LAB REPORT

CSE314: Computer Network Lab

03
[Report Number]

Topic: RIP(v1,v2),OSPF,NAT(Static & Dynamic)

Submitted To

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1. Objective

The objectives of this lab are:

1. To understand the configuration and working of RIP (Version 1 and Version 2).
2. To configure and analyze OSPF in a network.
3. To explore and implement Static and Dynamic NAT in a network environment.

2. Equipment and Software Required

1. Cisco Packet Tracer or GNS3.
2. Computers, routers, and switches (virtual or physical).
3. Ethernet cables for connections (if physical devices are used).

3.Theory

RIP (Routing Information Protocol)

RIP is a distance-vector routing protocol that uses hop count as a metric.

- **RIP Version 1 (RIPv1):**
  - Classful, does not support subnet masks.
  - Broadcasts routing updates every 30 seconds.
- **RIP Version 2 (RIPv2):**
  - Classless, supports subnet masks and VLSM.
  - Multicasts updates using 224.0.0.9.

OSPF (Open Shortest Path First)

OSPF is a link-state routing protocol that uses the Dijkstra algorithm to find the shortest path.

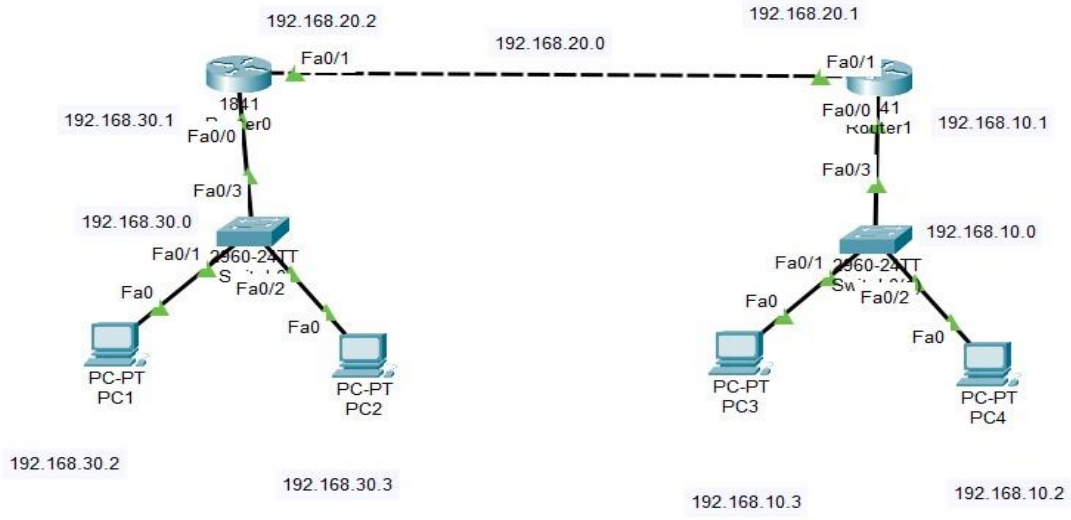
- Supports hierarchical design with areas.
- Uses cost as the routing metric.
- Faster convergence compared to RIP.

NAT (Network Address Translation)

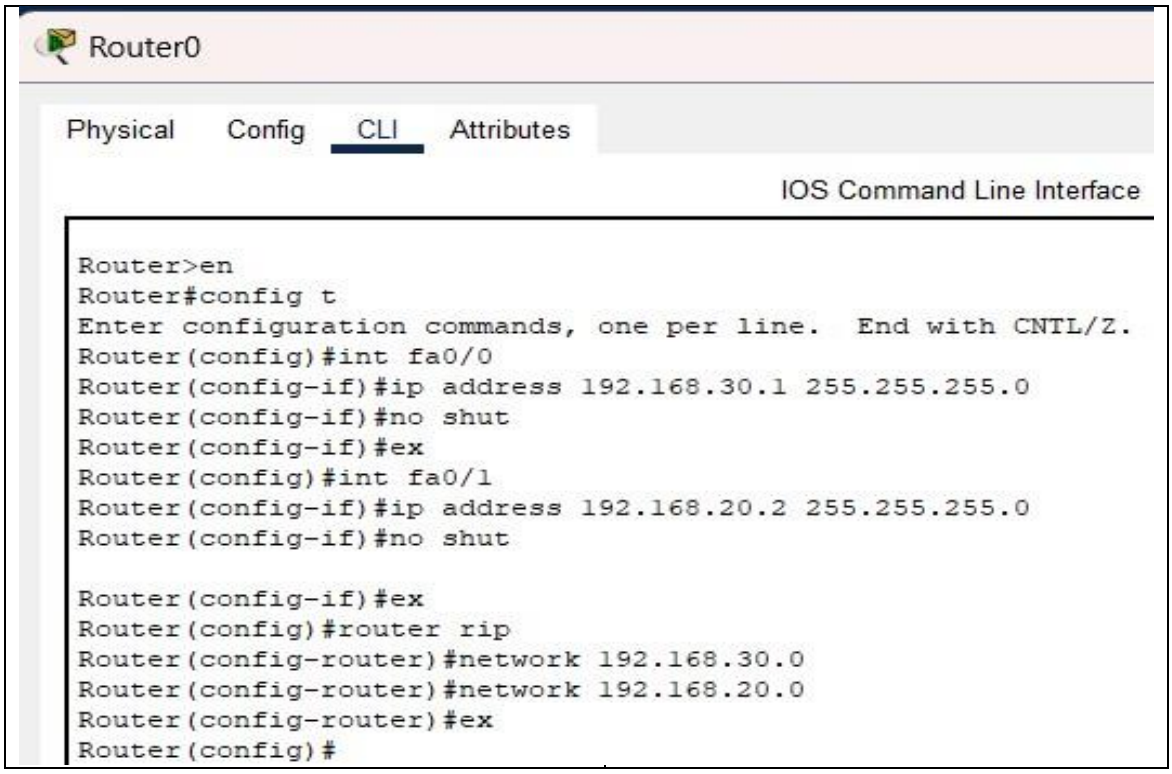
NAT allows private IP addresses to communicate with public networks.

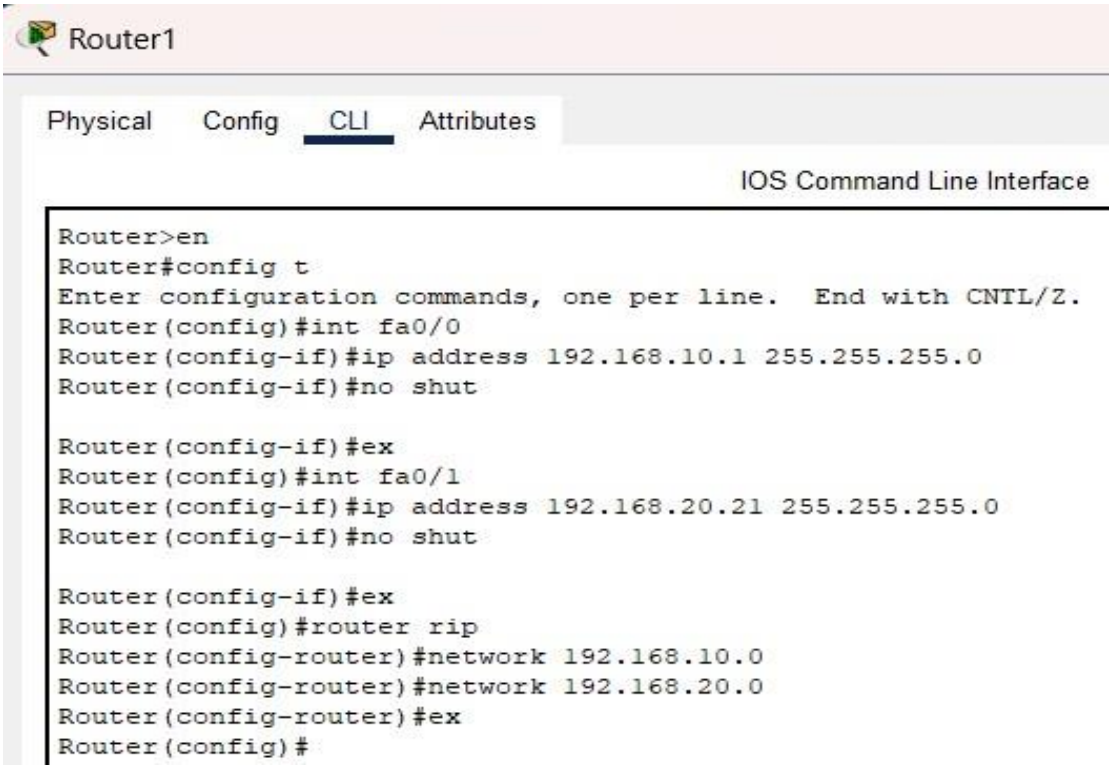
- **Static NAT:** Maps a specific private IP to a specific public IP.
- **Dynamic NAT:** Maps a pool of private IP addresses to a pool of public IPs dynamically.

4 . RIP V1:

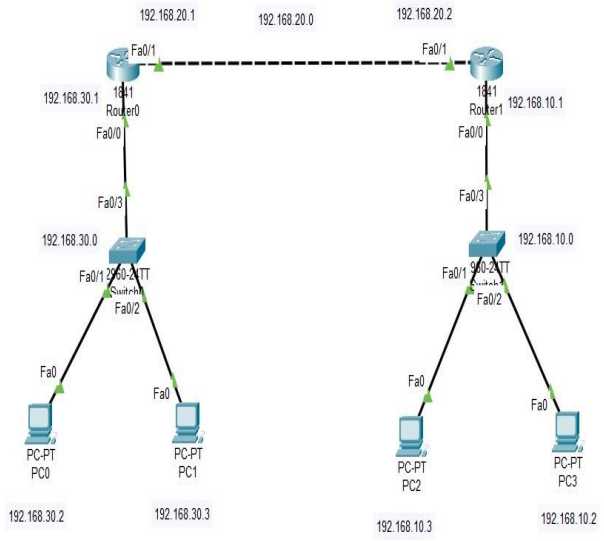


Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC1	PC4	ICMP		0.000	N	3	(edit)
	Successful	PC2	PC3	ICMP		0.000	N	4	(edit)
	Successful	PC2	PC4	ICMP		0.000	N	5	(edit)
	Successful	PC1	PC3	ICMP		0.000	N	6	(edit)


Router0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.30.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int fa0/1
Router(config-if)#ip address 192.168.20.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#router rip
Router(config-router)#network 192.168.30.0
Router(config-router)#network 192.168.20.0
Router(config-router)#ex
Router(config)#


Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int fa0/1
Router(config-if)#ip address 192.168.20.21 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#router rip
Router(config-router)#network 192.168.10.0
Router(config-router)#network 192.168.20.0
Router(config-router)#ex
Router(config)#

5 . RIP V2:



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC0	PC2	ICMP		0.000	N	4	(edit)
	Successful	PC1	PC3	ICMP		0.000	N	5	(edit)
	Successful	PC1	PC2	ICMP		0.000	N	6	(edit)

Router0

Physical Config CLI Attributes

IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.30.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#ex
Router(config)#int fa0/1
Router(config-if)#ip address 192.168.20.2 255.255.255.0
Router(config-if)#no shut

Router(config-if)#ex
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.30.0
Router(config-router)#network 192.168.20.0
Router(config-router)#no auto summary
Router(config-router)#ex
Router(config)#
```

Router1

Physical Config CLI Attributes

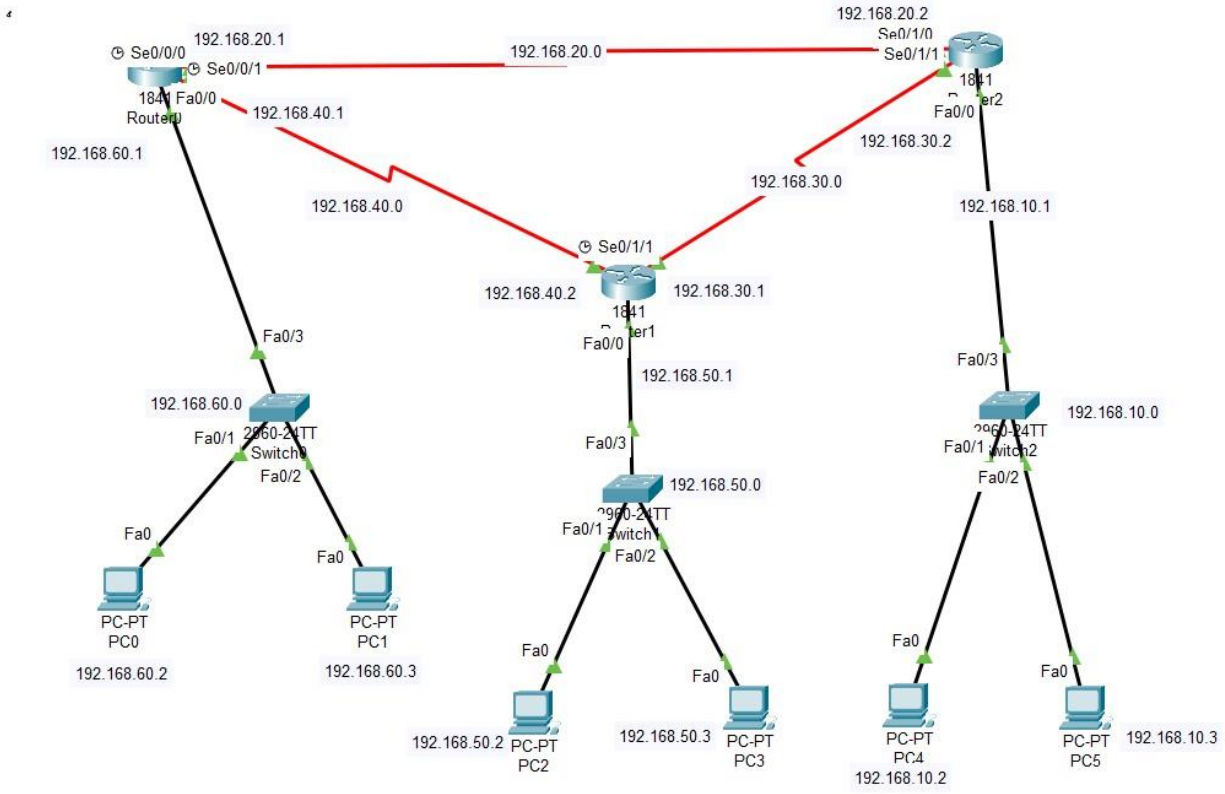
IOS Command Line Interface

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#ex
Router(config)#int fa0/1
Router(config-if)#ip address 192.168.20.21 255.255.255.0
Router(config-if)#no shut

Router(config-if)#ex
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.10.0
Router(config-router)#network 192.168.20.0
Router(config-router)#no auto summary
Router(config-router)#ex
Router(config)#
```

6 . OSPF:


192.168.20.1
Se0/0/0
Se0/0/1
192.168.20.0
192.168.20.2
Se0/1/0
Se0/1/1
1841
Fa0/0
Router0
192.168.40.1
192.168.60.1
192.168.40.0
192.168.30.0
192.168.30.2
192.168.10.1
Se0/1/1
192.168.40.2
192.168.30.1
Fa0/0
192.168.50.1
Fa0/3
192.168.60.0
Fa0/1
Switch0
Fa0/2
192.168.50.0
Switch1
192.168.10.0
Switch2
Fa0
PC-PT
PC0
192.168.60.2
PC1
192.168.60.3
PC2
192.168.50.2
PC3
192.168.50.3
PC4
192.168.10.2
PC5
192.168.10.3

Router0

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)#int fa0/0
Router(config-if)#ip address 192.168.60.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/0/1
Router(config-if)#ip address 192.168.40.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/0/0
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#router ospf 1
Router(config-router)#network 192.168.60.0 0.0.0.0 area 1
Router(config-router)#network 192.168.40.0 0.0.0.0 area 1
Router(config-router)#network 192.168.20.0 0.0.0.0 area 1
Router(config-router)#ex
```

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)#int fa0/0
Router(config-if)#ip address 192.168.50.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/1/1
Router(config-if)#ip address 192.168.30.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/1/0
Router(config-if)#ip address 192.168.40.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#router ospf 1
Router(config-router)#network 192.168.50.0 0.0.0.0 area 1
Router(config-router)#network 192.168.30.0 0.0.0.0 area 1
Router(config-router)#network 192.168.40.0 0.0.0.0 area 1
Router(config-router)#ex
```

Router2

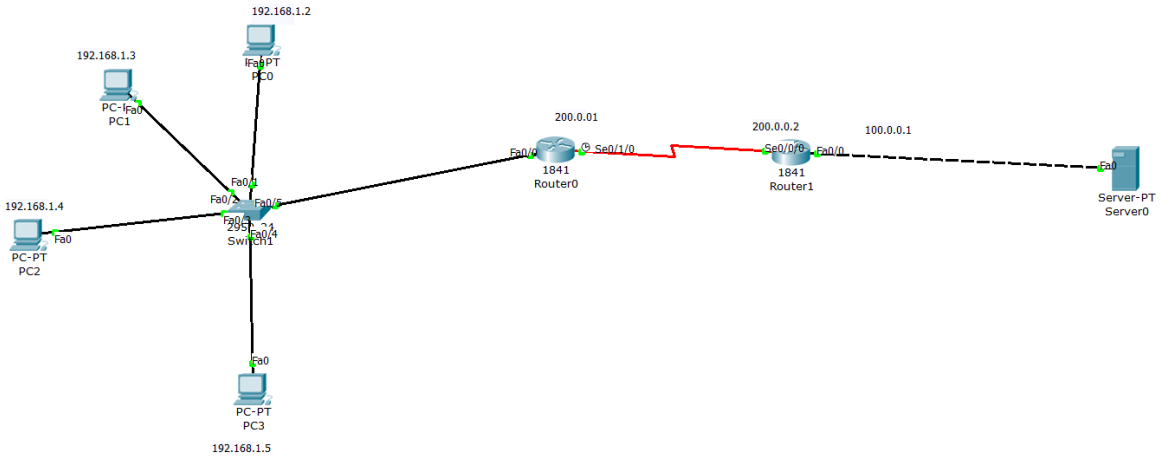
Physical Config CLI Attributes

IOS Command Line Interface

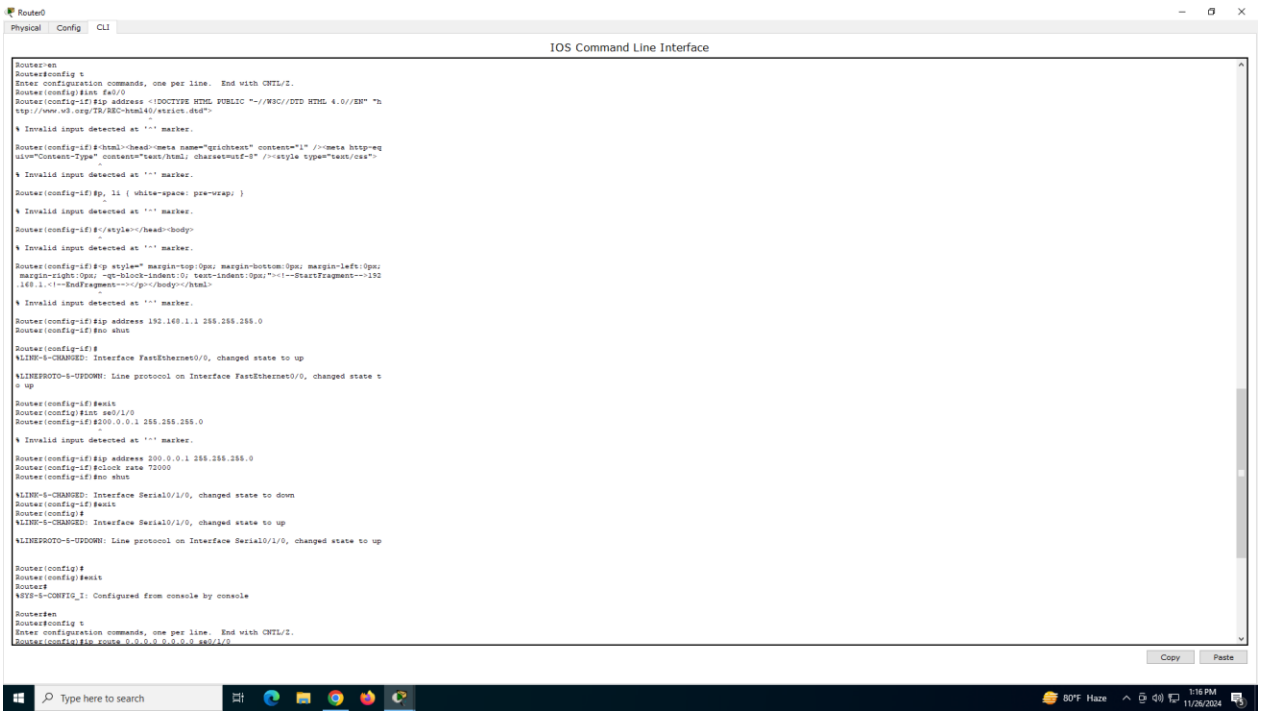
```
Router#en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/1/0
Router(config-if)#ip address 192.168.20.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#int se0/1/1
Router(config-if)#ip address 192.168.30.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#ex
Router(config)#router ospf 1
Router(config-router)#network 192.168.10.0 0.0.0.0 area 1
Router(config-router)#network 192.168.20.0 0.0.0.0 area 1
Router(config-router)#network 192.168.30.0 0.0.0.0 area 1
Router(config-router)#ex
```

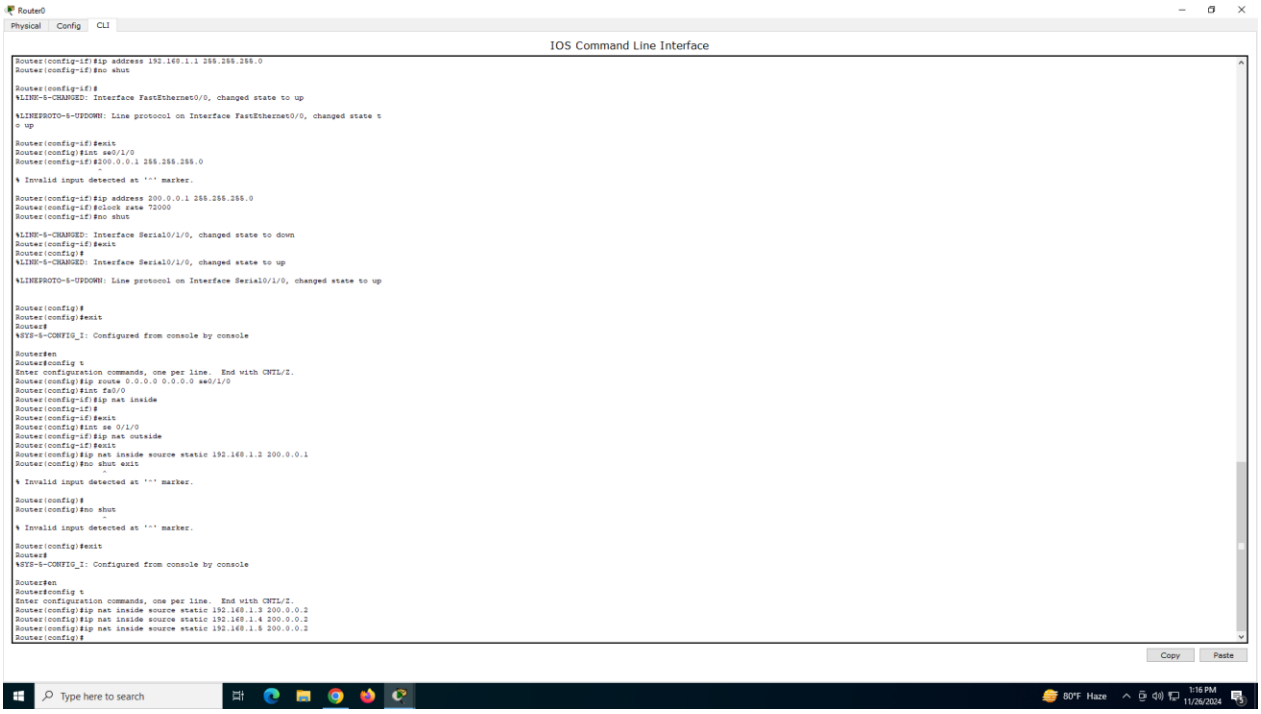
Fire	Last Status	Source	Destination	Type	Color
	Successful	PC1	PC2	ICMP	
	Successful	PC3	PC0	ICMP	
	Successful	PC1	PC3	ICMP	

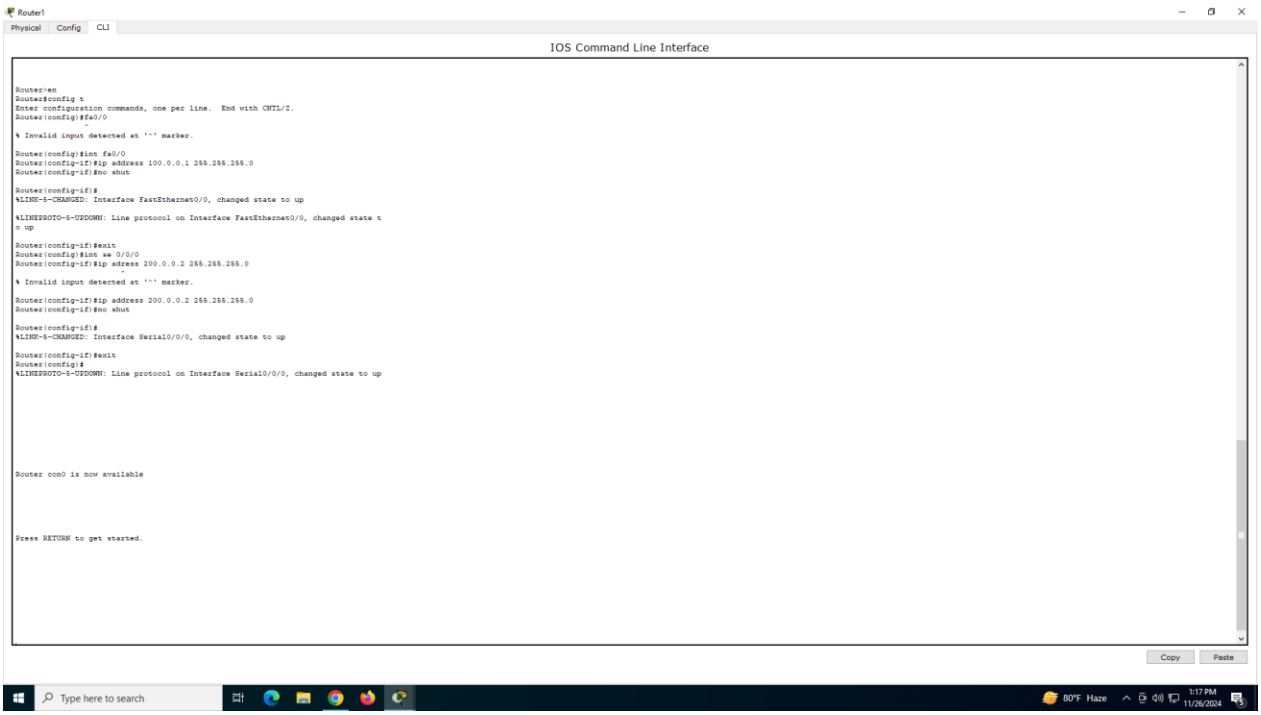
NAT(STATIC):



ROUTER CONFIGERATION:


Router0
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0//EN" "h
ttp://www.w3.org/TR/REC-html40/strict.dtd">
% Invalid input detected at '^' marker.
Router(config-if)#<html><head><meta name="qrichtext" content="1" /><meta http-eq
uiv="Content-Type" content="text/html; charset=utf-8" /><style type="text/css">
% Invalid input detected at '^' marker.
Router(config-if)#p, li { white-space: pre-wrap; }
% Invalid input detected at '^' marker.
Router(config-if)#</style></head><body>
% Invalid input detected at '^' marker.
Router(config-if)#<p style=" margin-top:0px; margin-bottom:0px; margin-left:0px;
margin-right:0px; -qt-block-indent:0; text-indent:0px;"><!--StartFragment-->192
.168.1.1<!--EndFragment--></p></body></html>
% Invalid input detected at '^' marker.
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router(config-if)#exit
Router(config)#int se0/1/0
Router(config-if)#200.0.0.1 255.255.255.0
% Invalid input detected at '^' marker.
Router(config-if)#ip address 200.0.0.1 255.255.255.0
Router(config-if)#clock rate 72000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 se0/1/0
Copy
Paste
Type here to search
80°F Haze
1:16 PM
11/26/2024

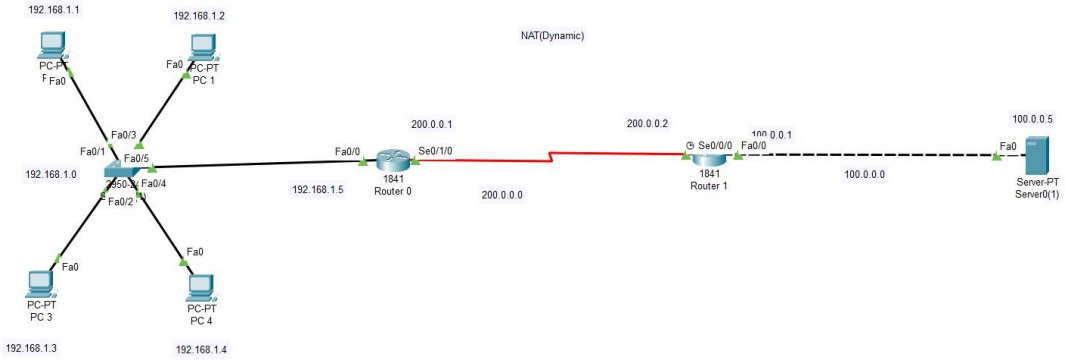

Router0
Physical
Config
CLI
IOS Command Line Interface
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state t
o up
Router(config-if)#exit
Router(config)#int se0/1/0
Router(config-if)#200.0.0.1 255.255.255.0
% Invalid input detected at '^' marker.
Router(config-if)#ip address 200.0.0.1 255.255.255.0
Router(config-if)#clock rate 72000
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Router(config-if)#exit
Router(config)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up
Router(config)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 se0/1/0
Router(config)#int fa0/0
Router(config-if)#ip nat inside
Router(config-if)#
Router(config-if)#exit
Router(config)#int se 0/1/0
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip nat inside source static 192.168.1.2 200.0.0.1
Router(config)#no shut exit
% Invalid input detected at '^' marker.
Router(config)#
Router(config)#no shut
% Invalid input detected at '^' marker.
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip nat inside source static 192.168.1.3 200.0.0.2
Router(config)#ip nat inside source static 192.168.1.4 200.0.0.2
Router(config)#ip nat inside source static 192.168.1.5 200.0.0.2
Router(config)#
Copy
Paste
Type here to search
80°F Haze
1:16 PM
11/26/2024



MESSAGE SENDING:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
	Successful	PC0	Server0	ICMP		0.000	N	14
	Successful	PC1	Server0	ICMP		0.000	N	15
	Successful	PC2	Server0	ICMP		0.000	N	16
	Successful	PC3	Server0	ICMP		0.000	N	17

8 . NAT(Dynamic):



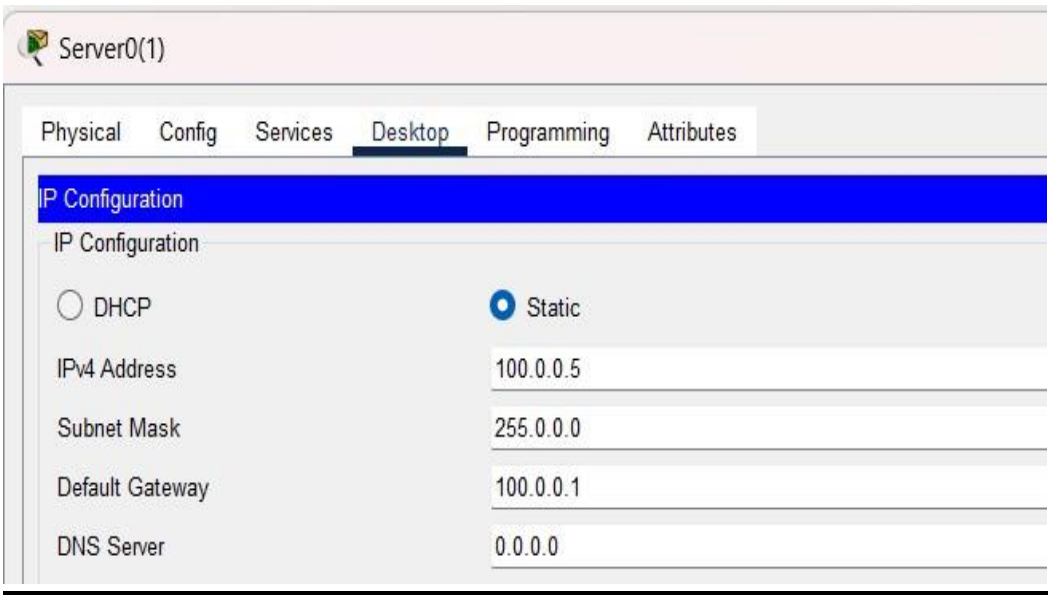
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC1	Server0	ICMP		0.000	N	23	(edit)
	Successful	PC 0	Server0(1)	ICMP		0.000	N	24	(edit)
	Successful	PC 1	Server0(1)	ICMP		0.000	N	25	(edit)
	Successful	PC 3	Server0(1)	ICMP		0.000	N	26	(edit)

Router 0

Physical Config CLI Attributes

IOS Command Line Interface

```
Router#en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.1.5 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int se0/1/0
Router(config-if)#ip address 200.0.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
Router(config)#ip route 0.0.0.0 0.0.0.0 se0/1/0
Router(config)#int fa0/0
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#int se0/1/0
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip nat pool mypool 200.0.0.3 200.0.0.4 netmask 255.255.255.0
Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat inside source list 1 pool mypool
```



9. Observations

1. RIP successfully exchanged routing information.
2. OSPF formed adjacencies, and the shortest path was calculated.
3. NAT translated private IPs to public IPs correctly.

10. Conclusion

The lab demonstrated the implementation of RIP, OSPF, Static NAT, and Dynamic NAT in a simulated network. It reinforced concepts of routing protocols and address translation.