#vlan 10
coreSwitch(config-vlan)# name HR
coreSwitch(config-vlan)#vlan 20
coreSwitch(config-vlan)# name IT
coreSwitch(config-vlan)#vlan 30
coreSwitch(config-vlan)# name ADMIN
coreSwitch(config-vlan)#vlan 40
coreSwitch(config-vlan)#name ACCOUNT
coreSwitch(config-vlan)#interface fa0/1
coreSwitch(config-if)#switchport mode trunk

coreSwitch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

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

coreSwitch(config-if)#switchport trunk allowed vlan 10,20,30,40
coreSwitch(config-if)#exit
coreSwitch(config)#interface range fa0/2 - 5
coreSwitch(config-if-range)#switchport mode trunk

coreSwitch(config-if-range)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to down

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

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

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

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

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

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

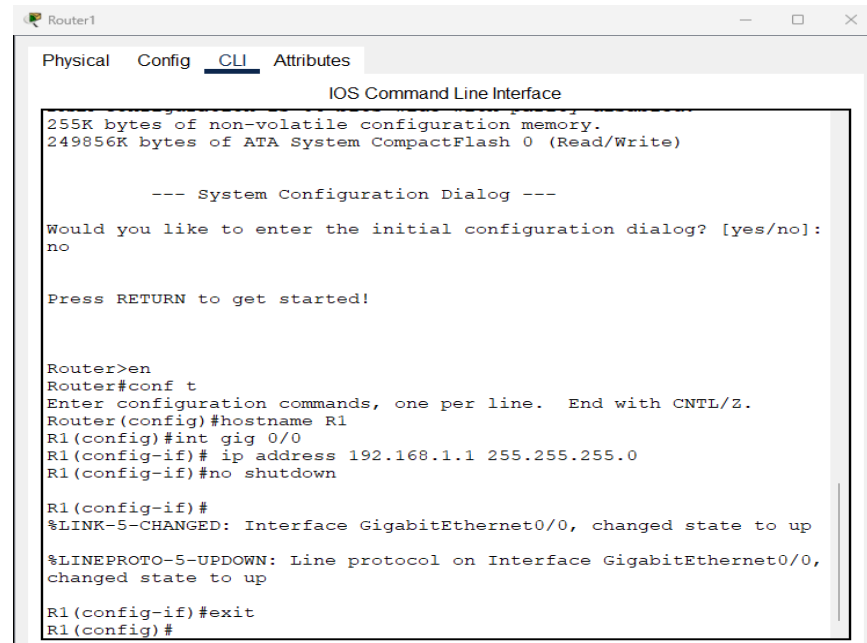
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up

coreSwitch(config-if-range)#switchport trunk allowed vlan 10,20,30,40
coreSwitch(config-if-range)#exit
coreSwitch(config)#

coreSwitch con0 is now available
```

## Configuring the first port (HR network)

HR Network: 192.168.1.0 /24



The screenshot shows the Router1 CLI interface with the 'CLI' tab selected. The interface displays the following text:

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]:
no

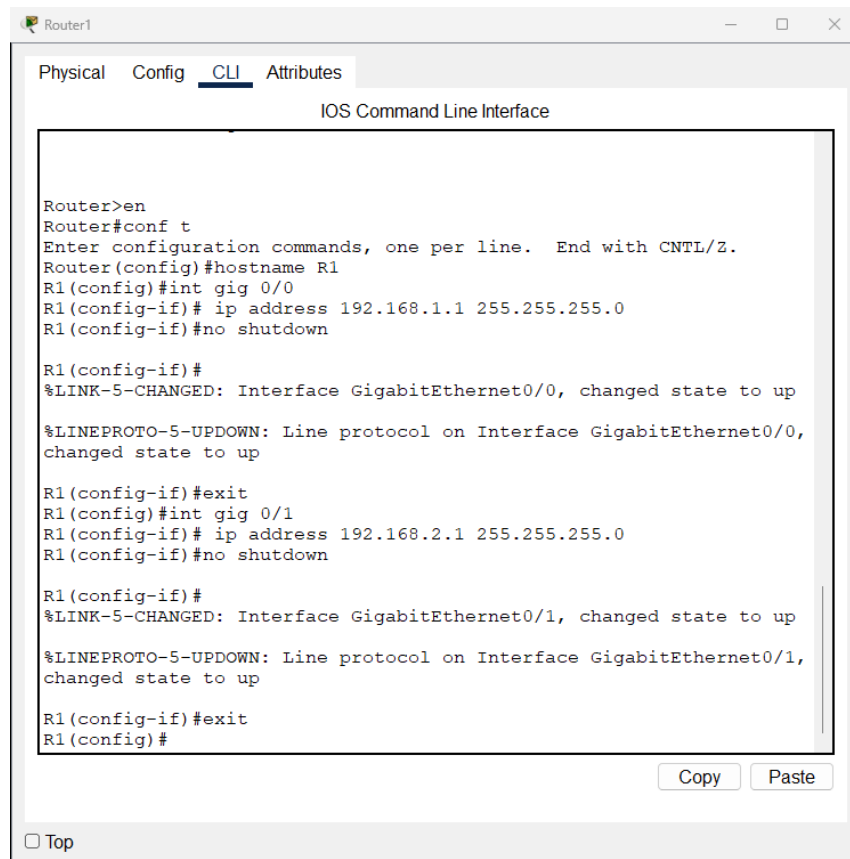
Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#int gig 0/0
R1(config-if)# ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up
R1(config-if)#exit
R1(config)#
```

## Configuring Port 2 (IT Network)

IT Network: 192.168.2.0/24



The screenshot shows the Router1 CLI interface with the 'CLI' tab selected. The interface displays the following text:

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#int gig 0/0
R1(config-if)# ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0,
changed state to up

R1(config-if)#exit
R1(config)#int gig 0/1
R1(config-if)# ip address 192.168.2.1 255.255.255.0
R1(config-if)#no shutdown

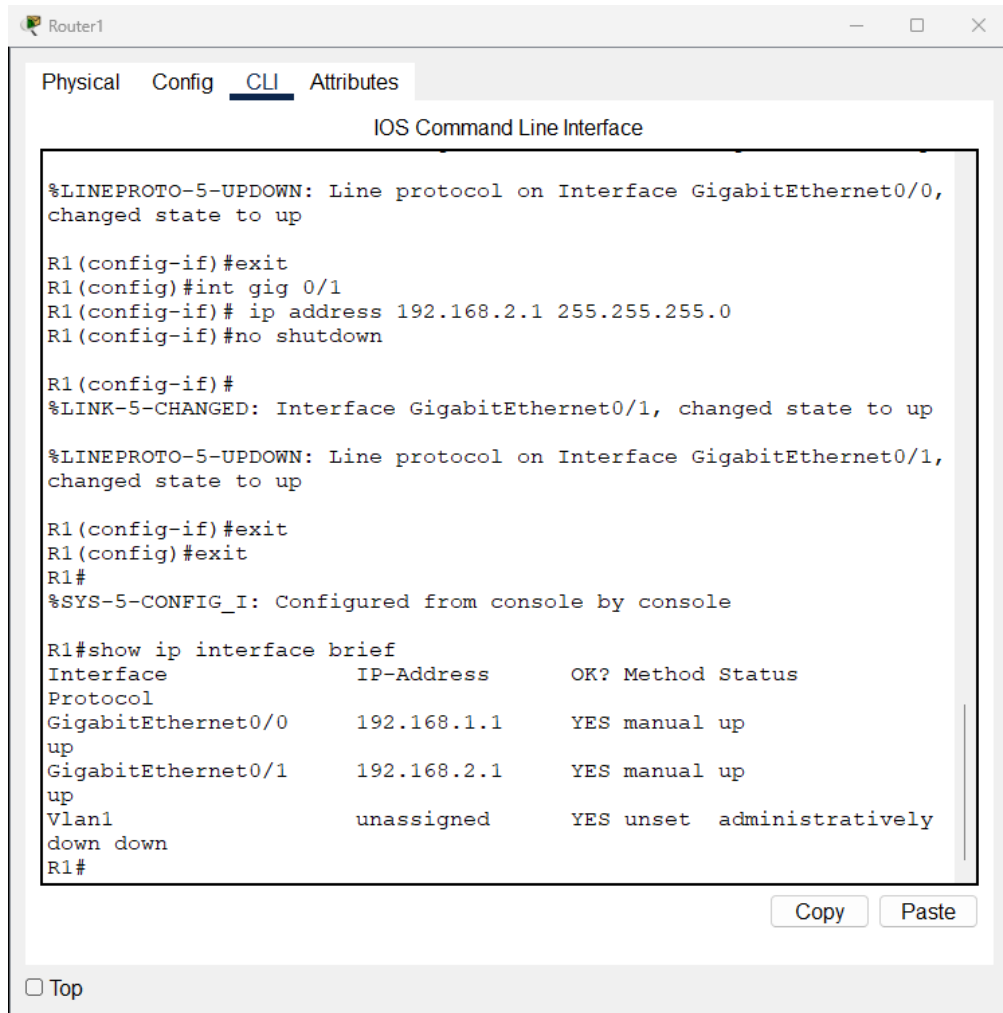
R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1,
changed state to up

R1(config-if)#exit
R1(config)#
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a 'Top' link.

Confirm that the ports are working.

R1# show ip interface brief



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

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

R1(config-if)#exit
R1(config)#int gig 0/1
R1(config-if)# ip address 192.168.2.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

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

R1(config-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
GigabitEthernet0/0  192.168.1.1     YES manual up
up
GigabitEthernet0/1  192.168.2.1     YES manual up
up
Vlan1               unassigned      YES unset  administratively
down down
R1#
```

Copy Paste

☐ Top

Ping the router from the router itself:

R1# ping 192.168.1.10 (This is the HR switch's IP address)

And R1# ping 192.168.2.10 (This is the IT switch)

```
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#show ip interface brief
Interface                IP-Address      OK? Method Status
Protocol
GigabitEthernet0/0       192.168.1.1     YES manual up
up
GigabitEthernet0/1       192.168.2.1     YES manual up
up
Vlan1                    unassigned      YES unset  administratively
down down
R1#ping 192.168.1.10

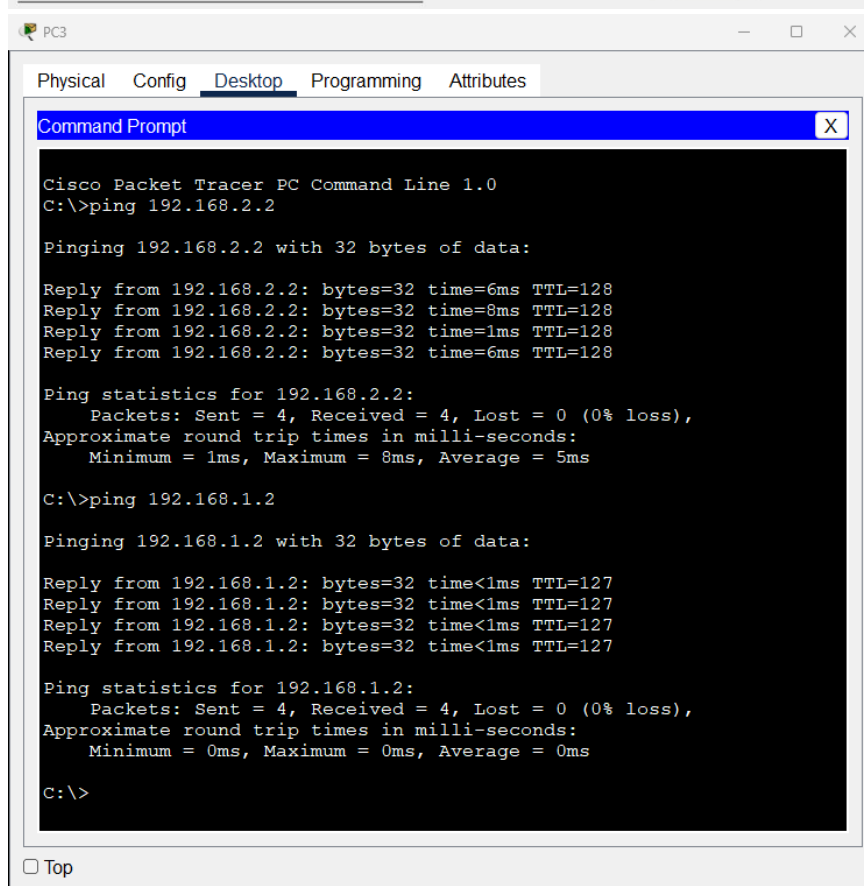
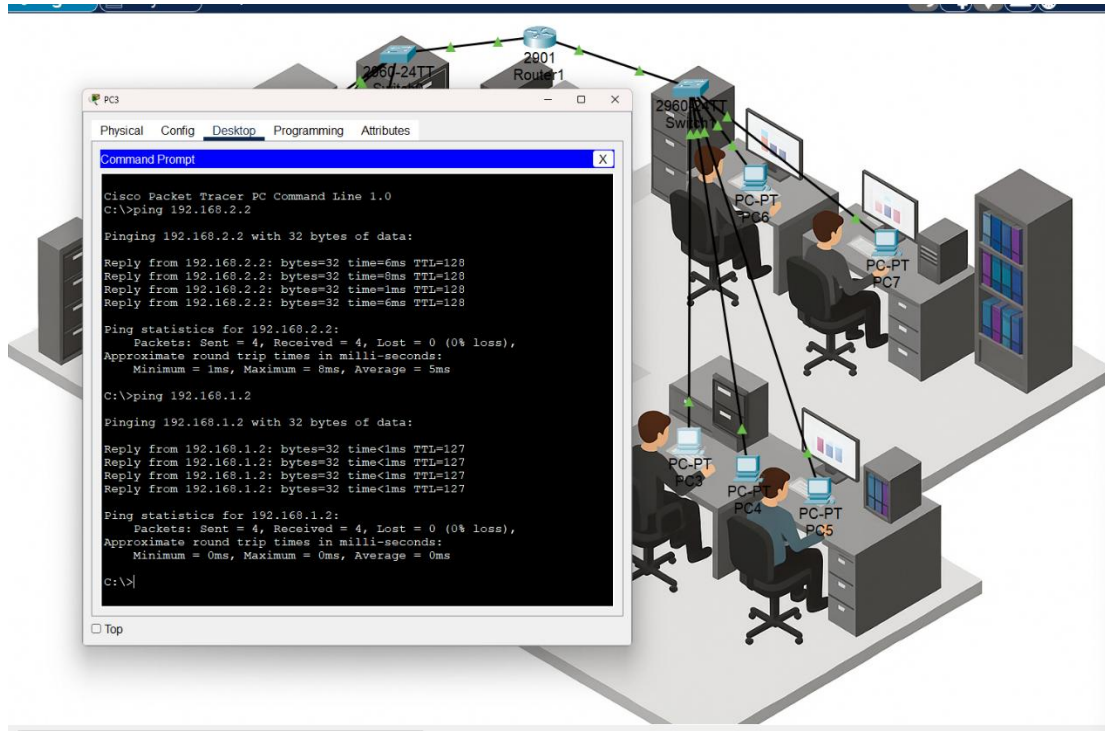
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.10, timeout is 2
seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 1/1/1 ms

R1#ping 192.168.2.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.10, timeout is 2
seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/1 ms

R1#
```

## Ping Test Between IT and HR Departments ping 192.168.1.2

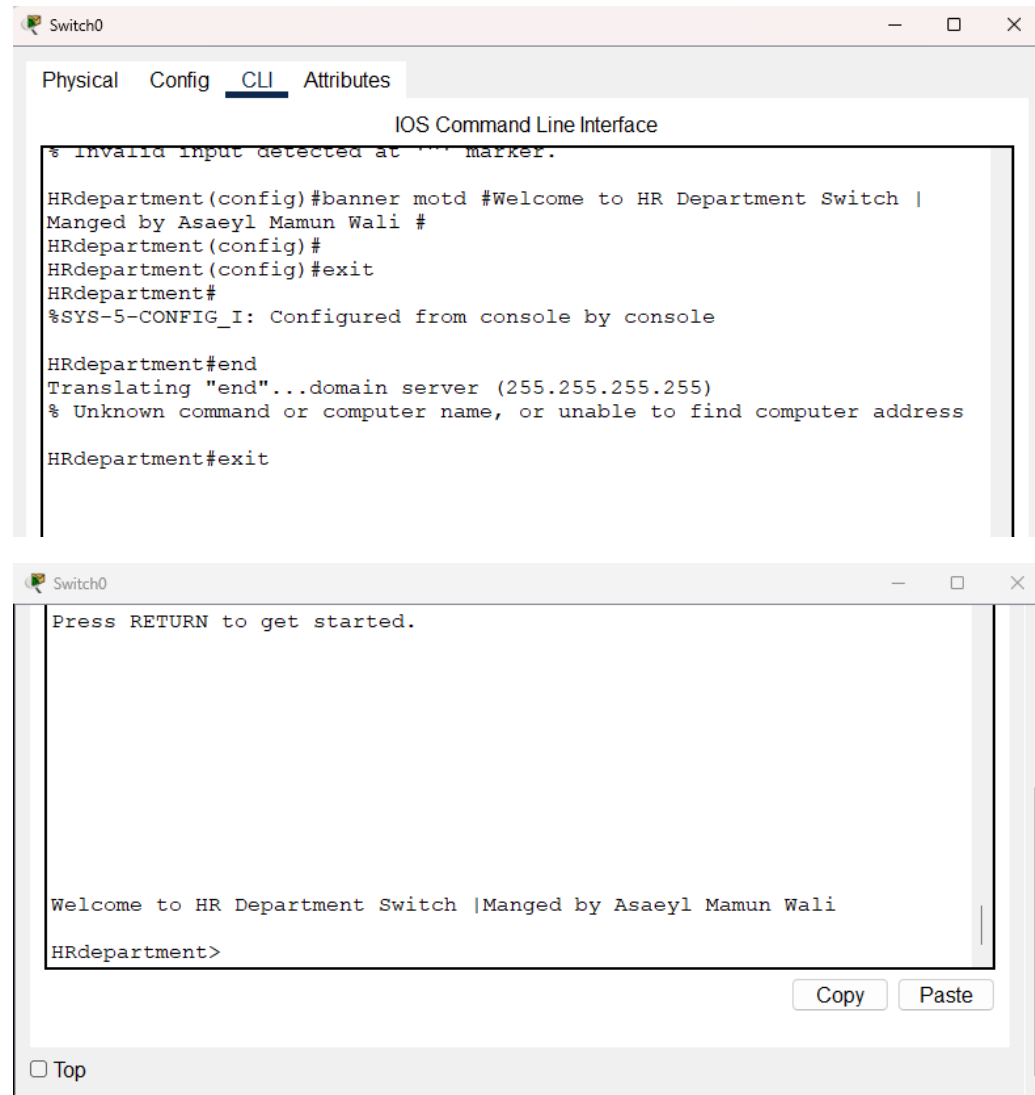




## 4. Message of the Day (MOTD)

The Message of the Day banner is a security feature displayed to anyone accessing the switch. This section includes the configuration of a MOTD banner that warns unauthorized users and reinforces network security policies. It ensures that anyone attempting to access the device is aware that only authorized personnel are allowed.

### 4.1 Message for HRdepartment Switch:



The image consists of two screenshots of a network switch's CLI interface, titled "Switch0".

The top screenshot shows the "CLI" tab selected. The prompt is "HRdepartment(config)#". The user enters the command "banner motd #Welcome to HR Department Switch | Manged by Asaeyl Mamun Wali #". The prompt changes to "HRdepartment(config)#", and the user enters "exit". The prompt returns to "HRdepartment#", and the user enters "end". The system displays "Translating 'end'...domain server (255.255.255.255)" and "% Unknown command or computer name, or unable to find computer address". Finally, the user enters "exit", and the prompt returns to "HRdepartment#".

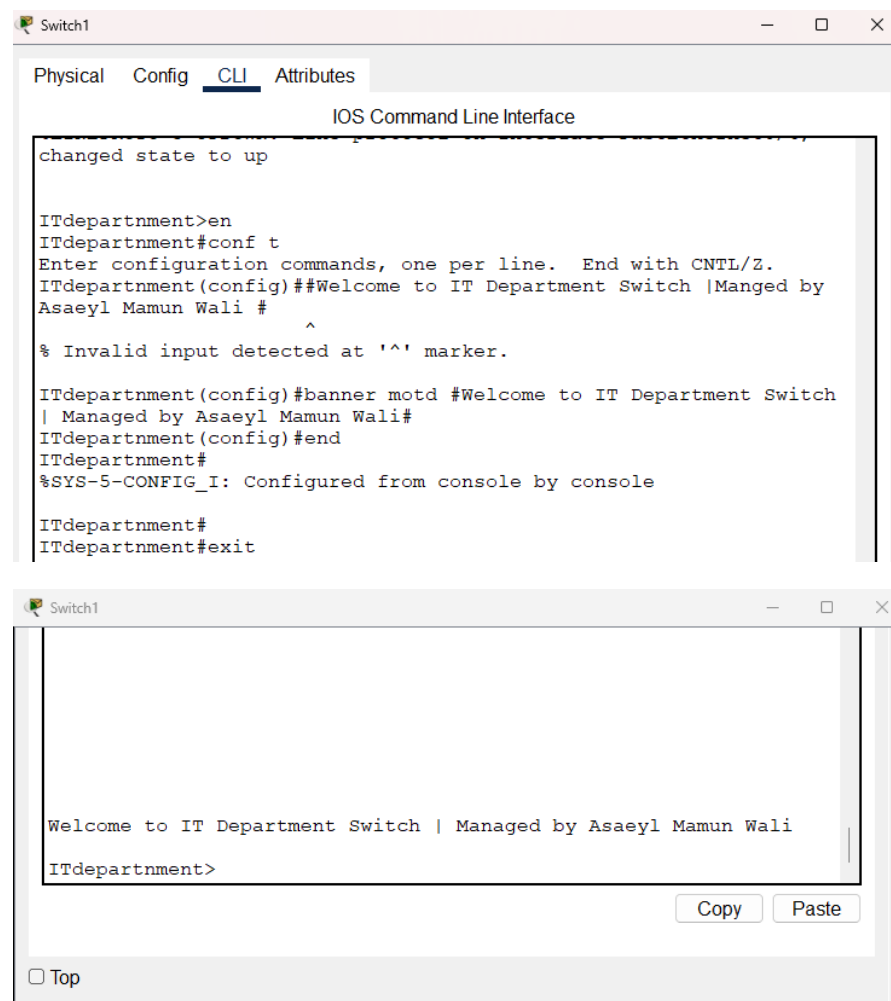
The bottom screenshot shows the same CLI interface after the configuration. The prompt is "HRdepartment>". The banner message is displayed: "Welcome to HR Department Switch |Manged by Asaeyl Mamun Wali". At the bottom of the window, there are "Copy" and "Paste" buttons, and a "Top" link.

```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface
% Invalid input detected at '^' marker.
HRdepartment(config)#banner motd #Welcome to HR Department Switch |
Manged by Asaeyl Mamun Wali #
HRdepartment(config)#
HRdepartment(config)#exit
HRdepartment#
%SYS-5-CONFIG_I: Configured from console by console
HRdepartment#end
Translating "end"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address
HRdepartment#exit

Switch0
Press RETURN to get started.

Welcome to HR Department Switch |Manged by Asaeyl Mamun Wali
HRdepartment>
```

## 4.2 Message for ITdepartment Switch:



The top screenshot shows the CLI interface of a switch named 'Switch1'. The 'CLI' tab is selected. The text 'changed state to up' is at the top. The user enters the following commands:

```
ITdepartment>en
ITdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ITdepartment(config)##Welcome to IT Department Switch |Manged by
Asaeyl Mamun Wali #
      ^
% Invalid input detected at '^' marker.

ITdepartment(config)#banner motd #Welcome to IT Department Switch
| Managed by Asaeyl Mamun Wali#
ITdepartment(config)#end
ITdepartment#
%SYS-5-CONFIG_I: Configured from console by console

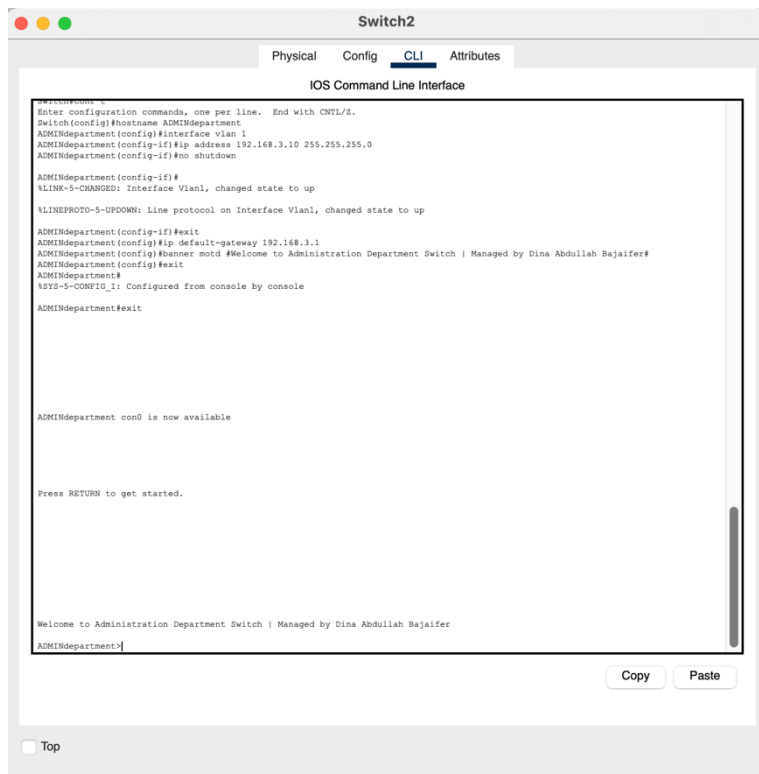
ITdepartment#
ITdepartment#exit
```

The bottom screenshot shows the same CLI interface. The banner message is now displayed on the console:

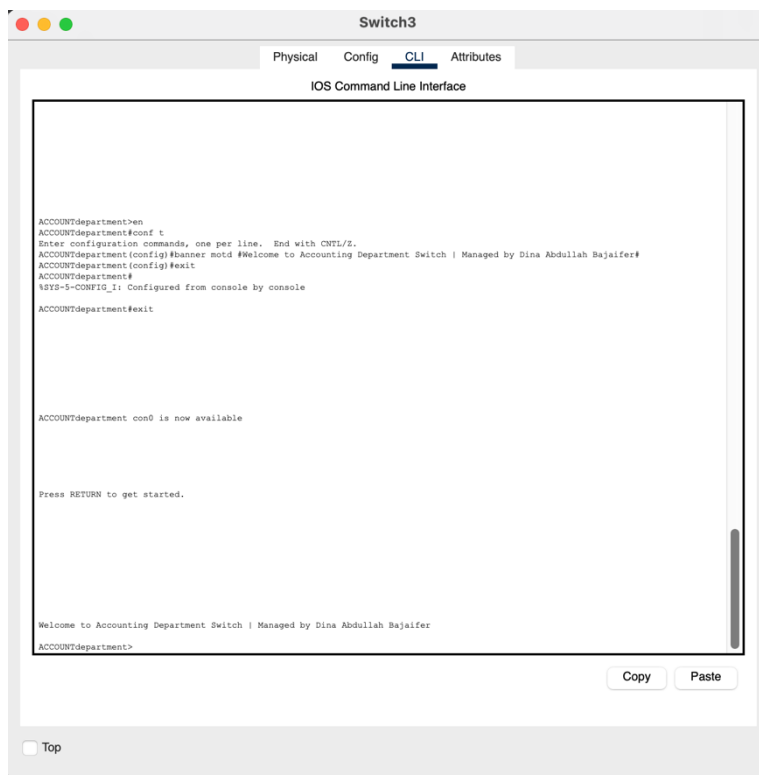
```
Welcome to IT Department Switch | Managed by Asaeyl Mamun Wali
ITdepartment>
```

At the bottom of the window, there are 'Copy' and 'Paste' buttons, and a 'Top' link.

### 4.3 Message for ADMINdepartment Switch:



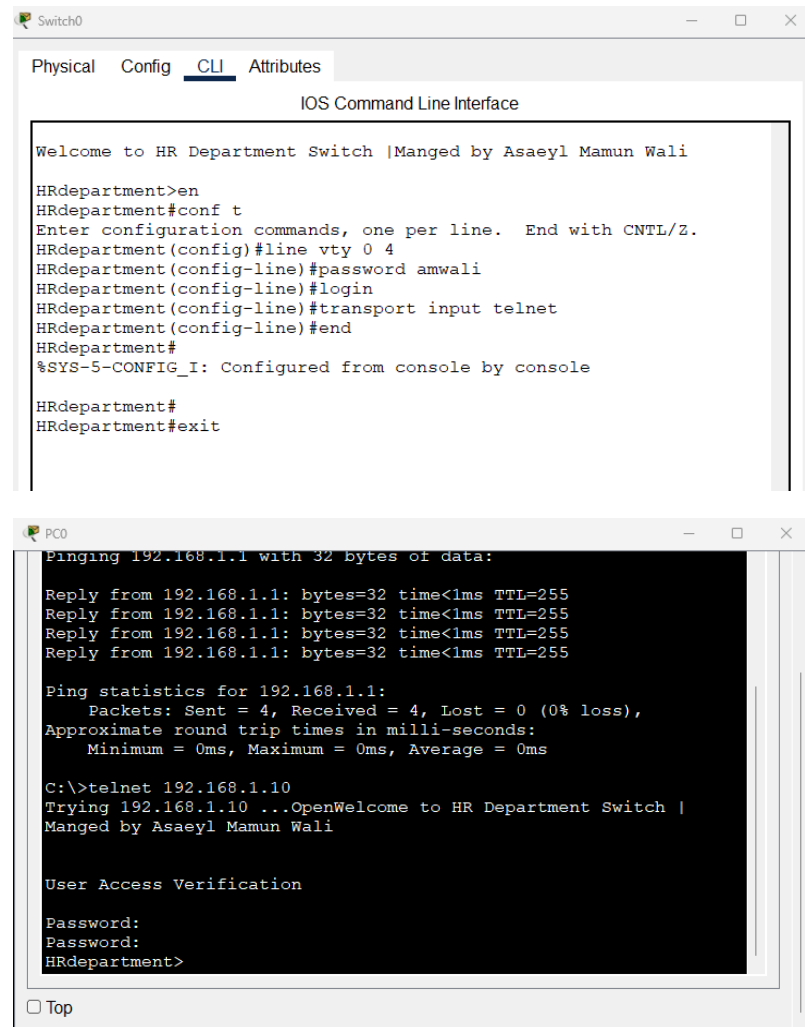
#### 4.4 Message for ACCOUNTdepartment Switch:



## 5.Remote Access to the Switch from a PC (Telnet)

This section documents how remote access was configured so administrators can manage the switch using Telnet. It explains the steps required to enable vty lines, set login credentials, and verify connectivity from a PC. Remote access allows management without needing physical console cables.

### 5.1 HRdepartment Switch:



The first screenshot shows the CLI of a switch named 'Switch0'. The user is in the configuration mode and has entered the following commands: 'en' to enter enable mode, 'conf t' to enter configuration mode, 'line vty 0 4' to configure the vty lines, 'password amwali' to set the password, 'login' to enable login, 'transport input telnet' to enable Telnet access, and 'end' to exit configuration mode. The switch has confirmed the configuration with the message '%SYS-5-CONFIG\_I: Configured from console by console'. The user has then entered 'exit' to return to the user EXEC mode.

```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface

Welcome to HR Department Switch |Manged by Asaeyl Mamun Wali

HRdepartment>en
HRdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
HRdepartment(config)#line vty 0 4
HRdepartment(config-line)#password amwali
HRdepartment(config-line)#login
HRdepartment(config-line)#transport input telnet
HRdepartment(config-line)#end
HRdepartment#
%SYS-5-CONFIG_I: Configured from console by console

HRdepartment#
HRdepartment#exit
```

The second screenshot shows a PC terminal window. The user has pinged the switch at 192.168.1.1, and the results show 100% success. Then, the user has initiated a Telnet session to the switch. The switch has responded with the welcome message and is now prompting for the password.

```
PC0
Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

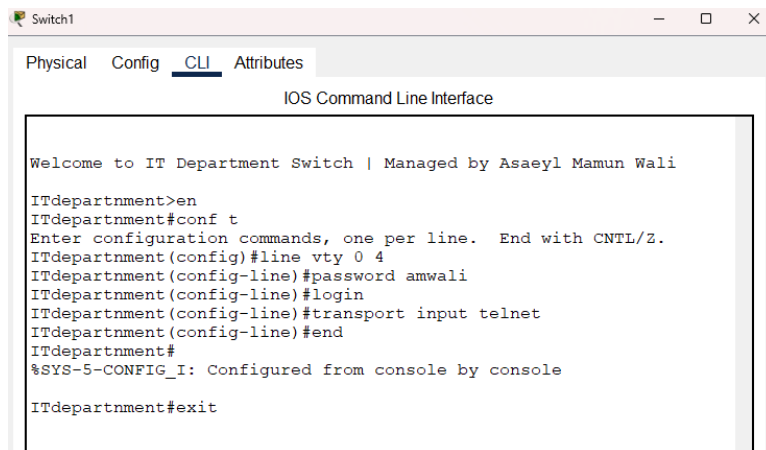
Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>telnet 192.168.1.10
Trying 192.168.1.10 ...OpenWelcome to HR Department Switch |
Manged by Asaeyl Mamun Wali

User Access Verification

Password:
Password:
HRdepartment>
```

## 5.2 ITdepartment Switch

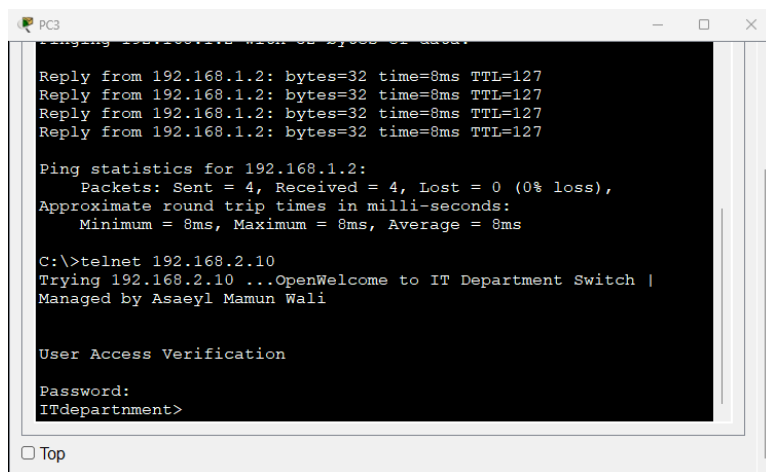


```
Switch1
Physical Config CLI Attributes
IOS Command Line Interface

Welcome to IT Department Switch | Managed by Asaeyl Mamun Wali

ITdepartment>en
ITdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ITdepartment(config)#line vty 0 4
ITdepartment(config-line)#password amwali
ITdepartment(config-line)#login
ITdepartment(config-line)#transport input telnet
ITdepartment(config-line)#end
ITdepartment#
%SYS-5-CONFIG_I: Configured from console by console

ITdepartment#exit
```



```
PC3
Reply from 192.168.1.2: bytes=32 time=8ms TTL=127
Reply from 192.168.1.2: bytes=32 time=8ms TTL=127
Reply from 192.168.1.2: bytes=32 time=8ms TTL=127
Reply from 192.168.1.2: bytes=32 time=8ms TTL=127

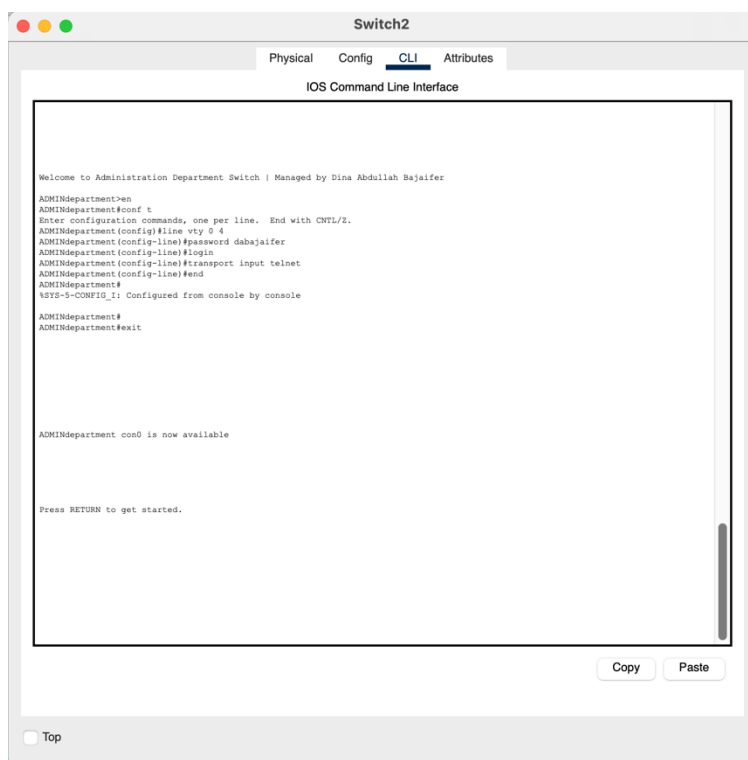
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 8ms, Average = 8ms

C:\>telnet 192.168.2.10
Trying 192.168.2.10 ...OpenWelcome to IT Department Switch |
Managed by Asaeyl Mamun Wali

User Access Verification

Password:
ITdepartment>
```

## 5.3 ADMINdepartment Switch:



```
Switch2
Physical Config CLI Attributes
IOS Command Line Interface

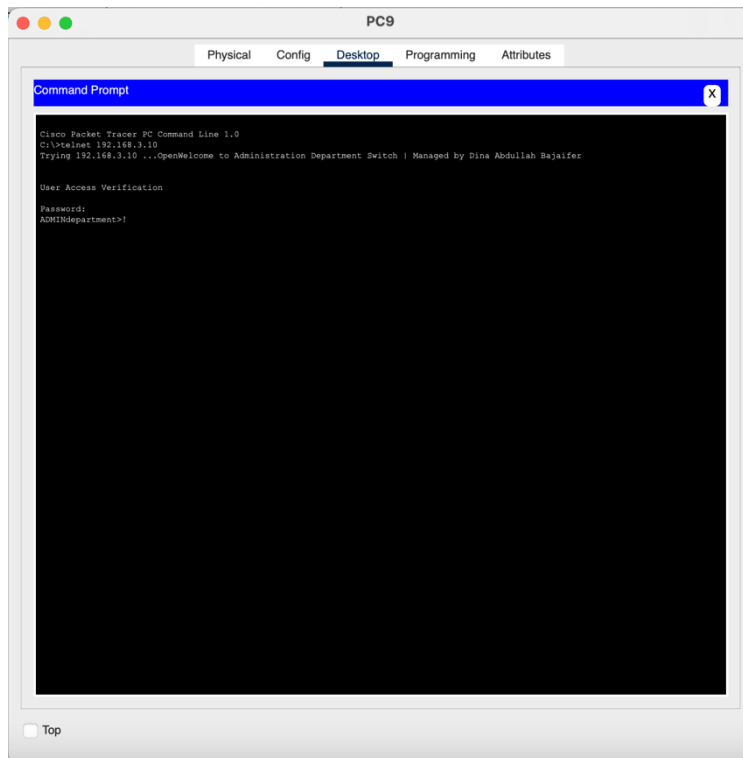
Welcome to Administration Department Switch | Managed by Dina Abdullah Bajaifer

ADMINdepartment>en
ADMINdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ADMINdepartment(config)#line vty 0 4
ADMINdepartment(config-line)#password dabajaifer
ADMINdepartment(config-line)#login
ADMINdepartment(config-line)#transport input telnet
ADMINdepartment(config-line)#end
ADMINdepartment#
%SYS-5-CONFIG_I: Configured from console by console

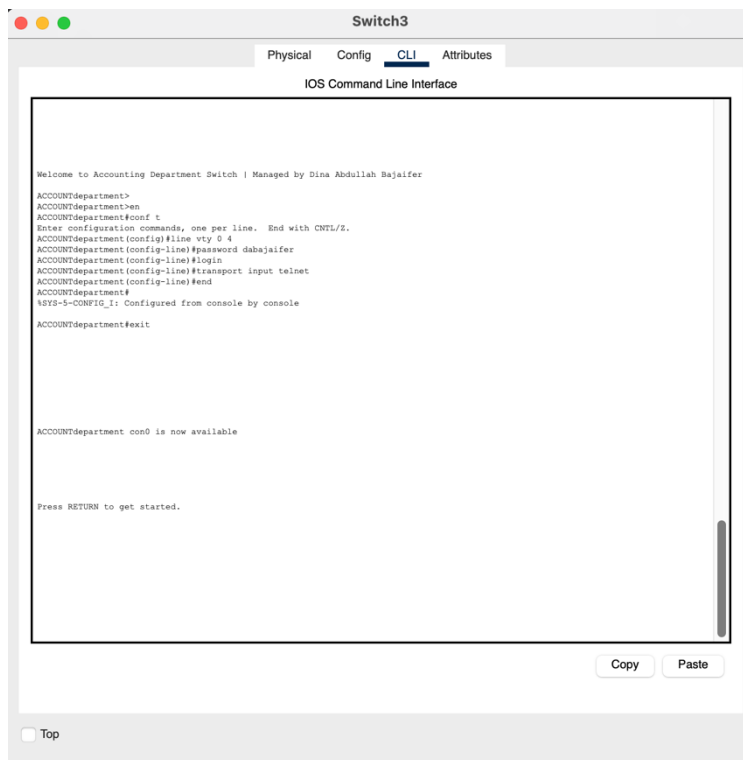
ADMINdepartment#
ADMINdepartment#exit

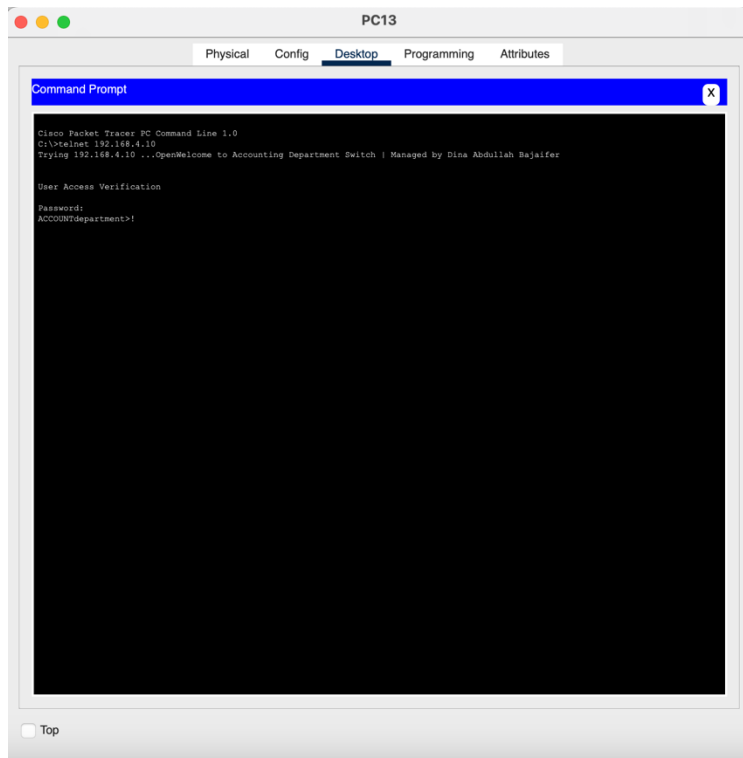
ADMINdepartment con0 is now available

Press RETURN to get started.
```



## 5.4 ACCOUNTdepartment switch:

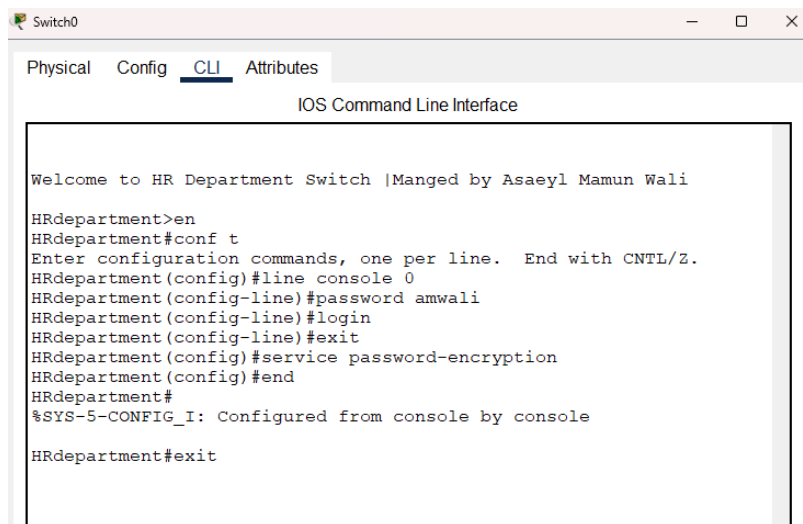


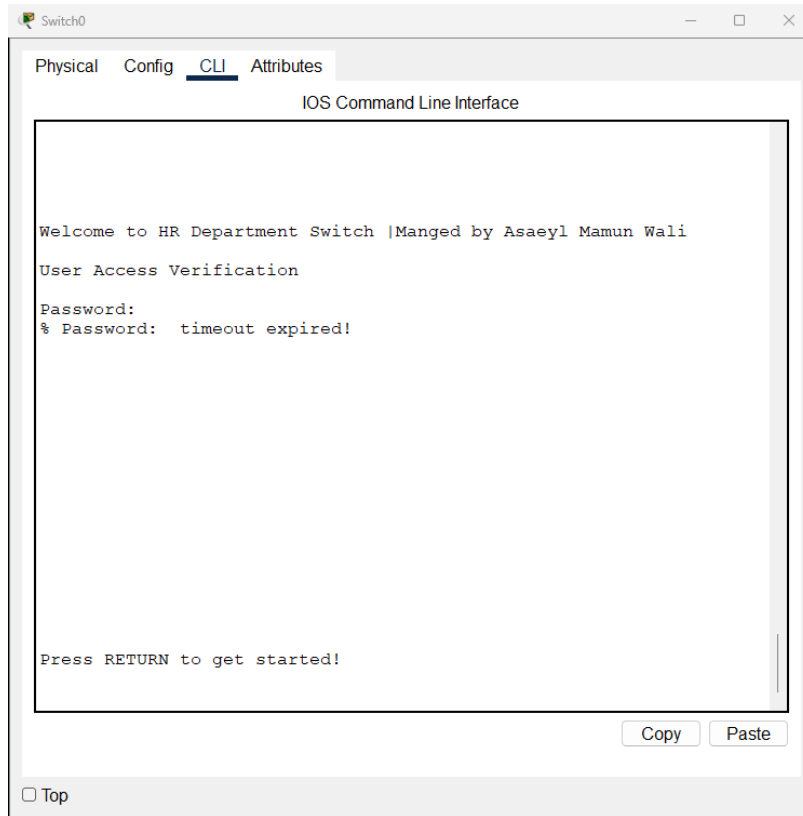


## 6. Set a Password for the Console

This part describes how a console password was added to secure physical access to the switch. Setting a console password prevents unauthorized users from configuring the device if they connect directly to it. This step is a fundamental part of applying basic device security.

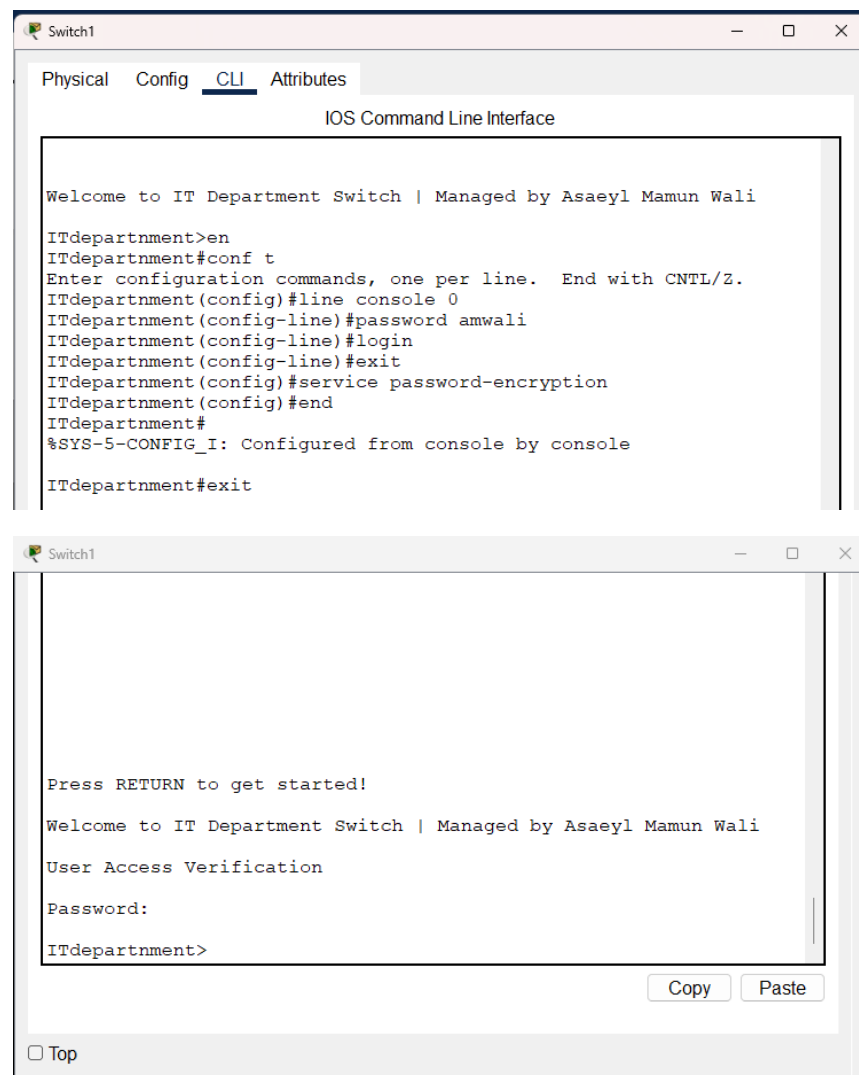
### 6.1 HRdepartment Switch:



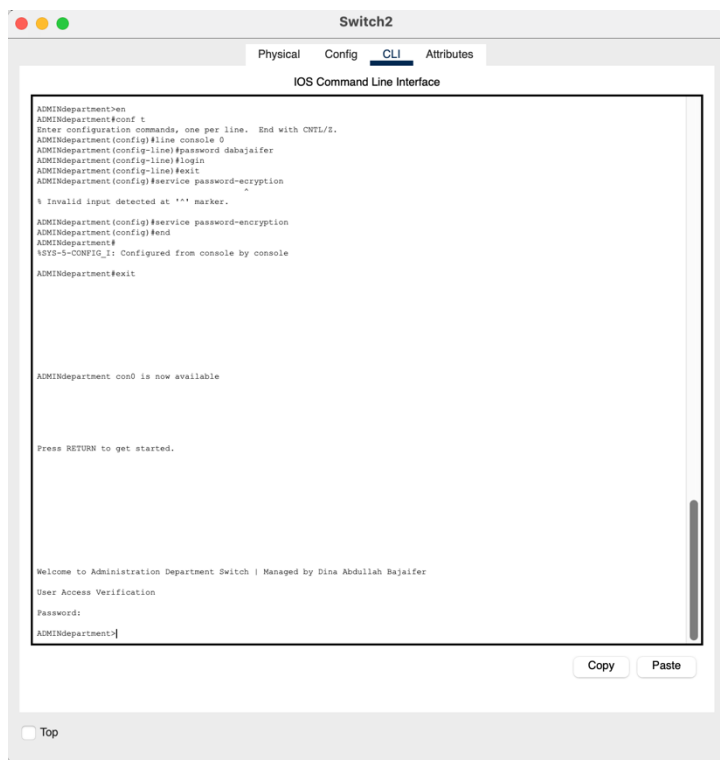




## 6.2 ITdepartment Switch



## 6.3 ADMINdepartment Switch:

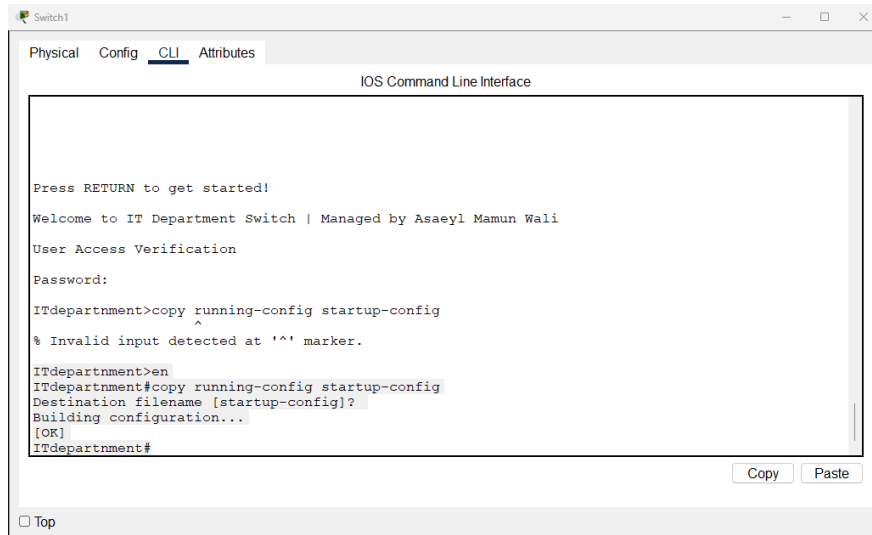


## 6.4 ACCOUNTdepartment switch:



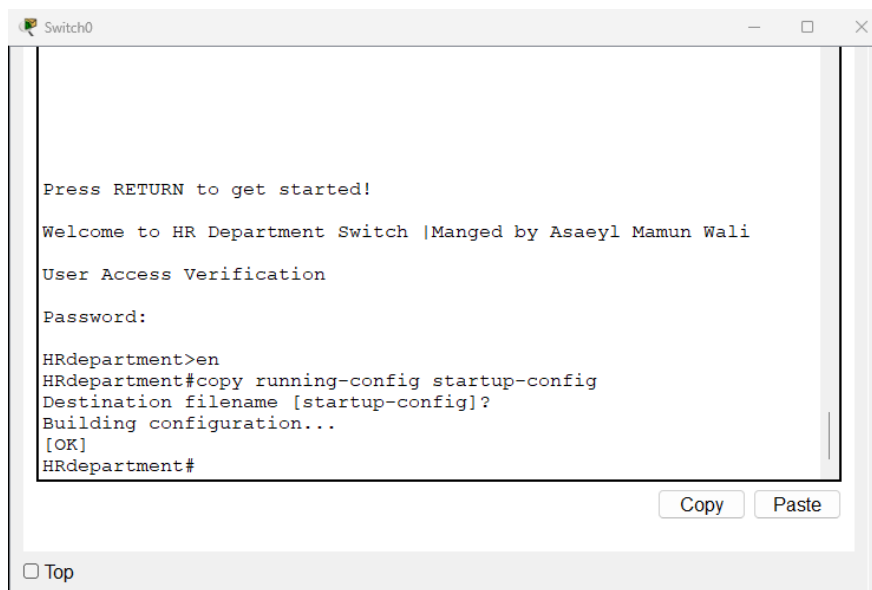
## 7. Save Settings

This section explains how all device configurations were saved to the startup configuration file. Saving ensures that all settings (hostname, IP management, passwords, MOTD, and Telnet configurations) remain active even after the switch or router restarts.



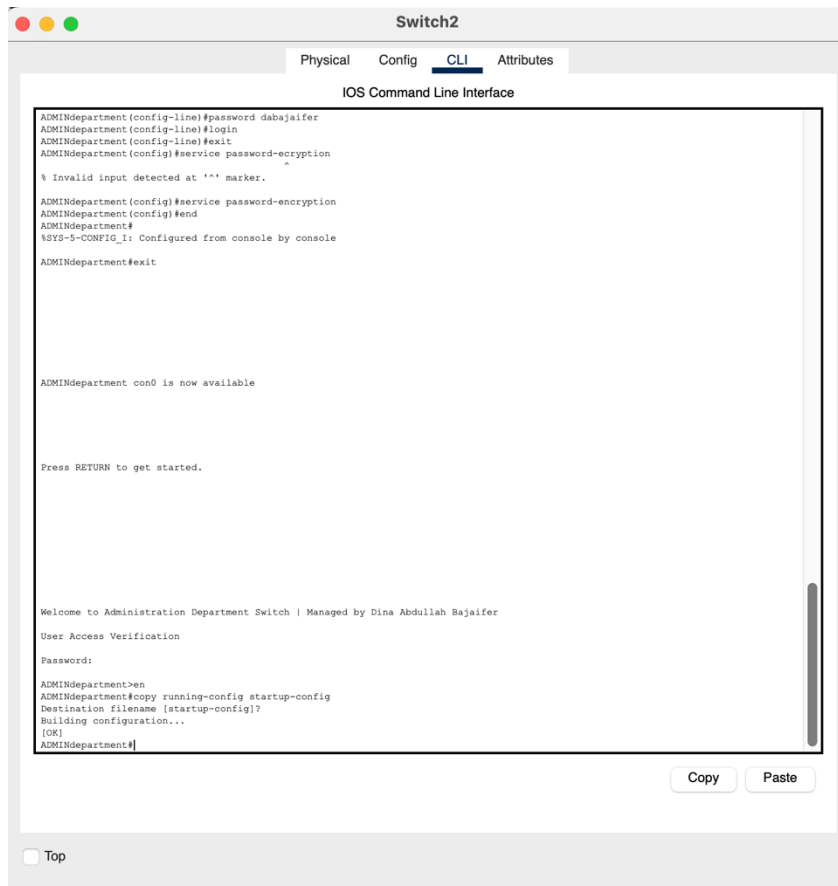
```
Switch1
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started!
Welcome to IT Department Switch | Managed by Asaeyl Mamun Wali
User Access Verification
Password:
ITdepartment>copy running-config startup-config
% Invalid input detected at '^' marker.
ITdepartment>en
ITdepartment#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ITdepartment#
```



```
Switch0

Press RETURN to get started!
Welcome to HR Department Switch |Manged by Asaeyl Mamun Wali
User Access Verification
Password:
HRdepartment>en
HRdepartment#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
HRdepartment#
```



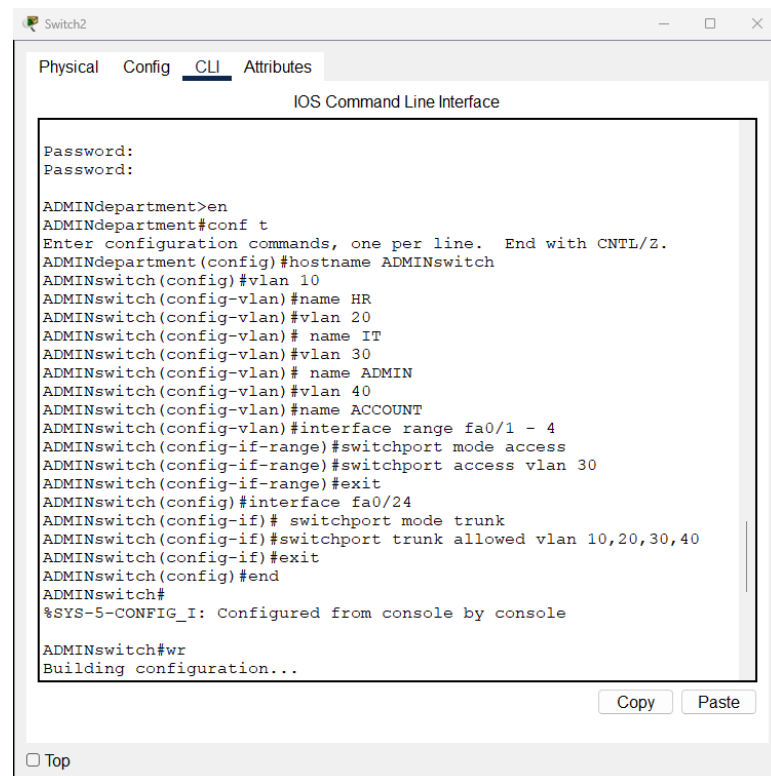
## VLAN Configuration on the Core Switch

: This screenshot shows the configuration of multiple VLANs (HR, IT, ADMIN, ACCOUNT) on the core switch, including assigning VLAN names and configuring trunk ports to allow inter-VLAN communication across the network.

```
Password:

ACCOUNTdepartment>en
ACCOUNTdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ACCOUNTdepartment(config)#hostname ACCOUNTswitch
ACCOUNTswitch(config)#vlan 10
ACCOUNTswitch(config-vlan)# name HR
ACCOUNTswitch(config-vlan)#vlan 20
ACCOUNTswitch(config-vlan)# name IT
ACCOUNTswitch(config-vlan)#vlan 30
ACCOUNTswitch(config-vlan)# name ADMIN
ACCOUNTswitch(config-vlan)#vlan 40
ACCOUNTswitch(config-vlan)#name ACCOUNT
ACCOUNTswitch(config-vlan)#interface range fa0/1 - 4
ACCOUNTswitch(config-if-range)#switchport mode access
ACCOUNTswitch(config-if-range)#switchport access vlan 40
ACCOUNTswitch(config-if-range)#exit
ACCOUNTswitch(config)#interface fa0/24
ACCOUNTswitch(config-if)# switchport mode trunk
ACCOUNTswitch(config-if)#switchport trunk allowed vlan 10,20,30,40
ACCOUNTswitch(config-if)#exit
ACCOUNTswitch(config)#end
ACCOUNTswitch#
%SYS-5-CONFIG_I: Configured from console by console

ACCOUNTswitch#wr
Building configuration...
[OK]
ACCOUNTswitch#
```



Switch0

Physical Config CLI Attributes

IOS Command Line Interface

changed state to up

Password:

HRdepartment>en

HRdepartment#conf t

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

HRdepartment(config)#hostname HRswitch

HRswitch(config)#vlan 10

HRswitch(config-vlan)# name HR

HRswitch(config-vlan)#vlan 20

HRswitch(config-vlan)#vlan 30

HRswitch(config-vlan)#vlan 40

HRswitch(config-vlan)#interface range fa0/1 - 3

HRswitch(config-if-range)# switchport mode access

HRswitch(config-if-range)#switchport access vlan 10

HRswitch(config-if-range)#exit

HRswitch(config)#interface fa0/24

HRswitch(config-if)#switchport mode trunk

HRswitch(config-if)#switchport trunk allowed vlan 10,20,30,40

HRswitch(config-if)#exit

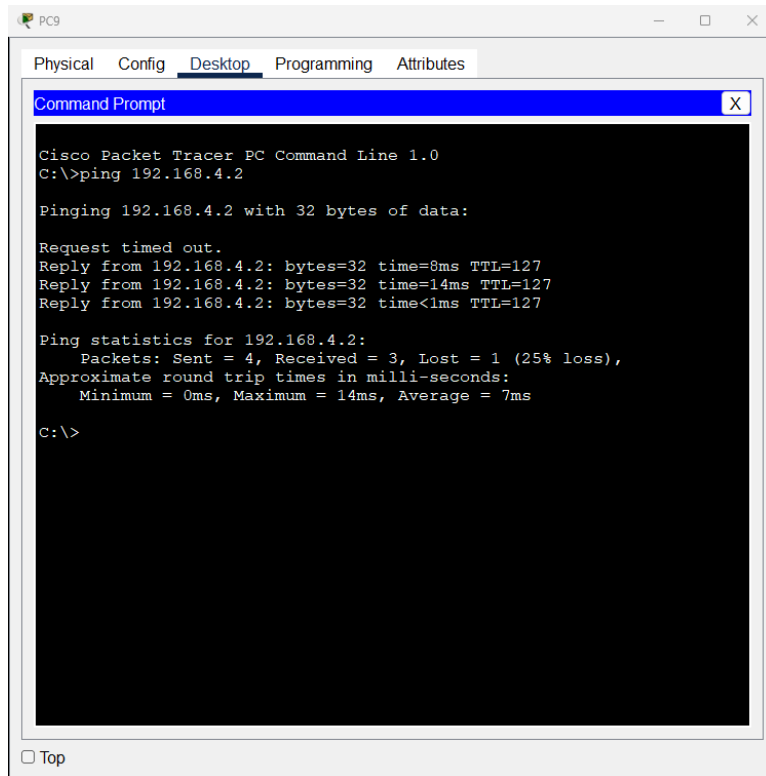
HRswitch(config)#

Copy Paste

☐ Top

# Full Network Connectivity Verification

This series of ping tests demonstrates full communication between all departments (HR, IT, Admin, Accounting). Each PC successfully reaches devices in different VLANs, proving that trunking, VLAN assignments, and router sub-interfaces are correctly configured.



PC9

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.2

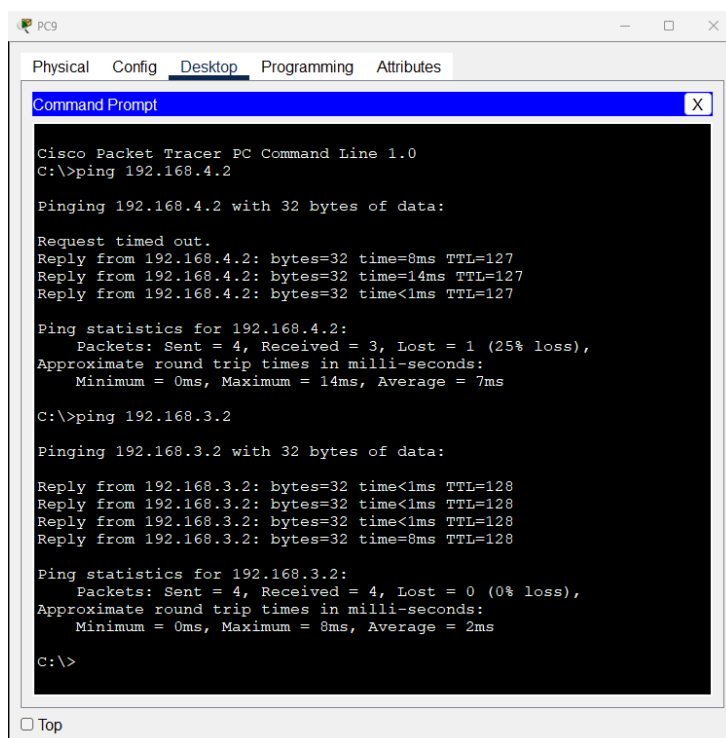
Pinging 192.168.4.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.4.2: bytes=32 time=8ms TTL=127
Reply from 192.168.4.2: bytes=32 time=14ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 7ms

C:\>
```

☐ Top



PC9

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.4.2: bytes=32 time=8ms TTL=127
Reply from 192.168.4.2: bytes=32 time=14ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 7ms

C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time<1ms TTL=128
Reply from 192.168.3.2: bytes=32 time<1ms TTL=128
Reply from 192.168.3.2: bytes=32 time<1ms TTL=128
Reply from 192.168.3.2: bytes=32 time=8ms TTL=128

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>
```

☐ Top

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=10ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 2ms

C:\>
```

Top

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=10ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 2ms

C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

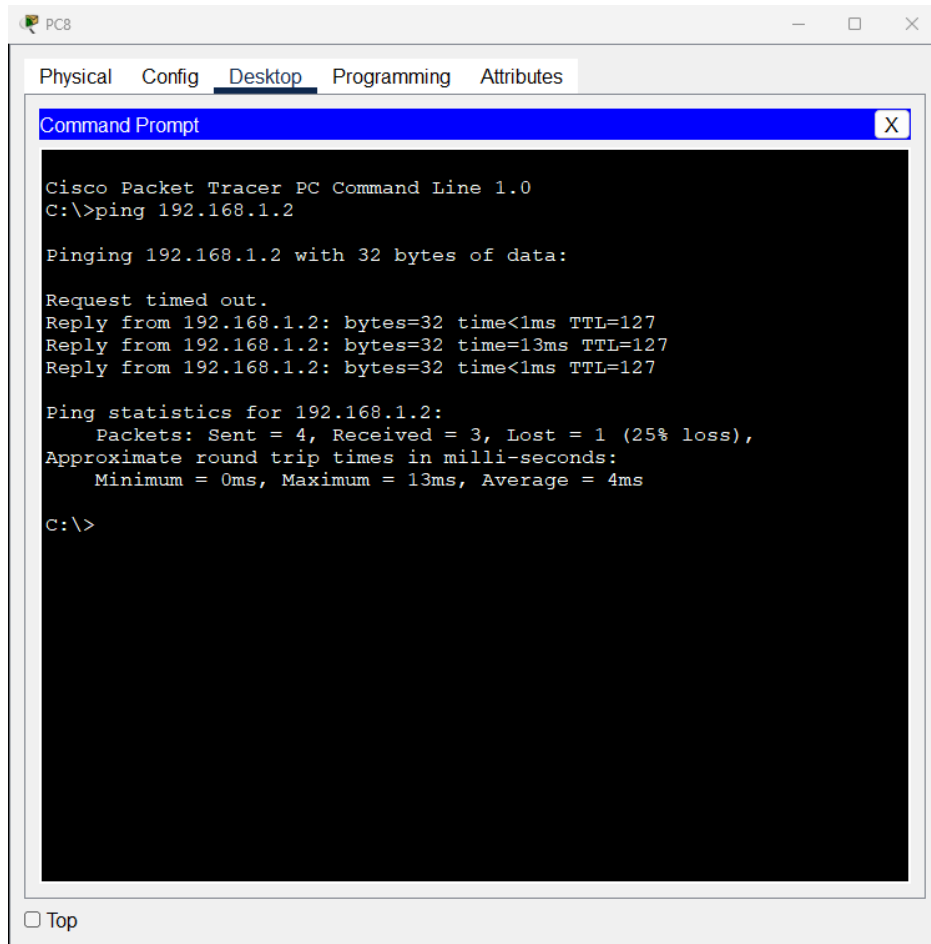
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127
Reply from 192.168.4.2: bytes=32 time=1ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

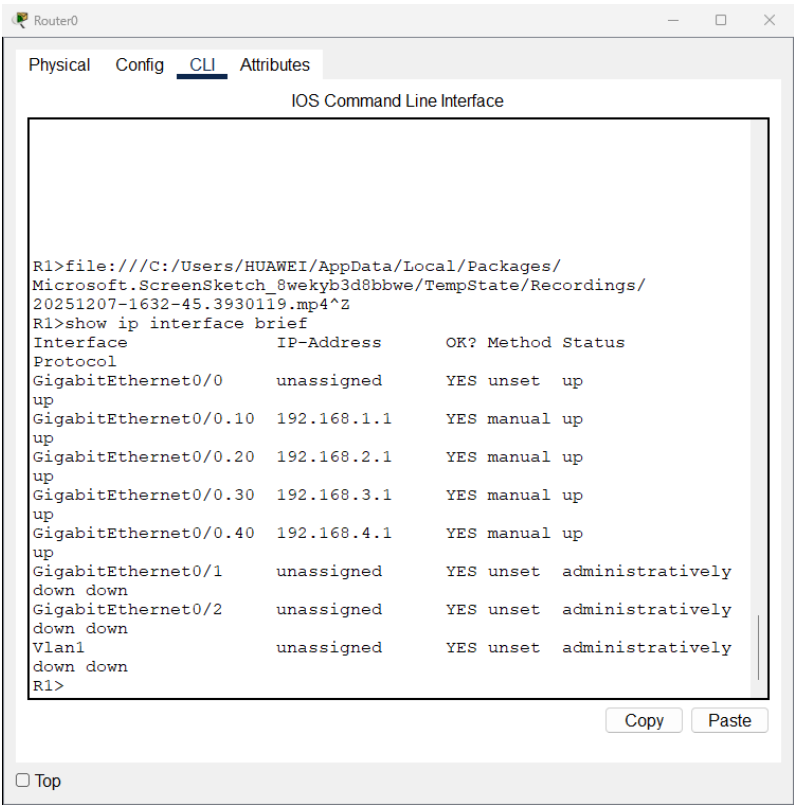
Top





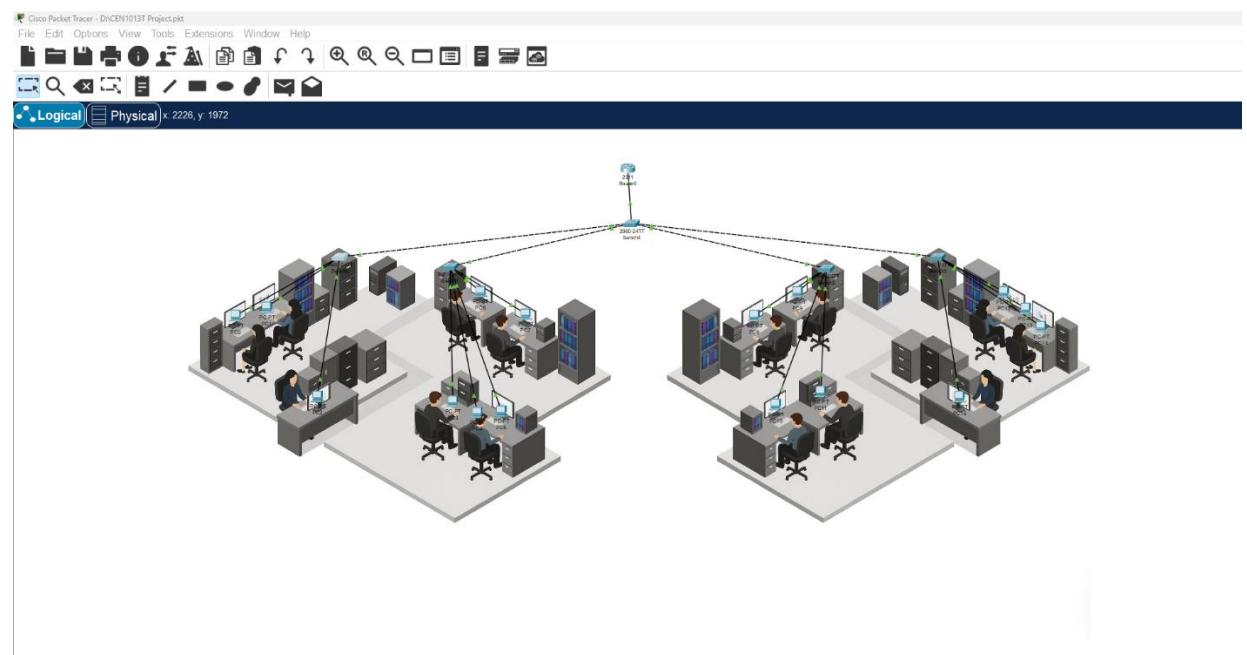
# Router Subinterfaces Configuration (Router-on-a-Stick)

This screenshot displays the router interface summary after configuring multiple subinterfaces on GigabitEthernet0/0. Each subinterface is assigned a unique IP address to serve as the default gateway for its corresponding VLAN (HR, IT, Admin, and Accounting). This confirms that inter-VLAN routing is successfully enabled using the router-on-a-stick approach.



# Enterprise Network Topology with VLAN Segmentation

This diagram illustrates an enterprise network design implemented in Cisco Packet Tracer. The network consists of multiple departments connected through access switches to a central core switch and a router. VLANs are used to logically separate departments (such as HR, IT, Admin, and Accounting), while inter-VLAN communication is enabled via router-on-a-stick configuration. The topology demonstrates structured cabling, centralized routing, and effective network segmentation.



---

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6. **Packet Tracer Official Guide**  
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<https://www.netacad.com/courses/packet-tracer>