

Bachelor of Information Technology (Hons)

Assignment Cover Sheet

Course Code: EC3275
Assignment Title: Report writing
Date Submitted: 3rd May, 2025

Course Title: Routing and Switching
Due Date: 3rd May, 2025
Lecturer Name: Mr. Santosh Yadav

To be completed if this is an individual assignment

I declare that this assignment is my individual work. I have not worked collaboratively nor have I copied from any other student's work or from any other source except where due acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

Student Name: _____ Student ID: _____ Signature: _____

To be completed if this is a group assignment

We declare that this is a group assignment and that no part of this submission has been copied from any other student's work or from any other source except where due acknowledgement is made explicitly in the text, nor has any part been written for us by another person.

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Student's Signature: _____

Extension certification:

This assignment has been given an extension and is now due on _____.

Lecturer's Signature: _____

Abstract

The structure of a scalable yet resilient multi-site network infrastructure for an insurance company is put forward in this project. This comprises the head office and seven almost geographically separated provincial branches. The purpose is to give all those areas the advantage of transparent centralized management for better resource sharing across sites with adequate security, redundancy, and high uptime of the network. The architecture is hybrid-Inter-VLAN routing with routing protocols of Rip version 2 , floating static route and DHCP services made use of necessary segmentation or filtering throughout the location data transfers between the internal sites.

The network design advocates scalability and failover to Head Office dual NSP links provisioned for redundancy. Each branch has stable single-copy access to the corporate network. Logical segmentation by VLANs will be set up within the Head Office to separate departments (Admin, Finance, Loan, IT) for security and traffic improvement. DHCP defines the further network infrastructure, including dynamic IP address allocation and the reservation of IP ranges for future use or for admin flexibility.

It is the demonstration of the above project on the field of network deployment as per the industry best practices on network engineering. The design process will cover topology mapping, IP addressing scheme, configuration scripts, redundancy planning, as well as detailed documentation. The ultimate result is a complete network plan that serves the targeted growth objectives while maximizing uptime. It also provides a secure and manageable environment for both end-users and administrations. The project conveys tremendous understanding on routing and switching concepts applied efficiently in a complex and distributed enterprise environment. The customer has drawn out their requirements into final deliverables, which include a complete network plan that serves growth targets while maximizing uptime-and hence providing security for both end users and Administrators. New learning is reflected through in-depth application of routing and switching concepts in real life for complex, distributed enterprise settings.

Acknowledgement

We would like to take this opportunity to express our sincere thanks to **Mr. Santosh Yadav**, our Routing and Switching lecturer, for his invaluable guidance, encouragement, and feedback throughout the course of this project. His guidance helped in shaping our design and implementation towards a real-world multi-site network infrastructure.

More important, however, is the acknowledgment to all our team members that we are eternally indebted for their efforts, teamwork, and hard work. Each member contributed his strength as a unique input right from the conceptualization of the network architecture up to the drafting of configurations and documentation. This project helped us relate our classroom learning with real-life exposures, and in teamwork, communication and project management skills.

Table of Contents

Abstract	2
Acknowledgement	3
Introduction	5
Topology	6
About Project	9
About Headquater Vlan	11
About NSP	24
About Connection	26
Default line Connection	26
Fail Safe Redundancy Connection	27
Command Screenshot	28
DHCP and Interface configuration	28
Floating Routing(Static Route protocol with AD).....	64
Testing.....	65
Conclusion	80

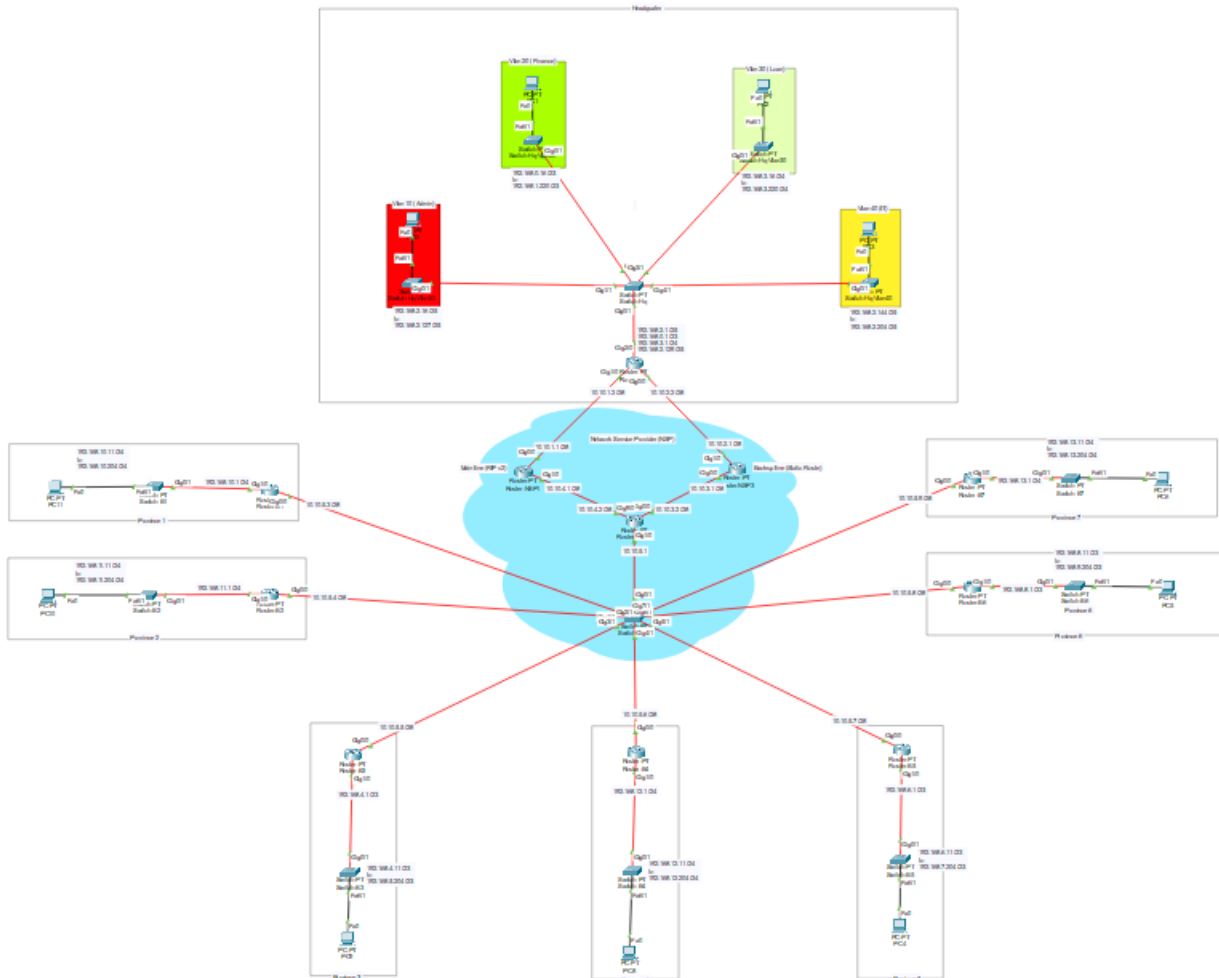
Introduction

In today's digitally driven business environment, a robust and scalable network infrastructure is critical for organizations to ensure seamless communication, data security, and operational continuity. This project focuses on designing and implementing a **multi-site network infrastructure** for a large insurance company with **one Head Office (HO)** and **seven Provincial Branches**. The primary objective is to create a secure, redundant, and future-proof network that facilitates reliable data transfer between all sites while adhering to industry best practices.

The insurance industry demands high availability and strict data integrity, necessitating a design that incorporates **dual ISP links** for failover at the Head Office, **VLAN segmentation** to isolate departmental traffic (Admin, Finance, Loan, and IT), and **dynamic routing protocols** (RIP and OSPF) to ensure efficient inter-site communication. Additionally, the network leverages **DHCP services** with reserved IP ranges to accommodate future scalability and device management.

This project emphasizes practical application of routing and switching principles, addressing real-world challenges such as redundancy, traffic prioritization, and secure segmentation. By integrating dual-homed routers, Inter-VLAN routing, and hierarchical subnetting, the proposed solution not only meets the current operational needs of the company but also provides a flexible framework for expansion. The following sections detail the network topology, configurations, and testing methodologies that underpin this design, demonstrating how theoretical concepts translate into a functional, enterprise-grade network infrastructure.

Topology



This is the IP addressing and subnetting table for all the branches.

Location& Employees	Subnet Size	Subnet/CI DR	Subnet Mask	IP Range	Usable IPs	Reserved IPs	DHCP Pool
Province 1(70)	/24 (256 IPs)	192.168.10 .0 /24	255.255 .255.0	192.168. 10.1 - 192.168. 10.254	254	192.168.10. 1-10, 192.168.10. 205-254	192.168.10.11 - 192.168.10.20 4
Province 2(95)	/24 (256 IPs)	192.168.11 .0 /24	255.255 .255.0	192.168. 11.1 - 192.168. 11.254	254	192.168.11. 1-10, 192.168.11. 205-254	192.168.11.11 - 192.168.11.20 4
Province 3(300)	/23 (512 IPs)	192.168.4. 0 /23	255.255 .254.0	192.168. 4.1 - 192.168. 5.254	510	192.168.4.1 -10, 192.168.5.2 05-254	192.168.4.11 - 192.168.5.204
Province 4(175)	/24 (256 IPs)	192.168.12 .0 /24	255.255 .255.0	192.168. 12.1 - 192.168. 12.254	254	192.168.12. 1-10, 192.168.12. 205-254	192.168.12.11 - 192.168.12.20 4
Province 5(450)	/23 (512 IPs)	192.168.6. 0 /23	255.255 .254.0	192.168. 6.1 - 192.168. 7.254	510	192.168.6.1 -10, 192.168.7.2 05-254	192.168.6.11 - 192.168.7.204
Province 6(280)	/23 (512 IPs)	192.168.8. 0 /23	255.255 .254.0	192.168. 8.1 - 192.168. 9.254	510	192.168.8.1 -10, 192.168.9.2 05-254	192.168.8.11 - 192.168.9.204
Province 7(120)	/24 (256 IPs)	192.168.13 .0 /24	255.255 .255.0	192.168. 13.1 - 192.168. 13.254	254	192.168.13. 1-10, 192.168.13. 205-254	192.168.13.11 - 192.168.13.20 4

This is the IP addressing and subnetting table for the entire head office department (Vlans).

VLAN	Department	Subnet/CIDR	Subnet Mask	Reserved IPs	DHCP Pool
10	Admin	192.168.2.0/25	255.255.255.128	2.1-2.15+2.93-2.127	2.16-2.92
20	Finance	192.168.0.0/23	255.255.254.0	0.1-0.15+1.221-1.254	0.16-1.220
30	Loan	192.168.3.0/24	255.255.255.0	3.1-3.15+3.221-3.254	3.16-3.220
40	IT	192.168.2.128/25	255.255.255.128	2.129-2.143+2.205-2.255	2.144-2.204

About Project

The network topology consists of a centralized Head Office and seven Provincial Branches, each connected through a Network Service Provider (NSP). The Network Service Provider (NSP) acts as a central hub for interconnecting all branch routers and the Head Office. The network uses small /28 subnets from the range 10.10.1.0 to 10.10.5.0, providing point-to-point WAN links between sites.

The design emphasizes scalability, performance, and redundancy, particularly at the core (Head Office). Each site has been carefully subnetted according to user count and future growth projections.

There are 16 IPs per Subnet which is 16 IPs (14 usable) and it is used for P2P connections between Head Office and each branch, as well as for the backup link at the Head Office.

1. Redundancy: The Head Office is connected to the NSP via two WAN links (primary and backup) for high availability.
3. Routing: All routers use RIP protocol to communicate with the Head Office and other branches through the NSP.
4. DHCP Configuration: Each branch router provides DHCP to local hosts, excluding reserved IPs.

Key DHCP Features in the Network Design

1. Automated IP Assignment:

DHCP dynamically allocates IP addresses, subnet masks, default gateways, and DNS server information to devices, reducing manual configuration errors and administrative overhead.

2. Reserved IP Ranges:

○ Head Office:

- First 15 IPs and last 35 IPs of each departmental subnet are excluded from DHCP pools.
- Reserved IPs are used for static devices (e.g., servers, printers, network equipment).

○ Provincial Branches:

- First 10 IPs and last 50 IPs of each branch subnet are reserved for future use or static assignments.

3. VLAN-Aware DHCP:

Each VLAN at the HO (Admin, Finance, Loan, IT) has a dedicated DHCP pool to ensure devices receive IPs specific to their departmental subnet.

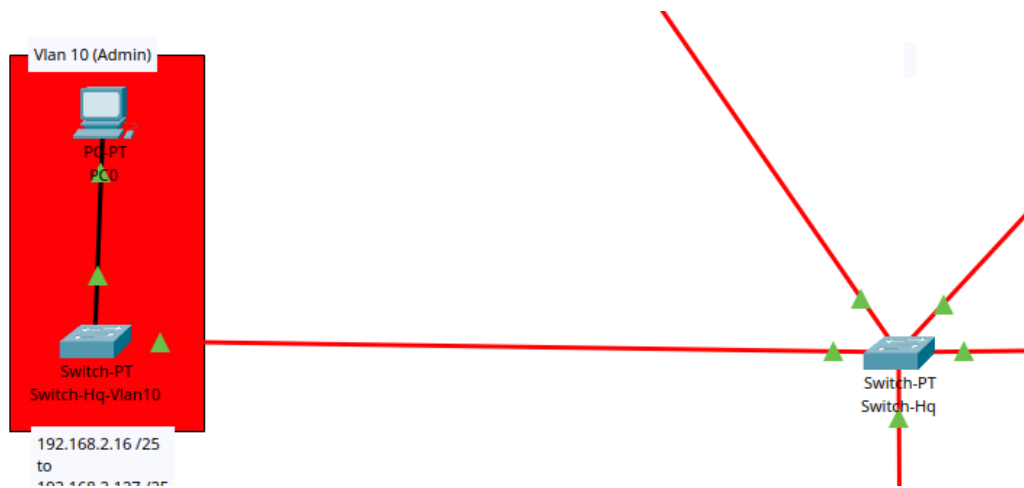
4. Localized DHCP Servers:

- HO Router: Acts as the DHCP server for all departmental VLANs.
- Branch Routers: Serve as DHCP servers for their respective branches.

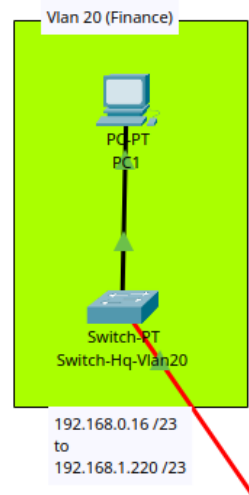
About Headquater Vlan

Firstly, in this project we used 4 different vlans in headquater to divide 4 departments of headquater, where vlan 10 is named as Admin, vlan 20 is named as Finance, Vlan 30 is named as Loan and Vlan 40 is named as IT . These are all the 4 departments inside the headquater only. we also have created intervlan connection between different Vlans(departments).

Those departments are connected using vlan technique calleed router on a stick where the switchc is connected to the router using trunk and in router interface we divide into sub interface and connection happens , in that router we made dhcp pool and use router as dhcp server to give each Vlan and devices its own dedicated addresses automatically. Every Vlan has different Ip range based on sub inter faces as a gateway. The first 15 ip addresses are reserved and last 35 IPs of network are reserved for future use in every vlan network.



In Vlan 10 named as Admin , it use
 ip network of : **192.168.2.0/24** with
 subnet mask of **255.255.255.128**,
 gateway of : 192.168.2.1
 the ip address range provided by dhcp server is :
 from 192.168.1.11 to 192.168.1.204
 reserved ip range: 192.168.2.1 - 192.168.2.15 & 192.168.2.93 - 192.168.2.127
 User here is 55.



In Vlan 20 named as Finance, it use

ip network of : **192.168.0.0 & 1.0/23** with

subnet mask of **255.255.254.0** ,

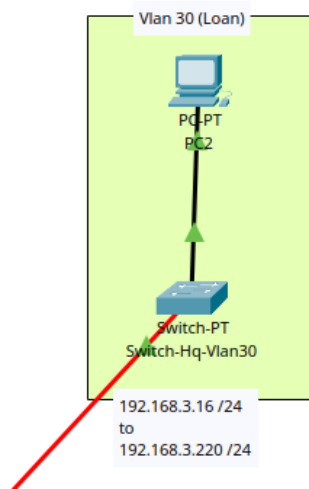
gateway of : 192.168.0.1

the ip address range provided by dhcp server is :

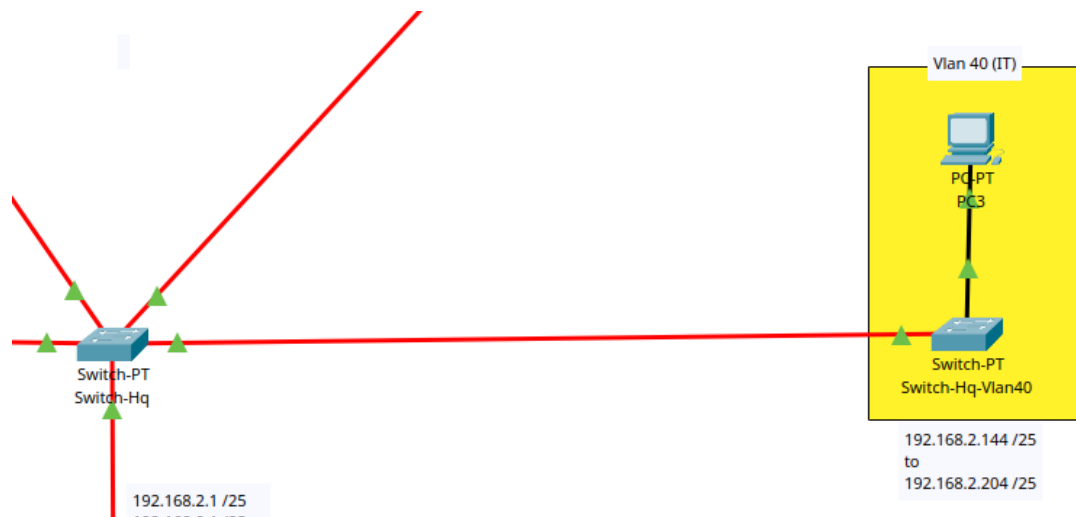
from **192.168.0.16** to **192.168.1.220**

reserved ip range:192.168.0.1 - 192.168.0.15 & 192.168.1.221- 192.168.1.254

User here is 290.



In Vlan 30 named as Loan, it use
 ip network of : **192.168.3.0/24** with
 subnet mask of **255.255.255.0** ,
 gateway of : 192.168.3.1
 the ip address range provided by dhcp server is :
 from **192.168.3.16** to **192.168.3.220**
 reserved ip range: 192.168.3.1 - 192.168.3.15 & 192.168.3.221 - 192.168.3.254
 User here is 120.



In Vlan 40 named as IT, it use
 ip network of : **192.168.2.12/25** with
 subnet mask of **255.255.255.128**,
 gateway of : 192.168.2.129
 the ip address range provided by dhcp server is :
 from **192.168.2.144** to **192.168.2.204**
 reserved ip range: 192.168.2.129 - 192.168.2.143 & 192.168.2.205 - 192.168.2.255

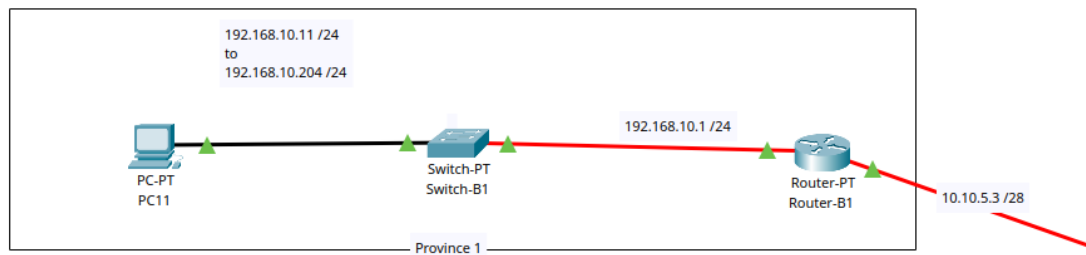
About Branches

In this project we have seven provinces with seven different branches, where every province has a branch, every branch has a dedicated network and have minimum users. Every branches are connected to the headquarter using network provided by NSP (Network Service Provider) which also give them dedicated connected to internet/intranet.

In every branch has its own dhcp pool in their dedicated router to provide their end devices with dhcp ip address automatically.

Every branch has reserved ip address for future use .

Branch 1 :



ip address of : **192.168.10.0/24** with

subnet mask of **255.255.255.0** ,

gateway of : 192.168.10.1

the ip address range provided by dhcp server is :

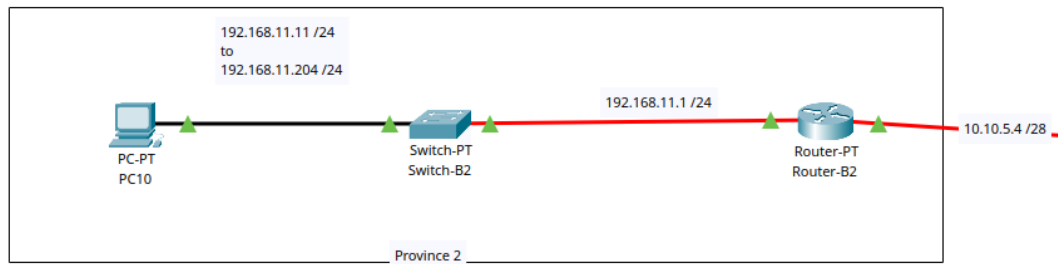
from **192.168.10.11** to **192.168.10.204**

reserved ip range: 192.168.10.1 - 192.168.10.10 & 192.168.10.205- 192.168.10.254

User here is 70.

total usable ip: 254

Branch 2:



ip address of : **192.168.11.0/24**with

subnet mask of **255.255.255.0** ,

gateway of : 192.168.11.1

the ip address range provided by dhcp server is :

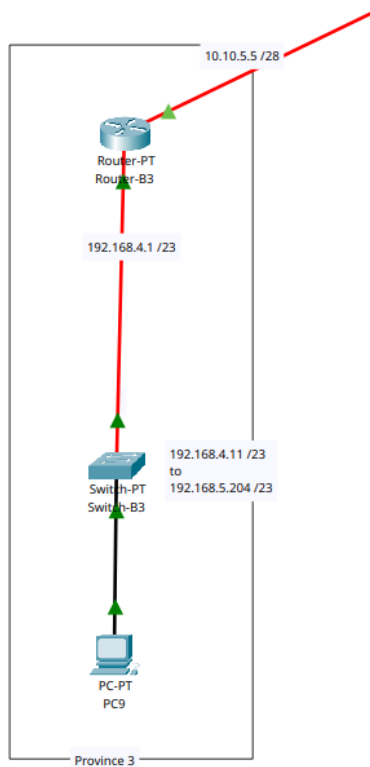
from **192.168.11.11** to **192.168.11.204**

reserved ip range: 192.168.11.1 - 192.168.11.10 & 192.168.11.205- 192.168.11.254

User here is 95.

total usable ip: 254

Branch 3:



ip address of : **192.168.4.0/23 & 192.168.5.0** with
subnet mask of **255.255.254.0** ,

gateway of : 192.168.4.1

the ip address range provided by dhcp server is :

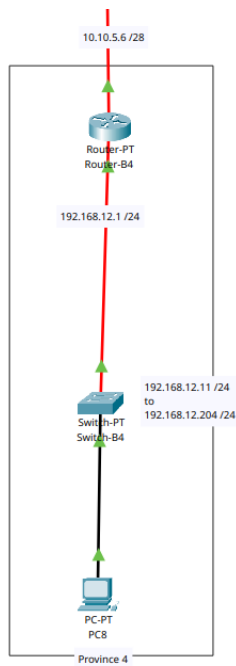
from **192.168.4.11** to **192.168.5.204**

reserved ip range: 192.168.4.1 - 192.168.4.10 & 192.168.5.205- 192.168.5.254

User here is 300.

total usable ip: 510

Branch 4:



ip address of : **192.168.12.0/24** with

subnet mask of **255.255.255.0** ,

gateway of : 192.168.12.1

the ip address range provided by dhcp server is :

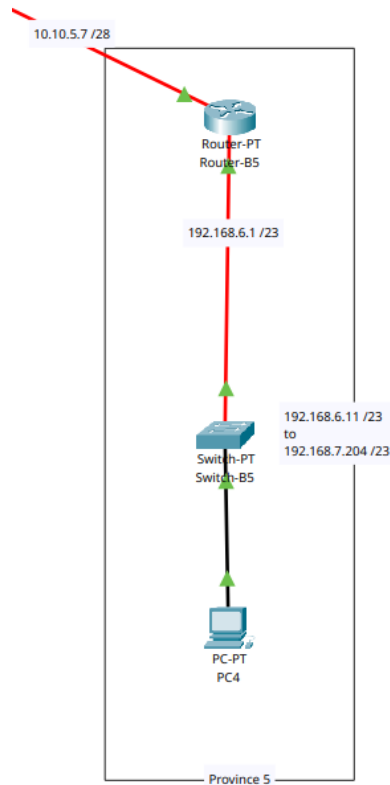
from **192.168.12.1** to **192.168.12.204**

reserved ip range: 192.168.12.1 - 192.168.12.10 & 192.168.12.204- 192.168.12.254

User here is 175.

total usable ip: 254

Branch 5:



ip address of : **192.168.6.0/23 & 192.168.7.0/23** with
subnet mask of **255.255.254.0** ,

gateway of : 192.168.6.1

the ip address range provided by dhcp server is :

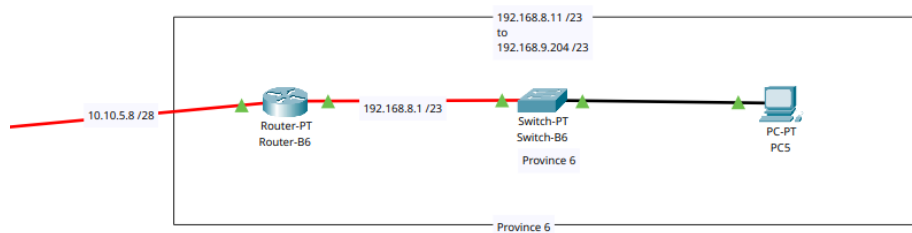
from **192.168.6.11** to **192.168.7.204**

reserved ip range: 192.168.6.1 - 192.168.6.10 & 192.168.7.205- 192.168.7.254

User here is 450

total usable ip: 510

Branch 6:



ip address of : **192.168.8.0/23** with

subnet mask of **255.255.254.0** ,

gateway of : 192.168.8.1

the ip address range provided by dhcp server is :

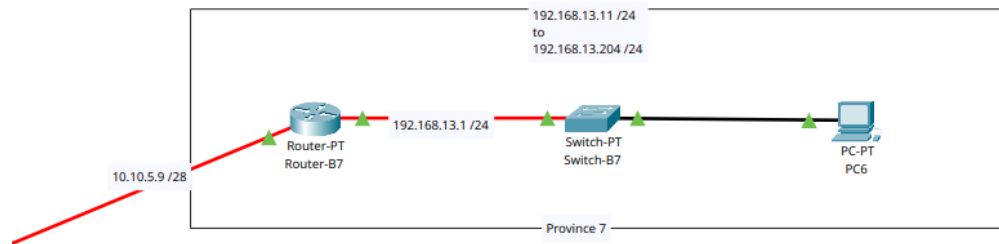
from **192.168.8.11** to **192.168.9.204**

reserved ip range: 192.168.8.1 - 192.168.8.10 & 192.168.9.205- 192.168.9.254

User here is 280

total usable ip: 510

Branch 7:



ip address of : **192.168.13.0/24** with

subnet mask of **255.255.255.0** ,

gateway of : 192.168.13.1

the ip address range provided by dhcp server is :

from **192.168.13.11** to **192.168.13.204**

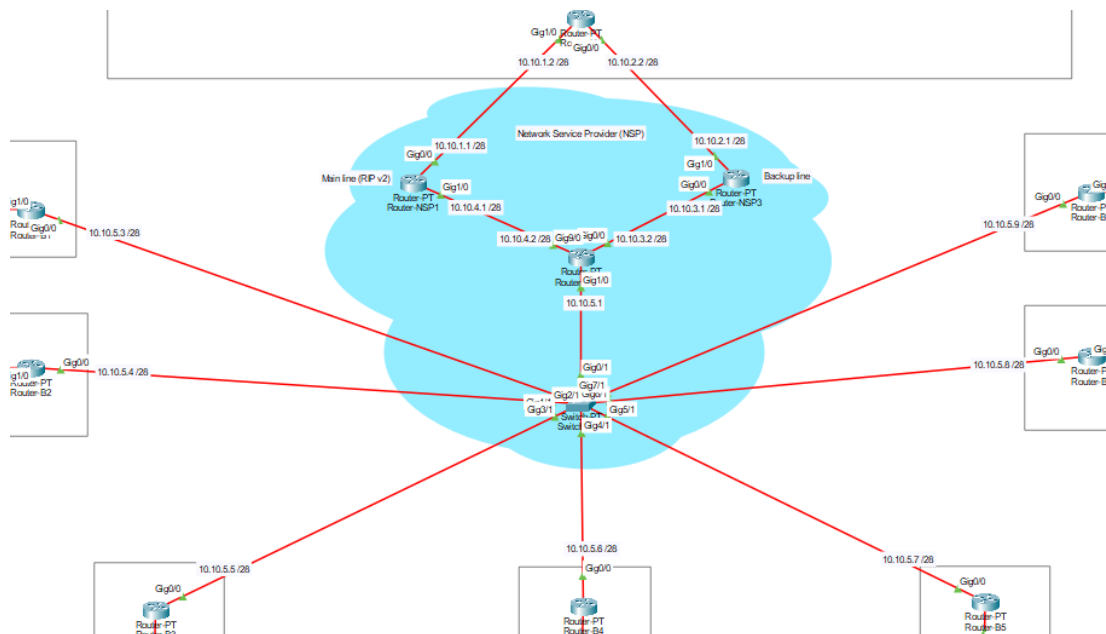
reserved ip range: 192.168.13.1 - 192.168.13.10 & 192.168.13.205- 192.168.13.254

User here is 220.

total usable ip: 254

About NSP

Nsp are organizations which provide network public and private network services like internet and intranet.



For Demonstration we have used 3 routers as Nsp to show the architecture. With backup and default route.

This Network uses Rip V2 protocol for routing. With floating route in hq router for backup.

Having router name

Router-NSP1

Router-NSP2

Router-NSP3

Connecting headquarter with branches in every province using network provided by nsp.

This nsp architecture uses network range between 10.10.1.x /28 to 10.10.1.x /28

Where headquarter is provide with 10.10.1.2 /28 ip address for main line and for backup with 10.10.2.2 /28 ip address

Also branches are provided with

Branch1 with ip address of 10.10.5.3 /28

Branch2 with ip address of 10.10.5.4 /28

Branch3 with ip address of 10.10.5.5 /28

Branch4 with ip address of 10.10.5.6 /28

Branch5 with ip address of 10.10.5.7 /28

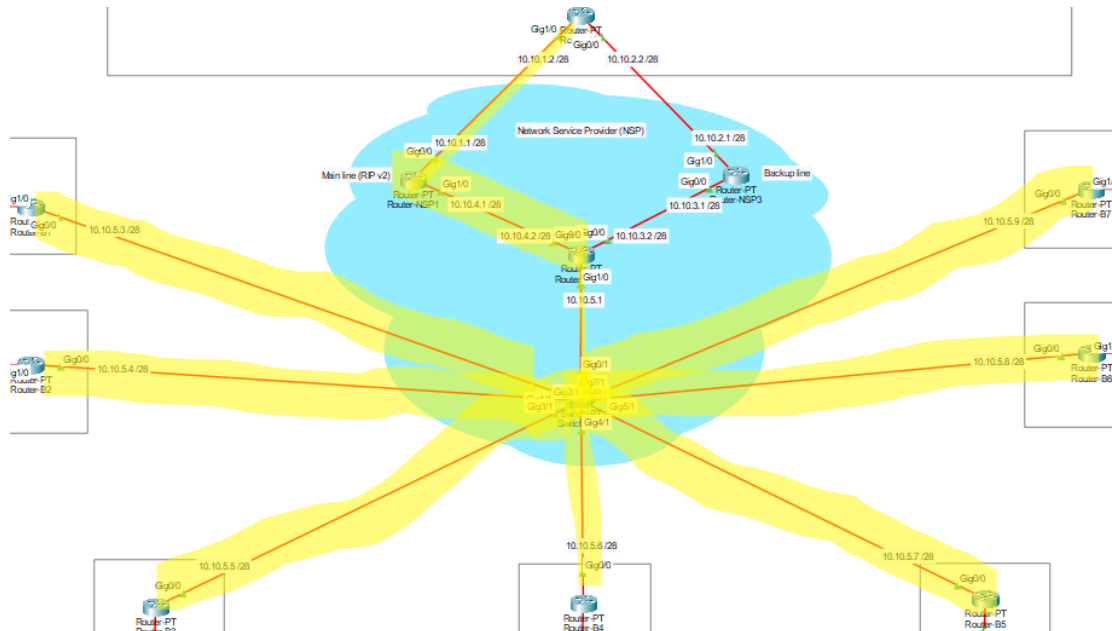
Branch6 with ip address of 10.10.5.8 /28

Branch7 with ip address of 10.10.5.9 /28

To connect all branches and headquarter with each other.

About Connection

Default line Connection



Router-Hq -> Router-NSP1 -> Router-NSP2 -> Switch-NSP -> (all provance network)

Yellow highlighted part show the default route and there dedicated ip address.

The default route defined using floating static route in the Headquater Router. To chose this line as default route. With default administrative distance.

Using command

```
Router-Hq(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.1
```

In case of any failure in default network. It will use the given path highlighted using blue.
It add as backup using floating static route method. With giving extra 10 Administrative Distance to make it last choice

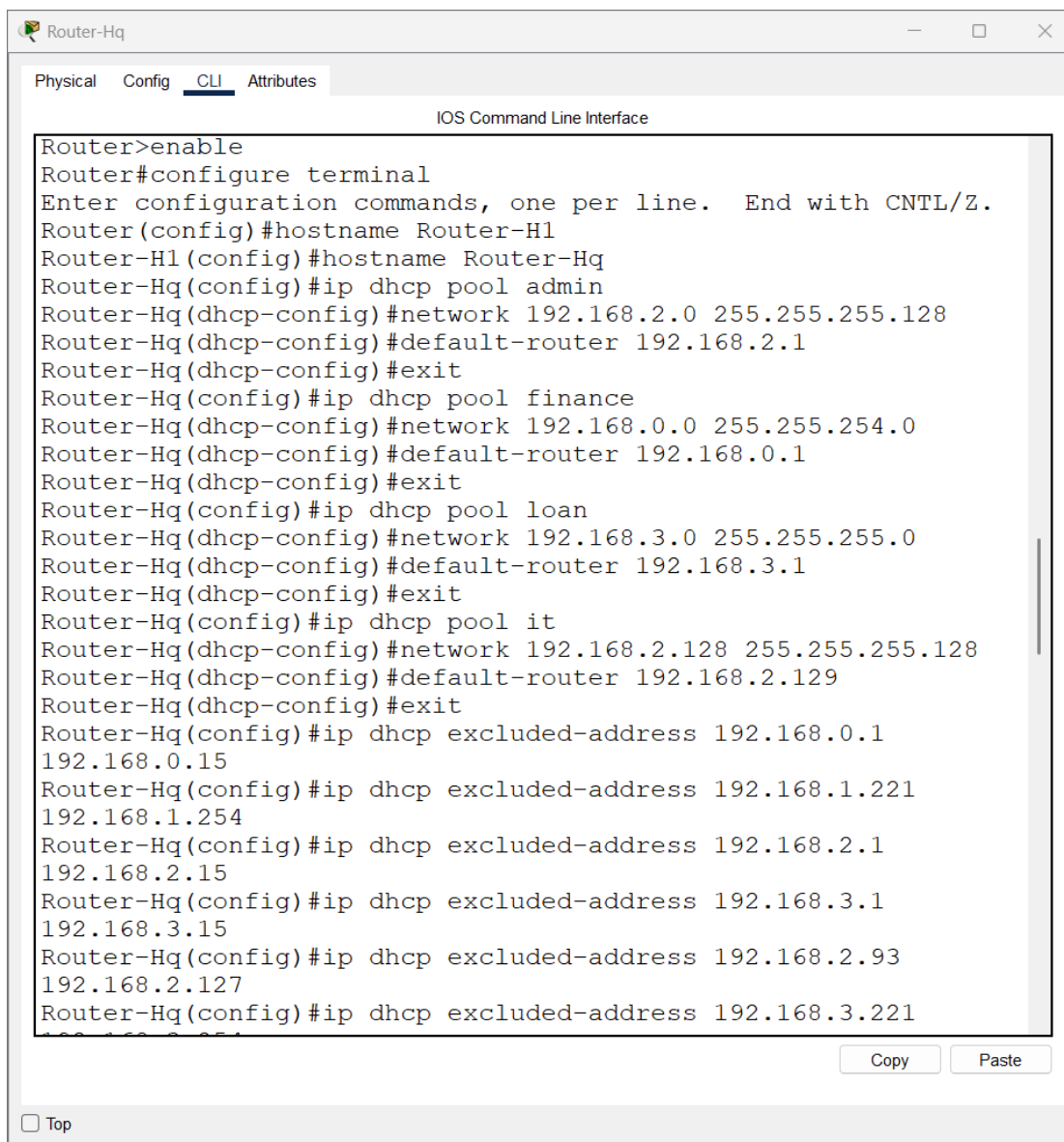
```
Router-Hq(config)#ip route 0.0.0.0 0.0.0.0 10.10.2.1 10
```

Command Screenshot

DHCP and Interface configuration

Headquarter with Vlan and intervlan configuration using router in a stick method

Router-Hq



The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "Router-Hq". The window has tabs for "Physical", "Config", "CLI", and "Attributes", with "CLI" currently selected. The CLI text area displays the following commands and their outputs:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-H1
Router-H1(config)#hostname Router-Hq
Router-Hq(config)#ip dhcp pool admin
Router-Hq(dhcp-config)#network 192.168.2.0 255.255.255.128
Router-Hq(dhcp-config)#default-router 192.168.2.1
Router-Hq(dhcp-config)#exit
Router-Hq(config)#ip dhcp pool finance
Router-Hq(dhcp-config)#network 192.168.0.0 255.255.254.0
Router-Hq(dhcp-config)#default-router 192.168.0.1
Router-Hq(dhcp-config)#exit
Router-Hq(config)#ip dhcp pool loan
Router-Hq(dhcp-config)#network 192.168.3.0 255.255.255.0
Router-Hq(dhcp-config)#default-router 192.168.3.1
Router-Hq(dhcp-config)#exit
Router-Hq(config)#ip dhcp pool it
Router-Hq(dhcp-config)#network 192.168.2.128 255.255.255.128
Router-Hq(dhcp-config)#default-router 192.168.2.129
Router-Hq(dhcp-config)#exit
Router-Hq(config)#ip dhcp excluded-address 192.168.0.1
192.168.0.15
Router-Hq(config)#ip dhcp excluded-address 192.168.1.221
192.168.1.254
Router-Hq(config)#ip dhcp excluded-address 192.168.2.1
192.168.2.15
Router-Hq(config)#ip dhcp excluded-address 192.168.3.1
192.168.3.15
Router-Hq(config)#ip dhcp excluded-address 192.168.2.93
192.168.2.127
Router-Hq(config)#ip dhcp excluded-address 192.168.3.221
192.168.3.255
```

At the bottom of the CLI window, there are "Copy" and "Paste" buttons. Below the CLI window, there is a "Top" button with a checkbox next to it.

Router-Hq

PhysicalConfigCLIAttributes

IOS Command Line Interface

```
192.168.3.254
Router-Hq(config)#ip dhcp excluded-address 192.168.2.129
192.168.2.143
Router-Hq(config)#ip dhcp excluded-address 192.168.2.205
192.168.2.255
Router-Hq(config)#interface gig 0/1.10
%Invalid interface type and number
Router-Hq(config)#interface gig 2/0.10
Router-Hq(config-subif)#enacsulation dot1q 10
      ^
% Invalid input detected at '^' marker.

Router-Hq(config-subif)#encapsulation dot1q 10
Router-Hq(config-subif)#ip address 192.168.2.1 255.255.255.128
Router-Hq(config-subif)#no shutdown
Router-Hq(config-subif)#exit
Router-Hq(config)#interface gig 2/0.20
Router-Hq(config-subif)#ip address 192.168.0.1 255.255.254.0

% Configuring IP routing on a LAN subinterface is only allowed
if that
subinterface is already configured as part of an IEEE 802.10,
IEEE 802.1Q,
or ISL VLAN.

Router-Hq(config-subif)#encapsulation dot1q 20
Router-Hq(config-subif)#ip address 192.168.0.1 255.255.254.0
Router-Hq(config-subif)#no shutdown
Router-Hq(config-subif)#exit
Router-Hq(config)#interface gig 2/0.30
Router-Hq(config-subif)#encapsulation dot1q 30
Router-Hq(config-subif)#ip address 192.168.3.1 255.255.255.0
```

CopyPaste

☐ Top

Router-Hq

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
Router-Hq(config-subif)#no shutdown
Router-Hq(config-subif)#exit
Router-Hq(config)#interface gig 2/0.40
Router-Hq(config-subif)#encapsulation dot1q 40
Router-Hq(config-subif)#ip address 192.168.2.129
255.255.255.128
Router-Hq(config-subif)#no shutdown
Router-Hq(config-subif)#exit
Router-Hq(config)#interface gig 2/0
Router-Hq(config-if)#no shutdown

Router-Hq(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet2/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet2/0, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet2/0.10, changed
state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet2/0.10, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet2/0.20, changed
state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet2/0.20, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet2/0.30, changed
state to up
```

Copy

Paste

☐ Top

Router-Hq

Physical

Config

CLI

Attributes

IOS Command Line Interface

GigabitEthernet2/0.30, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet2/0.40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0.40, changed state to up

Router-Hq(config-if)#interface gig 1/0

Router-Hq(config-if)#ip address 10.10.1.2 255.255.255.240

Router-Hq(config-if)#no shutdown

Router-Hq(config-if)#

%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up

Router-Hq(config-if)#exit

Router-Hq(config)#interface gig 0/0

Router-Hq(config-if)#ip address 10.10.2.2 255.255.255.240

Router-Hq(config-if)#no shutdown

Router-Hq(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

exit

Router-Hq(config)#

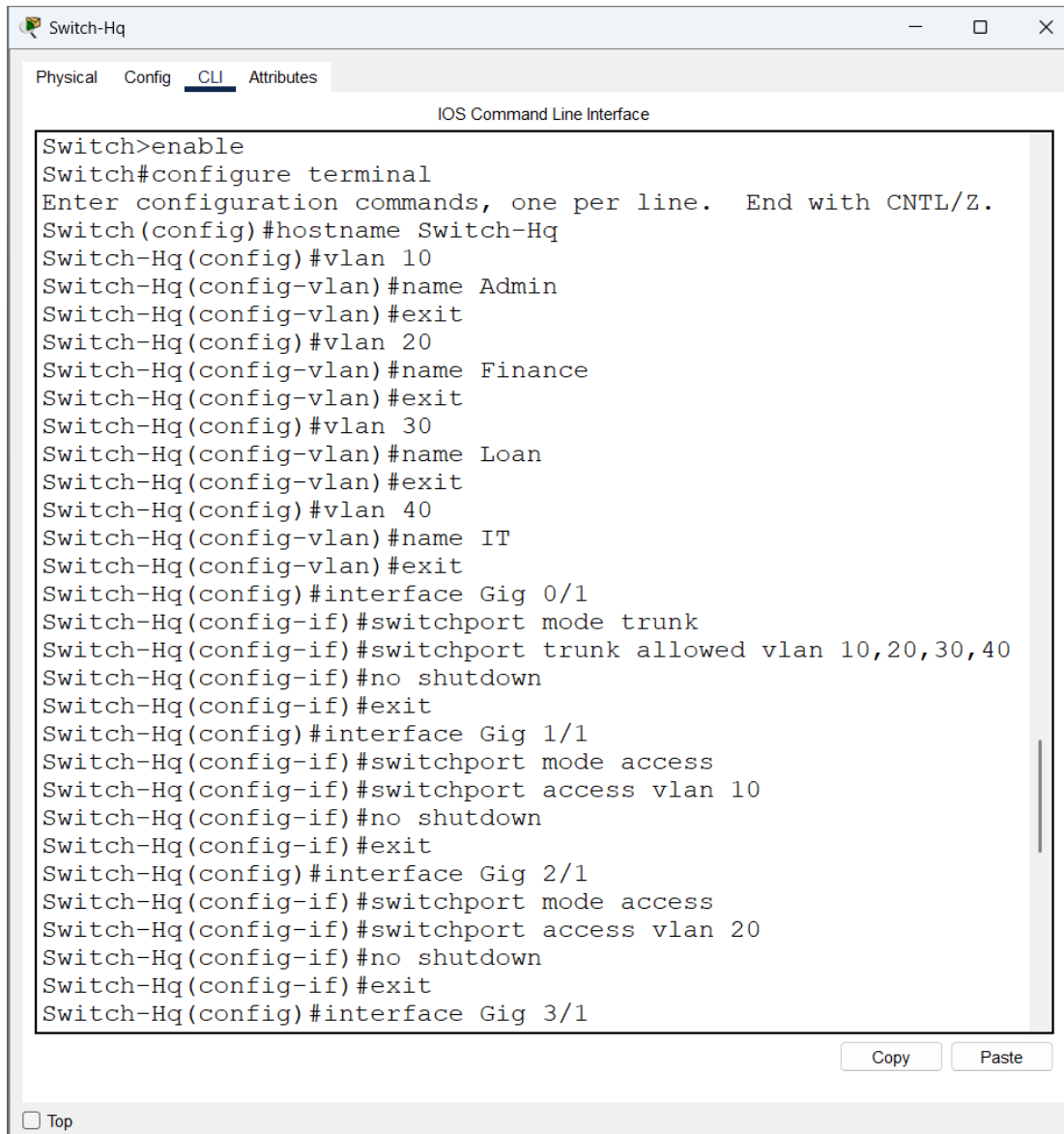
Copy

Paste

☐ Top

31

Switch-Hq



The screenshot shows a window titled "Switch-Hq" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a series of commands entered into a terminal, configuring a switch named "Switch-Hq". The commands include enabling the terminal, setting the hostname, creating VLANs 10, 20, 30, and 40 with names Admin, Finance, Loan, and IT respectively, and configuring interfaces Gig 0/1, 1/1, 2/1, and 3/1. Interface Gig 0/1 is configured as a trunk port allowing VLANs 10, 20, 30, and 40. Interfaces 1/1, 2/1, and 3/1 are configured as access ports for VLANs 10, 20, and 30 respectively. The window has a "Copy" and "Paste" button at the bottom right and a "Top" link at the bottom left.

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Switch-Hq
Switch-Hq(config)#vlan 10
Switch-Hq(config-vlan)#name Admin
Switch-Hq(config-vlan)#exit
Switch-Hq(config)#vlan 20
Switch-Hq(config-vlan)#name Finance
Switch-Hq(config-vlan)#exit
Switch-Hq(config)#vlan 30
Switch-Hq(config-vlan)#name Loan
Switch-Hq(config-vlan)#exit
Switch-Hq(config)#vlan 40
Switch-Hq(config-vlan)#name IT
Switch-Hq(config-vlan)#exit
Switch-Hq(config)#interface Gig 0/1
Switch-Hq(config-if)#switchport mode trunk
Switch-Hq(config-if)#switchport trunk allowed vlan 10,20,30,40
Switch-Hq(config-if)#no shutdown
Switch-Hq(config-if)#exit
Switch-Hq(config)#interface Gig 1/1
Switch-Hq(config-if)#switchport mode access
Switch-Hq(config-if)#switchport access vlan 10
Switch-Hq(config-if)#no shutdown
Switch-Hq(config-if)#exit
Switch-Hq(config)#interface Gig 2/1
Switch-Hq(config-if)#switchport mode access
Switch-Hq(config-if)#switchport access vlan 20
Switch-Hq(config-if)#no shutdown
Switch-Hq(config-if)#exit
Switch-Hq(config)#interface Gig 3/1
```


Switch-Hq

Physical Config CLI Attributes

IOS Command Line Interface

Switch-Hq(config-if)#switchport mode access
Switch-Hq(config-if)#switchport access vlan 30
Switch-Hq(config-if)#no shutdown
Switch-Hq(config-if)#exit
Switch-Hq(config)#interface Gig 3/1
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
on GigabitEthernet2/1 (20), with Switch GigabitEthernet0/1
(1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
on GigabitEthernet3/1 (30), with Switch GigabitEthernet0/1
(1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
on GigabitEthernet1/1 (10), with Switch Gigabit
Switch-Hq(config)#interface Gig 4/1
Switch-Hq(config-if)#switchport mode access
Switch-Hq(config-if)#switchport access vlan 40
Switch-Hq(config-if)#no shutdown
Switch-Hq(config-if)#exit
Switch-Hq(config)#exit
Switch-Hq#
%SYS-5-CONFIG_I: Configured from console by console

Switch-Hq#copy running-config statur
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
on GigabitEthernet3/1 (30), with Switch GigabitEthernet0/1
(1).

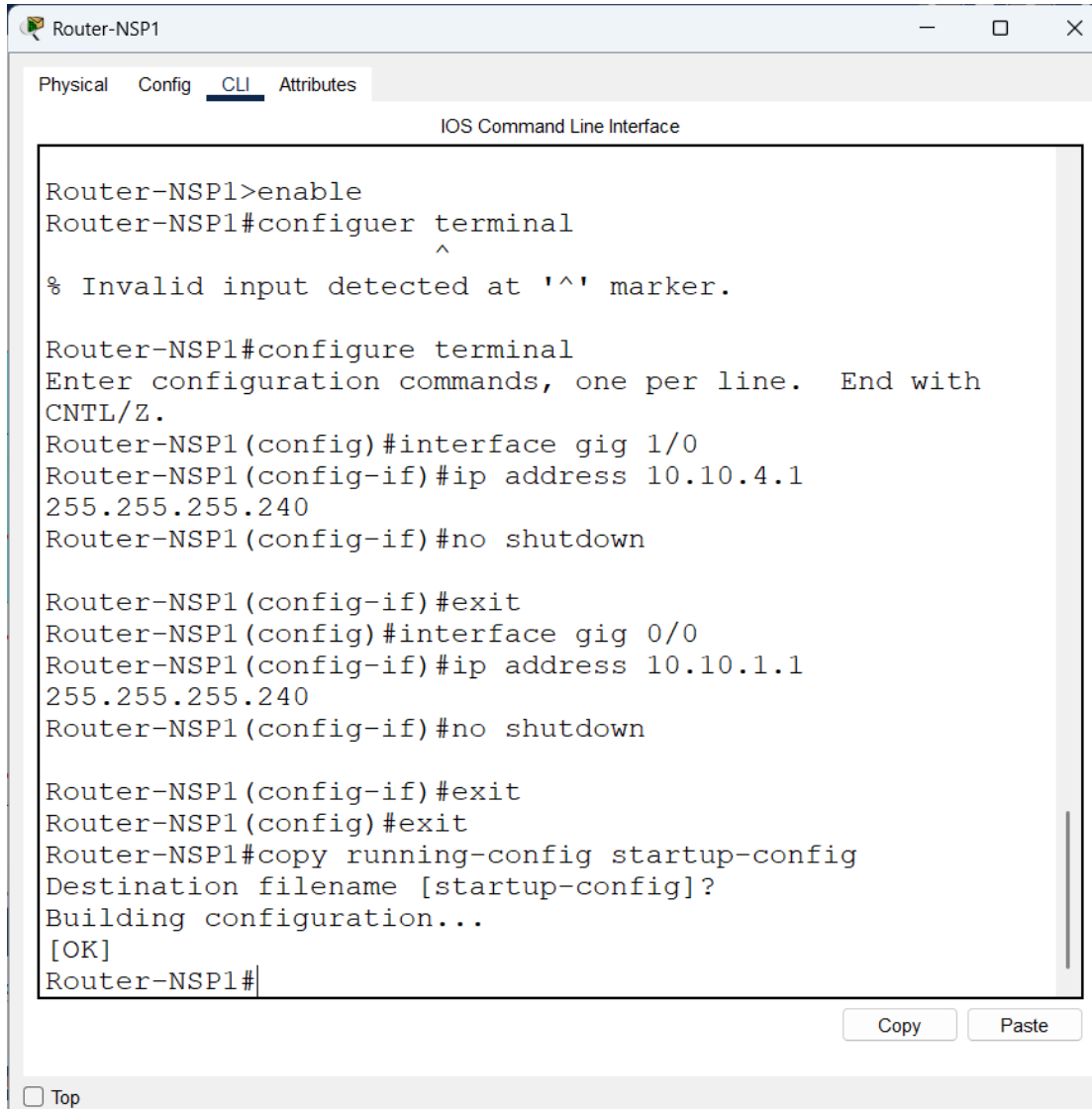
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered
on GigabitEthernet2/1 (20), with Switch GigabitEthernet0/1
(1).

Copy Paste

☐ Top

Network Service Provider (NSP)

Router-NSP1



The screenshot shows a web-based interface for Router-NSP1. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs is a title bar 'IOS Command Line Interface'. The main area is a text box containing the following commands and their outputs:

```
Router-NSP1>enable
Router-NSP1#configuer terminal
      ^
% Invalid input detected at '^' marker.

Router-NSP1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-NSP1(config)#interface gig 1/0
Router-NSP1(config-if)#ip address 10.10.4.1
255.255.255.240
Router-NSP1(config-if)#no shutdown

Router-NSP1(config-if)#exit
Router-NSP1(config)#interface gig 0/0
Router-NSP1(config-if)#ip address 10.10.1.1
255.255.255.240
Router-NSP1(config-if)#no shutdown

Router-NSP1(config-if)#exit
Router-NSP1(config)#exit
Router-NSP1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-NSP1#
```

At the bottom right of the text box are 'Copy' and 'Paste' buttons. At the bottom left of the window is a 'Top' button.

Router-NSP2

Router-NSP2

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-NSP2(config)#interface gig 1/0
Router-NSP2(config-if)#ip address 10.10.5.1 255.255.255.240
Router-NSP2(config-if)#no shutdown

Router-NSP2(config-if)#exit
Router-NSP2(config)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-NSP2(config)#interface gig 9/0
Router-NSP2(config-if)#ip address 10.10.4.2 255.255.255.240
Router-NSP2(config-if)#no shutdown

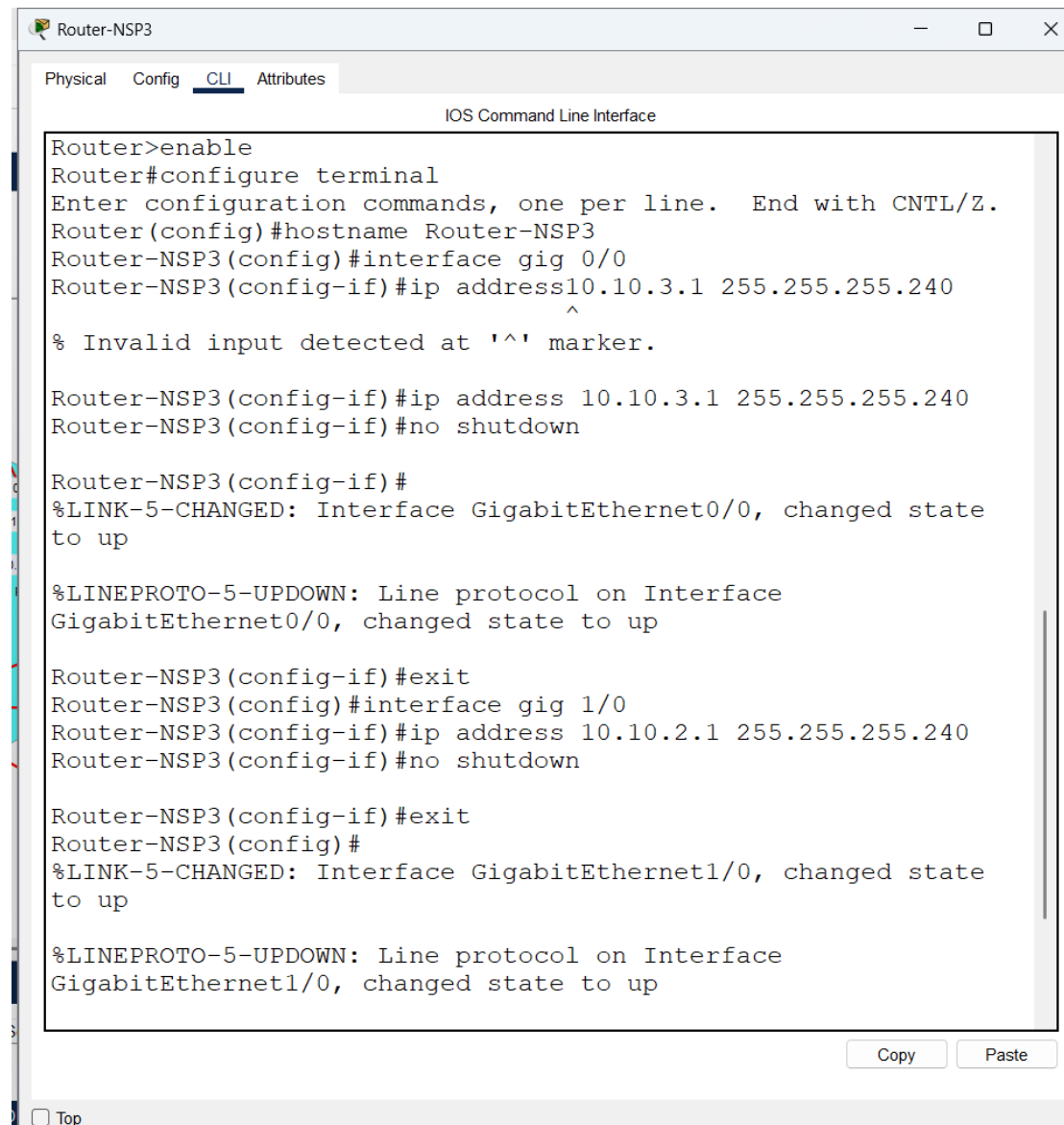
%LINK-5-CHANGED: Interface GigabitEthernet9/0, changed state
to down
Router-NSP2(config-if)#exit
Router-NSP2(config)#interface gig 0/0
Router-NSP2(config-if)#ip address 10.10.3.2 255.255.255.240
Router-NSP2(config-if)#no shutdown

%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to down
Router-NSP2(config-if)#
Router-NSP2(config-if)#exit
Router-NSP2(config)#exit
Router-NSP2#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
```

Copy Paste

☐ Top

Router-NSP3



The screenshot shows a web-based interface for a router named Router-NSP3. The interface has tabs for Physical, Config, CLI, and Attributes, with the CLI tab selected. The CLI window displays the following text:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router-NSP3
Router-NSP3(config)#interface gig 0/0
Router-NSP3(config-if)#ip address10.10.3.1 255.255.255.240
      ^
% Invalid input detected at '^' marker.

Router-NSP3(config-if)#ip address 10.10.3.1 255.255.255.240
Router-NSP3(config-if)#no shutdown

Router-NSP3(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

Router-NSP3(config-if)#exit
Router-NSP3(config)#interface gig 1/0
Router-NSP3(config-if)#ip address 10.10.2.1 255.255.255.240
Router-NSP3(config-if)#no shutdown

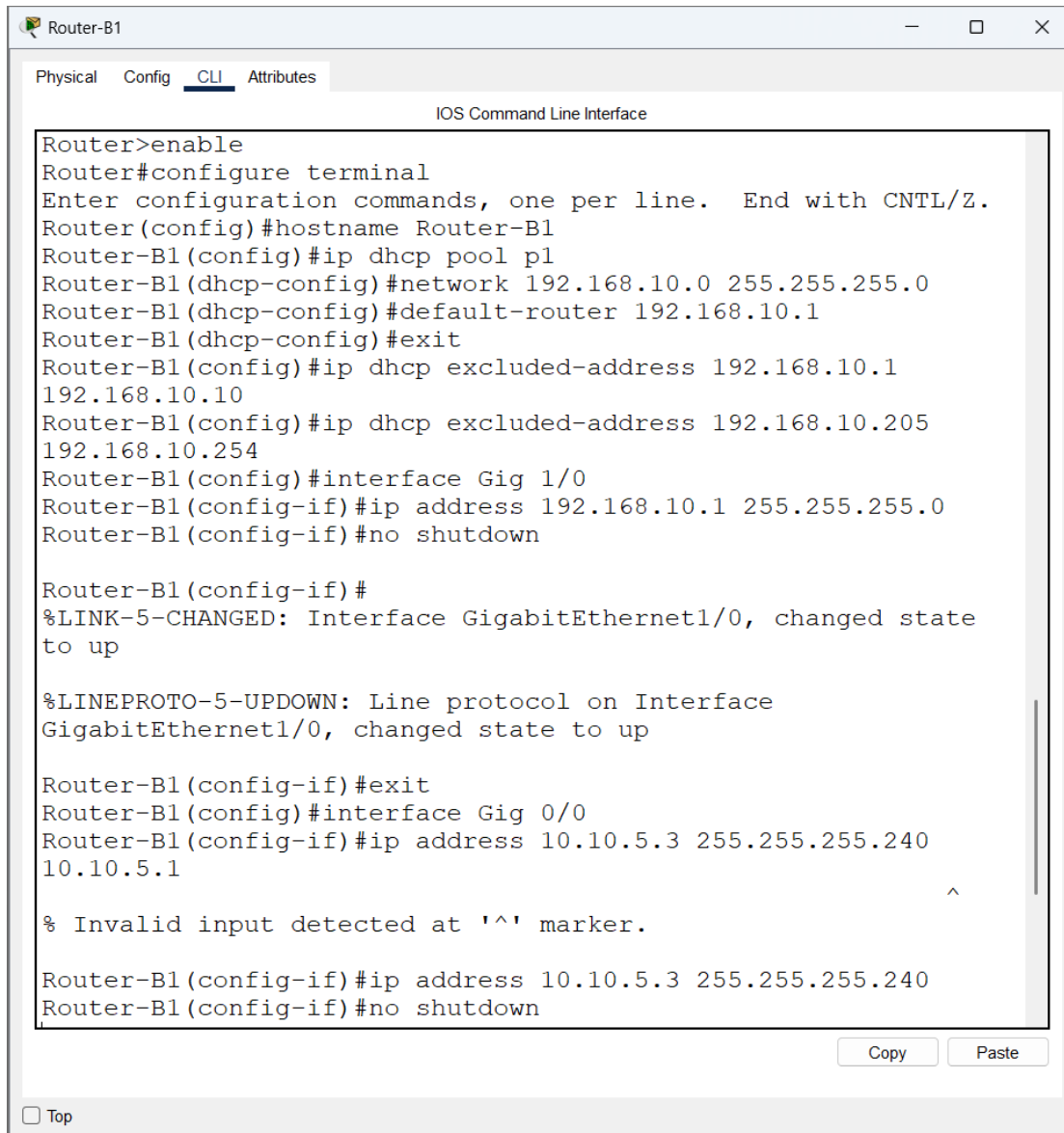
Router-NSP3(config-if)#exit
Router-NSP3(config)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up
```

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

Province 1

Router-B1



```
Router-B1
Physical Config CLI Attributes
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router-B1
Router-B1(config)#ip dhcp pool p1
Router-B1(dhcp-config)#network 192.168.10.0 255.255.255.0
Router-B1(dhcp-config)#default-router 192.168.10.1
Router-B1(dhcp-config)#exit
Router-B1(config)#ip dhcp excluded-address 192.168.10.1
192.168.10.10
Router-B1(config)#ip dhcp excluded-address 192.168.10.205
192.168.10.254
Router-B1(config)#interface Gig 1/0
Router-B1(config-if)#ip address 192.168.10.1 255.255.255.0
Router-B1(config-if)#no shutdown

Router-B1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B1(config-if)#exit
Router-B1(config)#interface Gig 0/0
Router-B1(config-if)#ip address 10.10.5.3 255.255.255.240
10.10.5.1
^
% Invalid input detected at '^' marker.

Router-B1(config-if)#ip address 10.10.5.3 255.255.255.240
Router-B1(config-if)#no shutdown
```

Copy Paste

☐ Top

Router-B1

Physical Config CLI Attributes

IOS Command Line Interface

```
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B1(config-if)#exit
Router-B1(config)#interface Gig 0/0
Router-B1(config-if)#ip address 10.10.5.3 255.255.255.240
10.10.5.1
^

% Invalid input detected at '^' marker.

Router-B1(config-if)#ip address 10.10.5.3 255.255.255.240
Router-B1(config-if)#no shutdown

Router-B1(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

Router-B1(config-if)#exit
Router-B1(config)#exit
Router-B1#
%SYS-5-CONFIG_I: Configured from console by console

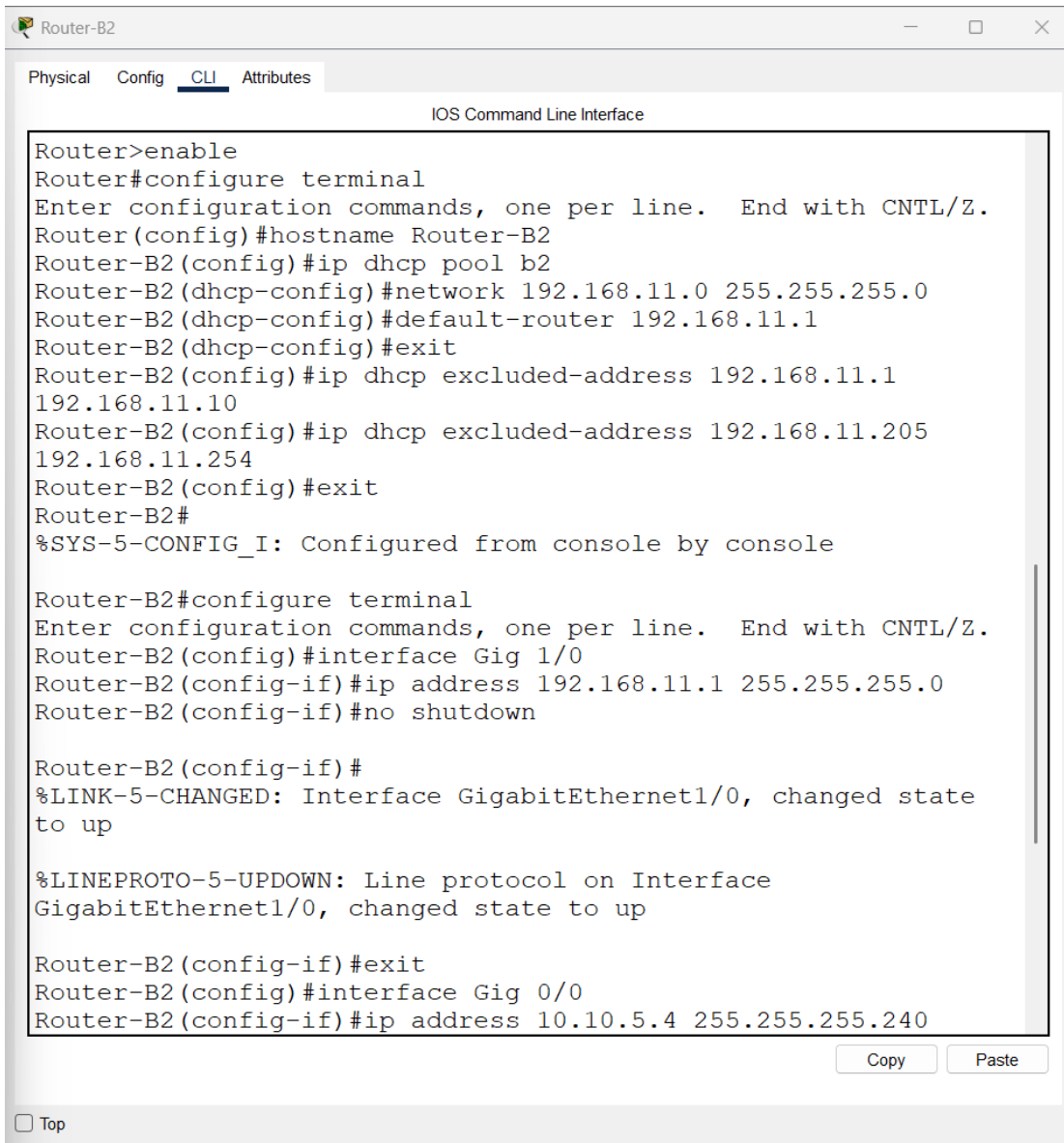
Router-B1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B1#
```

Copy Paste

☐ Top

Province 2

Router-B2



```
Router-B2
Physical Config CLI Attributes
IOS Command Line Interface

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router-B2
Router-B2(config)#ip dhcp pool b2
Router-B2(dhcp-config)#network 192.168.11.0 255.255.255.0
Router-B2(dhcp-config)#default-router 192.168.11.1
Router-B2(dhcp-config)#exit
Router-B2(config)#ip dhcp excluded-address 192.168.11.1
192.168.11.10
Router-B2(config)#ip dhcp excluded-address 192.168.11.205
192.168.11.254
Router-B2(config)#exit
Router-B2#
%SYS-5-CONFIG_I: Configured from console by console

Router-B2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router-B2(config)#interface Gig 1/0
Router-B2(config-if)#ip address 192.168.11.1 255.255.255.0
Router-B2(config-if)#no shutdown

Router-B2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B2(config-if)#exit
Router-B2(config)#interface Gig 0/0
Router-B2(config-if)#ip address 10.10.5.4 255.255.255.240
```

Copy Paste

☐ Top

Router-B2

Physical Config CLI Attributes

IOS Command Line Interface

Router-B2(config-if)#ip address 192.168.11.1 255.255.255.0
Router-B2(config-if)#no shutdown

Router-B2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up

Router-B2(config-if)#exit
Router-B2(config)#interface Gig 0/0
Router-B2(config-if)#ip address 10.10.5.4 255.255.255.240
Router-B2(config-if)#no shutdown

Router-B2(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

Router-B2(config-if)#exit
Router-B2(config)#exit
Router-B2#
%SYS-5-CONFIG_I: Configured from console by console

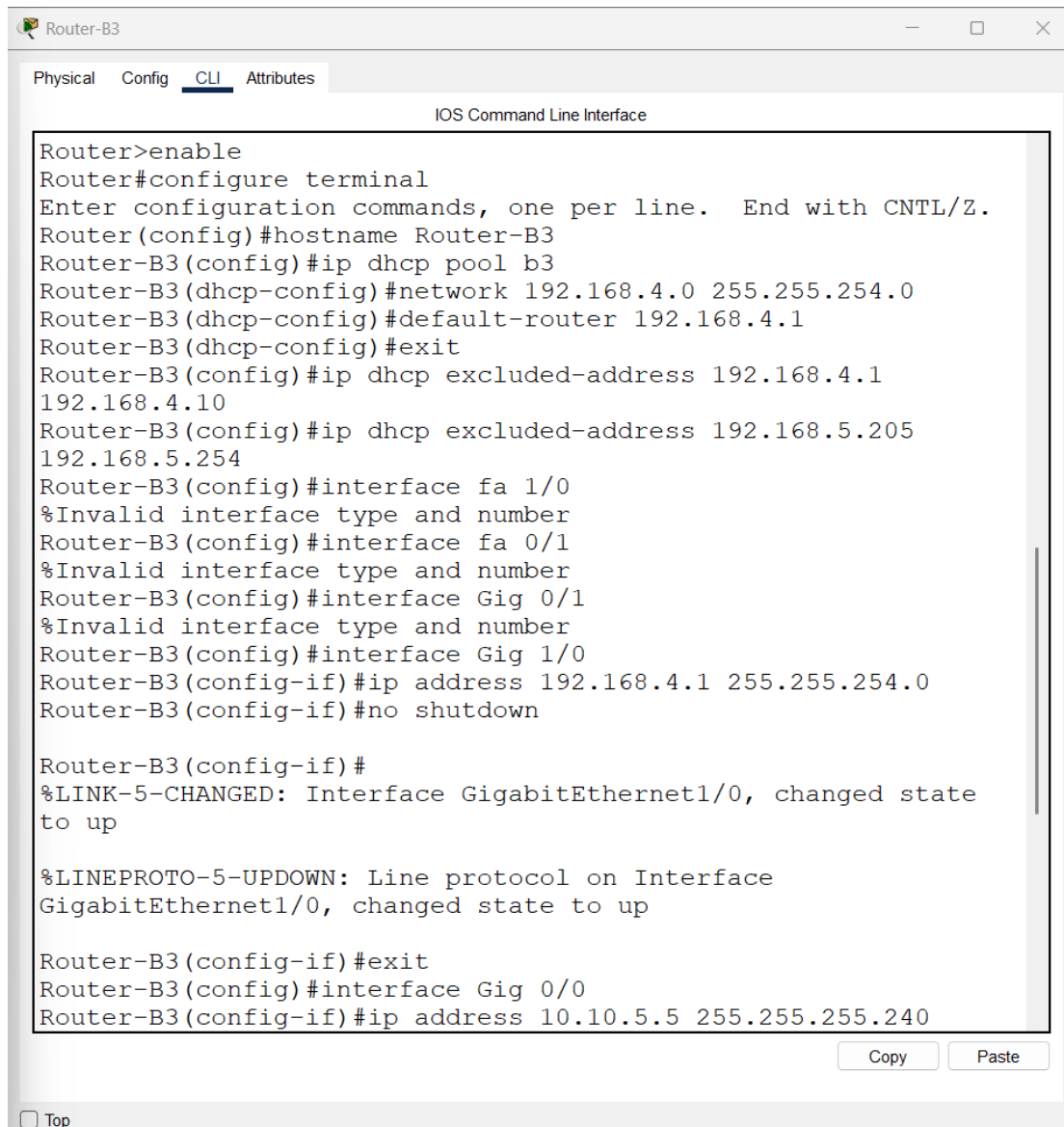
Router-B2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B2#

Copy Paste

☐ Top

Province 3

Router-B3



The screenshot shows a web-based interface for configuring a router named Router-B3. The interface has tabs for Physical, Config, CLI, and Attributes, with the CLI tab selected. The CLI window displays the following commands and their outputs:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-B3
Router-B3(config)#ip dhcp pool b3
Router-B3(dhcp-config)#network 192.168.4.0 255.255.254.0
Router-B3(dhcp-config)#default-router 192.168.4.1
Router-B3(dhcp-config)#exit
Router-B3(config)#ip dhcp excluded-address 192.168.4.1
192.168.4.10
Router-B3(config)#ip dhcp excluded-address 192.168.5.205
192.168.5.254
Router-B3(config)#interface fa 1/0
%Invalid interface type and number
Router-B3(config)#interface fa 0/1
%Invalid interface type and number
Router-B3(config)#interface Gig 0/1
%Invalid interface type and number
Router-B3(config)#interface Gig 1/0
Router-B3(config-if)#ip address 192.168.4.1 255.255.254.0
Router-B3(config-if)#no shutdown

Router-B3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B3(config-if)#exit
Router-B3(config)#interface Gig 0/0
Router-B3(config-if)#ip address 10.10.5.5 255.255.255.240
```

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

Router-B3

Physical Config CLI Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B3(config-if)#exit
Router-B3(config)#interface Gig 0/0
Router-B3(config-if)#ip address 10.10.5.5 255.255.255.240
Router-B3(config-if)#no shutdown

Router-B3(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

Router-B3(config-if)#exit
Router-B3(config)#copy running-config startup-config
^
% Invalid input detected at '^' marker.

Router-B3(config)#exit
Router-B3#
%SYS-5-CONFIG_I: Configured from console by console

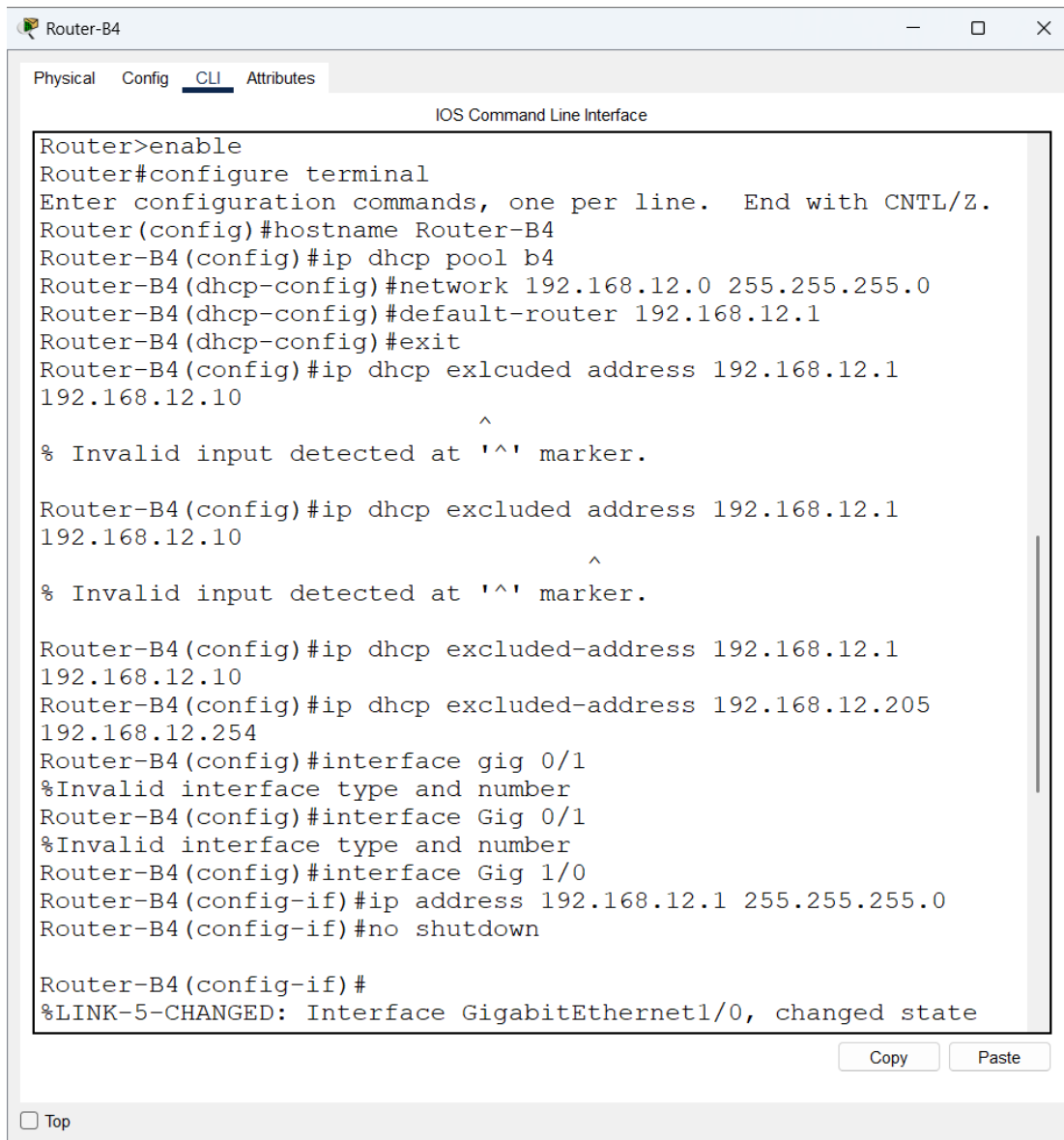
Router-B3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B3#
```

Copy Paste

☐ Top

Province 4

Router-B4



The screenshot shows a web-based interface for configuring a router named Router-B4. The interface has tabs for Physical, Config, CLI, and Attributes, with the CLI tab selected. The CLI window displays the following commands and their outputs:

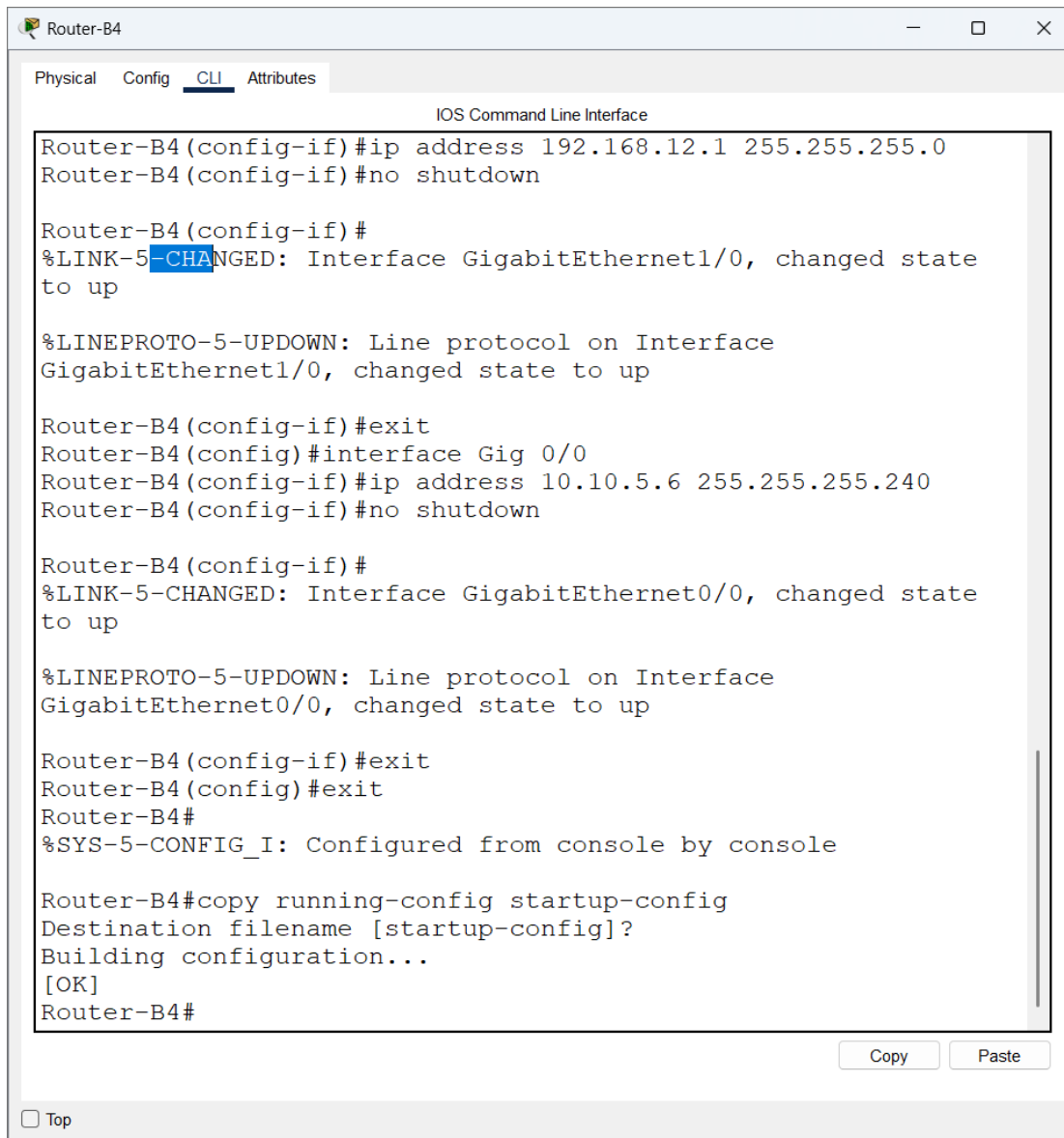
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-B4
Router-B4(config)#ip dhcp pool b4
Router-B4(dhcp-config)#network 192.168.12.0 255.255.255.0
Router-B4(dhcp-config)#default-router 192.168.12.1
Router-B4(dhcp-config)#exit
Router-B4(config)#ip dhcp excluded address 192.168.12.1
192.168.12.10
      ^
% Invalid input detected at '^' marker.

Router-B4(config)#ip dhcp excluded address 192.168.12.1
192.168.12.10
      ^
% Invalid input detected at '^' marker.

Router-B4(config)#ip dhcp excluded-address 192.168.12.1
192.168.12.10
Router-B4(config)#ip dhcp excluded-address 192.168.12.205
192.168.12.254
Router-B4(config)#interface gig 0/1
%Invalid interface type and number
Router-B4(config)#interface Gig 0/1
%Invalid interface type and number
Router-B4(config)#interface Gig 1/0
Router-B4(config-if)#ip address 192.168.12.1 255.255.255.0
Router-B4(config-if)#no shutdown

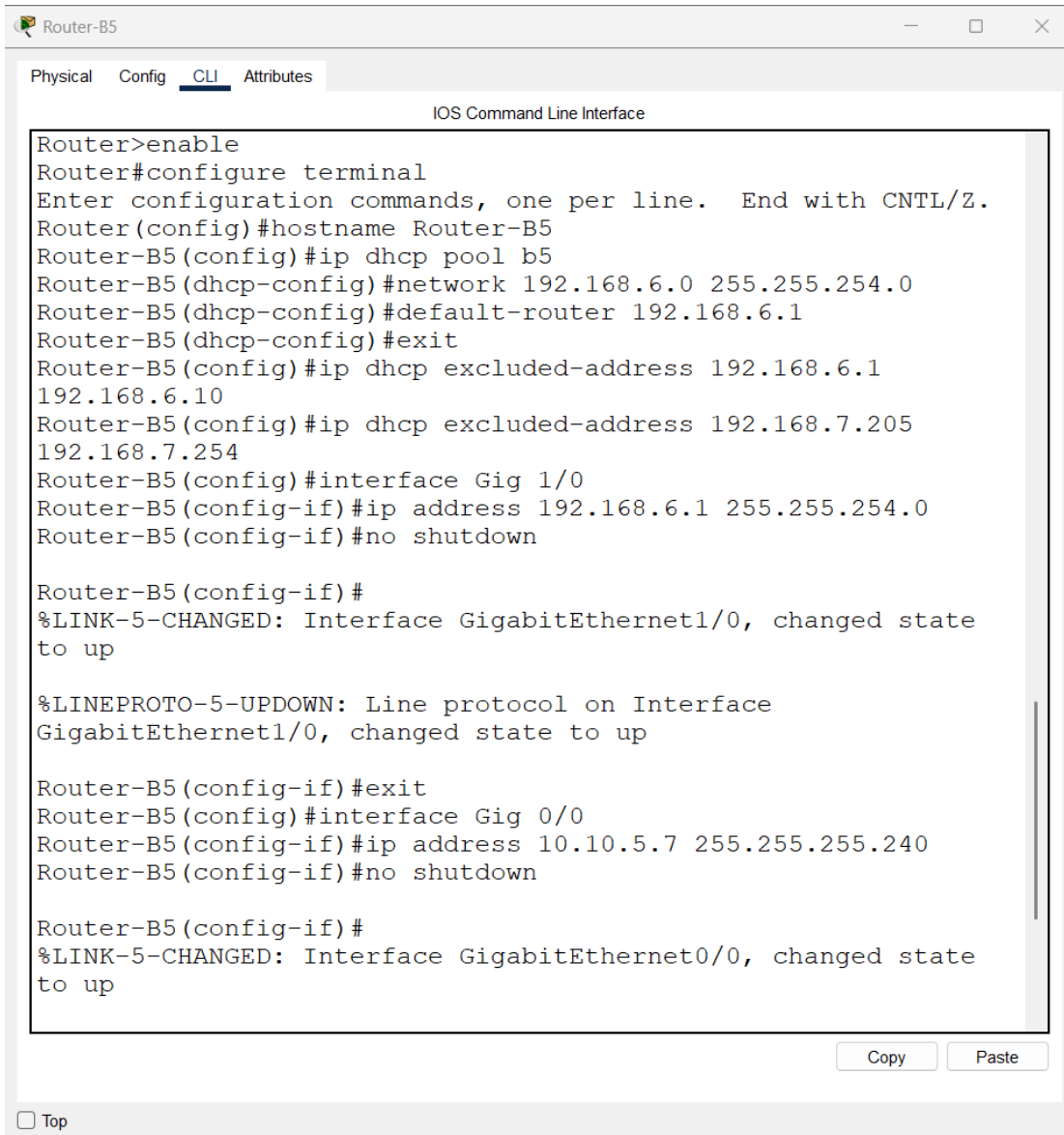
Router-B4(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
```

At the bottom of the CLI window, there are "Copy" and "Paste" buttons. Below the CLI window, there is a "Top" link.



Province 5

Router-B5



The screenshot shows a window titled "Router-B5" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a series of commands entered to configure Router-B5, including enabling the terminal, setting the hostname, configuring a DHCP pool, and setting up two interfaces (Gig 1/0 and Gig 0/0) with IP addresses and shutdown status. Status messages indicate that the interfaces have changed state to up.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-B5
Router-B5(config)#ip dhcp pool b5
Router-B5(dhcp-config)#network 192.168.6.0 255.255.254.0
Router-B5(dhcp-config)#default-router 192.168.6.1
Router-B5(dhcp-config)#exit
Router-B5(config)#ip dhcp excluded-address 192.168.6.1
192.168.6.10
Router-B5(config)#ip dhcp excluded-address 192.168.7.205
192.168.7.254
Router-B5(config)#interface Gig 1/0
Router-B5(config-if)#ip address 192.168.6.1 255.255.254.0
Router-B5(config-if)#no shutdown

Router-B5(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B5(config-if)#exit
Router-B5(config)#interface Gig 0/0
Router-B5(config-if)#ip address 10.10.5.7 255.255.255.240
Router-B5(config-if)#no shutdown

Router-B5(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
```

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

Router-B5

Physical Config CLI Attributes

IOS Command Line Interface

Router-B5(config-if)#ip address 192.168.6.1 255.255.254.0
Router-B5(config-if)#no shutdown

Router-B5(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up

Router-B5(config-if)#exit
Router-B5(config)#interface Gig 0/0
Router-B5(config-if)#ip address 10.10.5.7 255.255.255.240
Router-B5(config-if)#no shutdown

Router-B5(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

Router-B5(config-if)#exit
Router-B5(config)#exit
Router-B5#
%SYS-5-CONFIG_I: Configured from console by console

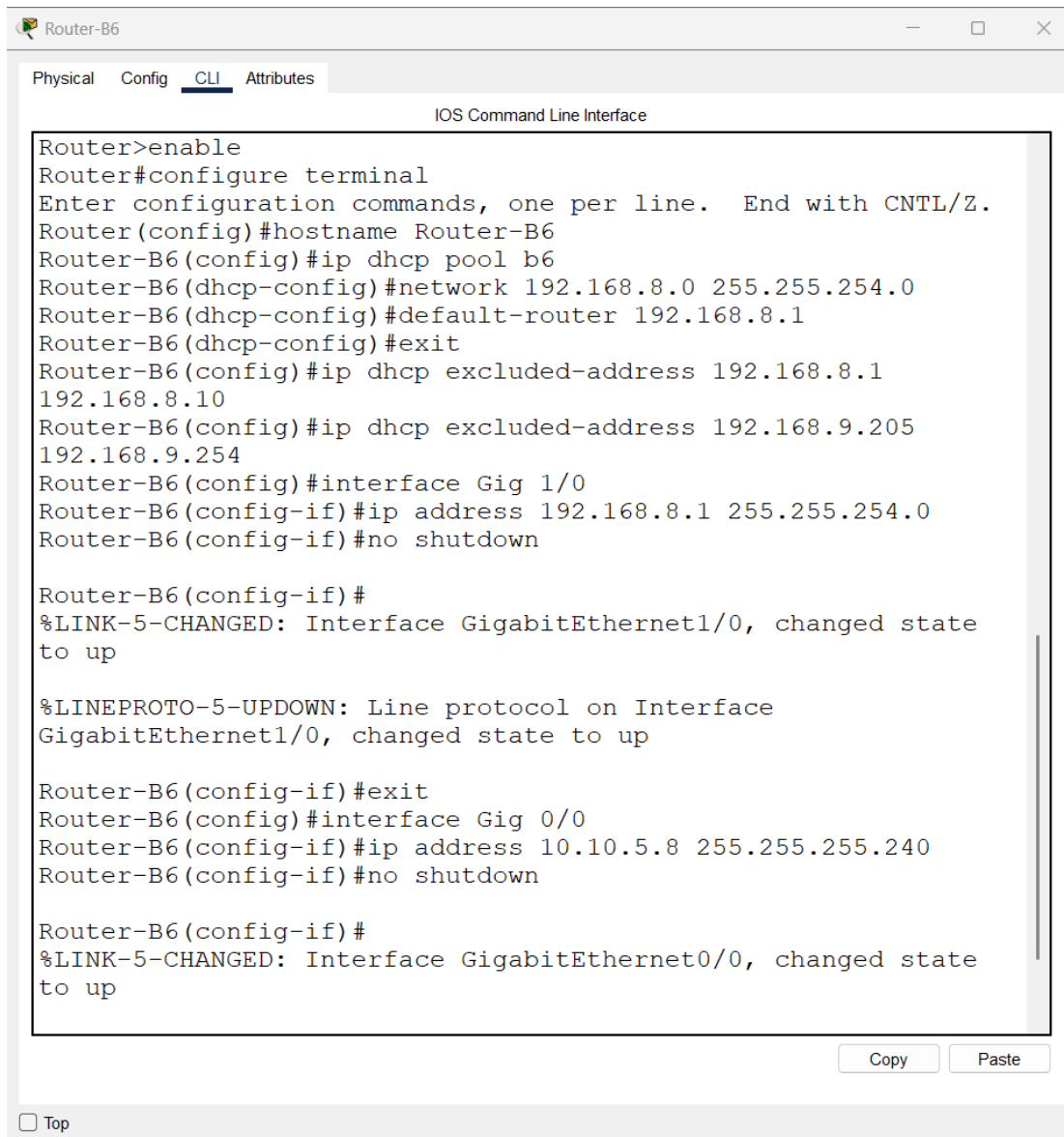
Router-B5#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B5#

Copy Paste

☐ Top

Province 6

Router-B6



The screenshot shows a window titled "Router-B6" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a series of commands entered to configure Router-B6, including enabling the terminal, setting the hostname, configuring a DHCP pool, and setting up two interfaces (Gig 1/0 and Gig 0/0) with IP addresses and shutdown status. Status messages indicate that the interfaces have changed state to up.

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-B6
Router-B6(config)#ip dhcp pool b6
Router-B6(dhcp-config)#network 192.168.8.0 255.255.254.0
Router-B6(dhcp-config)#default-router 192.168.8.1
Router-B6(dhcp-config)#exit
Router-B6(config)#ip dhcp excluded-address 192.168.8.1
192.168.8.10
Router-B6(config)#ip dhcp excluded-address 192.168.9.205
192.168.9.254
Router-B6(config)#interface Gig 1/0
Router-B6(config-if)#ip address 192.168.8.1 255.255.254.0
Router-B6(config-if)#no shutdown

Router-B6(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B6(config-if)#exit
Router-B6(config)#interface Gig 0/0
Router-B6(config-if)#ip address 10.10.5.8 255.255.255.240
Router-B6(config-if)#no shutdown

Router-B6(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
```

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

Router-B6

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-B6(config-if)#ip address 192.168.8.1 255.255.254.0
Router-B6(config-if)#no shutdown

Router-B6(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B6(config-if)#exit
Router-B6(config)#interface Gig 0/0
Router-B6(config-if)#ip address 10.10.5.8 255.255.255.240
Router-B6(config-if)#no shutdown

Router-B6(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

Router-B6(config-if)#exit
Router-B6(config)#exit
Router-B6#
%SYS-5-CONFIG_I: Configured from console by console

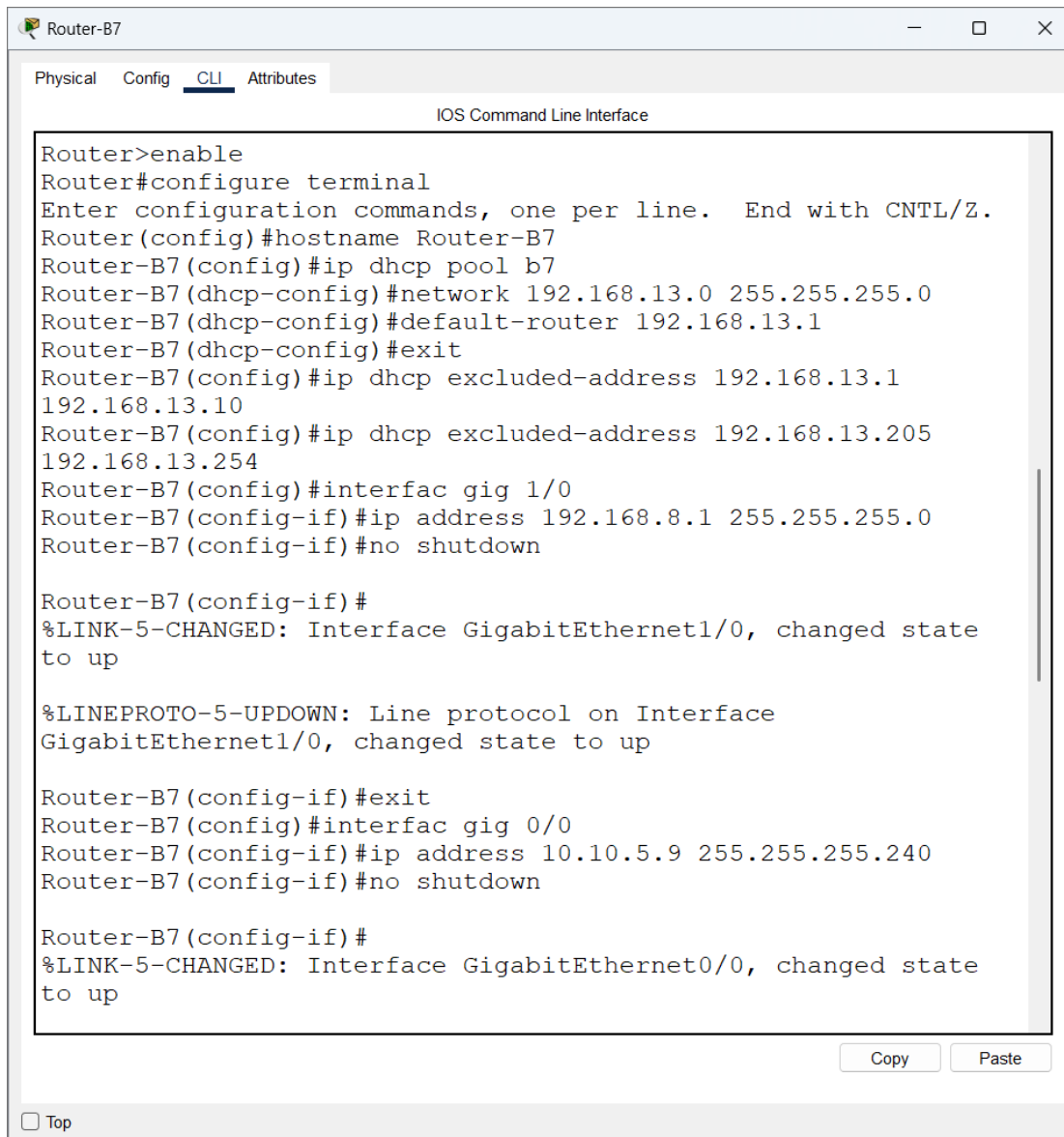
Router-B6#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B6#
```

Copy Paste

☐ Top

Province 7

Router-B7



The screenshot shows a web-based interface for Router-B7. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs is a title bar 'Router-B7' with standard window controls. The main area is titled 'IOS Command Line Interface' and contains a text box with the following text:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router-B7
Router-B7(config)#ip dhcp pool b7
Router-B7(dhcp-config)#network 192.168.13.0 255.255.255.0
Router-B7(dhcp-config)#default-router 192.168.13.1
Router-B7(dhcp-config)#exit
Router-B7(config)#ip dhcp excluded-address 192.168.13.1
192.168.13.10
Router-B7(config)#ip dhcp excluded-address 192.168.13.205
192.168.13.254
Router-B7(config)#interfac gig 1/0
Router-B7(config-if)#ip address 192.168.8.1 255.255.255.0
Router-B7(config-if)#no shutdown

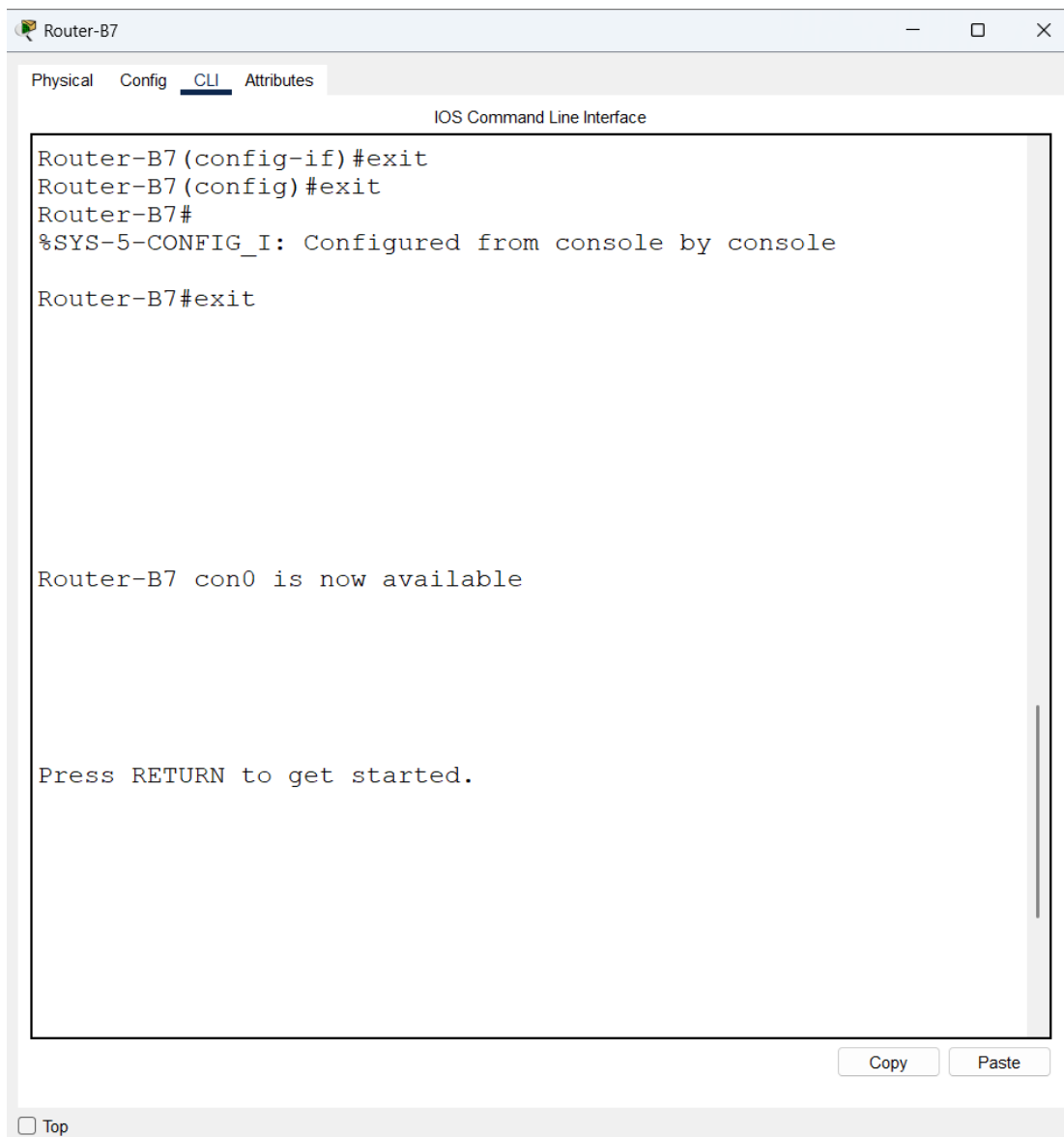
Router-B7(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state
to up

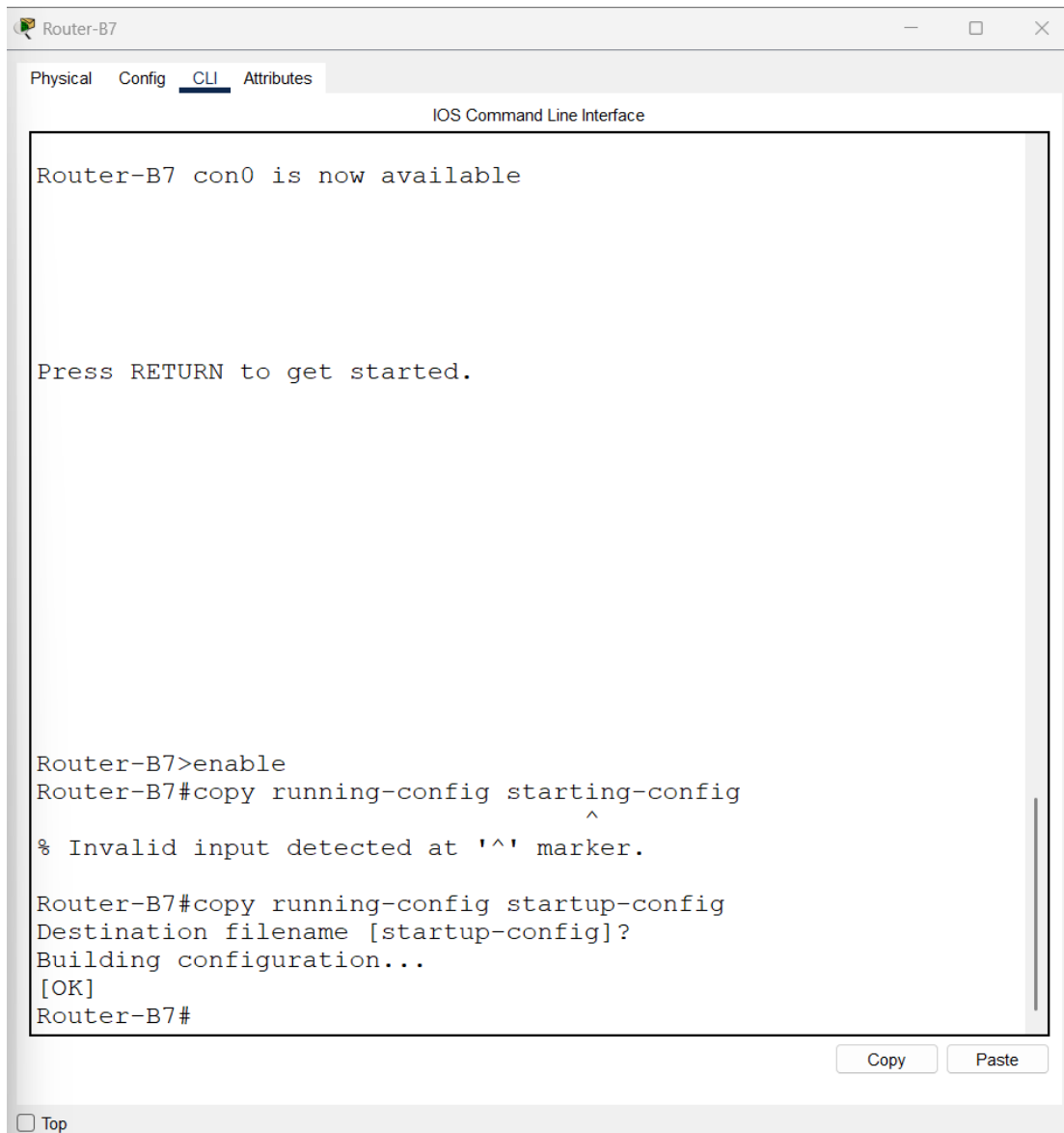
%LINEPROTO-5-UPDOWN: Line protocol on Interface
GigabitEthernet1/0, changed state to up

Router-B7(config-if)#exit
Router-B7(config)#interfac gig 0/0
Router-B7(config-if)#ip address 10.10.5.9 255.255.255.240
Router-B7(config-if)#no shutdown

Router-B7(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state
to up
```

At the bottom right of the text box are 'Copy' and 'Paste' buttons. Below the text box is a 'Top' link with a small square icon.





Router-B7

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-B7>enable
Router-B7#copy running-config starting-config
                                     ^
% Invalid input detected at '^' marker.

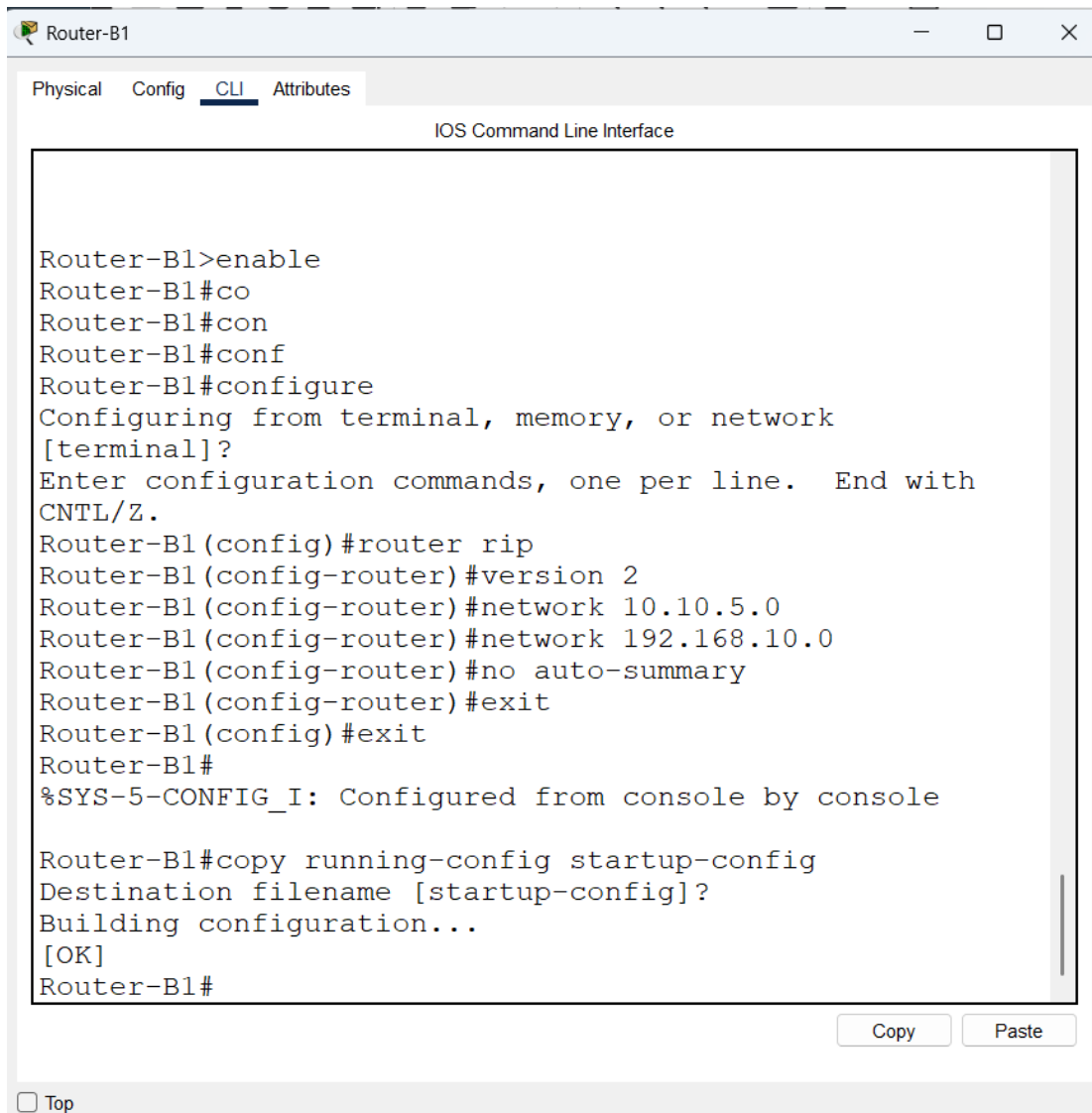
Router-B7#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B7#enable
Router-B7#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-B7(config)#interface gig 1/0
Router-B7(config-if)#ip address 192.168.13.1
255.255.255.0
Router-B7(config-if)#no shutdown
Router-B7(config-if)#exit
Router-B7(config)#exit
Router-B7#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B7#
```

Copy Paste

☐ Top

Routing (using Rip v2)

Router-B1



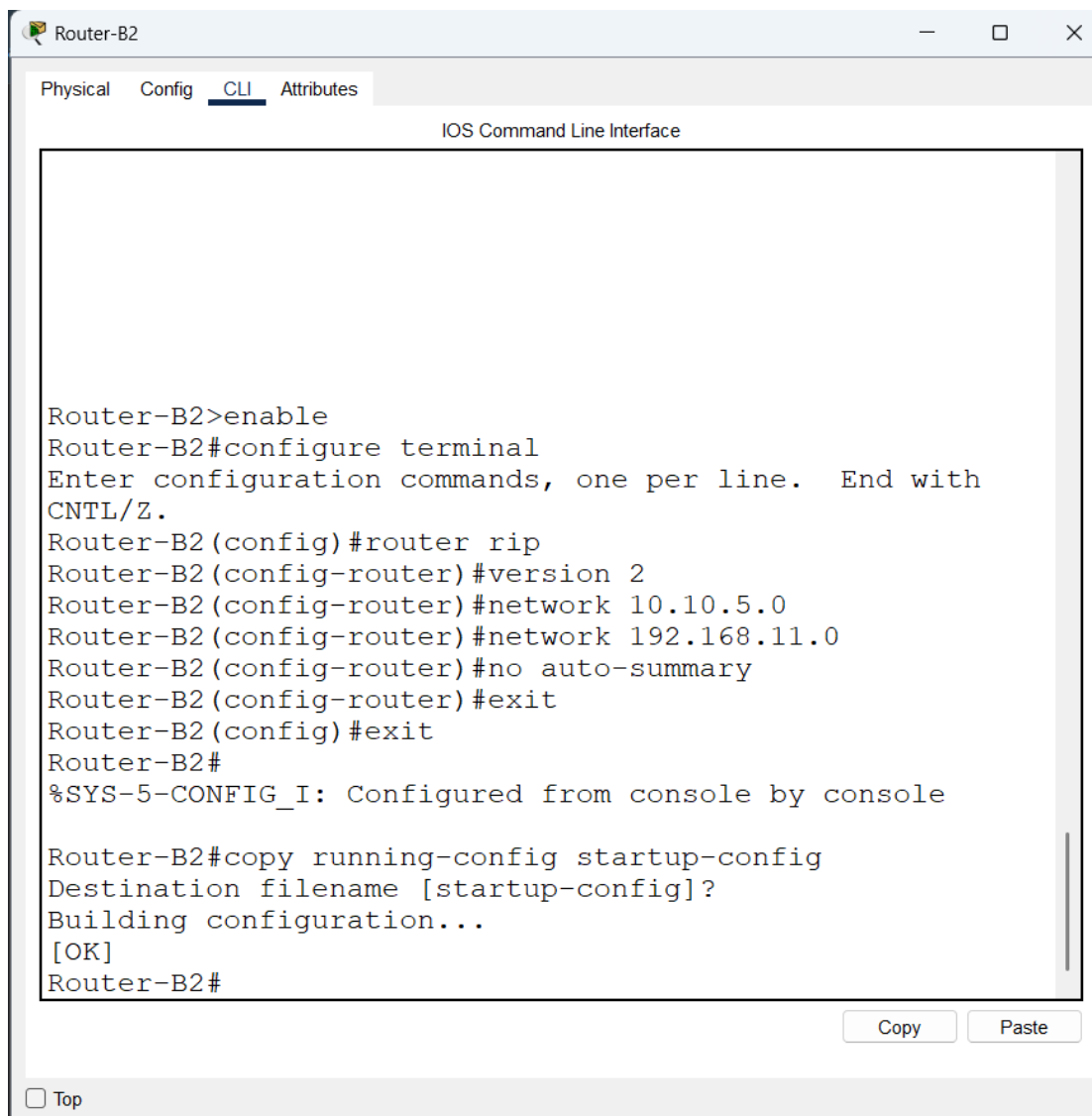
The screenshot shows a web-based interface for Router-B1. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs, the title 'IOS Command Line Interface' is displayed. The main area contains a terminal window with the following text:

```
Router-B1>enable
Router-B1#co
Router-B1#con
Router-B1#conf
Router-B1#configure
Configuring from terminal, memory, or network
[terminal]?
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-B1(config)#router rip
Router-B1(config-router)#version 2
Router-B1(config-router)#network 10.10.5.0
Router-B1(config-router)#network 192.168.10.0
Router-B1(config-router)#no auto-summary
Router-B1(config-router)#exit
Router-B1(config)#exit
Router-B1#
%SYS-5-CONFIG_I: Configured from console by console

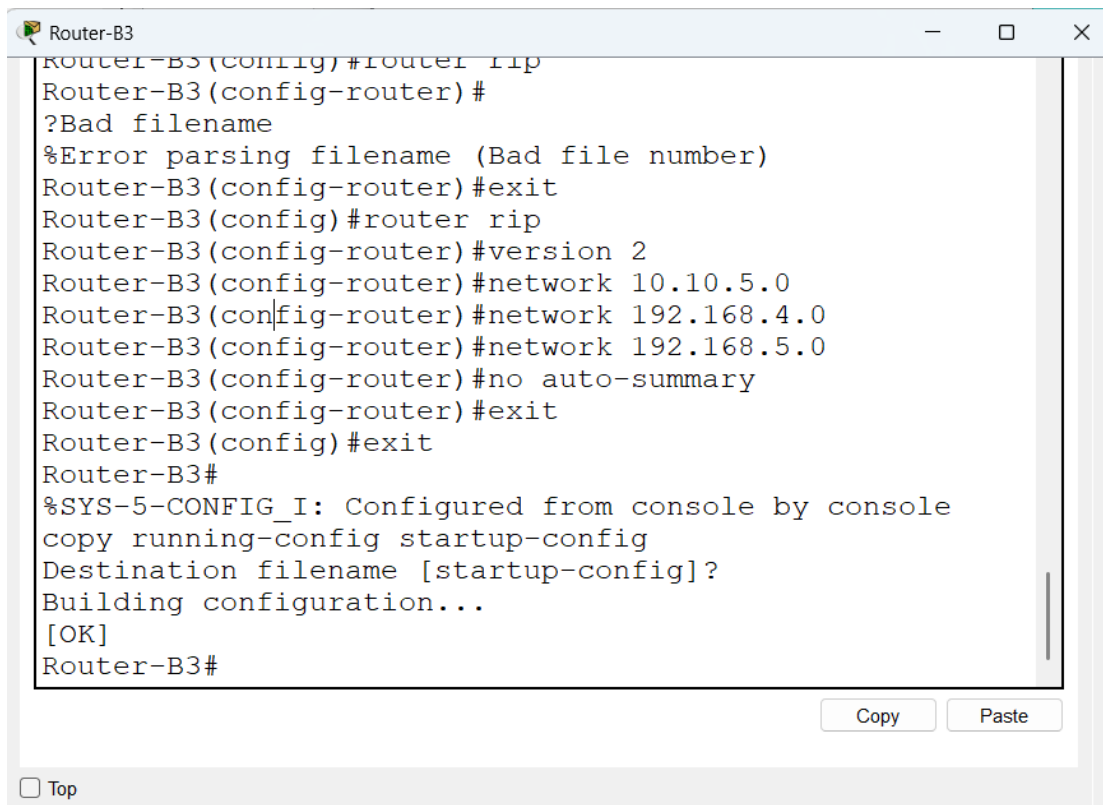
Router-B1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B1#
```

At the bottom right of the terminal window, there are 'Copy' and 'Paste' buttons. At the bottom left of the interface, there is a 'Top' link.

Router-B2



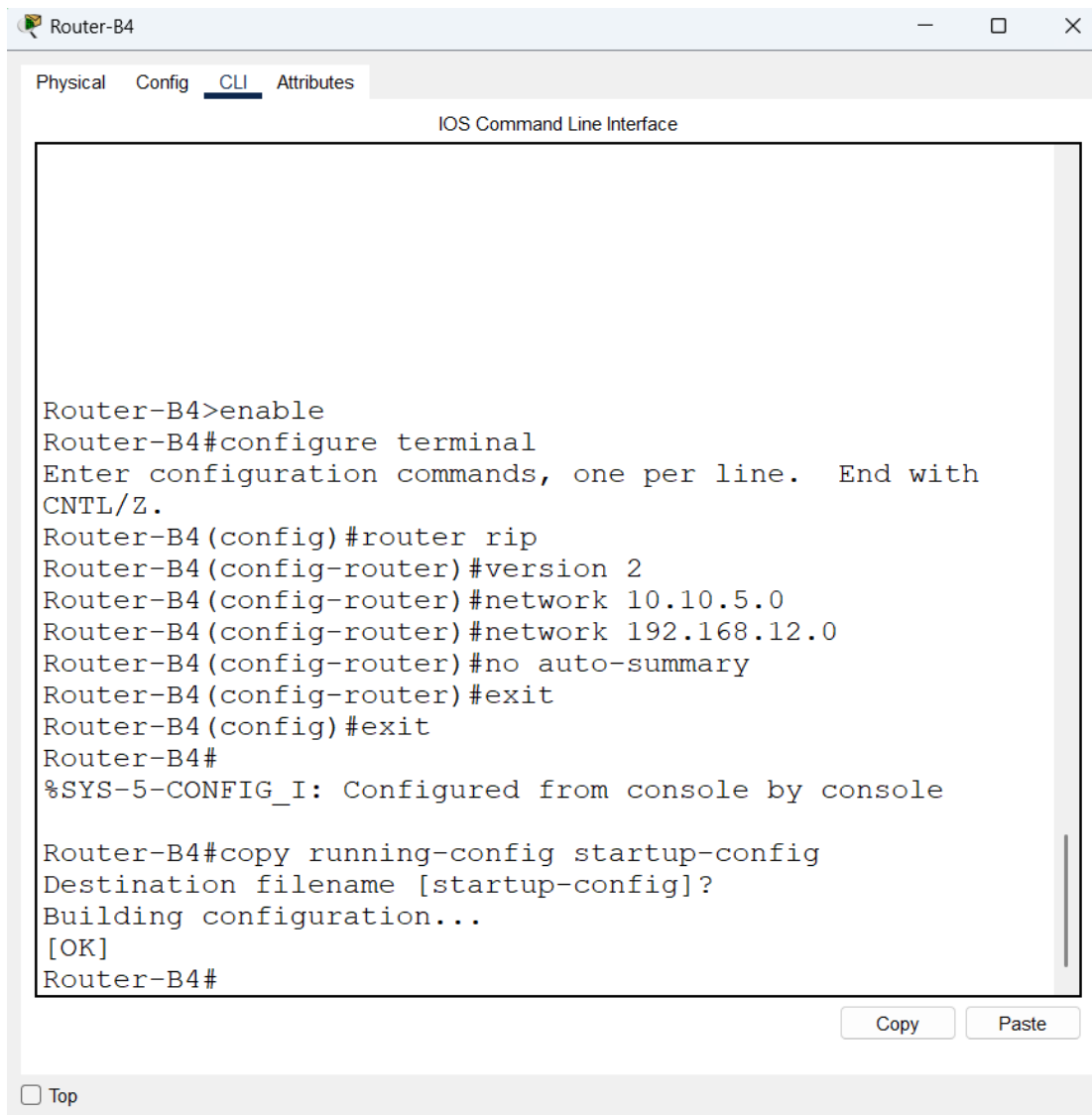
Router-B3



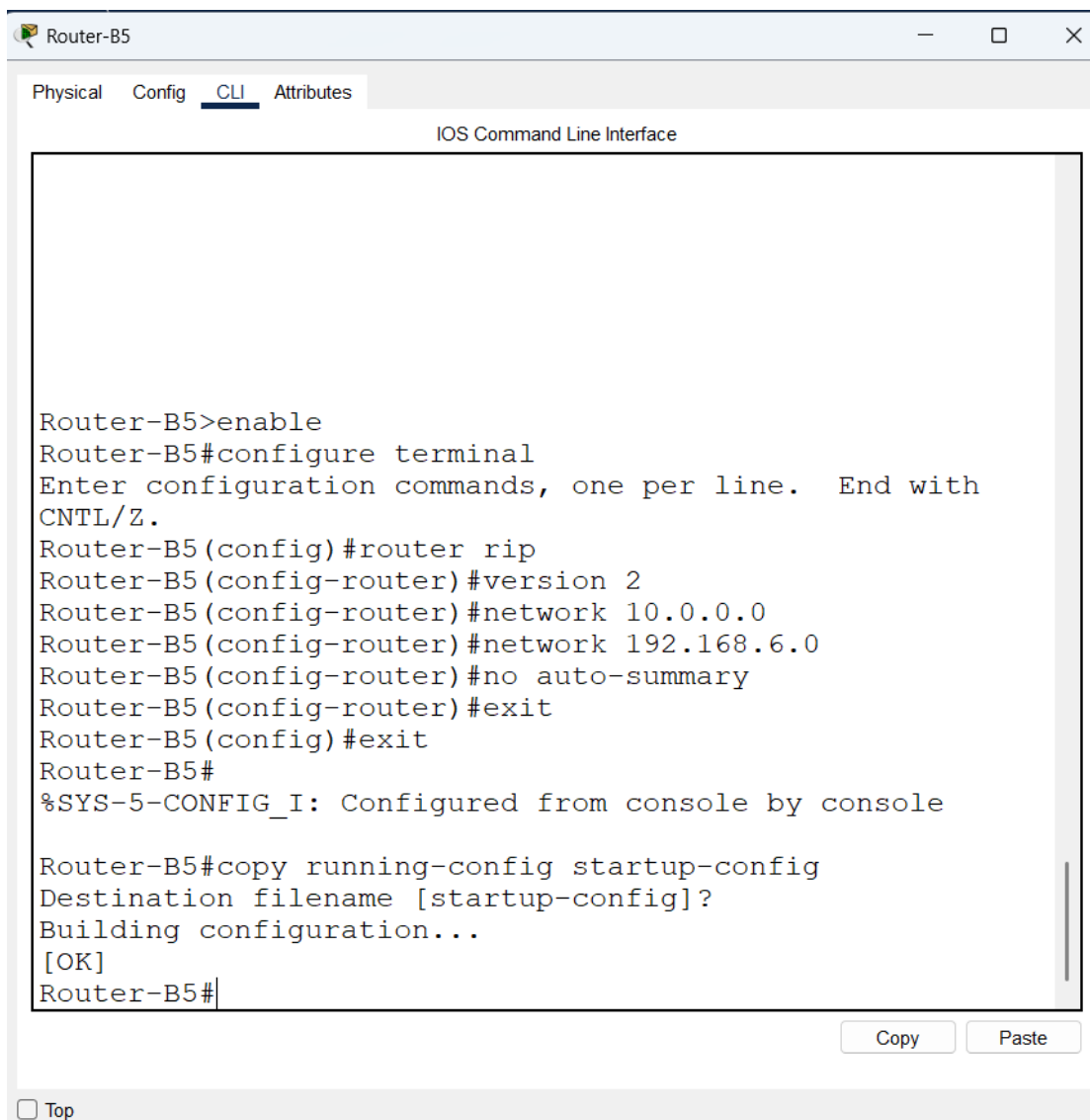
```
Router-B3(config)#router rip
Router-B3(config-router)#
?Bad filename
%Error parsing filename (Bad file number)
Router-B3(config-router)#exit
Router-B3(config)#router rip
Router-B3(config-router)#version 2
Router-B3(config-router)#network 10.10.5.0
Router-B3(config-router)#network 192.168.4.0
Router-B3(config-router)#network 192.168.5.0
Router-B3(config-router)#no auto-summary
Router-B3(config-router)#exit
Router-B3(config)#exit
Router-B3#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B3#
```

☐ Top

Router-B4



Router-B5



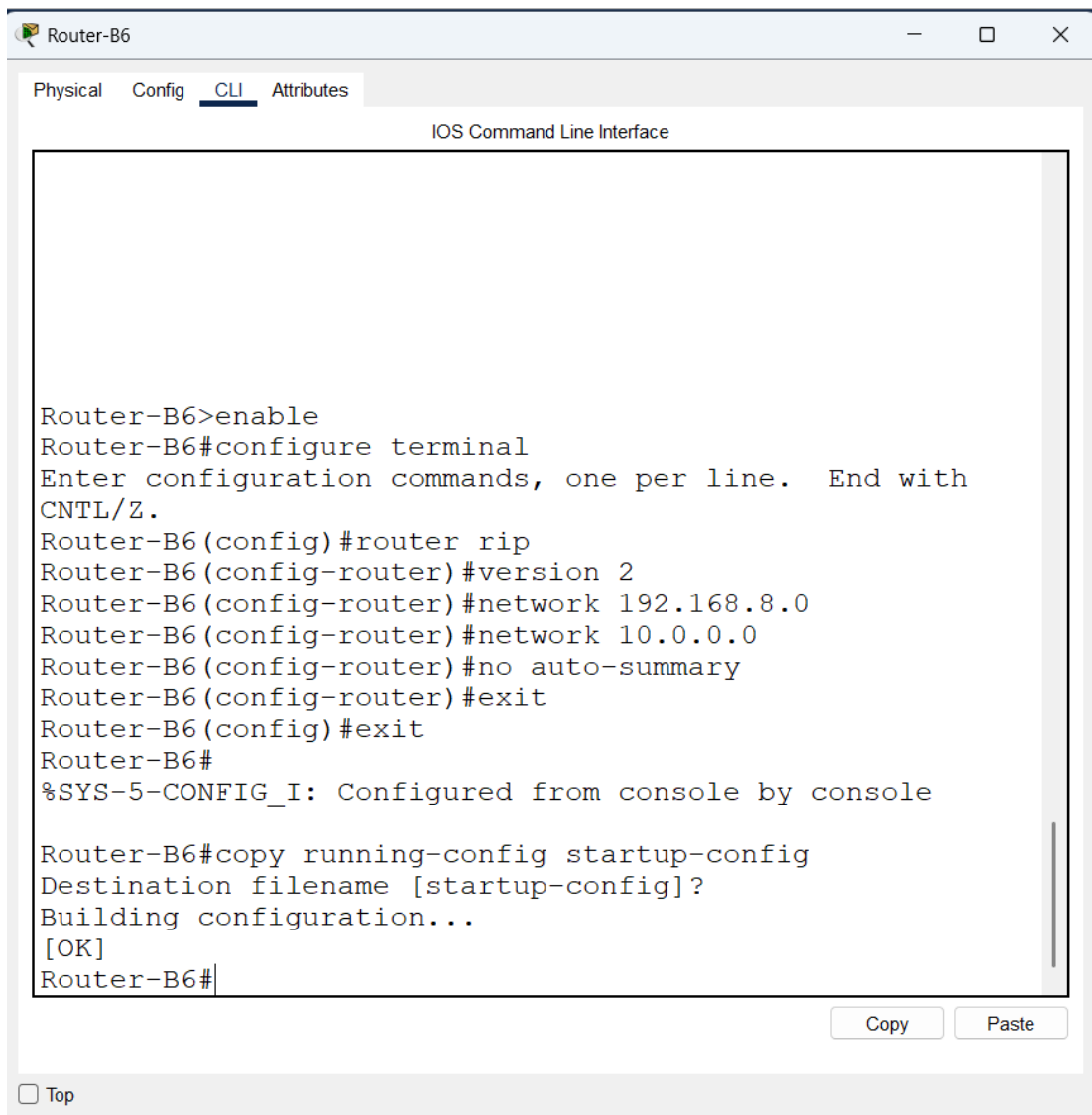
The screenshot shows a web-based interface for configuring a router named Router-B5. The interface has a top bar with the router name and standard window controls. Below this is a tabbed menu with 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal window shows the following sequence of commands and output:

```
Router-B5>enable
Router-B5#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router-B5(config)#router rip
Router-B5(config-router)#version 2
Router-B5(config-router)#network 10.0.0.0
Router-B5(config-router)#network 192.168.6.0
Router-B5(config-router)#no auto-summary
Router-B5(config-router)#exit
Router-B5(config)#exit
Router-B5#
%SYS-5-CONFIG_I: Configured from console by console

Router-B5#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B5#
```

At the bottom of the CLI window, there are 'Copy' and 'Paste' buttons. Below the CLI window, there is a 'Top' link with a checkbox.

Router-B6



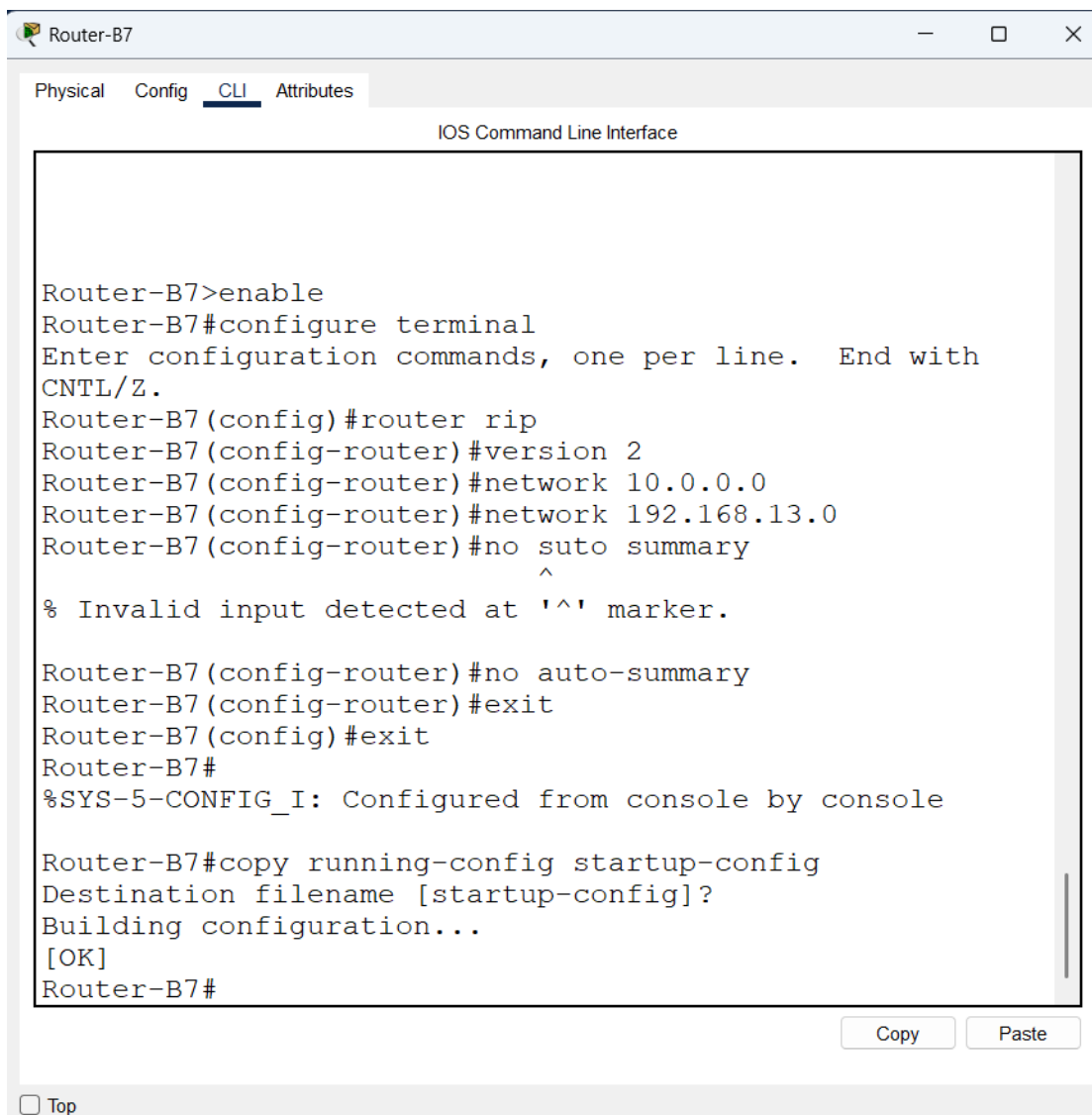
The screenshot shows a web-based interface for configuring a router named Router-B6. The interface has a top bar with the router name and standard window controls. Below this is a tabbed menu with 'Physical', 'Config', 'CLI', and 'Attributes'. The 'CLI' tab is active, displaying the 'IOS Command Line Interface'. The terminal window shows the following sequence of commands and responses:

```
Router-B6>enable
Router-B6#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-B6(config)#router rip
Router-B6(config-router)#version 2
Router-B6(config-router)#network 192.168.8.0
Router-B6(config-router)#network 10.0.0.0
Router-B6(config-router)#no auto-summary
Router-B6(config-router)#exit
Router-B6(config)#exit
Router-B6#
%SYS-5-CONFIG_I: Configured from console by console

Router-B6#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B6#
```

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

Router-B7



The screenshot shows a web-based interface for Router-B7. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs, the title 'IOS Command Line Interface' is displayed. The main area contains a terminal window with the following text:

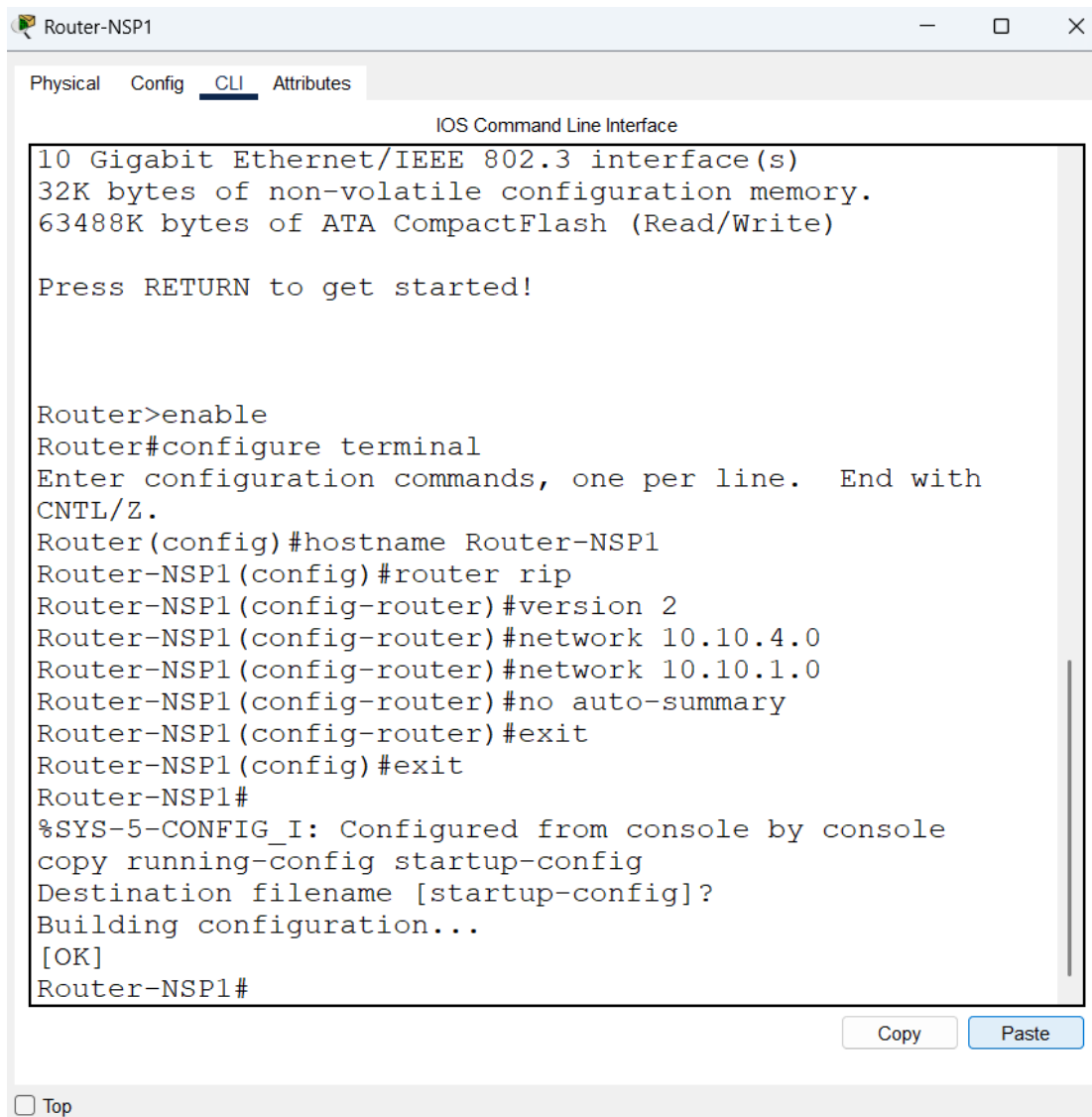
```
Router-B7>enable
Router-B7#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-B7(config)#router rip
Router-B7(config-router)#version 2
Router-B7(config-router)#network 10.0.0.0
Router-B7(config-router)#network 192.168.13.0
Router-B7(config-router)#no suto summary
      ^
% Invalid input detected at '^' marker.

Router-B7(config-router)#no auto-summary
Router-B7(config-router)#exit
Router-B7(config)#exit
Router-B7#
%SYS-5-CONFIG_I: Configured from console by console

Router-B7#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-B7#
```

At the bottom right of the terminal window, there are 'Copy' and 'Paste' buttons. Below the terminal window, there is a 'Top' link with a checkbox icon.

Router-NSP1



The screenshot shows a web-based interface for a Cisco NSP1 router. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs, the title 'IOS Command Line Interface' is displayed. The main area contains a text box with the following text: '10 Gigabit Ethernet/IEEE 802.3 interface(s)', '32K bytes of non-volatile configuration memory.', '63488K bytes of ATA CompactFlash (Read/Write)', and 'Press RETURN to get started!'. Below this, the command history is shown, starting with 'Router>enable', followed by 'Router#configure terminal'. The configuration commands include 'hostname Router-NSP1', 'router rip', 'version 2', 'network 10.10.4.0', 'network 10.10.1.0', 'no auto-summary', and 'exit'. The prompt returns to 'Router-NSP1#'. A system message follows: '%SYS-5-CONFIG_I: Configured from console by console', followed by 'copy running-config startup-config', 'Destination filename [startup-config]?', 'Building configuration...', '[OK]', and finally 'Router-NSP1#'. At the bottom right of the text box, there are 'Copy' and 'Paste' buttons. At the bottom left of the interface, there is a 'Top' link.

```
Router-NSP1
Physical Config CLI Attributes
IOS Command Line Interface
10 Gigabit Ethernet/IEEE 802.3 interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

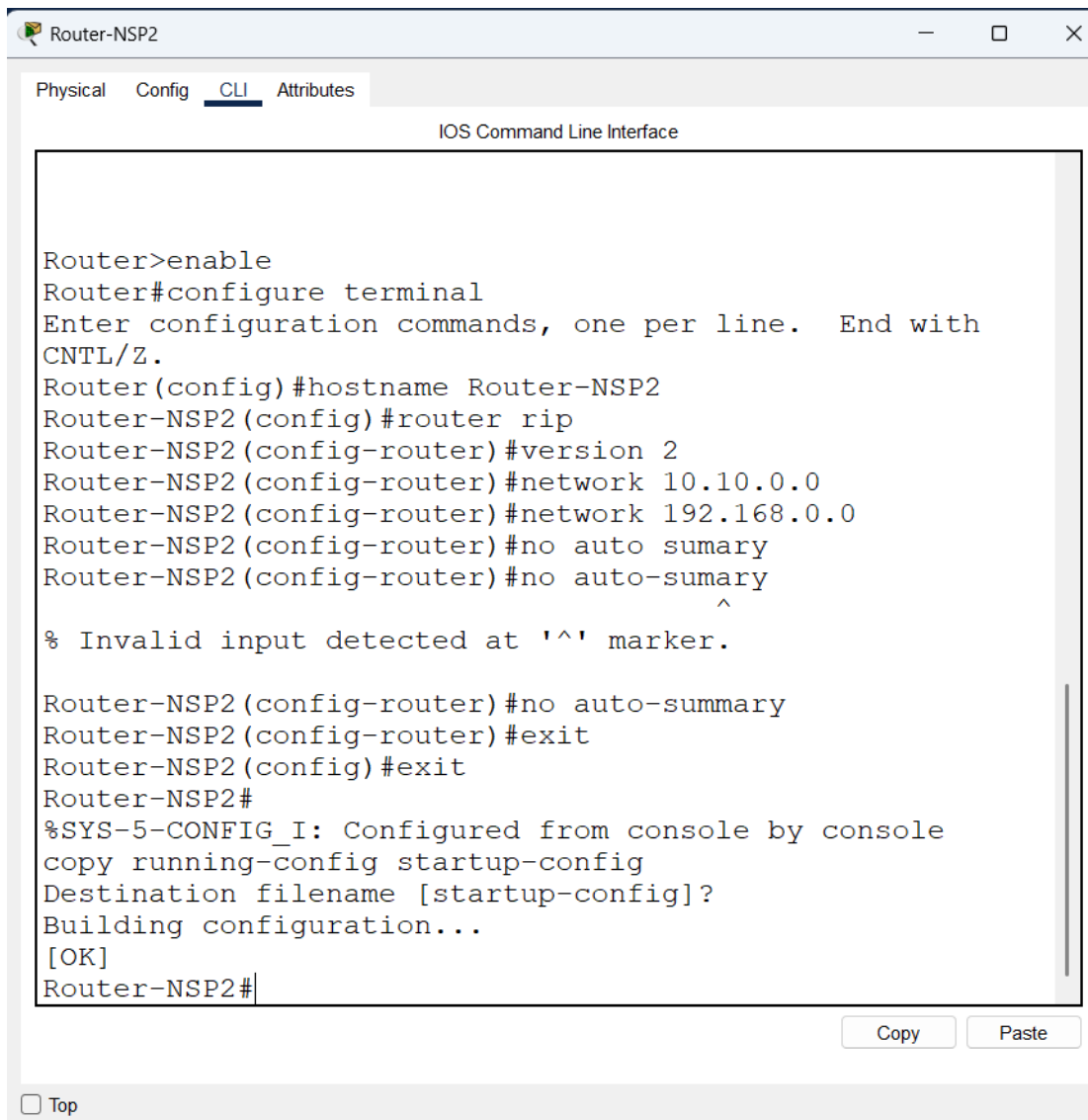
Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with
CNTL/Z.
Router(config)#hostname Router-NSP1
Router-NSP1(config)#router rip
Router-NSP1(config-router)#version 2
Router-NSP1(config-router)#network 10.10.4.0
Router-NSP1(config-router)#network 10.10.1.0
Router-NSP1(config-router)#no auto-summary
Router-NSP1(config-router)#exit
Router-NSP1(config)#exit
Router-NSP1#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-NSP1#
```

Copy Paste

☐ Top

Router- NSP2



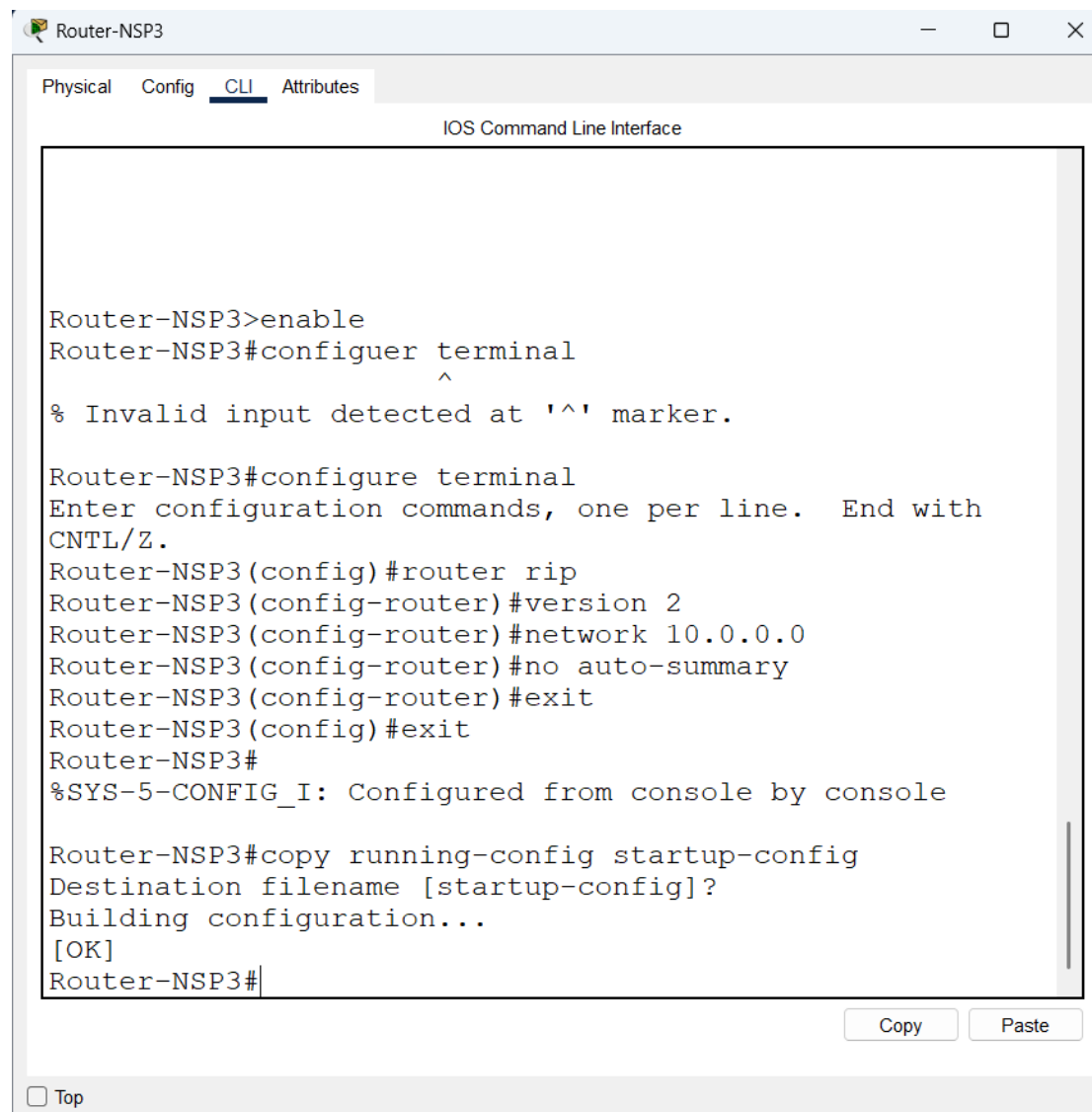
The screenshot shows a web-based interface for a router named 'Router-NSP2'. The interface has tabs for 'Physical', 'Config', 'CLI', and 'Attributes', with 'CLI' currently selected. The main area is titled 'IOS Command Line Interface' and contains a text box with the following text:

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router(config)#hostname Router-NSP2
Router-NSP2(config)#router rip
Router-NSP2(config-router)#version 2
Router-NSP2(config-router)#network 10.10.0.0
Router-NSP2(config-router)#network 192.168.0.0
Router-NSP2(config-router)#no auto sumary
Router-NSP2(config-router)#no auto-summary
      ^
% Invalid input detected at '^' marker.

Router-NSP2(config-router)#no auto-summary
Router-NSP2(config-router)#exit
Router-NSP2(config)#exit
Router-NSP2#
%SYS-5-CONFIG_I: Configured from console by console
copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-NSP2#
```

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

Router- NSP3



The screenshot shows a web-based interface for a Cisco NSP3 router. The 'CLI' tab is selected, displaying the 'IOS Command Line Interface'. The terminal session shows the user enabling privileged EXEC mode, attempting to use the 'configuer' command (which fails due to a typo), and then successfully using 'configure'. Inside configuration mode, the user sets up RIP version 2, specifies the network 10.0.0.0, disables auto-summary, and exits. The system confirms the configuration and prompts to save it to the startup-config file, which the user confirms with '[OK]'.

```
Router-NSP3>enable
Router-NSP3#configuer terminal
      ^
% Invalid input detected at '^' marker.

Router-NSP3#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-NSP3(config)#router rip
Router-NSP3(config-router)#version 2
Router-NSP3(config-router)#network 10.0.0.0
Router-NSP3(config-router)#no auto-summary
Router-NSP3(config-router)#exit
Router-NSP3(config)#exit
Router-NSP3#
%SYS-5-CONFIG_I: Configured from console by console

Router-NSP3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-NSP3#
```

Copy Paste

☐ Top

Router-Hq

The screenshot shows a web-based interface for a router named 'Router-Hq'. It has tabs for 'Physical', 'Config', 'CLI' (selected), and 'Attributes'. The 'CLI' tab displays the 'IOS Command Line Interface'. The interface shows a series of configuration commands entered in a text area, followed by a copy command that failed due to an invalid input marker. The commands are: 'Router-Hq(config-router)#Enter configuration commands, one per line. End with CNTL/Z.', 'Router-Hq(config)#router ripEnter configuration commands, one per line. End with CNTL/Z.', 'Router-Hq(config)#', 'Router-Hq(config)#router rip', 'Router-Hq(config-router)#router rip', 'Router-Hq(config-router)#version 2', 'Router-Hq(config-router)#network 192.168.0.0', 'Router-Hq(config-router)#network 192.168.2.0', 'Router-Hq(config-router)#network 192.168.3.0', 'Router-Hq(config-router)#network 10.0.0.0', 'Router-Hq(config-router)#no auto-summary', 'Router-Hq(config-router)#exit', 'Router-Hq(config)#exit', 'Router-Hq#', and '%SYS-5-CONFIG_I: Configured from console by console'. The copy command 'Router-Hq#copy running-config statup-config' was entered, with an arrow pointing to the space before 'statup-config'. Below it, the error message '% Invalid input detected at '^' marker.' is shown. The next command 'Router-Hq#copy running-config startup-config' was entered, followed by the prompts 'Destination filename [startup-config]?' and 'Building configuration...'. The user pressed '[OK]', and the prompt returned to 'Router-Hq#'. At the bottom right of the CLI area are 'Copy' and 'Paste' buttons. At the bottom left of the interface is a 'Top' button.

```
Router-Hq
Physical Config CLI Attributes
IOS Command Line Interface
Router-Hq(config-router)#Enter configuration commands,
one per line. End with CNTL/Z.
Router-Hq(config)#router ripEnter configuration
commands, one per line. End with CNTL/Z.
Router-Hq(config)#
Router-Hq(config)#router rip
Router-Hq(config-router)#router rip
Router-Hq(config-router)#version 2
Router-Hq(config-router)#network 192.168.0.0
Router-Hq(config-router)#network 192.168.2.0
Router-Hq(config-router)#network 192.168.3.0
Router-Hq(config-router)#network 10.0.0.0
Router-Hq(config-router)#no auto-summary
Router-Hq(config-router)#exit
Router-Hq(config)#exit
Router-Hq#
%SYS-5-CONFIG_I: Configured from console by console

Router-Hq#copy running-config statup-config
                                ^
% Invalid input detected at '^' marker.

Router-Hq#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-Hq#
```

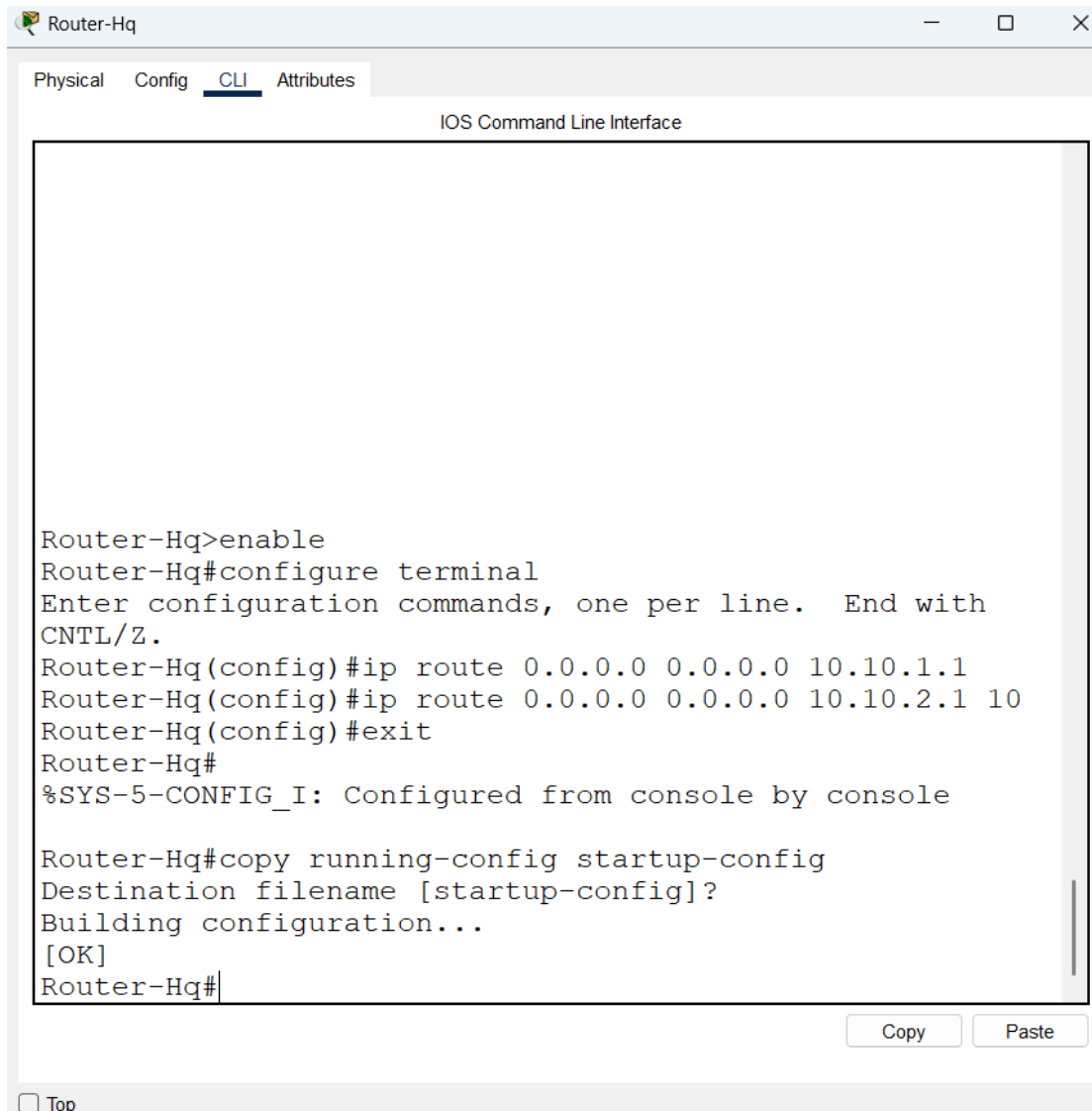
Copy Paste

☐ Top

Floating Routing (Static Route protocol with AD)

Connect default and backup connection with Hq

Router Hq



The screenshot shows a web-based interface for a Router-Hq. At the top, there are tabs for 'Physical', 'Config', 'CLI' (which is selected), and 'Attributes'. Below the tabs, the title 'IOS Command Line Interface' is displayed. The main area is a text box containing the following text:

```
Router-Hq>enable
Router-Hq#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
Router-Hq(config)#ip route 0.0.0.0 0.0.0.0 10.10.1.1
Router-Hq(config)#ip route 0.0.0.0 0.0.0.0 10.10.2.1 10
Router-Hq(config)#exit
Router-Hq#
%SYS-5-CONFIG_I: Configured from console by console

Router-Hq#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router-Hq#
```

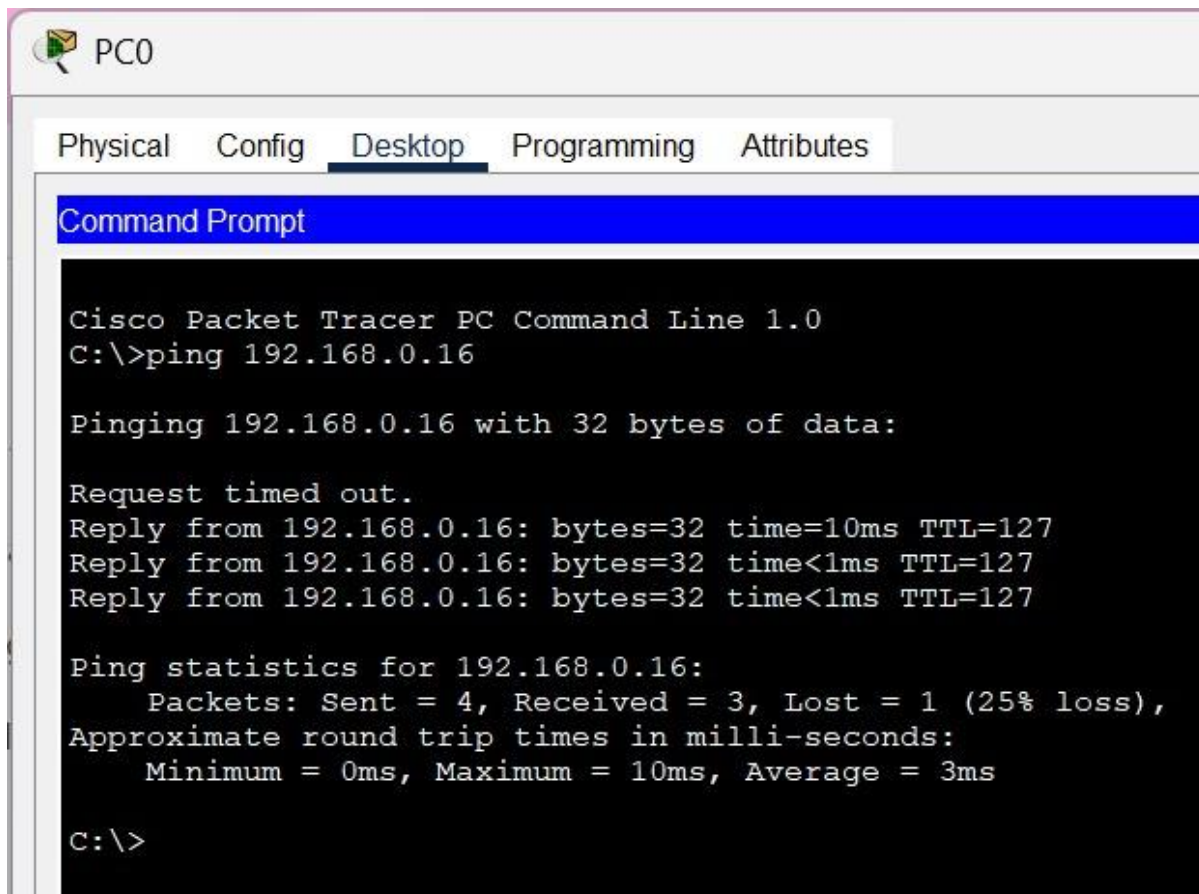
At the bottom right of the text box, there are 'Copy' and 'Paste' buttons. Below the text box, there is a 'Top' link with a small square icon next to it.

Testing

Inter-VLAN Routing Test (Head Office)

Purpose: Confirm that devices in Admin, Finance, Loan, and IT VLANs can communicate across VLANs.

Ping from a PC in Admin VLAN to a PC in Finance VLAN,



The screenshot shows the PC0 configuration window in Cisco Packet Tracer. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the execution of a ping command to 192.168.0.16. The output indicates that the first ping request timed out, while the subsequent three succeeded with 32 bytes of data, a time of less than 1ms, and a TTL of 127. The ping statistics show 4 packets sent, 3 received, and 1 lost (25% loss), with round trip times of 0ms, 10ms, and 3ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.16

Pinging 192.168.0.16 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.16: bytes=32 time=10ms TTL=127
Reply from 192.168.0.16: bytes=32 time<1ms TTL=127
Reply from 192.168.0.16: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.0.16:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 3ms

C:\>
```

Return to Switch-Hq,

Switch-Hq

Physical Config CLI Attributes

IOS Command Line Interface

```
Switch-Hq>show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig5/1, Fa6/1, Fa7/1, Gig8/1, Gig9/1
10	Admin	active	Gig1/1
20	Finance	active	Gig2/1
30	Loan	active	Gig3/1
40	IT	active	Gig4/1
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

DHCP Validation

On PC11,

PC11

Physical Config Desktop Programming Attributes

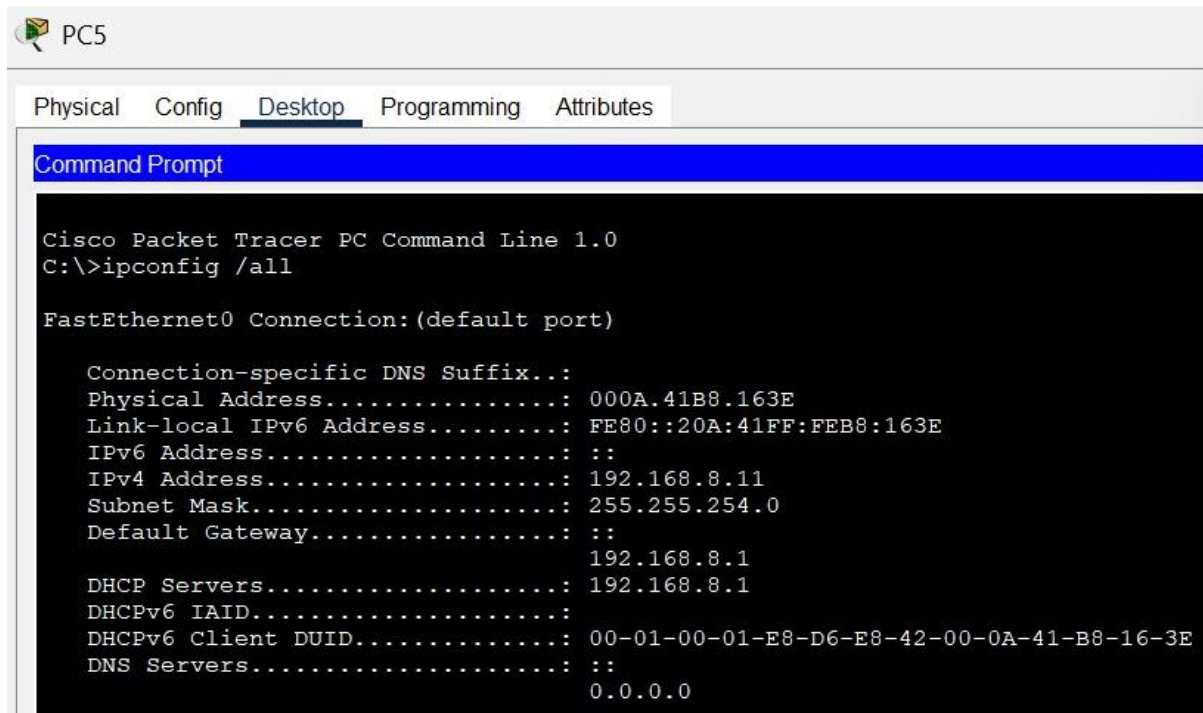
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Physical Address...: 0060.4756.BDEC
    Link-local IPv6 Address...: FE80::260:47FF:FE56:BDEC
    IPv6 Address...: ::
    IPv4 Address...: 192.168.10.11
    Subnet Mask...: 255.255.255.0
    Default Gateway...: ::
                        192.168.10.1
    DHCP Servers...: 192.168.10.1
    DHCPv6 IAID...:
    DHCPv6 Client DUID...: 00-01-00-01-5B-71-C4-E0-00-60-47-56-BD-EC
    DNS Servers...: ::
                        0.0.0.0
```

OnPC5,



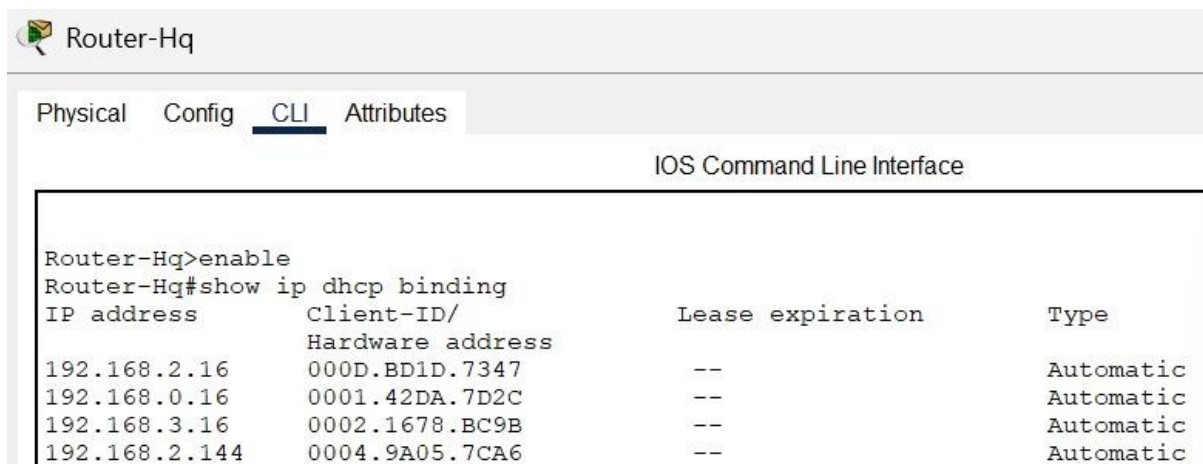
The screenshot shows the 'PC5' window in Cisco Packet Tracer. The 'Desktop' tab is selected, and a 'Command Prompt' window is open. The command prompt displays the output of the 'ipconfig /all' command, showing network configuration details for the 'FastEthernet0' interface.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Physical Address.....: 000A.41B8.163E
    Link-local IPv6 Address.....: FE80::20A:41FF:FE8B:163E
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.8.11
    Subnet Mask.....: 255.255.254.0
    Default Gateway.....: ::
                                192.168.8.1
    DHCP Servers.....: 192.168.8.1
    DHCPv6 IAID.....:
    DHCPv6 Client DUID.....: 00-01-00-01-E8-D6-E8-42-00-0A-41-B8-16-3E
    DNS Servers.....: ::
                                0.0.0.0
```

On router,



The screenshot shows the 'Router-Hq' window in Cisco Packet Tracer. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is displayed. The commands 'enable' and 'show ip dhcp binding' have been entered, resulting in a table showing DHCP bindings.

```
Router-Hq>enable
Router-Hq#show ip dhcp binding
```

IP address	Client-ID/ Hardware address	Lease expiration	Type
192.168.2.16	000D.BD1D.7347	--	Automatic
192.168.0.16	0001.42DA.7D2C	--	Automatic
192.168.3.16	0002.1678.BC9B	--	Automatic
192.168.2.144	0004.9A05.7CA6	--	Automatic

On router of headquarter,

Router-Hq

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-Hq>show ip route rip
      10.0.0.0/28 is subnetted, 5 subnets
R       10.10.3.0 [120/1] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
R       10.10.4.0 [120/1] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       10.10.5.0 [120/2] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/2] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
      192.168.2.0/25 is subnetted, 2 subnets
R       192.168.4.0/23 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.6.0/23 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.8.0/23 [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
          [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
R       192.168.10.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.11.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.12.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.13.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
```



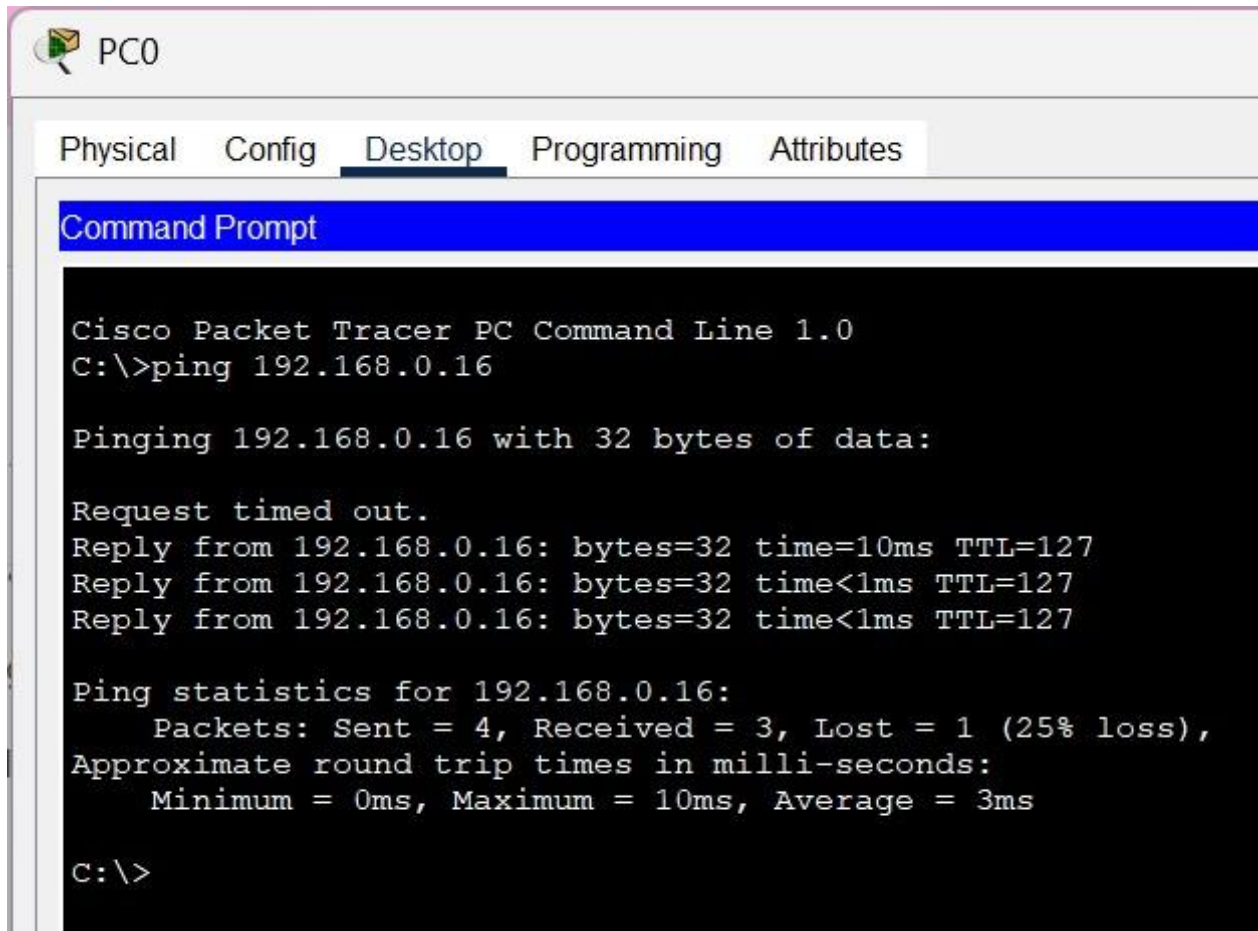
```
Router-Hq>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 3 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
GigabitEthernet0/0    22
GigabitEthernet1/0    22
GigabitEthernet2/0.10 22
GigabitEthernet2/0.20 22
GigabitEthernet2/0.30 22
GigabitEthernet2/0.40 22
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  10.0.0.0
  192.168.0.0
  192.168.2.0
  192.168.3.0
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  10.10.2.1        120           00:00:18
  10.10.1.1        120           00:00:21
Distance: (default is 120)
```

```
Router-Hq>show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0 10.10.2.2       YES manual up          up
GigabitEthernet1/0 10.10.1.2       YES manual up          up
GigabitEthernet2/0  unassigned     YES NVRAM  up          up
GigabitEthernet2/0.10 192.168.2.1    YES manual up          up
GigabitEthernet2/0.20 192.168.0.1    YES manual up          up
GigabitEthernet2/0.30 192.168.3.1    YES manual up          up
GigabitEthernet2/0.40 192.168.2.129  YES manual up          up
GigabitEthernet3/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet4/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet5/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet6/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet7/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet8/0  unassigned     YES NVRAM  administratively down down
GigabitEthernet9/0  unassigned     YES NVRAM  administratively down down
```

Inter-VLAN Routing Test (Head Office)

Purpose: Confirm that devices in Admin, Finance, Loan, and IT VLANs can communicate across VLANs.

Ping from a PC in Admin VLAN to a PC in Finance VLAN,



The screenshot shows a Cisco Packet Tracer interface for PC0. The 'Desktop' tab is selected, displaying a Command Prompt window. The command prompt shows the execution of a ping command to 192.168.0.16. The output indicates that the first ping request timed out, while the subsequent three succeeded with 32 bytes of data, 10ms, <1ms, and <1ms round trip times respectively. The ping statistics show 4 packets sent, 3 received, and 1 lost (25% loss), with an average round trip time of 3ms.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.16

Pinging 192.168.0.16 with 32 bytes of data:

Request timed out.
Reply from 192.168.0.16: bytes=32 time=10ms TTL=127
Reply from 192.168.0.16: bytes=32 time<1ms TTL=127
Reply from 192.168.0.16: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.0.16:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 10ms, Average = 3ms

C:\>
```

Return to Switch-Hq,

Switch-Hq

Physical Config CLI Attributes

IOS Command Line Interface

```
Switch-Hq>show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig5/1, Fa6/1, Fa7/1, Gig8/1, Gig9/1
10	Admin	active	Gig1/1
20	Finance	active	Gig2/1
30	Loan	active	Gig3/1
40	IT	active	Gig4/1
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

DHCP Validation

On PC11,

PC11

Physical Config Desktop Programming Attributes

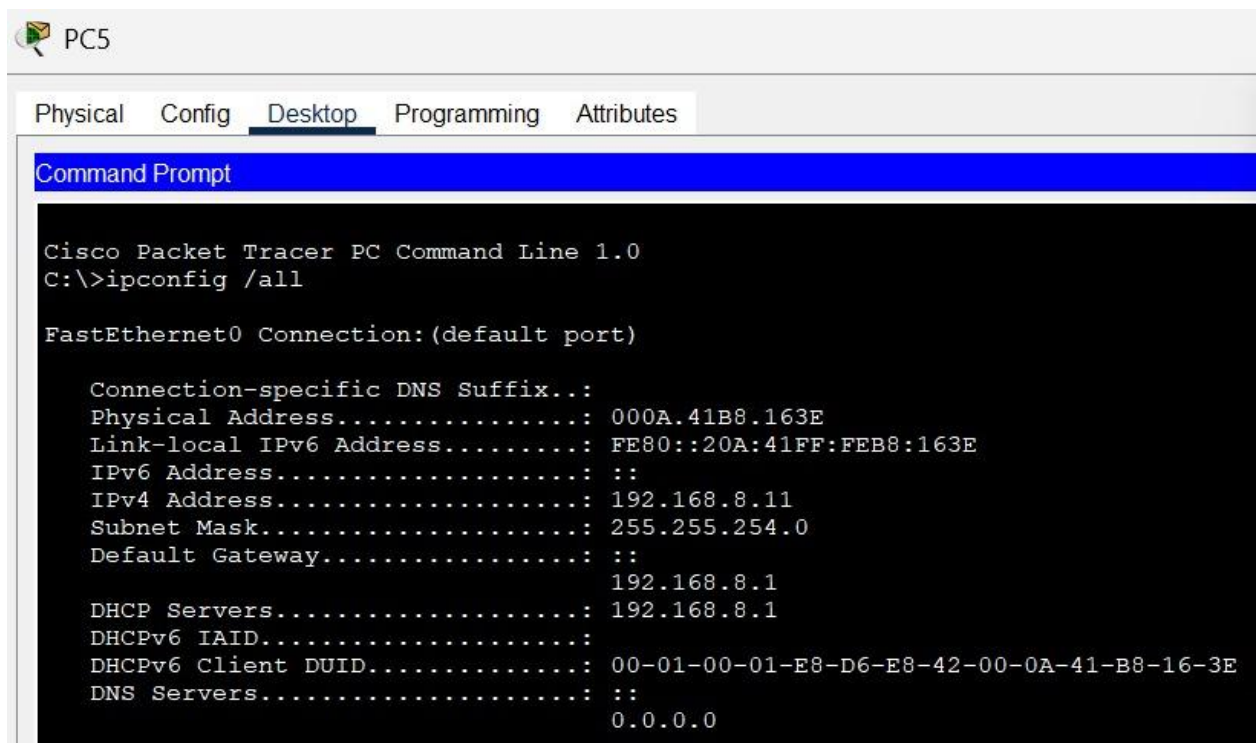
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Physical Address...: 0060.4756.BDEC
    Link-local IPv6 Address...: FE80::260:47FF:FE56:BDEC
    IPv6 Address...: ::
    IPv4 Address...: 192.168.10.11
    Subnet Mask...: 255.255.255.0
    Default Gateway...: ::
    : 192.168.10.1
    DHCP Servers...: 192.168.10.1
    DHCPv6 IAID...:
    DHCPv6 Client DUID...: 00-01-00-01-5B-71-C4-E0-00-60-47-56-BD-EC
    DNS Servers...: ::
    : 0.0.0.0
```

On PC5,

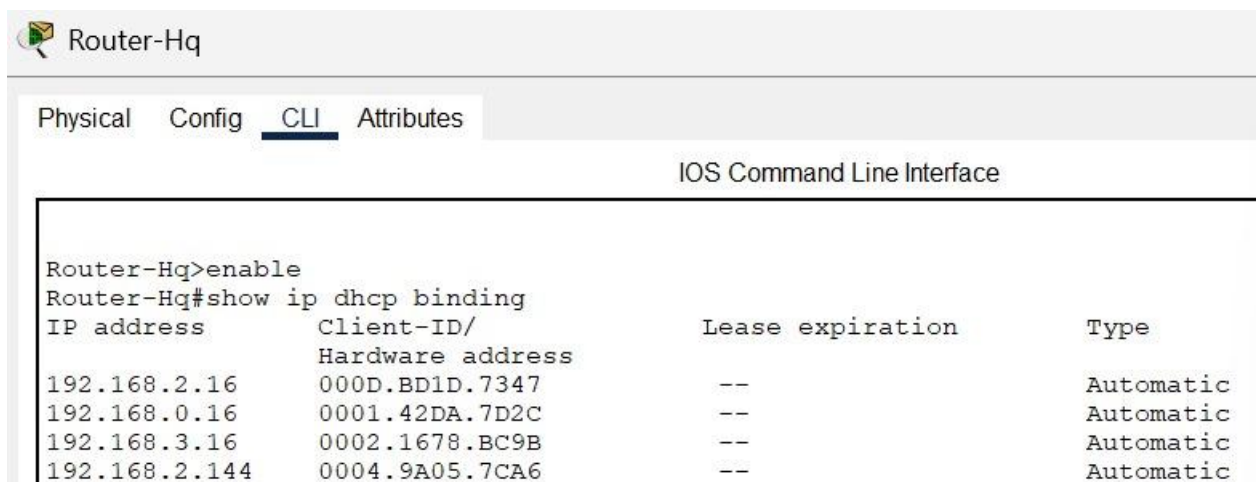


```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Physical Address.....: 000A.41B8.163E
    Link-local IPv6 Address.....: FE80::20A:41FF:FEB8:163E
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.8.11
    Subnet Mask.....: 255.255.254.0
    Default Gateway.....: ::
                        192.168.8.1
    DHCP Servers.....: 192.168.8.1
    DHCPv6 IAID.....:
    DHCPv6 Client DUID.....: 00-01-00-01-E8-D6-E8-42-00-0A-41-B8-16-3E
    DNS Servers.....: ::
                        0.0.0.0
```

On router,



```
Router-Hq>enable
Router-Hq#show ip dhcp binding
```

IP address	Client-ID/ Hardware address	Lease expiration	Type
192.168.2.16	000D.BD1D.7347	--	Automatic
192.168.0.16	0001.42DA.7D2C	--	Automatic
192.168.3.16	0002.1678.BC9B	--	Automatic
192.168.2.144	0004.9A05.7CA6	--	Automatic

On router of headquarter,



Router-Hq

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-Hq>show ip route rip
      10.0.0.0/28 is subnetted, 5 subnets
R       10.10.3.0 [120/1] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
R       10.10.4.0 [120/1] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       10.10.5.0 [120/2] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/2] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
      192.168.2.0/25 is subnetted, 2 subnets
R       192.168.4.0/23 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.6.0/23 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.8.0/23 [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
          [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
R       192.168.10.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.11.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.12.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
R       192.168.13.0/24 [120/3] via 10.10.2.1, 00:00:17, GigabitEthernet0/0
          [120/3] via 10.10.1.1, 00:00:16, GigabitEthernet1/0
```

```

Router-Hq>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 3 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send  Recv  Triggered RIP  Key-chain
GigabitEthernet0/0    22
GigabitEthernet1/0    22
GigabitEthernet2/0.10 22
GigabitEthernet2/0.20 22
GigabitEthernet2/0.30 22
GigabitEthernet2/0.40 22
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  10.0.0.0
  192.168.0.0
  192.168.2.0
  192.168.3.0
Passive Interface(s):
Routing Information Sources:
  Gateway           Distance      Last Update
  10.10.2.1          120           00:00:18
  10.10.1.1          120           00:00:21
Distance: (default is 120)

```

IOS Command Line Interface

Router-Hq>show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	10.10.2.2	YES	manual	up	up
GigabitEthernet1/0	10.10.1.2	YES	manual	up	up
GigabitEthernet2/0	unassigned	YES	NVRAM	up	up
GigabitEthernet2/0.10	192.168.2.1	YES	manual	up	up
GigabitEthernet2/0.20	192.168.0.1	YES	manual	up	up
GigabitEthernet2/0.30	192.168.3.1	YES	manual	up	up
GigabitEthernet2/0.40	192.168.2.129	YES	manual	up	up
GigabitEthernet3/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet4/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet5/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet6/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet7/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet8/0	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet9/0	unassigned	YES	NVRAM	administratively down	down

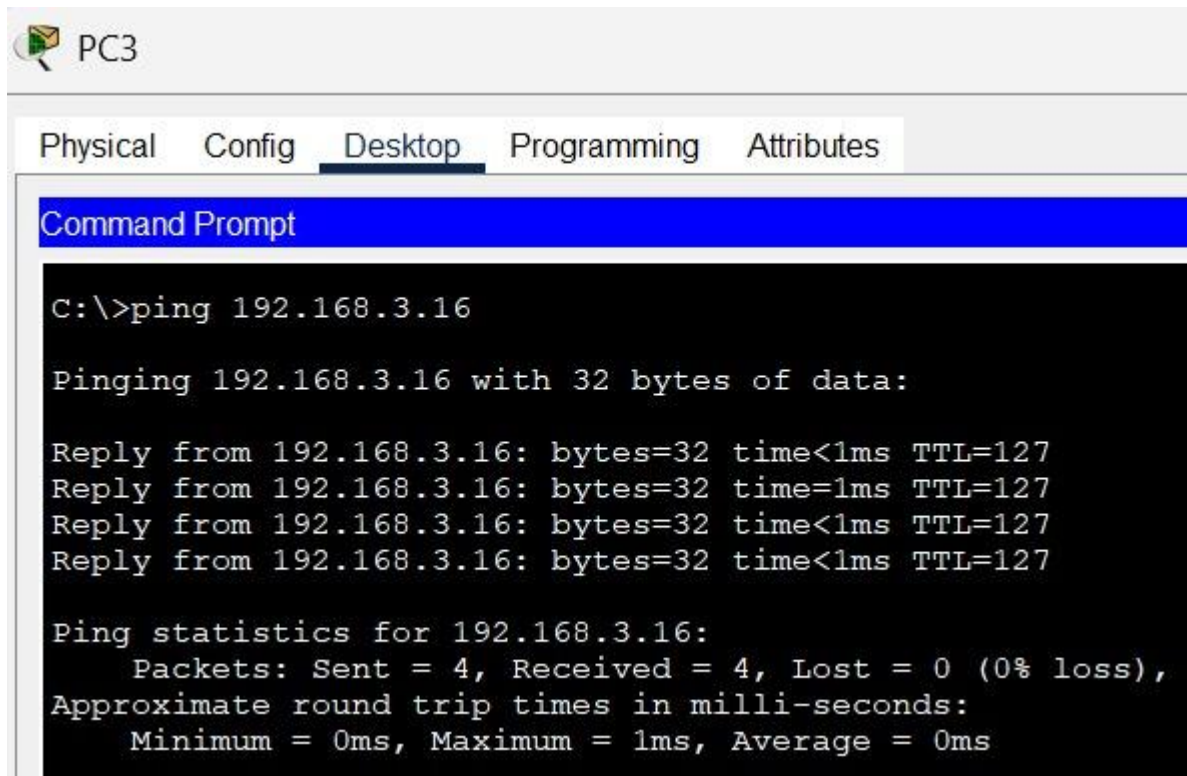
Testing

VLAN Implementation Check

Purpose: Confirm VLANs are properly implemented

PC to PC Communication within VLAN

On PC3 (Loan),



The screenshot shows the 'PC3' window with the 'Desktop' tab selected. A 'Command Prompt' window is open, displaying the results of a ping command to 192.168.3.16. The output shows four successful replies with 32 bytes of data, a time of less than 1ms, and a TTL of 127. The ping statistics indicate 4 packets sent, 4 received, and 0% loss, with round trip times of 0ms minimum, 1ms maximum, and 0ms average.

```
C:\>ping 192.168.3.16

Pinging 192.168.3.16 with 32 bytes of data:

Reply from 192.168.3.16: bytes=32 time<1ms TTL=127
Reply from 192.168.3.16: bytes=32 time=1ms TTL=127
Reply from 192.168.3.16: bytes=32 time<1ms TTL=127
Reply from 192.168.3.16: bytes=32 time<1ms TTL=127


Ping statistics for 192.168.3.16:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Check VLAN Configuration on Switch

On the Head Office Switch,

VLANs 10, 20, 30, 40 are present

Ports are assigned to correct VLANs

 Switch-Hq


Physical Config CLI Attributes

IOS Command Line Interface

```
Switch-Hq>show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig5/1, Fa6/1, Fa7/1, Gig8/1, Gig9/1
10	Admin	active	Gig1/1
20	Finance	active	Gig2/1
30	Loan	active	Gig3/1
40	IT	active	Gig4/1
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

On the Head Office Router, Assigned addresses,

 Router-Hq

Physical Config CLI Attributes

IOS Command Line Interface

```
Router-Hq>show ip dhcp binding
```

IP address	Client-ID/ Hardware address	Lease expiration	Type
192.168.2.16	000D.BD1D.7347	--	Automatic
192.168.0.16	0001.42DA.7D2C	--	Automatic
192.168.3.16	0002.1678.BC9B	--	Automatic
192.168.2.144	0004.9A05.7CA6	--	Automatic

Failover Redundancy Test (Floating Static Route)

To verify redundant connectivity at the Head Office.

Step 1 : Shutdown the primary interface (connected to ISP 1) on the Head Office router.

Step 2: Wait a few seconds.

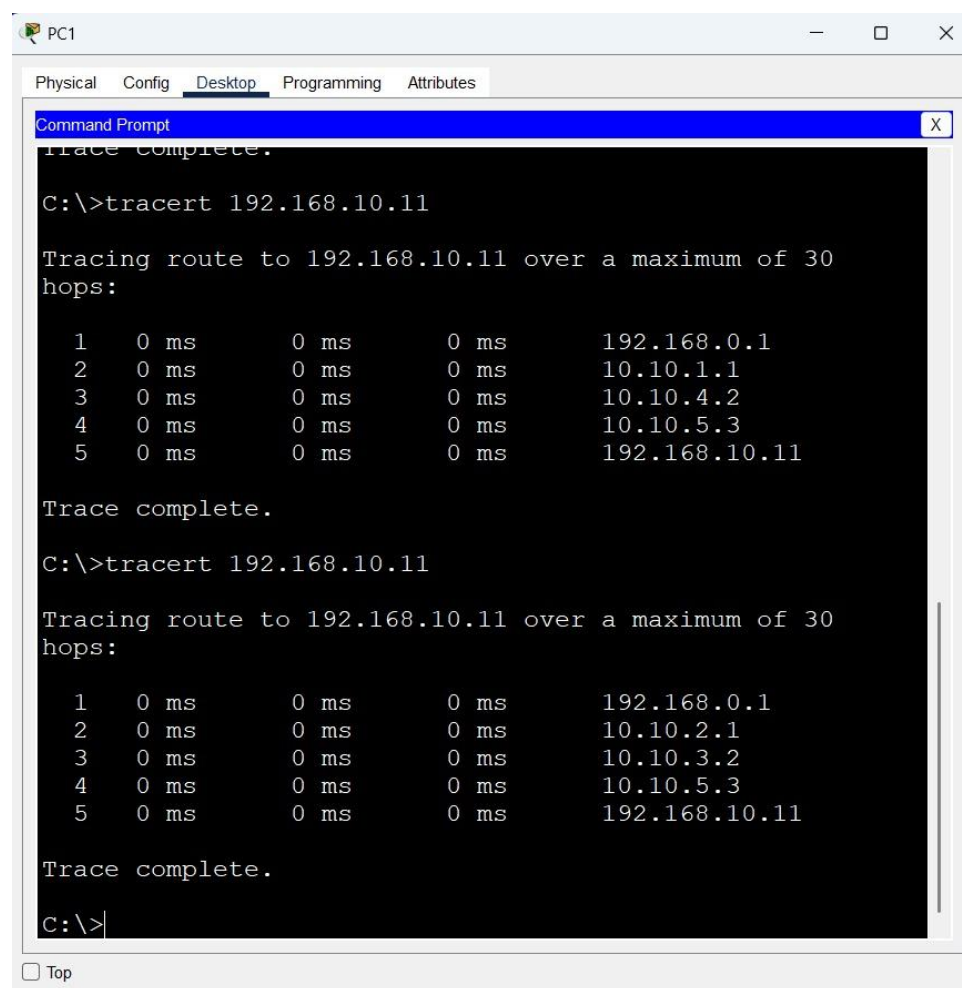
Step 3: Go back to any Head Office PC.

Step 4: Then run:

```
tracert 192.168.10.16
```

Step 5: Now the route should take the backup path via the floating static route.

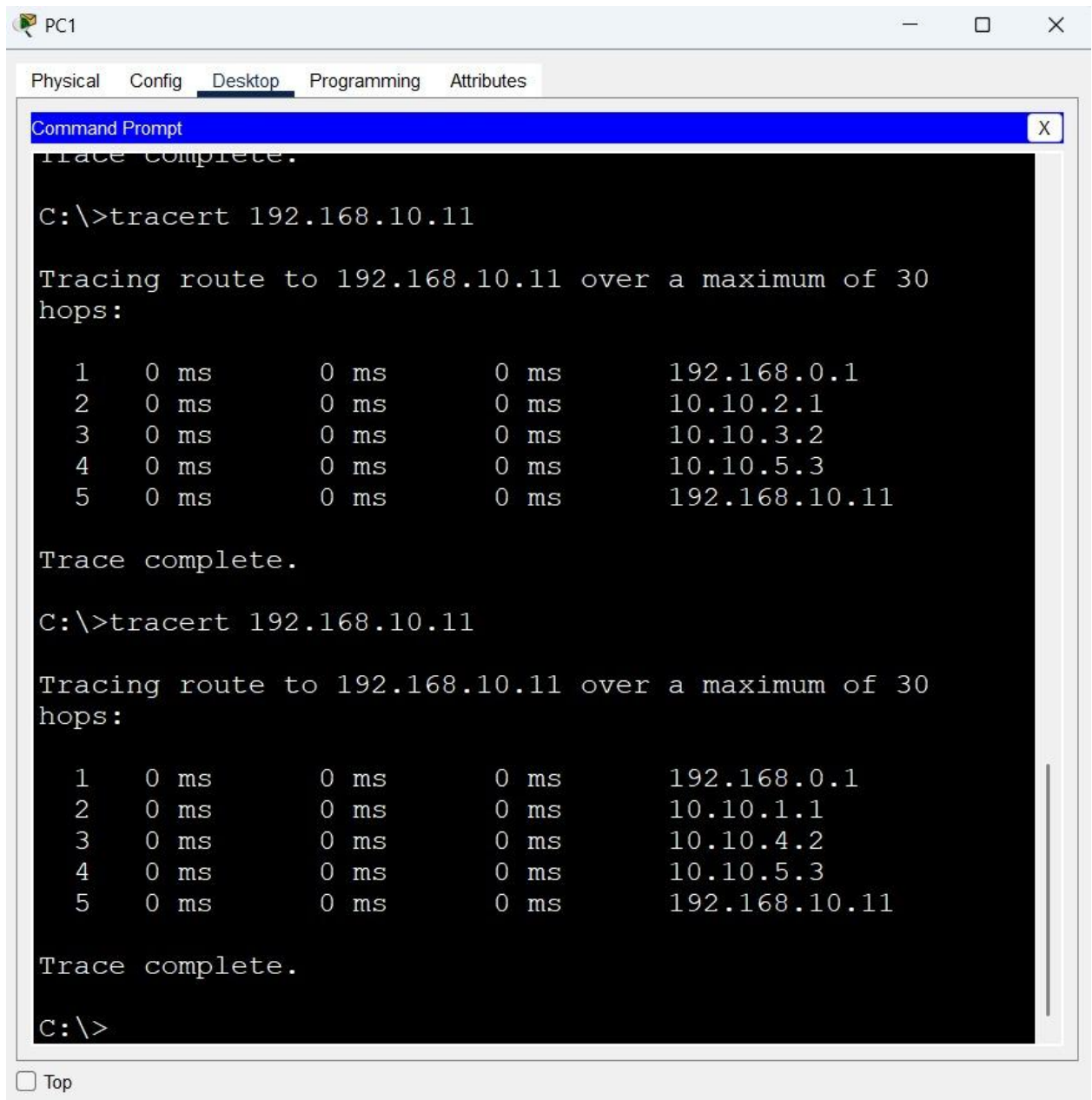
Default:



The screenshot shows a PC1 desktop environment with a Command Prompt window open. The window title is 'PC1' and it has tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The Command Prompt shows the following output:

```
Trace Complete.  
C:\>tracert 192.168.10.11  
  
Tracing route to 192.168.10.11 over a maximum of 30 hops:  
  
  1    0 ms      0 ms      0 ms      192.168.0.1  
  2    0 ms      0 ms      0 ms      10.10.1.1  
  3    0 ms      0 ms      0 ms      10.10.4.2  
  4    0 ms      0 ms      0 ms      10.10.5.3  
  5    0 ms      0 ms      0 ms      192.168.10.11  
  
Trace complete.  
C:\>tracert 192.168.10.11  
  
Tracing route to 192.168.10.11 over a maximum of 30 hops:  
  
  1    0 ms      0 ms      0 ms      192.168.0.1  
  2    0 ms      0 ms      0 ms      10.10.2.1  
  3    0 ms      0 ms      0 ms      10.10.3.2  
  4    0 ms      0 ms      0 ms      10.10.5.3  
  5    0 ms      0 ms      0 ms      192.168.10.11  
  
Trace complete.  
C:\>
```

Failsafe:



The screenshot shows a window titled "PC1" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows two successful traceroute commands to 192.168.10.11. The first traceroute shows a path of 5 hops with 0 ms latency at each step. The second traceroute shows a different path of 5 hops, also with 0 ms latency at each step. The Command Prompt window has a blue title bar and a close button (X) in the top right corner. A "Top" button is visible at the bottom left of the PC1 window.

```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Trace complete.
C:\>tracert 192.168.10.11

Tracing route to 192.168.10.11 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.0.1
  2    0 ms      0 ms      0 ms      10.10.2.1
  3    0 ms      0 ms      0 ms      10.10.3.2
  4    0 ms      0 ms      0 ms      10.10.5.3
  5    0 ms      0 ms      0 ms      192.168.10.11

Trace complete.
C:\>tracert 192.168.10.11

Tracing route to 192.168.10.11 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.0.1
  2    0 ms      0 ms      0 ms      10.10.1.1
  3    0 ms      0 ms      0 ms      10.10.4.2
  4    0 ms      0 ms      0 ms      10.10.5.3
  5    0 ms      0 ms      0 ms      192.168.10.11

Trace complete.
C:\>
```

☐ Top

Conclusion

This project demonstrates the practical application of routing, switching, and DHCP principles to solve real-world networking challenges. By balancing automation, redundancy, and security, the proposed infrastructure not only meets the insurance company's current operational needs but also establishes a resilient foundation for future technological advancements. The successful integration of these components underscores the importance of meticulous planning and adherence to networking standards in building enterprise-grade solutions.

Group Project Marking schema

Student Name:

Abhishek Thapa , Reebusha Maiya Amatya , Ruksana Shakya, Saisha Luitel

Student Id:

00021299, 00021314, 00021321, 00021323,

SN	Topics	Allocated Marks	Obtained Marks
1	Detailed network topology diagram	5 MARKS	
2	Configuration files for key routing and switching devices	5 MARKS	
3	Redundancy and failover plan	5 MARKS	
4	VLAN implementation	5 MARKS	
5	Project documentation	5 MARKS	
6	Clarity and completeness of the network design	5 MARKS	
7	Appropriateness and correctness of routing and switching configurations	5 MARKS	
8	Robustness of redundancy and failover strategies	5 MARKS	
9	Logical and effective VLAN implementation	5 MARKS	
10	Quality and comprehensiveness of documentation and presentation	5 MARKS	
	Total	50 Marks	