COMPUTER NETWORKS LAB SIX REPORT

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B. TECH COMPUTER SCIENCE AND ENGINEERING (SEC-C 3RD YEAR, 5TH SEMESTER)
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Objective

This lab focuses on configuring Network Address Translation (NAT) on a router to enable internal devices with private IP addresses to communicate with external networks using a public IP address. NAT facilitates secure communication by hiding internal addresses from external networks. This experiment demonstrates how to set up NAT using Cisco Packet Tracer.

Procedure

Network Design:

- **Router1** connected to the **ISP Router**.
- **PC0** connected to **Router1**.
- **PC1** connected to **Router1**.

IP Addressing Scheme:

- **Inside Network (LAN)**: 192.168.10.0/24
- **Outside Network (ISP)**: 200.0.0.0/30

Step 1: Configure Network Addresses

1. **Inside Network (LAN)**:
    - Network Address: 192.168.10.0/24
2. **Outside Network (ISP)**:
    - Network Address: 200.0.0.0/30

Step 2: Configuring Router1

1. **Access CLI of Router1**:
    - Press ENTER to start configuration.

2. **Activate Privileged Mode**:
    - Type enable.
3. **Access Configuration Mode**:
    - Type config t.
4. **Configure Interfaces**:
    - **FastEthernet0/0** (connected to LAN):
        - Command: interface FastEthernet0/0
        - IP: 192.168.10.1
        - Subnet Mask: 255.255.255.0
    - **Serial0/0/0** (connected to ISP Router):
        - Command: interface Serial0/0/0
        - IP: 200.0.0.1
        - Subnet Mask: 255.255.255.252
5. **Activate Interfaces**:
    - Command: no shutdown

Step 3: Configuring ISP Router

1. **Access CLI of ISP Router**:
    - Press ENTER to start configuration.
2. **Activate Privileged Mode**:
    - Type enable.
3. **Access Configuration Mode**:
    - Type config t.

4. **Configure Interfaces**:
    - **Serial0/0/0** (connected to Router1):
        - Command: interface Serial0/0/0
        - IP: 200.0.0.2
        - Subnet Mask: 255.255.255.252
5. **Activate Interfaces**:
    - Command: no shutdown

Step 4: Configuring PCs

1. **PC0 Configuration**:
    - Go to the desktop of PC0, select **IP Configuration**, and assign:
        - IP Address: 192.168.10.2
        - Subnet Mask: 255.255.255.0
        - Default Gateway: 192.168.10.1
2. **PC1 Configuration**:
    - Go to the desktop of PC1, select **IP Configuration**, and assign:
        - IP Address: 192.168.10.3
        - Subnet Mask: 255.255.255.0
        - Default Gateway: 192.168.10.1

Step 5: Configuring NAT on Router1

1. **Define Inside and Outside Interfaces**:
    - Command:

interface FastEthernet0/0

ip nat inside

exit

interface Serial0/0/0

ip nat outside

exit

2. **Configure a Standard Access List to Permit the Internal Network**:
    - Command:

access-list 1 permit 192.168.10.0 0.0.0.255

3. **Configure NAT Overload (PAT) for the Internal Network**:
    - Command:

ip nat inside source list 1 interface Serial0/0/0 overload

Step 6: Verify NAT Configuration

1. **Test Connectivity by Pinging from PC0 to ISP Router**:
    - Open the command prompt on PC0.
    - Type ping 200.0.0.2 and observe the response.
2. **Check NAT Translation Table on Router1**:
    - On Router1 CLI, type show ip nat translations to see the NAT entries.

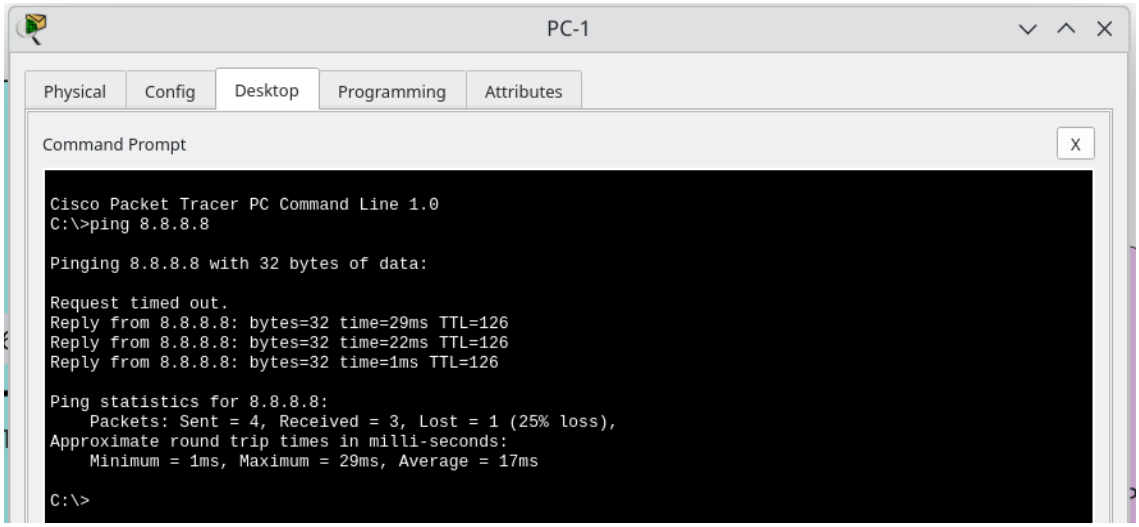
Step 7: Verify External Connectivity

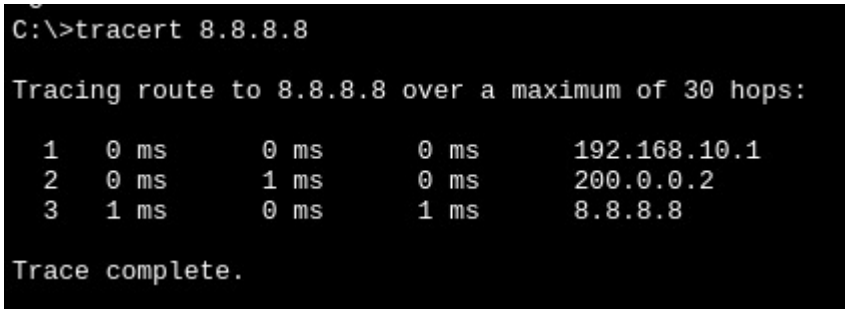
1. **Test External Connectivity by Pinging a Simulated Public IP**:
    - On PC0, type ping 8.8.8.8 (replace with an actual reachable IP in Packet Tracer).
    - On PC1, type ping 8.8.8.8.

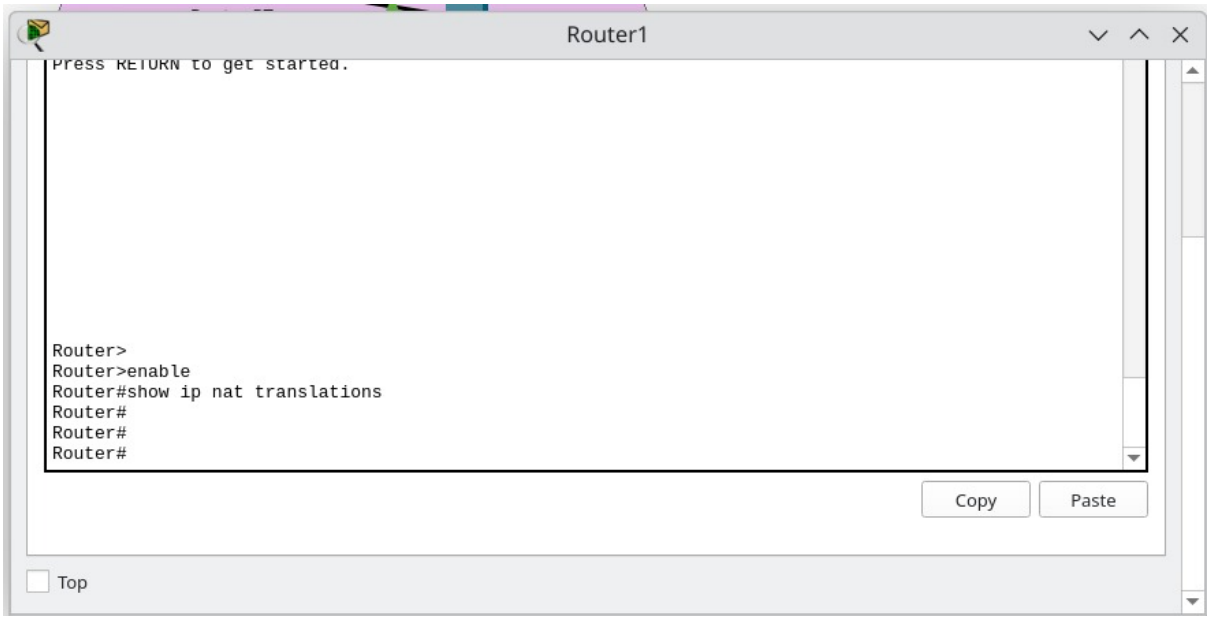
Simulation of Designed Network Topology

1. **Sending a PDU from PC0 to an External Network**:
    - Open **Simulation Mode** in Packet Tracer.
    - Send a PDU from PC0 to a simulated external IP (e.g., 8.8.8.8).
    - Observe the packet traveling from PC0 to Router1, where NAT translation occurs, then to the ISP Router and external network.
2. **Acknowledgment Packet**:
    - Observe the acknowledgment packet traveling back from the external network to PC0, confirming successful NAT configuration and communication.

Screenshots





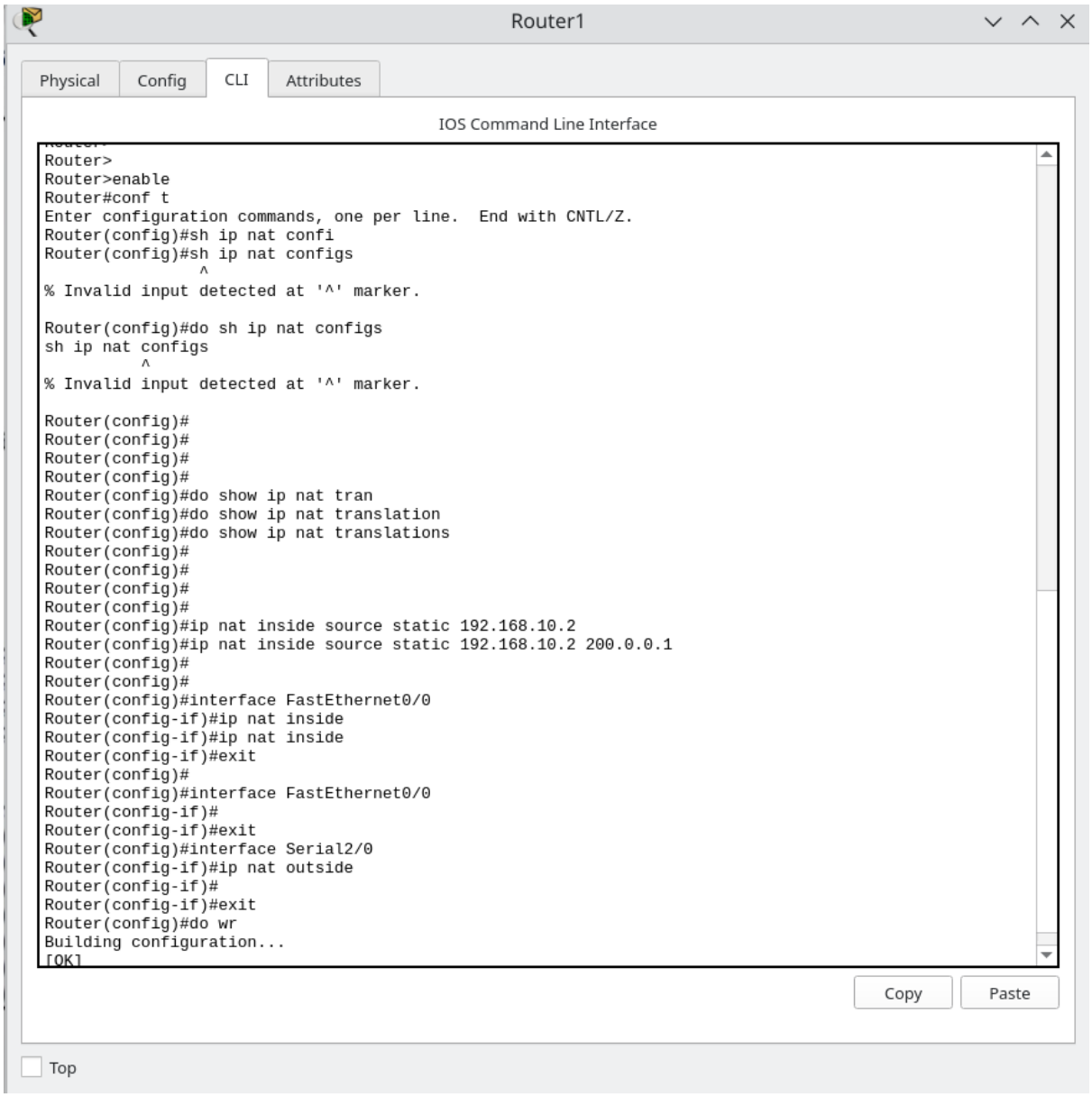


```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 8.8.8.8

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
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       ---                ---
```