Computer Networks Lab Assignment 6

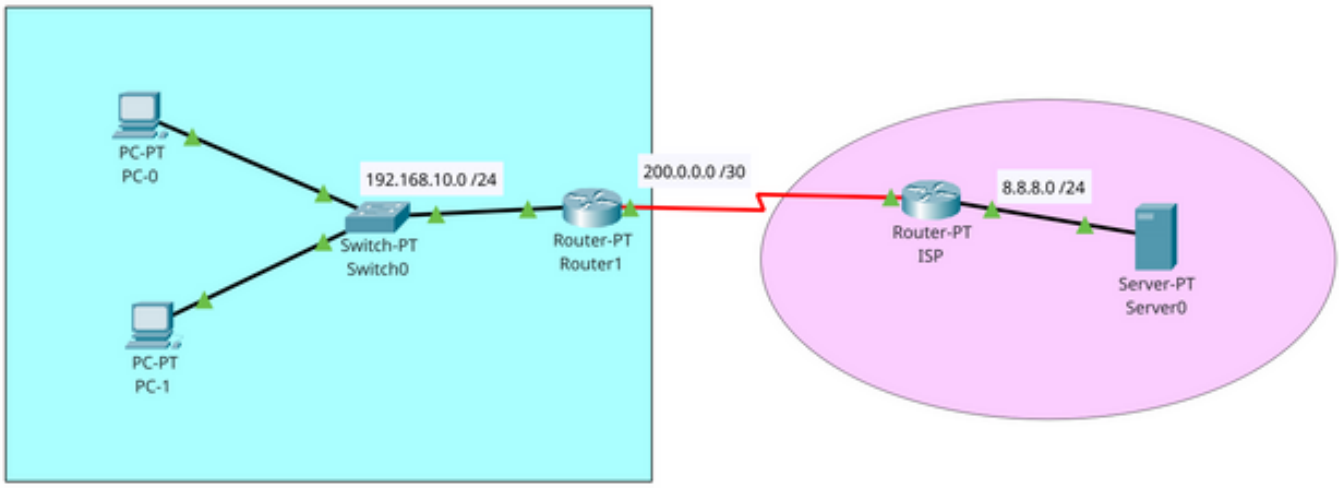
Objective

- To configure Network Address Translation (NAT) on a router using Cisco Packet Tracer
- To demonstrate the setup and configuration of NAT to allow internal network devices to communicate with external networks.

Steps taken to set up the network

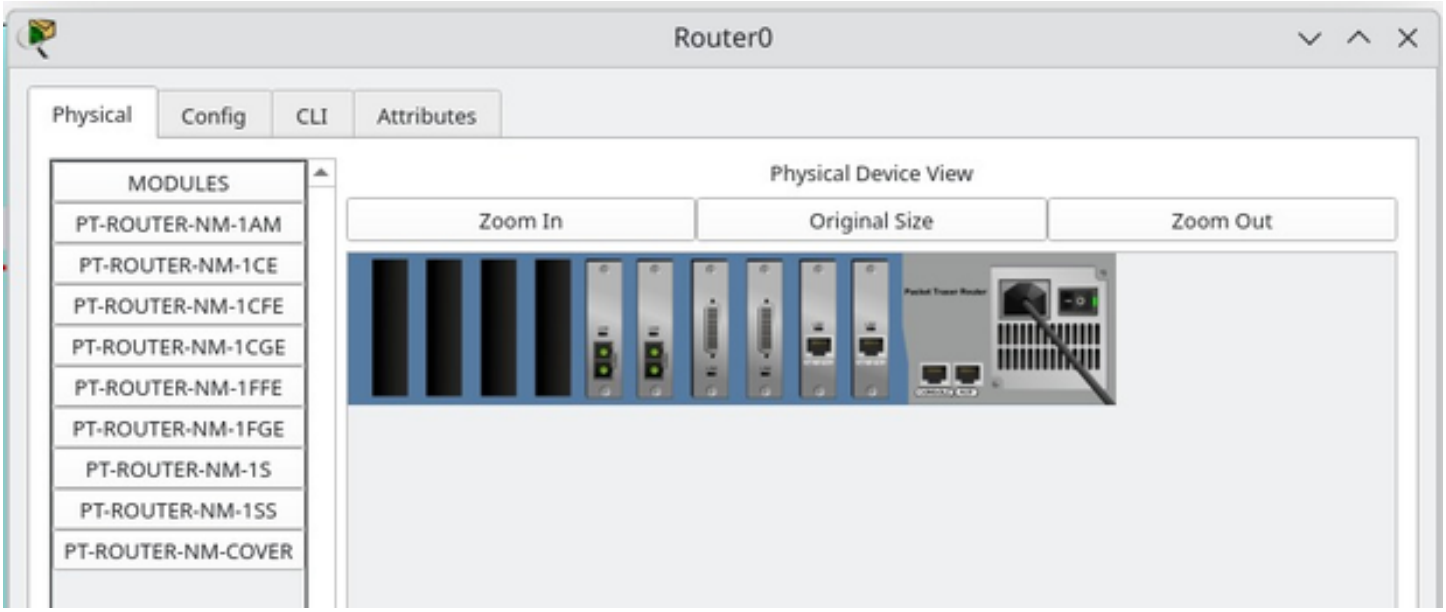
Step 1:

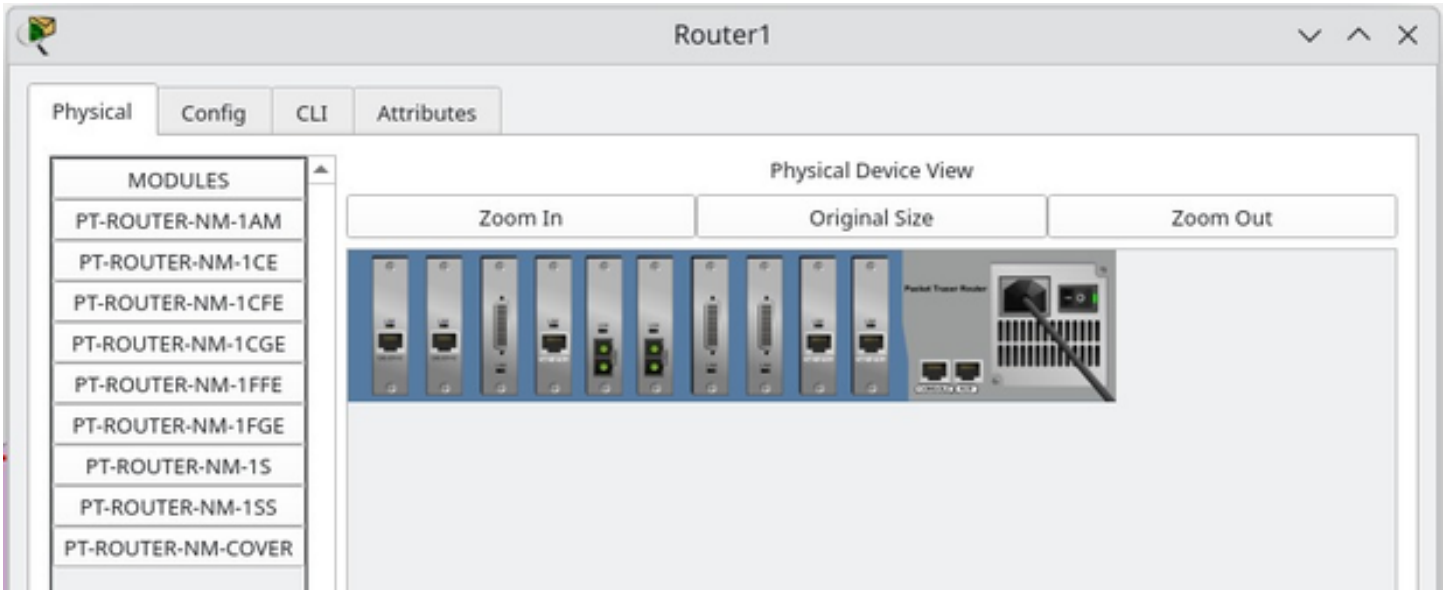
Drag and drop required Network devices (2 Router-PT's and 1 Switch-PT) and End devices (2 PC-PT's and a Server-PT) as shown below.



Step 2:

Open each Router and navigate to physical tab, and add PT-ROUTER-NM-1CGE, PT-ROUTER-NM-1S, PT-ROUTER-NM-1FFE Modules to the Router1 and add the same modules as Router1 except for PT-ROUTER-NM-1FFE, add PT-ROUTER-NM-1CGE module.





Step 3:

Make connections using cables between all the devices as shown in the picture.

Use Copper Straight through cable to connect different devices and use a Serial DCE cable to connect ISP Router and Router 1.

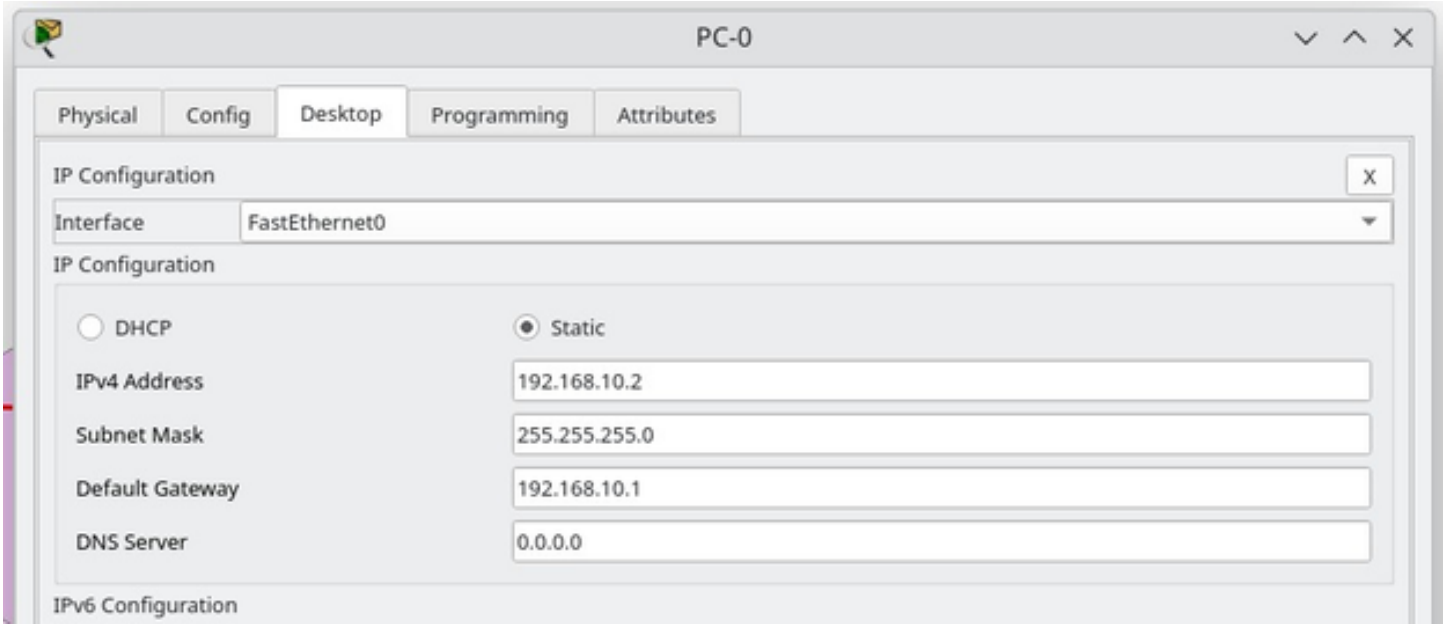
Step 4:

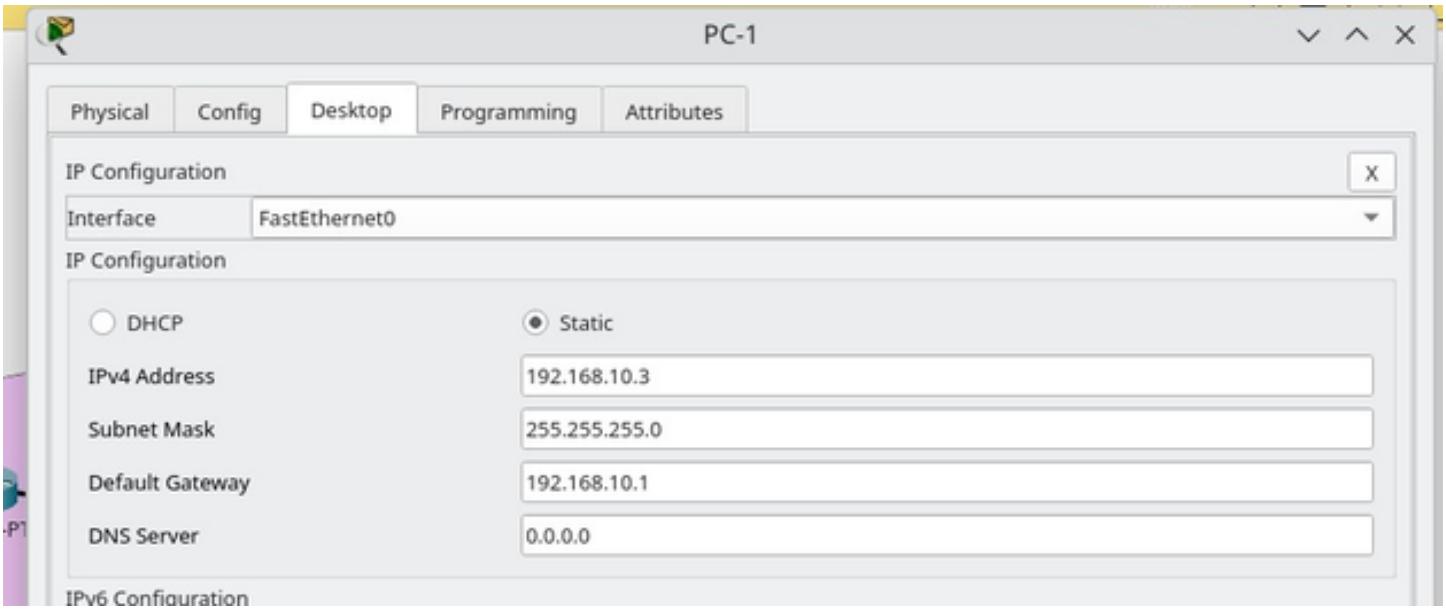
Now, Configure IP address of the routers and end devices according to the configuration table below;

Device Name	Interface	IP Address	Subnet Mask
Router1	FastEthernet0/0	192.168.10.1	255.255.255.0
Router1	Serial0/0/0	200.0.0.1	255.255.255.252
ISP Router	Serial0/0/0	200.0.0.2	255.255.255.252

PC Configuration Table:

Device Name	IP Address	Subnet Mask	Gateway
PC0	192.168.10.2	255.255.255.0	192.168.10.1
PC1	192.168.10.3	255.255.255.0	192.168.10.1





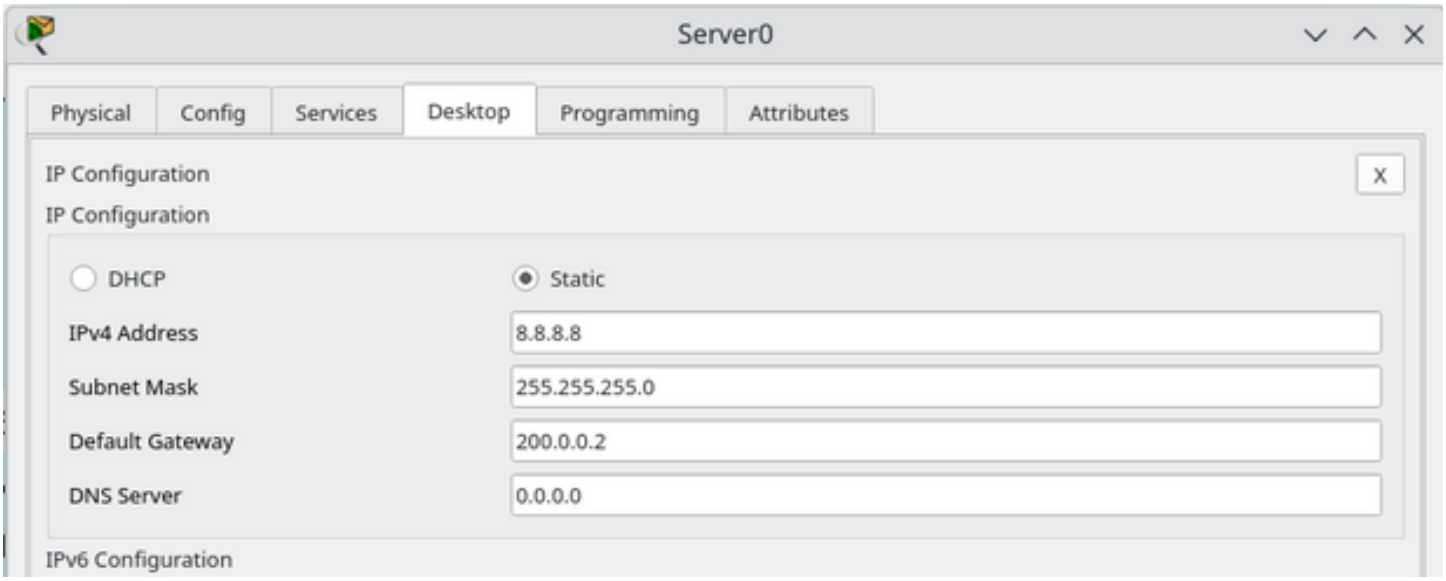

```
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa o/o
                     ^
% Invalid input detected at '^' marker.

Router(config)#int fa 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#int se 2/0
Router(config-if)#ip address 200.0.0.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
```

Router1

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int gi 8/0
Router(config-if)#ip address 8.8.8.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet8/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet8/0, changed state to up

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

ISP Router

And configure the Ip address of the server as ;



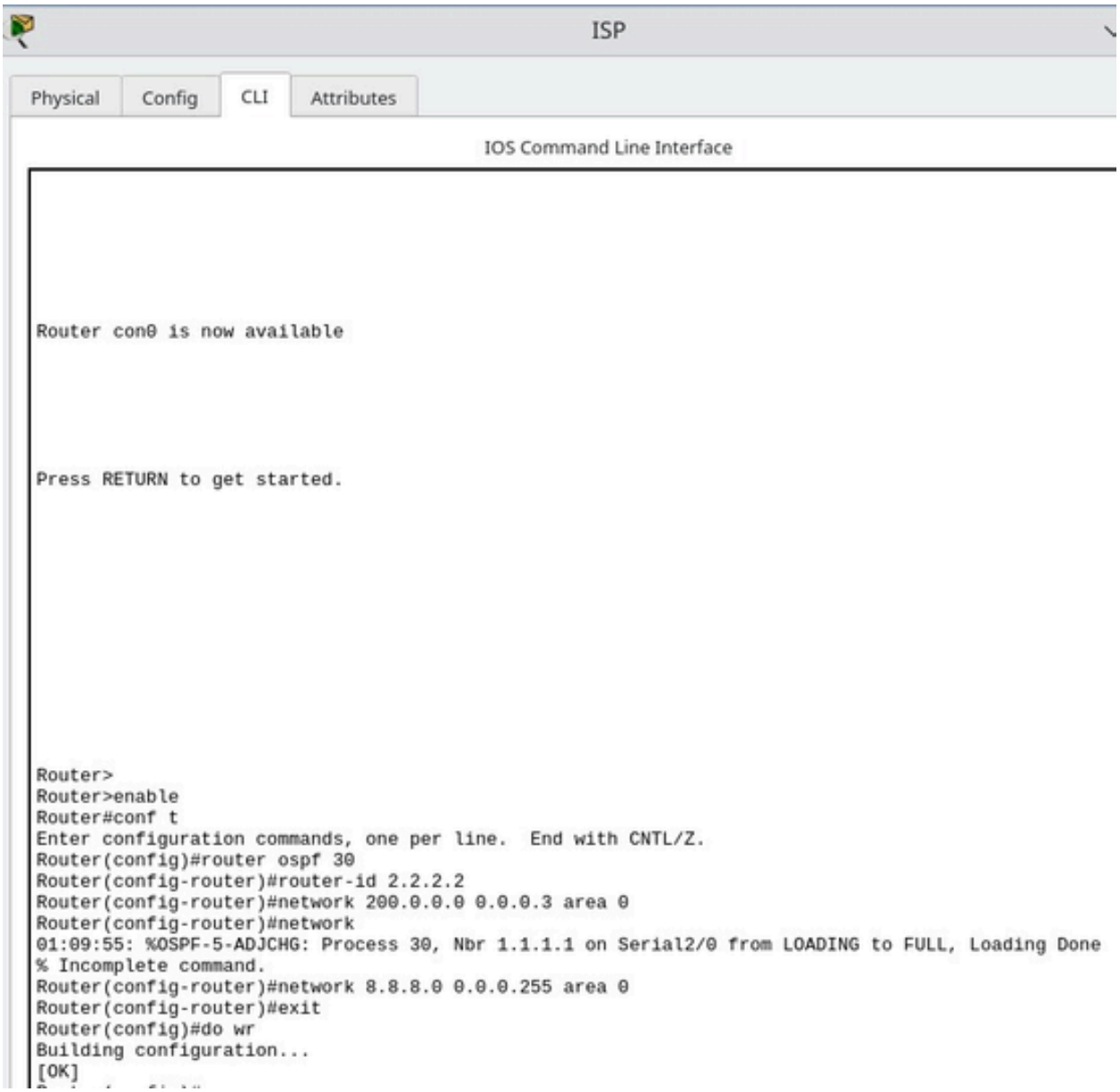
Step 5:

We shall enable ospf routing protocol between both routers.

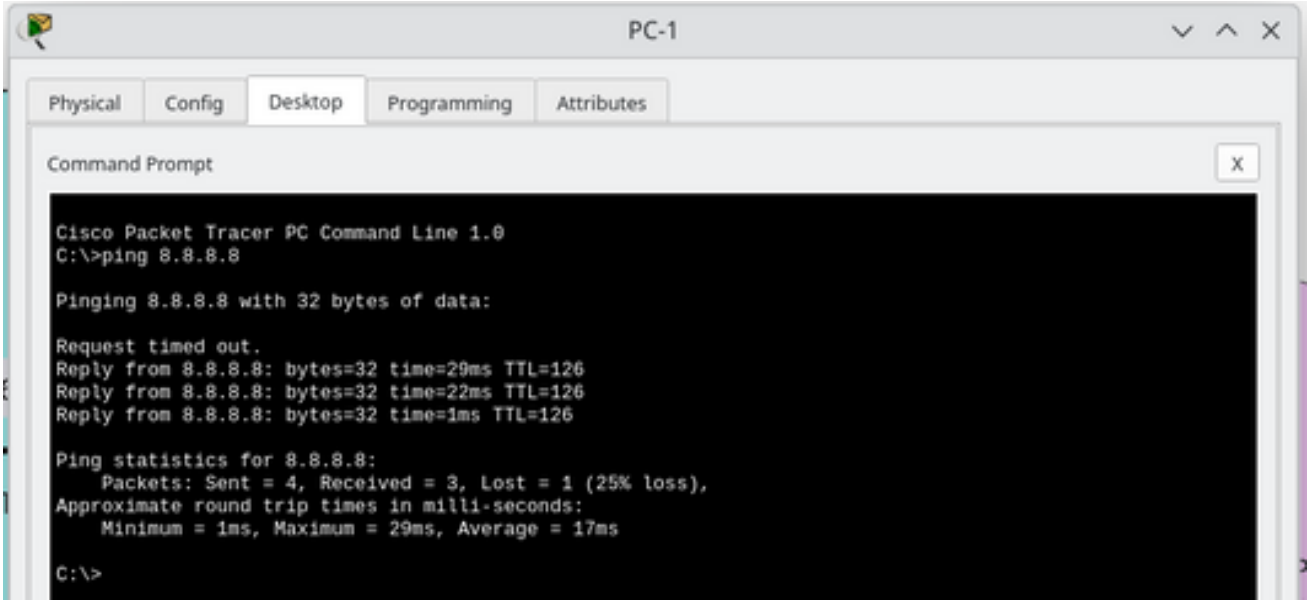
In Router 1;

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
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 to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#int se 2/0
          ^
% Invalid input detected at '^' marker.

Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int se 2/0
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.
Router(config-if)#ip address 200.0.0.1 255.255.255.252
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config)#router ospf 30
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 192.168.10.0 0.0.0.255 area 0
Router(config-router)#network 200.0.0.0 0.0.0.3 area 0
Router(config-router)#
Router(config-router)#
Router(config-router)#exit
Router(config)#
Router(config)#do wr
Building configuration...
[OK]
Router(config)#
```

In ISP router;

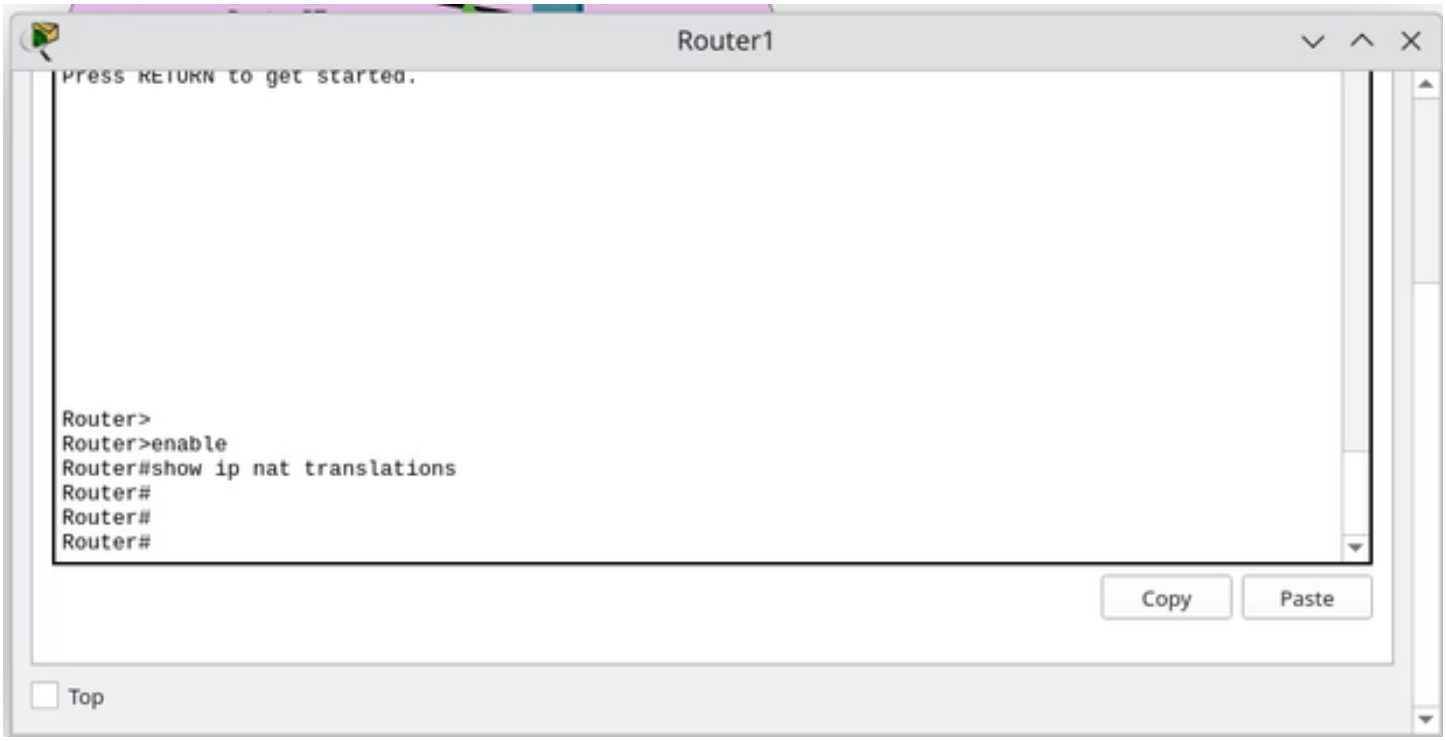


Step 6: Ping Server (8.8.8.8) from PC-1



```
C:\>tracert 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.10.1
  2    0 ms      1 ms      0 ms      200.0.0.2
  3    1 ms      0 ms      1 ms      8.8.8.8

Trace complete.
```

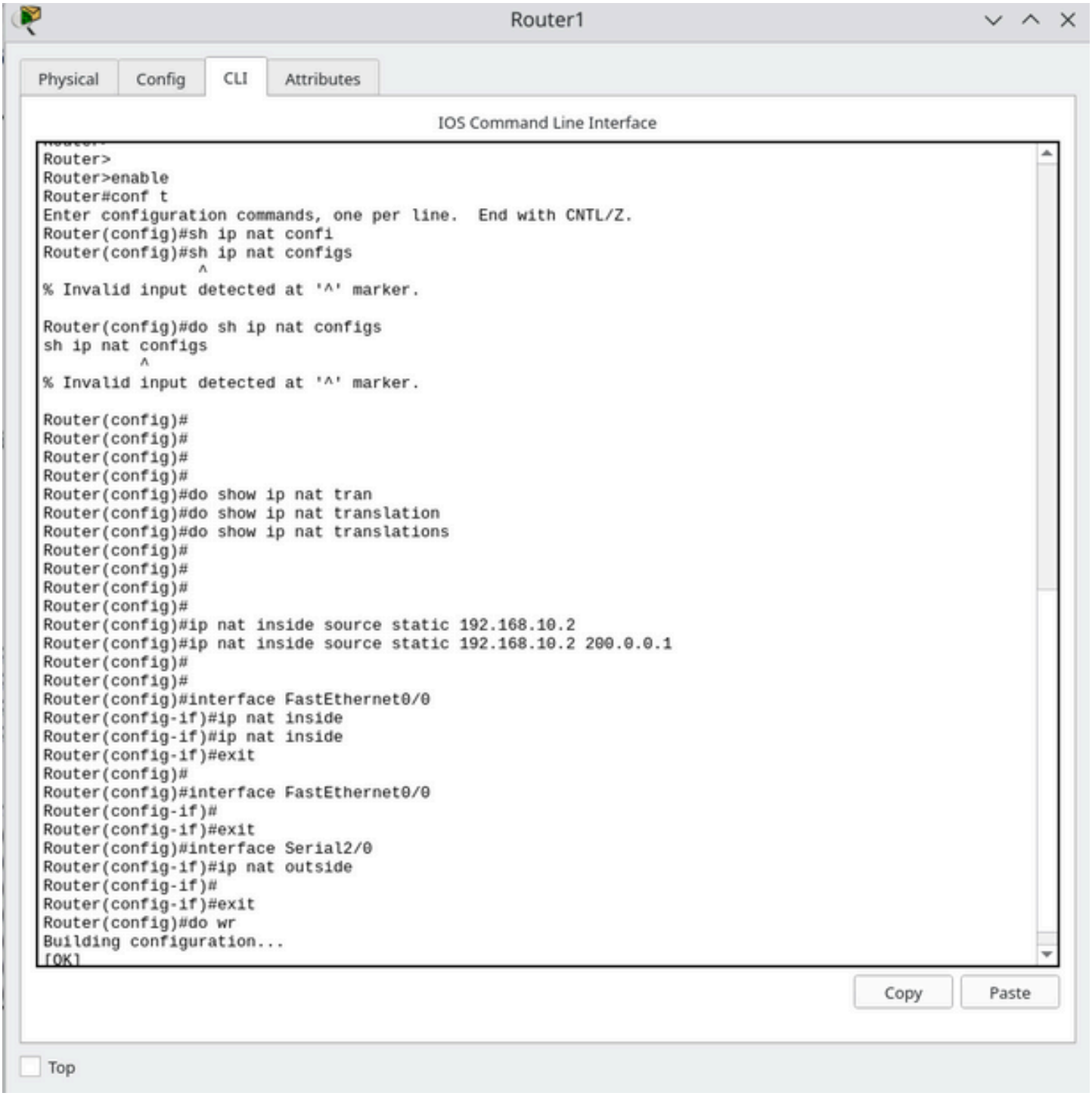
Step 7: Check for Address Translation



Step 8:

Configure Static NAT and configure interfaces as NAT inside and outside.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=1ms TTL=126
Reply from 8.8.8.8: bytes=32 time=31ms TTL=126

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 31ms, Average = 8ms
```




```
Router(config)#do sh ip nat translations
Pro  Inside global     Inside local       Outside local      Outside global
---  200.0.0.1         192.168.10.2       ---                ---
```

Now, let us ping again and verify the NAT;

In Router1;

```
Router(config)#do sh ip nat translations
Pro  Inside global     Inside local       Outside local      Outside global
icmp 200.0.0.1:10      192.168.10.2:10    8.8.8.8:10         8.8.8.8:10
icmp 200.0.0.1:11      192.168.10.2:11    8.8.8.8:11         8.8.8.8:11
icmp 200.0.0.1:12      192.168.10.2:12    8.8.8.8:12         8.8.8.8:12
icmp 200.0.0.1:13      192.168.10.2:13    8.8.8.8:13         8.8.8.8:13
icmp 200.0.0.1:1       192.168.10.2:1     8.8.8.8:1          8.8.8.8:1
icmp 200.0.0.1:2       192.168.10.2:2     8.8.8.8:2          8.8.8.8:2
icmp 200.0.0.1:3       192.168.10.2:3     8.8.8.8:3          8.8.8.8:3
icmp 200.0.0.1:4       192.168.10.2:4     8.8.8.8:4          8.8.8.8:4
icmp 200.0.0.1:8       192.168.10.2:8     8.8.8.8:8          8.8.8.8:8
icmp 200.0.0.1:9       192.168.10.2:9     8.8.8.8:9          8.8.8.8:9
---  200.0.0.1         192.168.10.2       ---                ---
```