

## **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)**

<b>PC no</b>	<b>IP Address</b>	<b>Subnet Mask</b>	<b>Default Gateway</b>
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)**

<b>PC no</b>	<b>IP Address</b>	<b>Subnet Mask</b>	<b>Default Gateway</b>
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)**

<b>PC no</b>	<b>IP Address</b>	<b>Subnet Mask</b>	<b>Default Gateway</b>
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)**

<b>PC no</b>	<b>IP Address</b>	<b>Subnet Mask</b>	<b>Default Gateway</b>
PC12	192.168.4.2	255.255.255.0	192.168.4.1

<b>PC no IP Address</b>	<b>Subnet Mask</b>	<b>Default Gateway</b>
-------------------------	--------------------	------------------------

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
^
% Invalid input detected at '^' marker.

Switch(config)#hostname HRdepartment
HRdepartment(config)#
Copy  Paste
□ Top
```

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

```

Switch1
Physical Config CLI Attributes
IOS Command Line Interface

%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

%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)#

```

Top

## 2.3 Change the name from switch 2 to ADMINdepartment

```

Switch2
Physical Config CLI Attributes
IOS Command Line Interface

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

```

Top

## 2.4 Change the name from switch 3 to ACCOUNTdepartment

```

Switch3
Physical Config CLI Attributes

IOS Command Line Interface

System Serial Number: FCG1010000000000
Top Assembly Part Number : 800-27221-02
Top Assembly Revision Number : A0
Version ID : V02
CIEI Code Number : COM3L00BRA
Hardware Board Revision Number : 0x01

Switch Ports Model SW Version SW Image
----- -----
* 1 26 WS-C2960-24TT-L 15.0(2)SE4 C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1998-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mngeuyen

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

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

```

Top

### 3. Assign IP Address for Switches (IP Management)

This part describes how a management IP address was assigned to each switch through the VLAN 1 interface. The management IP allows administrators to remotely access the switch for configuration, monitoring, and troubleshooting. It also ensures that the switch can communicate with its gateway for remote access across the company network.

#### 3.1 HRdepartment Switch:

```

Switch0
Physical Config CLI Attributes

IOS Command Line Interface

changed state to up

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

Switch(config)#hostname HRdepartment
HRdepartment(config)#interface vlan 1
HRdepartment(config-if)#ip add 192.168.1.0 255.255.255.0
Bad mask /24 for address 192.168.1.0
HRdepartment(config-if)#no shutdown

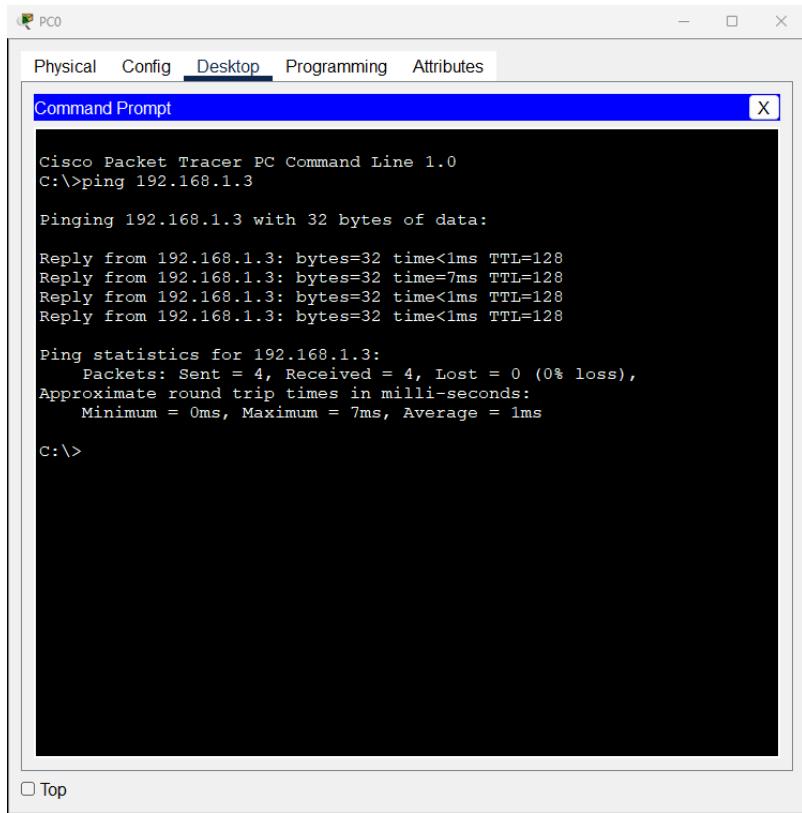
HRdepartment(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

HRdepartment(config-if)#exit
HRdepartment(config)#ip default-gateway 192.168.1.1
HRdepartment(config)#interface vlan 1
HRdepartment(config-if)#ip address 192.168.1.10 255.255.255.0
HRdepartment(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
HRdepartment#

```

Top

### 3.1.1 Ping Command: Confirmation of Connection



The screenshot shows a window titled "Command Prompt" from the Cisco Packet Tracer software. The window has tabs at the top: Physical, Config, Desktop (which is selected), Programming, and Attributes. The main area displays the output of a ping command:

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 192.168.1.3

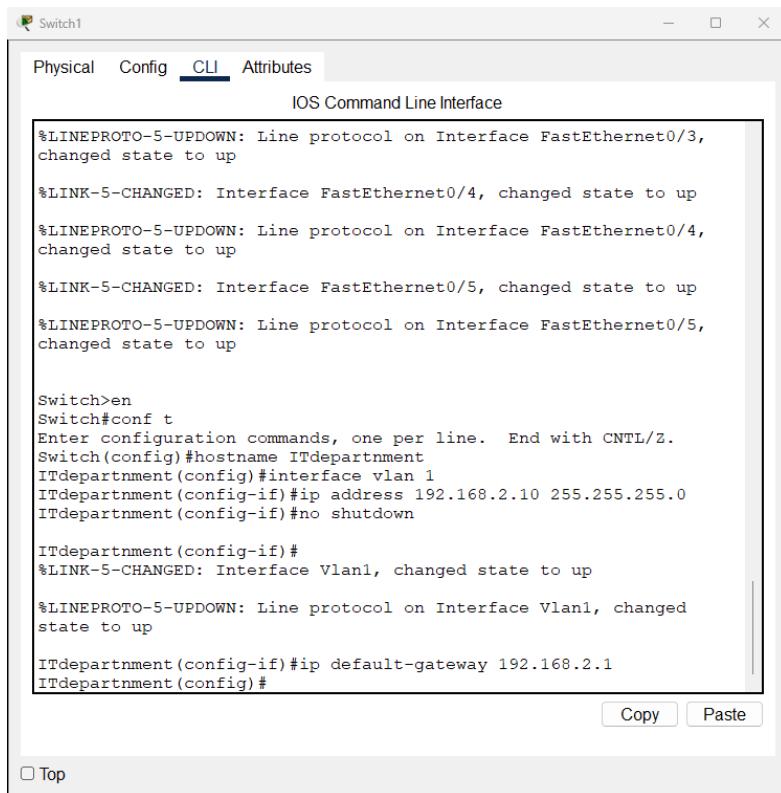
Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=7ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 7ms, Average = 1ms

C:>
```

At the bottom left of the window, there is a "Top" button.

### 3.2 ITdepartment Switch:



The screenshot shows the Cisco IOS Command Line Interface (CLI) window titled "Switch1". The "CLI" tab is selected. The terminal window displays the following text:

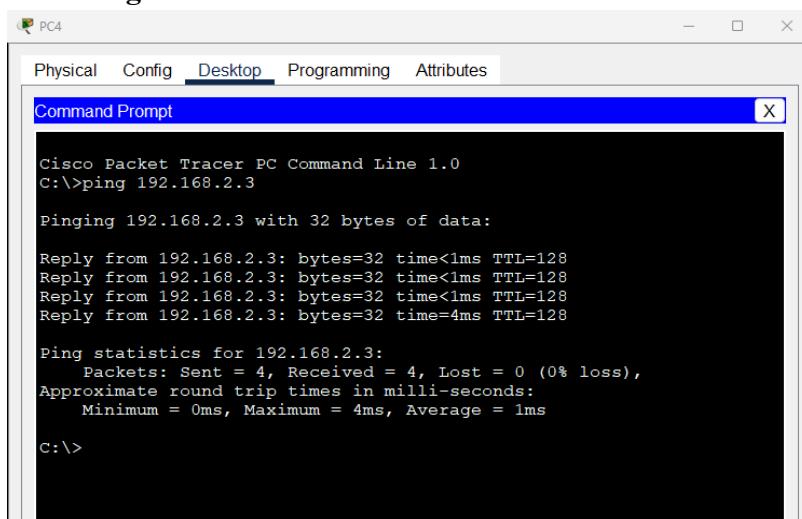
```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%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)#

Copy Paste
```

#### 3.2.1 Ping Command: Confirmation of Connection



The screenshot shows the Cisco Packet Tracer Command Prompt window titled "PC4". The "Desktop" tab is selected. The terminal window displays the following text:

```
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:**

Switch2

Physical    Config    **CLI**    Attributes

IOS Command Line Interface

```
Switch# support https://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 24-Jun-13 02:49 by mnoguyen

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

Switch>
Switch#en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname AdminDepartment
AdminDepartment(config)#interface vlan 1
AdminDepartment(config-if)#ip address 192.168.3.10 255.255.255.0
AdminDepartment(config-if)#no shutdown

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

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

AdminDepartment(config-if)#exit
AdminDepartment(config)#ip default-gateway 192.168.3.1
AdminDepartment(config)#[
```

### **3.3.1 Ping Command:** Confirmation of Connection

PC8

Physical Config Desktop Programming Attributes

Command Prompt X

```
Cisco Packet Tracer PC Command Line 1.0
C:\pinging 192.168.3.5

Pinging 192.168.3.5 with 32 bytes of data:
Reply from 192.168.3.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.3.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

### **3.4 ACCOUNTdepartment Switch:**

Switch3

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed Jun 13 02:49 by muguyen

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

Switch#en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ACCOUNTdepartment
ACCOUNTdepartment(config)#interface Vlan1
ACCOUNTdepartment(config-if)#ip address 192.168.4.10 255.255.255.0
ACCOUNTdepartment(config-if)#no shutdown

ACCOUNTdepartment(config-if)#
%LINK-3-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

ACCOUNTdepartment(config-if)##exit
ACCOUNTdepartment(config)##ip default-gateway 192.168.4.1
ACCOUNTdepartment(config)#[
```

### **3.4.1 Ping Command:** Confirmation of Connection

PC12

Physical Config Desktop Programming Attributes

Command Prompt X

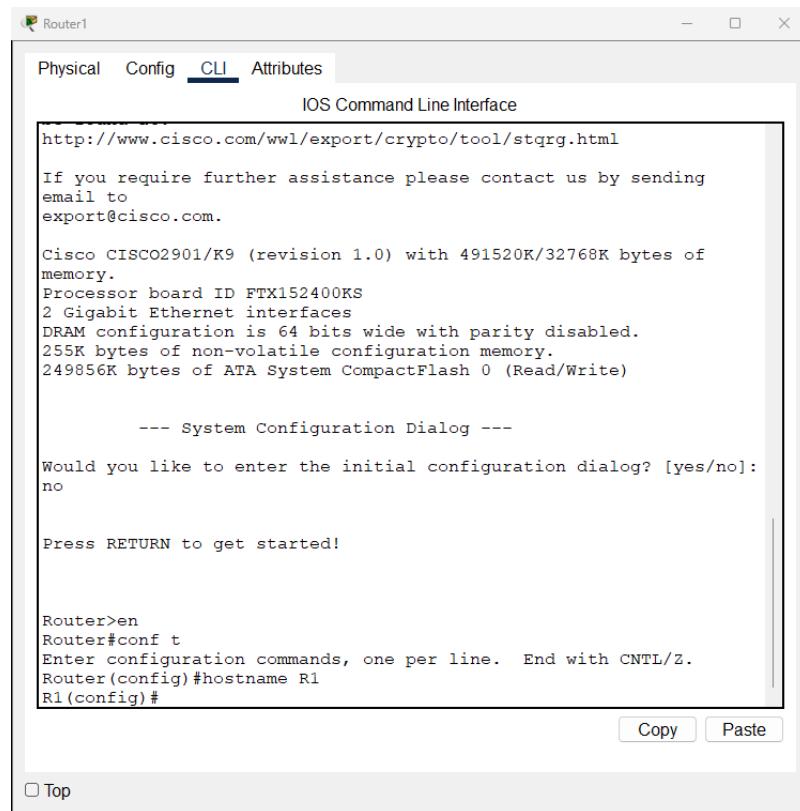
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.5

Pinging 192.168.4.5 with 32 bytes of data:
Reply from 192.168.4.5: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.4.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

## Changing the router name



The screenshot shows a Cisco Router CLI interface titled "Router1". The "CLI" tab is selected. The window title is "IOS Command Line Interface". The text area displays the following configuration steps:

```
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending
email to
export@cisco.com.

Cisco CISCO2901/K9 (revision 1.0) with 491520K/32768K bytes of
memory.
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

--- System Configuration Dialog ---

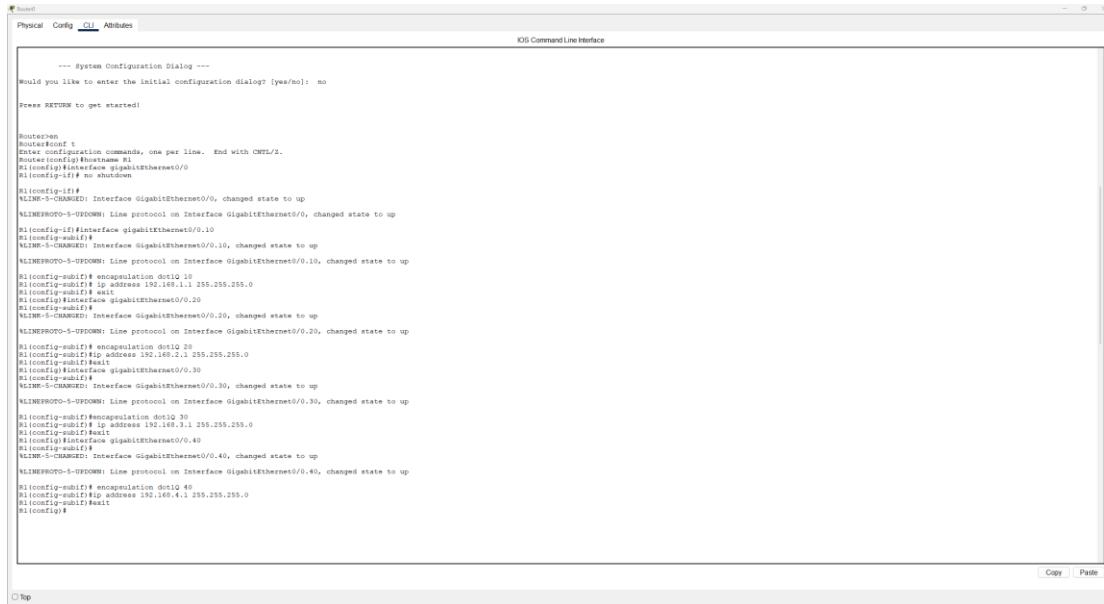
Would you like to enter the initial configuration dialog? [yes/no]: no

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)#
```

At the bottom right of the text area are "Copy" and "Paste" buttons. Below the text area is a "Top" button.

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



The screenshot shows a Cisco Router CLI interface titled "Router". The "CLI" tab is selected. The window title is "IOS Command Line Interface". The text area displays the following configuration steps for setting up multiple VLANs and their interconnection:

```
--- System Configuration Dialog ---

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

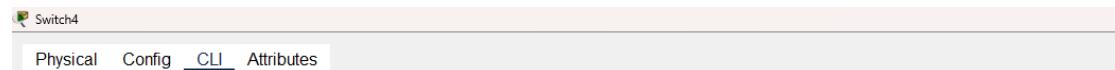
Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#encapsulation dot1Q 1
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#encapsulation dot1Q 10
Router(config-if)#ip address 192.168.1.10 255.255.255.0
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#encapsulation dot1Q 20
Router(config-if)#ip address 192.168.1.20 255.255.255.0
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/3
Router(config-if)#encapsulation dot1Q 30
Router(config-if)#ip address 192.168.1.30 255.255.255.0
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/4
Router(config-if)#encapsulation dot1Q 40
Router(config-if)#ip address 192.168.1.40 255.255.255.0
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/5
Router(config-if)#encapsulation dot1Q 40
Router(config-if)#ip address 192.168.1.40 255.255.255.0
Router(config-if)#exit
Router(config)#
```

At the bottom right of the text area are "Copy" and "Paste" buttons. Below the text area is a "Top" button.

## Core Switch VLAN Configuration

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



```
%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

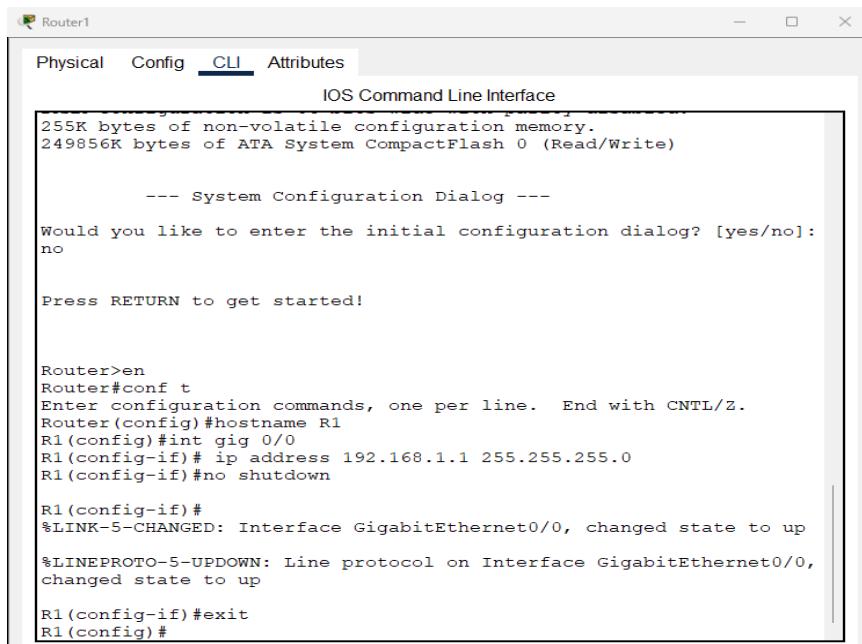
coreSwitch(config-if-range)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down
%LINEPROTO-5-UPDOWN: 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



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

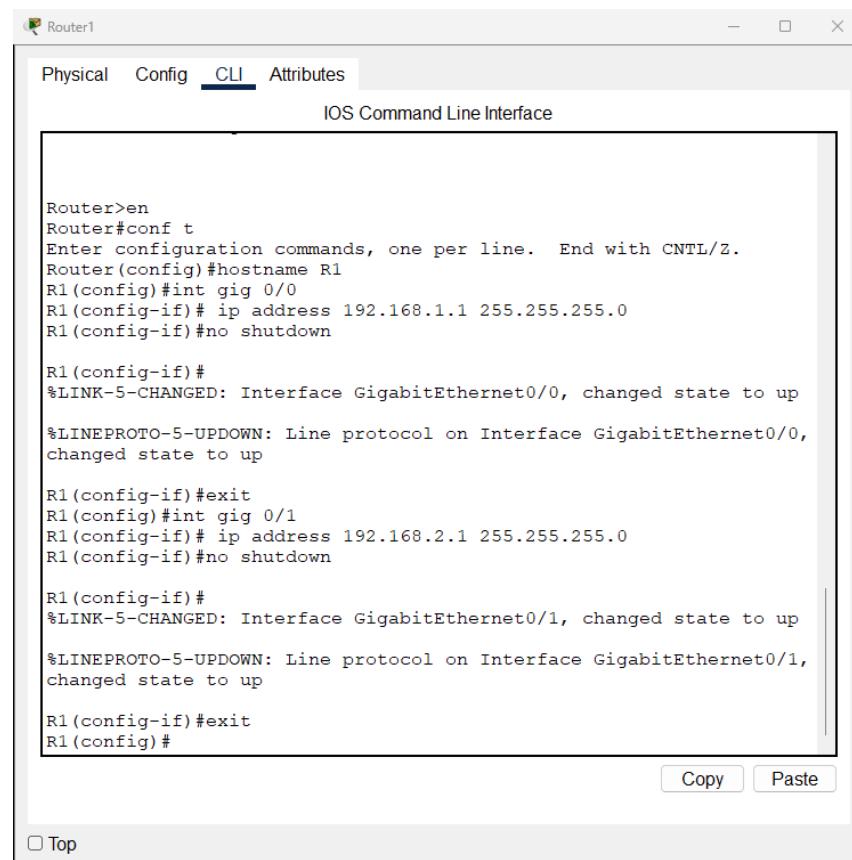
Press RETURN to get started!

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



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

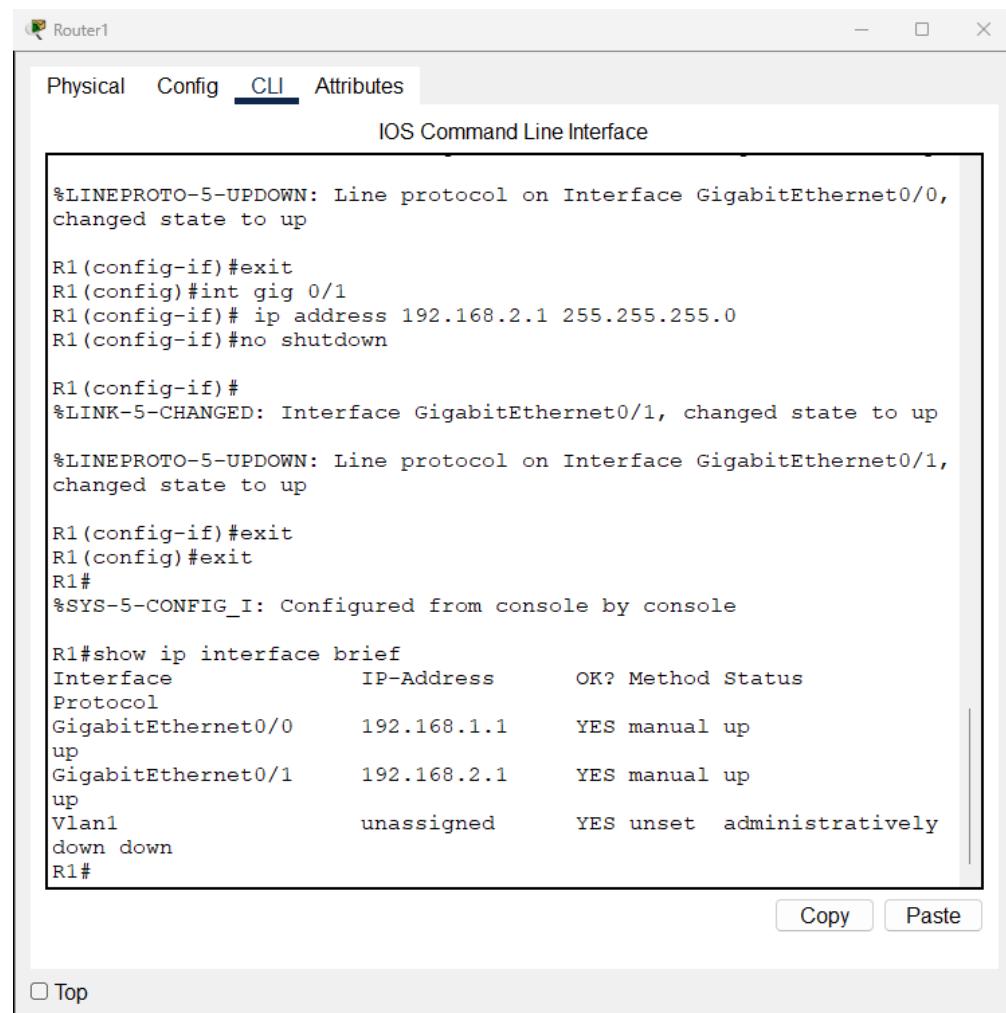
R1(config-if)#exit
R1(config) #
```

Top

Copy Paste

Confirm that the ports are working.

R1# show ip interface brief



The screenshot shows a window titled "Router1" with tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". It displays the following text:

```
%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#
```

At the bottom right of the main window are "Copy" and "Paste" buttons. At the bottom left is a "Top" button.

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

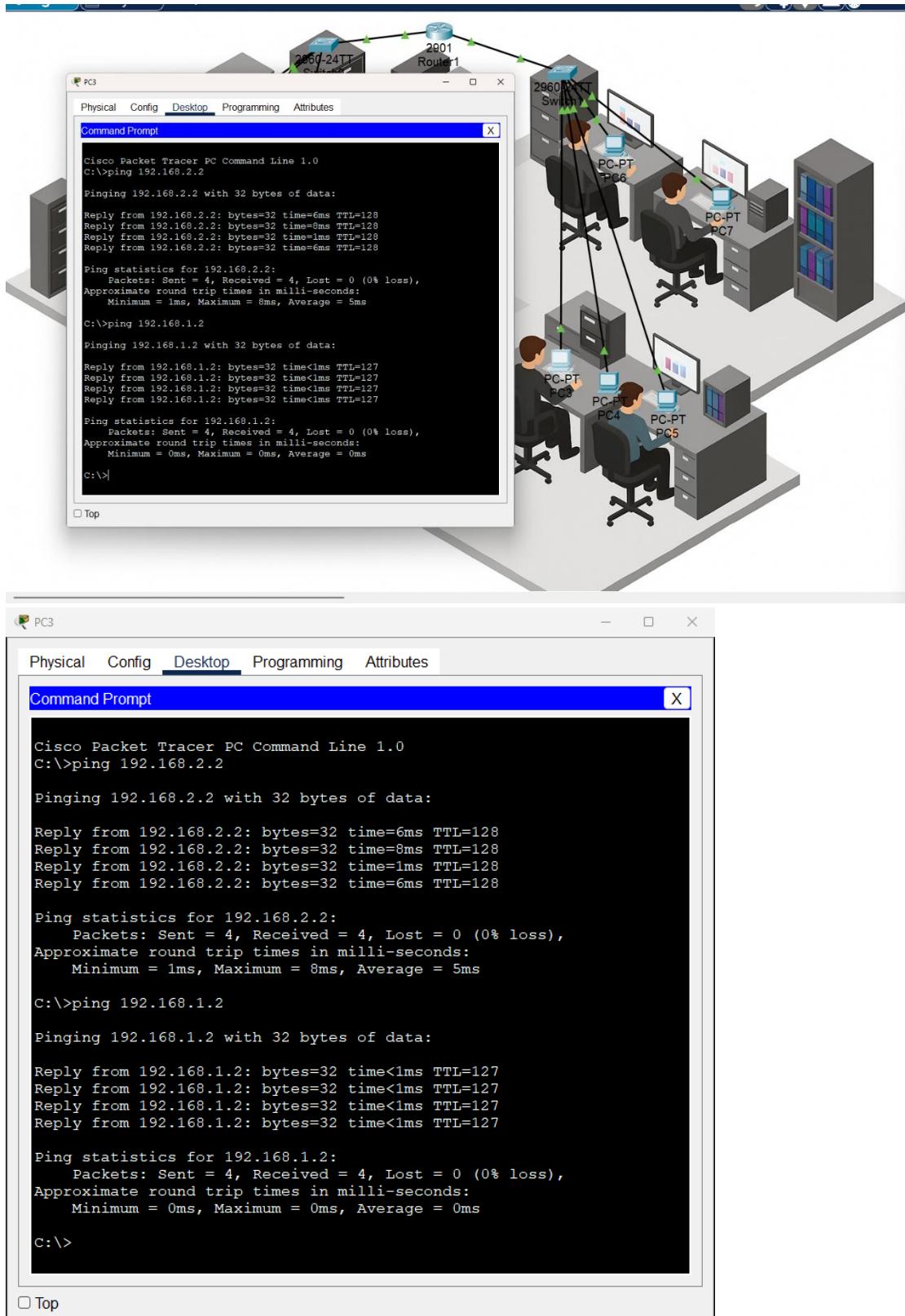
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.10, timeout is 2
seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/1 ms

R1#
```

Top

Copy Paste

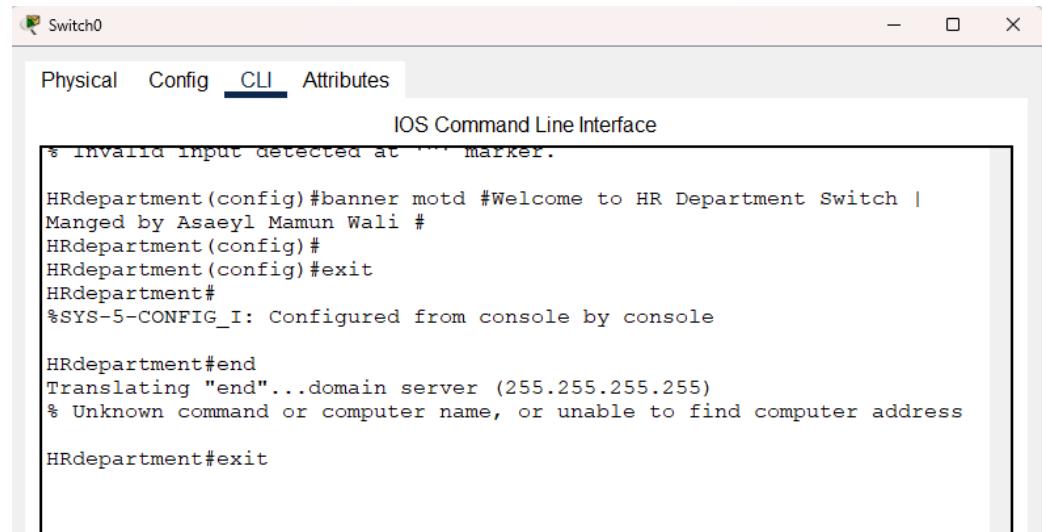
## Ping Test Between IT and HR Departments ping 192.168.1.2



## 4. Message of the Day (MOTD)

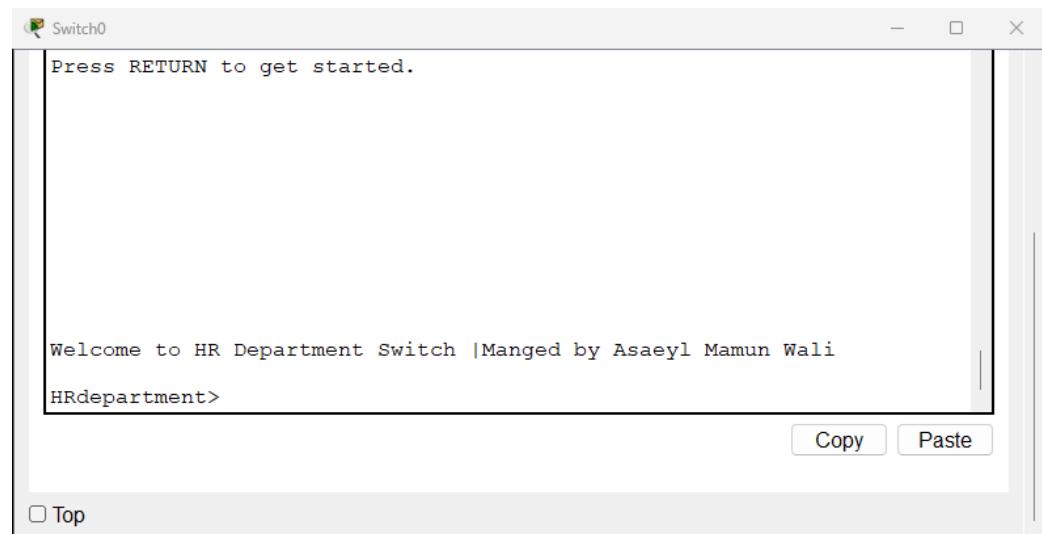
The Message of the Day banner is a security feature displayed to anyone accessing the switch. This section includes the configuration of a MOTD banner that warns unauthorized users and reinforces network security policies. It ensures that anyone attempting to access the device is aware that only authorized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

### 4.1 Message for HRdepartment Switch:



A screenshot of a Windows Command Line Interface window titled "Switch0". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". The title bar says "IOS Command Line Interface". The main window displays the following configuration commands:

```
% 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
```

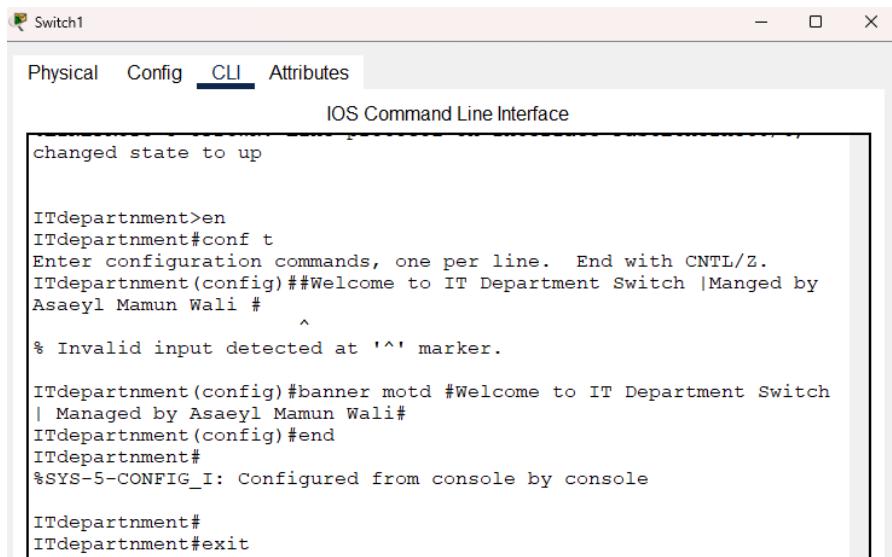


A screenshot of a Windows Command Line Interface window titled "Switch0". The tab bar at the top has "Physical", "Config", "CLI" (selected), and "Attributes". The title bar says "IOS Command Line Interface". The main window displays the following banner message:

```
Press RETURN to get started.  
  
Welcome to HR Department Switch | Manged by Asaeyl Mamun Wali  
HRdepartment>
```

At the bottom of the window, there are "Copy" and "Paste" buttons, and a checkbox labeled "Top".

## 4.2 Message for ITdepartment Switch:



```
Switch1
Physical Config CLI Attributes
IOS Command Line Interface
changed state to up

ITdepartment>en
ITdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
ITdepartment(config)##Welcome to IT Department Switch |Managed 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
```



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

Copy Paste

Top

#### 4.3 Message for ADMINdepartment Switch:

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

Switch# Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ADMINdepartment
Switch(config)#interface Vlan1
Switch(config-if)#ip address 192.168.3.10 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
ADMINdepartment(config-if)#exit
ADMINdepartment(config)#ip default-gateway 192.168.3.1
ADMINdepartment(config)#banner motd #Welcome to Administration Department Switch | Managed by Dina Abdullah Bajaifer#
ADMINdepartment(config)#exit
ADMINdepartment#
%SYS-5-CONFIG_I: Configured from console by console
ADMINdepartment#exit

ADMINdepartment con0 is now available

Press RETURN to get started.

Welcome to Administration Department Switch | Managed by Dina Abdullah Bajaifer
ADMINdepartment>
```

Top

Copy Paste

#### 4.4 Message for ACCOUNTdepartment Switch:

```
Switch3
Physical Config CLI Attributes
IOS Command Line Interface

Switch# Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname ACCOUNTdepartment
Switch(config)#interface Vlan1
Switch(config-if)#ip address 192.168.3.11 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
ACCOUNTdepartment(config-if)#exit
ACCOUNTdepartment(config)#ip default-gateway 192.168.3.1
ACCOUNTdepartment(config)#banner motd #Welcome to Accounting Department Switch | Managed by Dina Abdullah Bajaifer#
ACCOUNTdepartment(config)#exit
ACCOUNTdepartment#
%SYS-5-CONFIG_I: Configured from console by console
ACCOUNTdepartment#exit

ACCOUNTdepartment con0 is now available

Press RETURN to get started.

Welcome to Accounting Department Switch | Managed by Dina Abdullah Bajaifer
ACCOUNTdepartment>
```

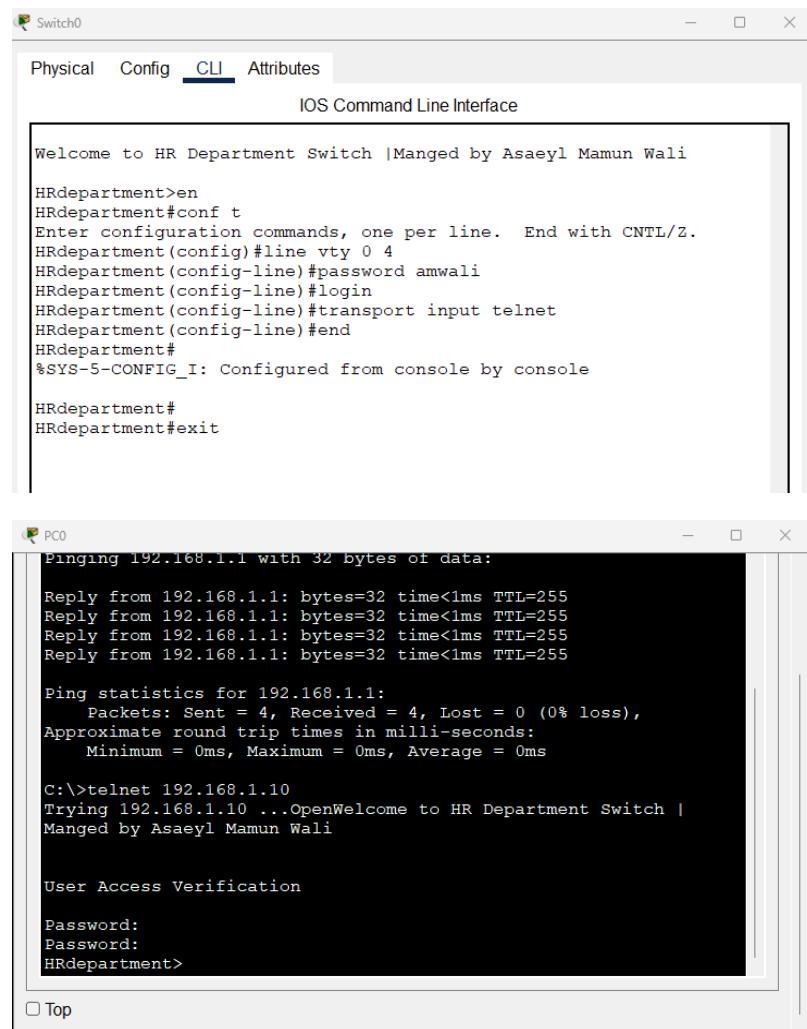
Top

Copy Paste

## 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 image displays two windows illustrating the configuration and verification of remote access on a Cisco switch.

**Switch0 Window (Top):**

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
```

**PC0 Window (Bottom):**

```
Pinging 192.168.1.1 with 32 bytes of data:
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 ...Open
Welcome to HR Department Switch |
Manged by Asaeyl Mamun Wali

User Access Verification

Password:
Password:
HRdepartment>
```

Top

## 5.2 ITdepartment Switch

The screenshot shows the CLI interface for the ITdepartment Switch. The window title is "Switch1". The tabs at the top are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". The terminal output is as follows:

```
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
```

Below the terminal window, there is another window titled "PC3" showing a ping session and a telnet connection to the switch.

PC3 window content:

```
Pinging 192.168.1.2 with 32 bytes of data:
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:

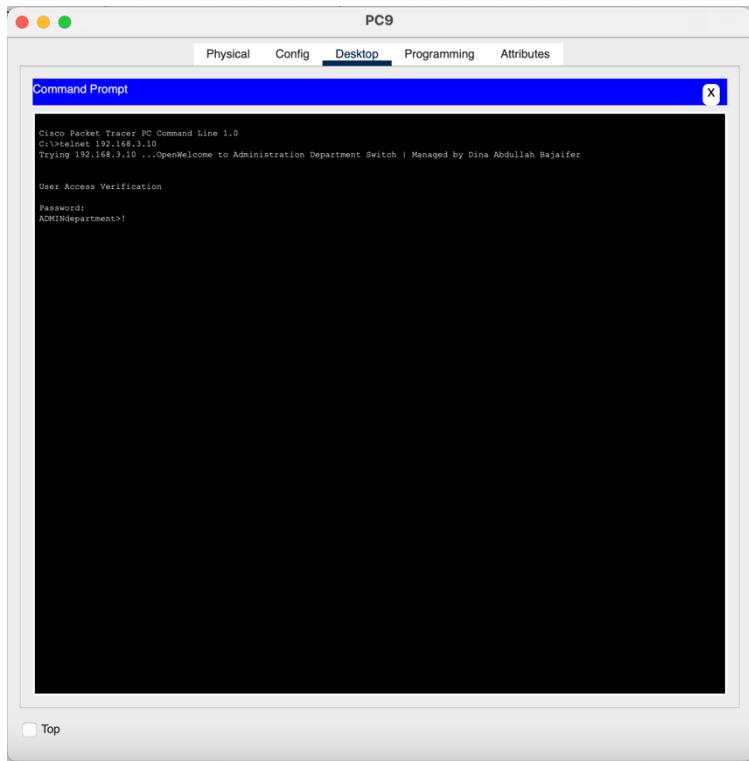
The screenshot shows the CLI interface for the ADMINdepartment Switch. The window title is "Switch2". The tabs at the top are "Physical", "Config", "CLI" (selected), and "Attributes". The main area is titled "IOS Command Line Interface". The terminal output is as follows:

```
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 dabaifaer
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

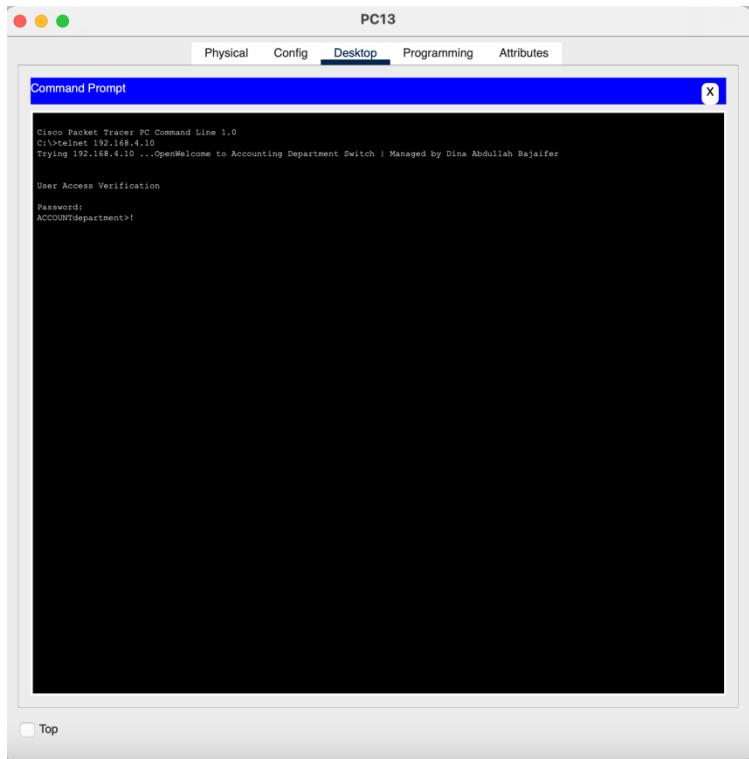
Press RETURN to get started.
```

At the bottom of the window, there are "Copy" and "Paste" buttons. A "Top" checkbox is located at the very bottom left.



#### 5.4 ACCOUNTdepartment switch:

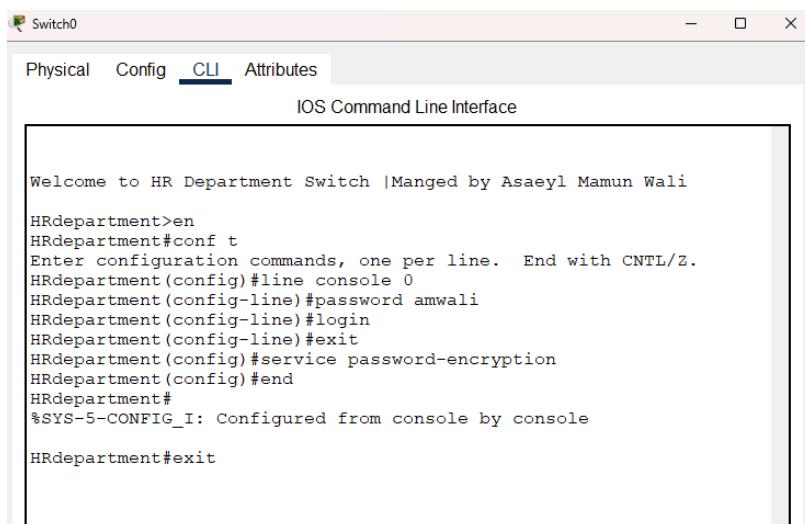


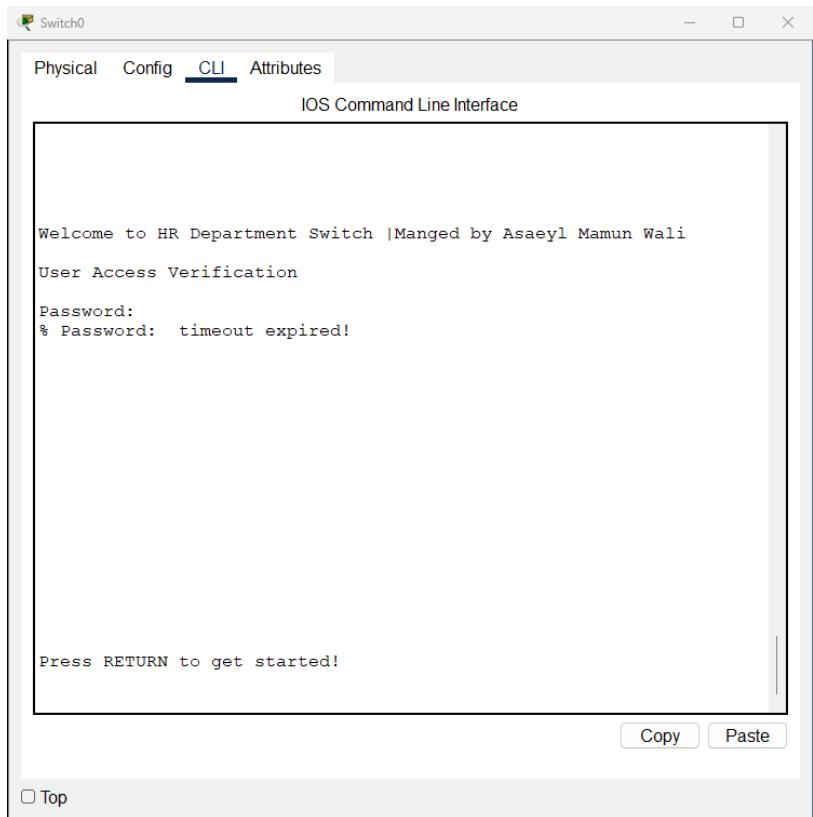


## 6. Set a Password for the Console

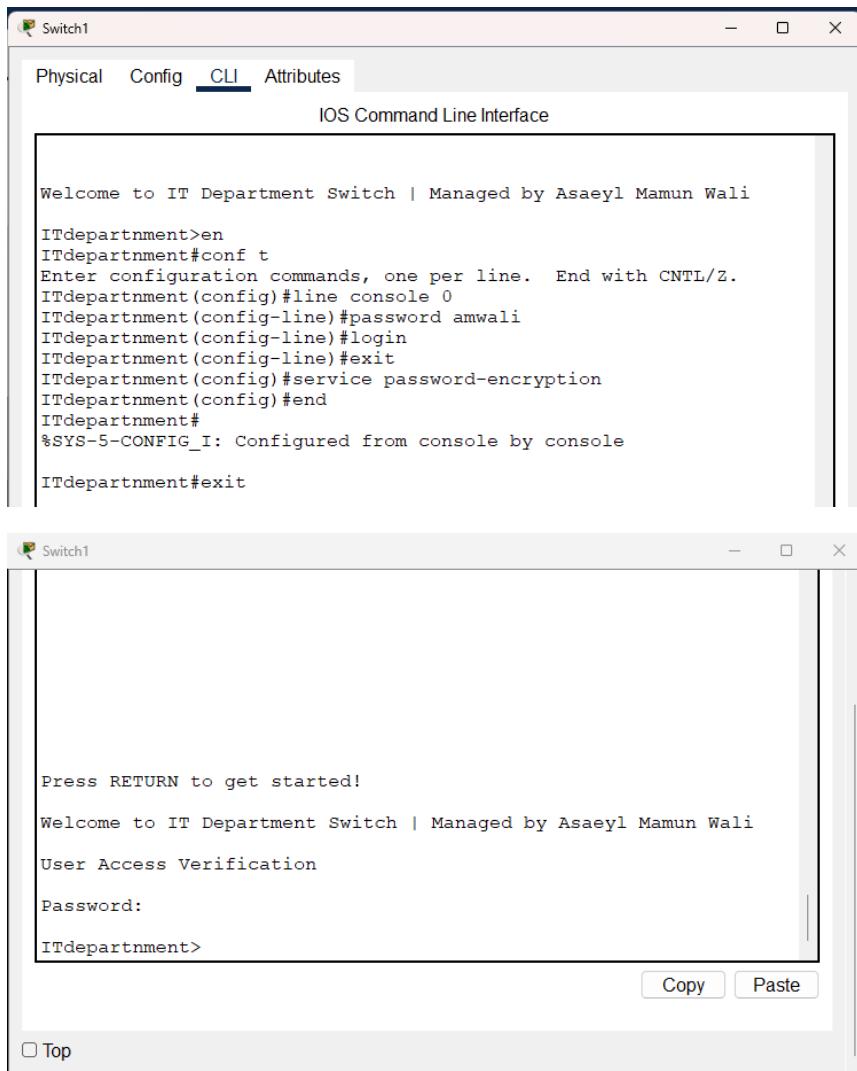
This part describes how a console password was added to secure physical access to the switch. Setting a console password prevents unauthorized users from configuring the device if they connect directly to it. This step is a fundamental part of applying basic device security.

### 6.1 HRdepartment Switch:





## 6.2 ITdepartment Switch



The image displays two windows titled "Switch1" showing the configuration of an ITdepartment Switch via the IOS Command Line Interface (CLI).

**Top Window (CLI View):**

```
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 console 0
ITdepartment(config-line)#password amwali
ITdepartment(config-line)#login
ITdepartment(config-line)#exit
ITdepartment(config)#service password-encryption
ITdepartment(config)#end
ITdepartment#
%SYS-5-CONFIG_I: Configured from console by console
ITdepartment#exit
```

**Bottom Window (Login View):**

```
Press RETURN to get started!
Welcome to IT Department Switch | Managed by Asaeyl Mamun Wali
User Access Verification
Password:
ITdepartment>
```

Buttons at the bottom of the bottom window:

- Copy
- Paste

Checkboxes at the bottom of the bottom window:

- Top

### 6.3 ADMINdepartment Switch:

The screenshot shows the Switch2 CLI interface. The title bar says "Switch2". The tabs are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". The command history shows:

```
ADMINdepartment>conf t
Enter configuration commands, one per line. End with CNTL/Z.
ADMINdepartment(config)#line console 0
ADMINdepartment(config-line)#password dabajalfer
ADMINdepartment(config-line)#login
ADMINdepartment(config-line)#exit
ADMINdepartment(config)#service password-encryption
^
% Invalid input detected at '^' marker.

ADMINdepartment(config)#service password-encryption
ADMINdepartment(config)#end
ADMINdepartment#
SYS-5-CONFIG_I: Configured from console by console

ADMINdepartment#exit

ADMINdepartment con0 is now available

Press RETURN to get started.

Welcome to Administration Department Switch | Managed by Dina Abdullah Bajaifer
User Access Verification
Password:
ADMINdepartment:>
```

Buttons "Copy" and "Paste" are at the bottom right. A "Top" checkbox is at the bottom left.

### 6.4 ACCOUNTdepartment switch:

The screenshot shows the Switch3 CLI interface. The title bar says "Switch3". The tabs are "Physical", "Config", "CLI" (which is selected), and "Attributes". The main window is titled "IOS Command Line Interface". The command history shows:

```
ACCOUNTdepartment>conf t
Enter configuration commands, one per line. End with CNTL/Z.
ACCOUNTdepartment(config)#line console 0
ACCOUNTdepartment(config-line)#password dabajalfer
ACCOUNTdepartment(config-line)#login
ACCOUNTdepartment(config-line)#exit
ACCOUNTdepartment(config)#service password-encryption
ACCOUNTdepartment(config)#end
ACCOUNTdepartment#
SYS-5-CONFIG_I: Configured from console by console

ACCOUNTdepartment#exit

ACCOUNTdepartment con0 is now available

Press RETURN to get started.

Welcome to Accounting Department Switch | Managed by Dina Abdullah Bajaifer
User Access Verification
Password:
ACCOUNTdepartment:>
```

Buttons "Copy" and "Paste" are at the bottom right. A "Top" checkbox is at the bottom left.

## 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.

The screenshot shows the 'Switch1' window with the 'CLI' tab selected. The title bar says 'Switch1'. The main area is titled 'IOS Command Line Interface'. It displays the following CLI session:

```
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#
```

At the bottom right are 'Copy' and 'Paste' buttons, and a 'Top' link.

The screenshot shows the 'Switch0' window with the 'CLI' tab selected. The title bar says 'Switch0'. The main area is titled 'IOS Command Line Interface'. It displays the following CLI session:

```
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#
```

At the bottom right are 'Copy' and 'Paste' buttons, and a 'Top' link.

**Switch2**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
ADMINdepartment(config-line)#password dabajaifer
ADMINdepartment(config-line)#login
ADMINdepartment(config-line)#exit
ADMINdepartment(config)#service password-encryption
^
% Invalid input detected at ''' marker.

ADMINdepartment(config)#service password-encryption
ADMINdepartment(config)#end
ADMINdepartment#
SYS-5-CONFIG_I: Configured from console by console

ADMINdepartment#exit

ADMINdepartment con0 is now available

Press RETURN to get started.

Welcome to Administration Department Switch | Managed by Dina Abdullah Bajaifer
User Access Verification
Password:

ADMINdepartment>en
ADMINdepartment#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ADMINdepartment#
```

Top

**Switch3**

Physical Config **CLI** Attributes

IOS Command Line Interface

```
ACCOUNTdepartment(config)#line console 0
ACCOUNTdepartment(config-line)#password dabajaifer
ACCOUNTdepartment(config-line)#login
ACCOUNTdepartment(config-line)#exit
ACCOUNTdepartment(config)#service password-encryption
ACCOUNTdepartment(config)#end
ACCOUNTdepartment#
SYS-5-CONFIG_I: Configured from console by console

ACCOUNTdepartment#exit

ACCOUNTdepartment con0 is now available

Press RETURN to get started.

Welcome to Accounting Department Switch | Managed by Dina Abdullah Bajaifer
User Access Verification
Password:

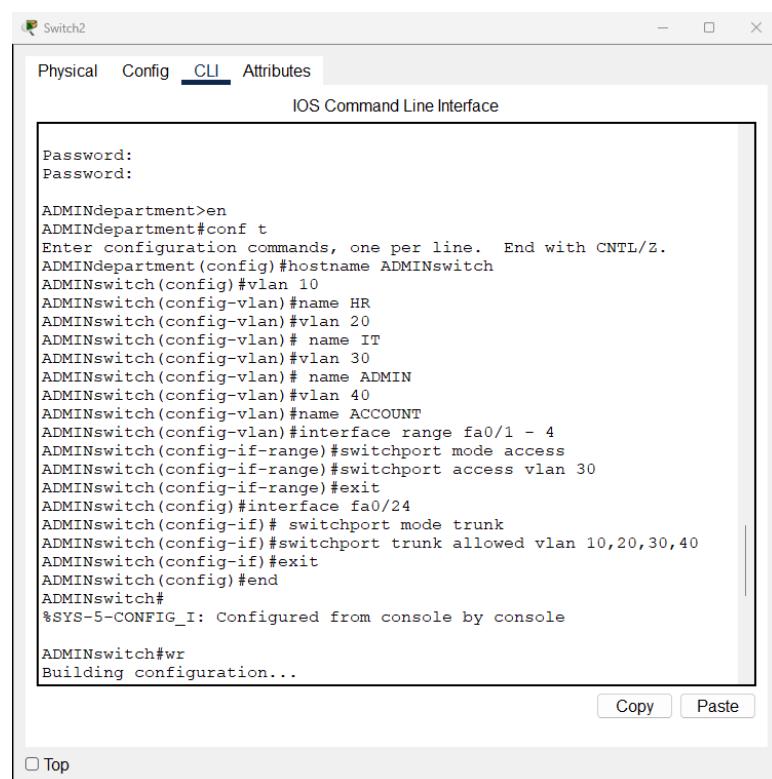
ACCOUNTdepartment>en
ACCOUNTdepartment#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ACCOUNTdepartment#
```

Top

## 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:

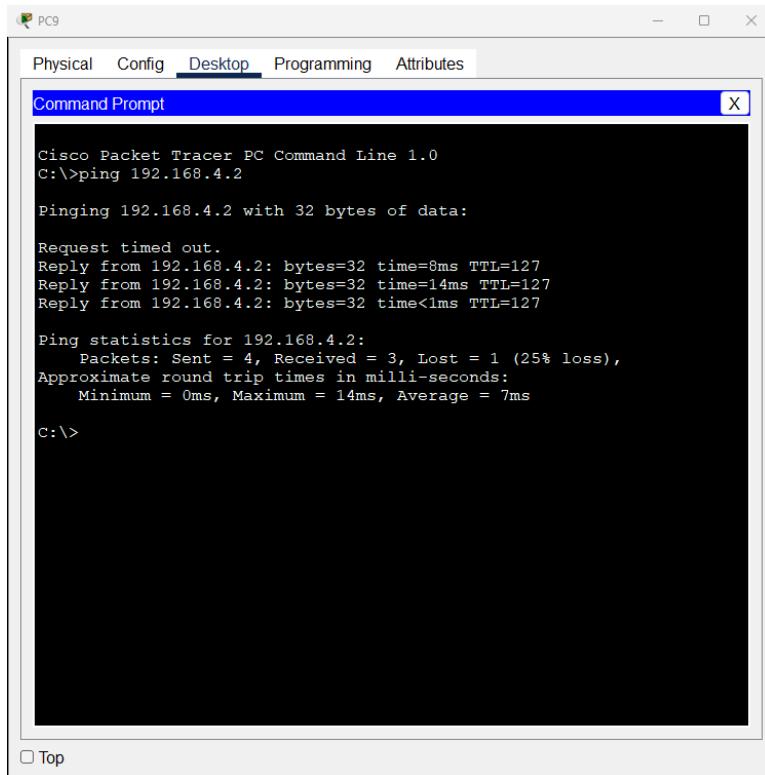
HRdepartment>en
HRdepartment#conf t
Enter configuration commands, one per line. End with CNTL/Z.
HRdepartment(config)#hostname HRswitch
HRswitch(config)#vlan 10
HRswitch(config-vlan)# name HR
HRswitch(config-vlan)#vlan 20
HRswitch(config-vlan)#vlan 30
HRswitch(config-vlan)#vlan 40
HRswitch(config-vlan)#interface 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)#
```

Top

Copy Paste

# 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 X

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

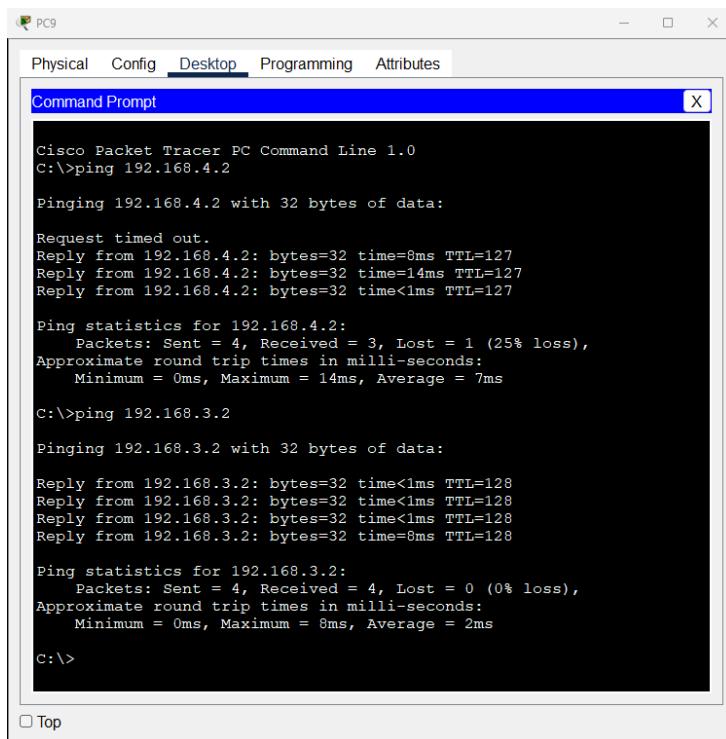
Pinging 192.168.4.2 with 32 bytes of data:

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 X

```
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 X

```
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:>
```

PC2

Physical Config Desktop Programming Attributes

Command Prompt X

```
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

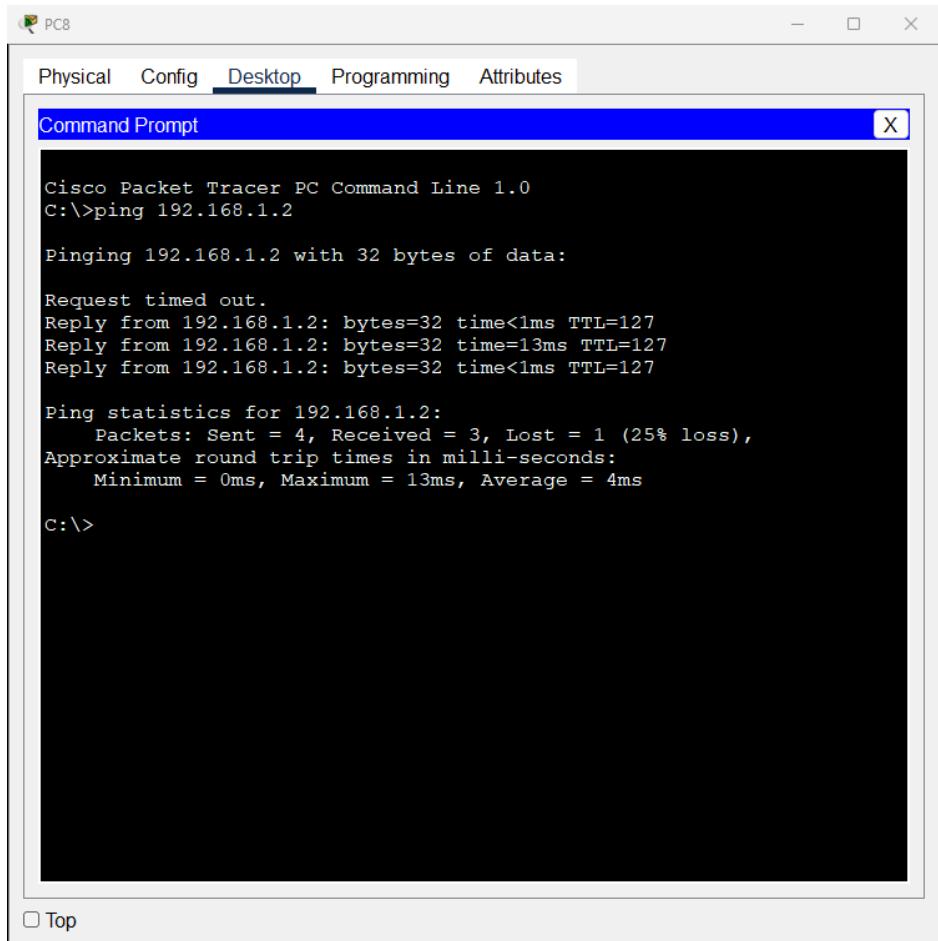
C:>ping 192.168.4.2

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

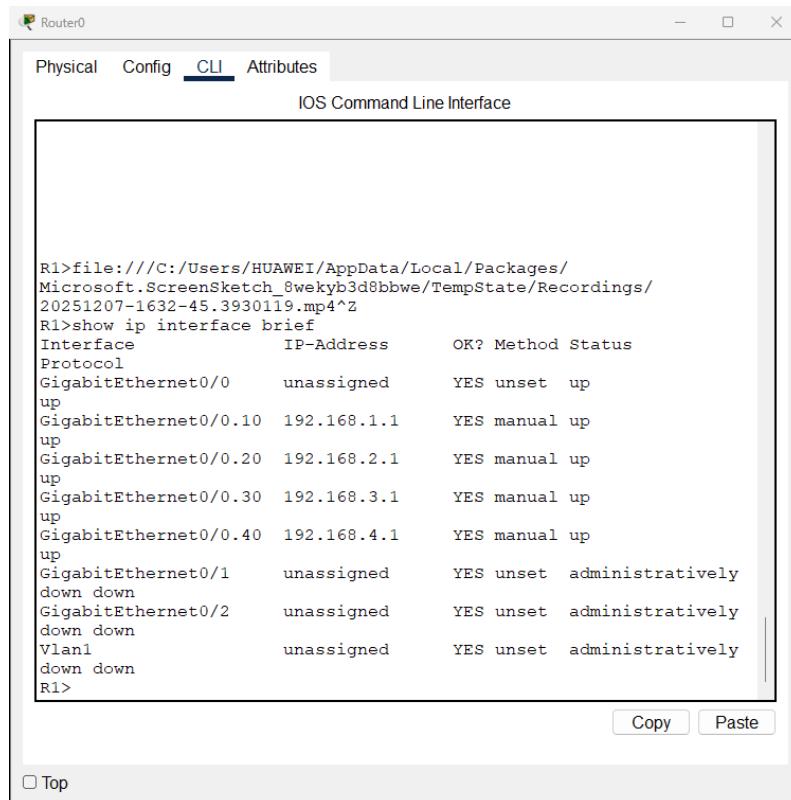
Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:>
```



## 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.



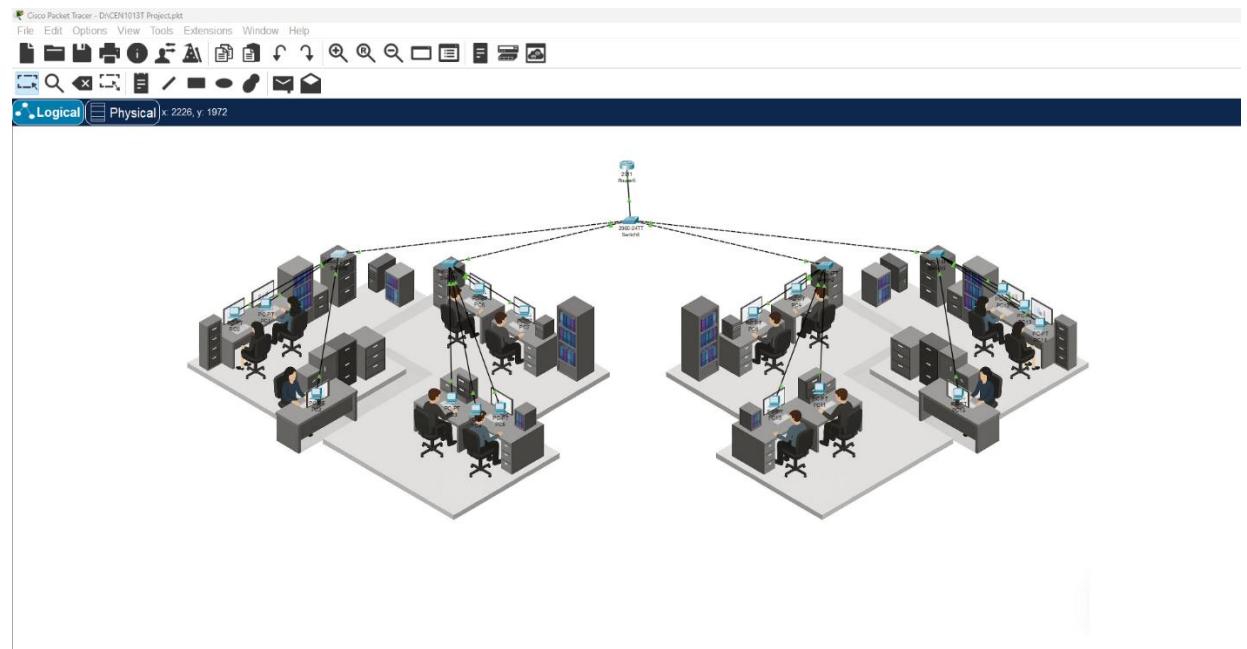
The screenshot shows a Windows Command Line Interface window titled "Router0". The tab bar at the top has "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tab bar is the text "IOS Command Line Interface". The main area of the window contains the output of the "show ip interface brief" command:

```
R1>file:///C:/Users/HUAWEI/AppData/Local/Packages/
Microsoft.ScreenSketch_8wekyb3d8bbwe/TmpState/Recordings/
20251207-1632-45.3930119.mp4^Z
R1>show ip interface brief
Interface          IP-Address      OK? Method Status
Protocol
GigabitEthernet0/0    unassigned     YES unset   up
up
GigabitEthernet0/0.10  192.168.1.1   YES manual  up
up
GigabitEthernet0/0.20  192.168.2.1   YES manual  up
up
GigabitEthernet0/0.30  192.168.3.1   YES manual  up
up
GigabitEthernet0/0.40  192.168.4.1   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
R1>
```

At the bottom of the window, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located at the very bottom left.

# 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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