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# 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

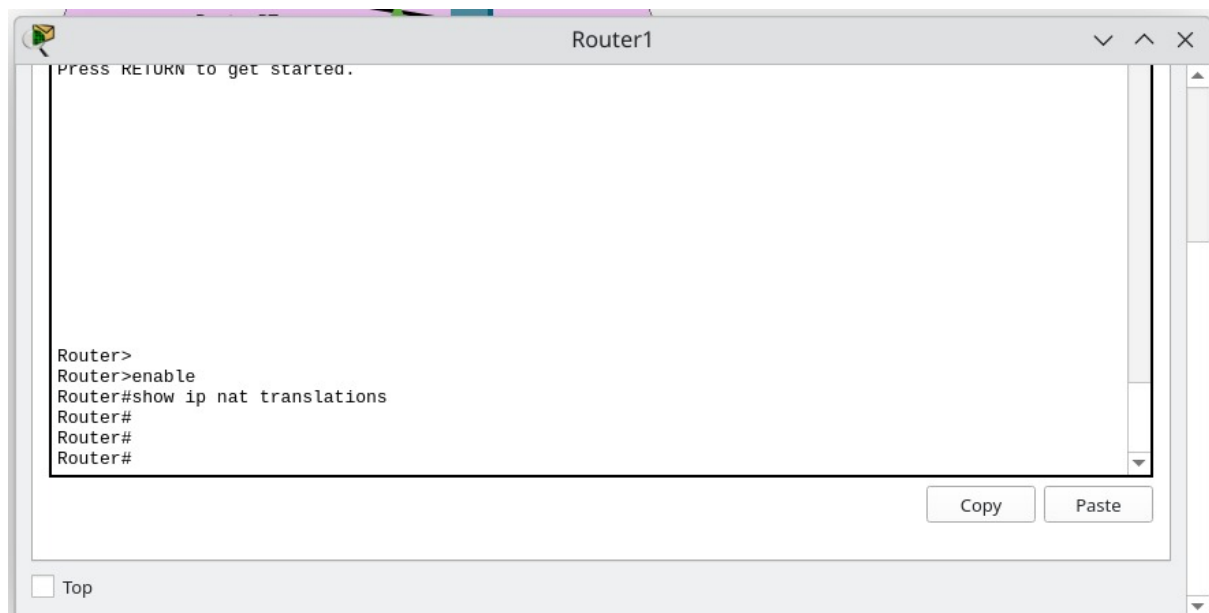
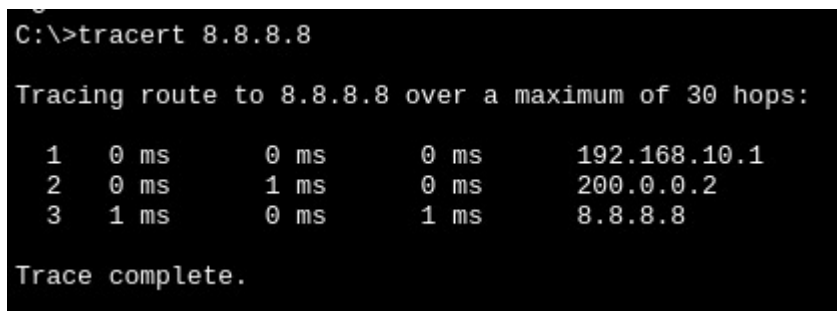
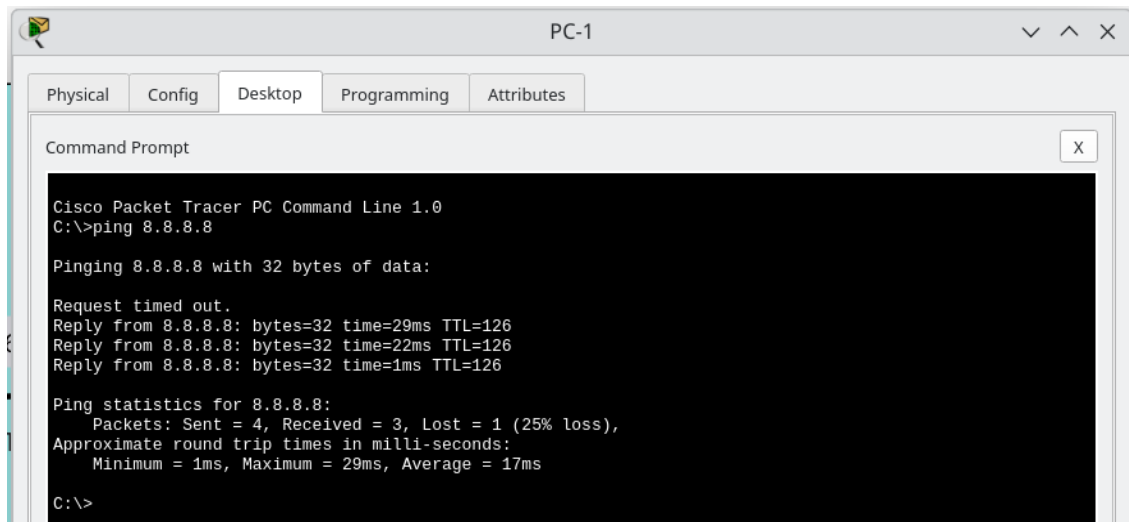
## 1. Sending a PDU from PC0 to an External Network:

- 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

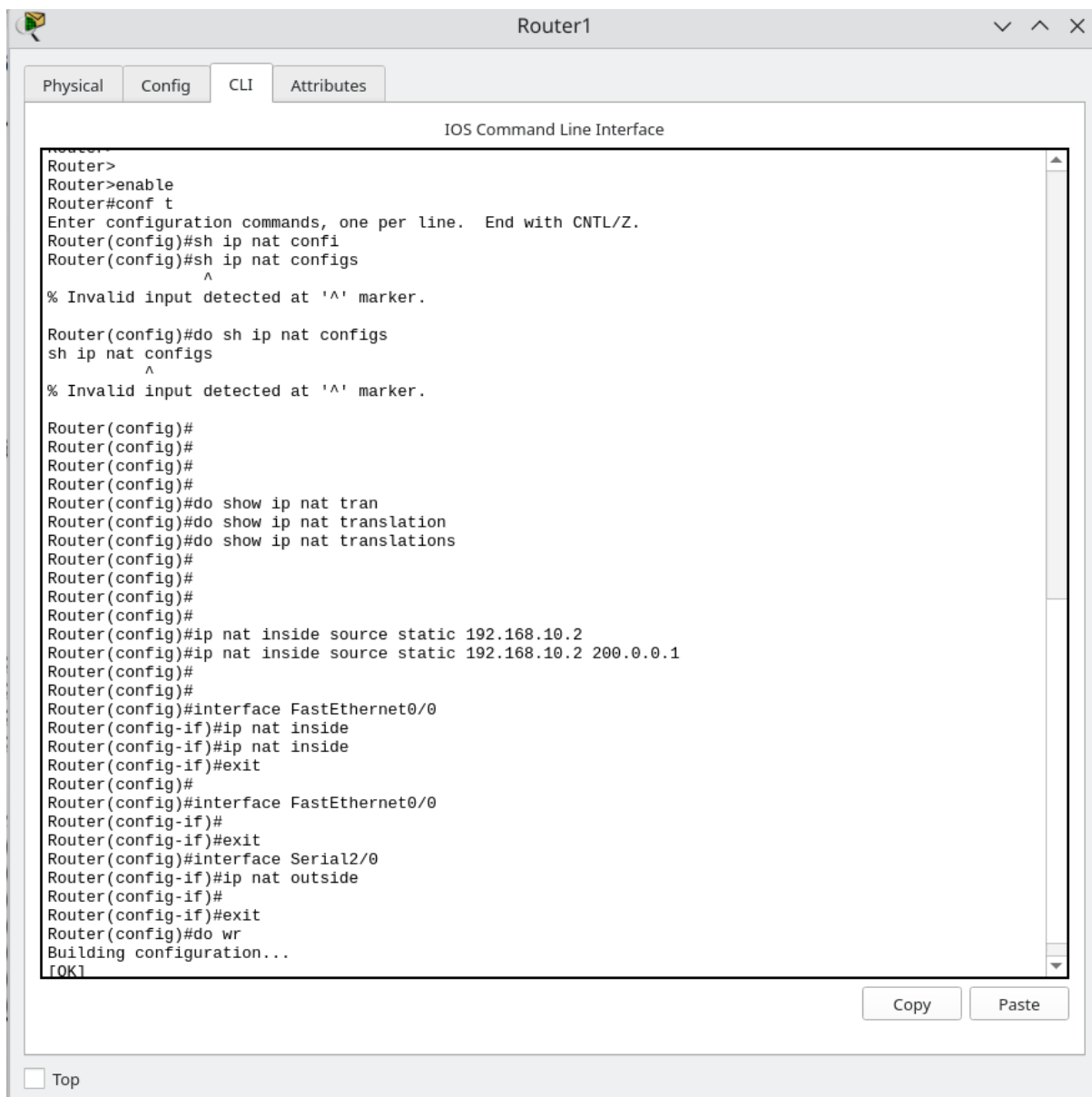


```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 8.8.8.8

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
```



The screenshot shows the Cisco Packet Tracer interface for Router1. The 'CLI' tab is selected, displaying the IOS Command Line Interface. The user has entered several commands to configure NAT on the router. The configuration includes enabling the router, entering configuration mode, and setting up static NAT for the 192.168.10.2 address. The configuration is saved to the startup configuration.

```
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#sh ip nat confi
Router(config)#sh ip nat configs
      ^
% Invalid input detected at '^' marker.

Router(config)#do sh ip nat configs
sh ip nat configs
      ^
% Invalid input detected at '^' marker.

Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#do show ip nat tran
Router(config)#do show ip nat translation
Router(config)#do show ip nat translations
Router(config)#
Router(config)#
Router(config)#
Router(config)#ip nat inside source static 192.168.10.2
Router(config)#ip nat inside source static 192.168.10.2 200.0.0.1
Router(config)#
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#ip nat inside
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip nat outside
Router(config-if)#
Router(config-if)#exit
Router(config)#do wr
Building configuration...
[OK]
```

Buttons for 'Copy' and 'Paste' are visible at the bottom right of the CLI window. A 'Top' button is located at the bottom left of the router window.



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	---	---