

Computer Networks – LAB 6: NAT Configuration

Objective:

- To configure Network Address Translation (NAT) on a router using Cisco Packet Tracer.
- To enable internal network devices with private IP addresses to communicate with external networks using a public IP address.
- To verify successful NAT configuration by testing connectivity between internal PCs and an external network.

Requirements:

- Cisco Packet Tracer software.
- A GitHub account and a repository for lab assignments.
- Access to Google Classroom for submission

Procedure:

Network Design:

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

Step 1: Configure Network Addresses

1. Determine IP address scheme:

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

Step 2: Configuring Router1

1. Select Router1 and open CLI.

2. Press ENTER to start configuring Router1.

3. Activate privileged mode:

- Type enable

4. Access the configuration menu:

- Type config t (configure terminal)

5. Configure interfaces of Router1:

- FastEthernet0/0 (connected to LAN):

- Type interface FastEthernet0/0

- Configure with the IP address 192.168.10.1 and Subnet mask 255.255.255.0

- Serial0/0/0 (connected to ISP Router):

- Type interface Serial0/0/0

- Configure with the IP address 200.0.0.1 and Subnet mask 255.255.255.252

6. Activate interfaces:

- Type no shutdown

Step 3: Configuring ISP Router

1. Select the ISP Router and open CLI.

2. Press ENTER to start configuring the ISP Router.

3. Activate privileged mode:

- Type enable

4. Access the configuration menu:

- Type config t (configure terminal)

5. Configure interfaces of the ISP Router:

- Serial0/0/0 (connected to Router1):

- Type interface Serial0/0/0

- Configure with the IP address 200.0.0.2 and Subnet mask 255.255.255.252

6. Activate interfaces:

- Type no shutdown

ISP Router Command Line Interface:

Step 4: Configuring PCs

1. Assign IP addresses to each PC:

- PC0:

- Go to the desktop, select IP Configuration, and assign the following:

- IP address: 192.168.10.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.10.1

○ PC1:

- Go to the desktop, select IP Configuration, and assign the following:
- 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 the inside and outside interfaces:

○ Access Router1 CLI and type the following commands:

- 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:

○ access-list 1 permit 192.168.10.0 0.0.0.255

3. Configure NAT overload (PAT) for the internal network:

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

Router1 NAT Configuration Commands:

Step 6: Verify NAT Configuration

1. Test the connectivity by pinging from PC0 to the 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 public IP (simulated):

- 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.

Configuration Tables

Simulation of Designed Network Topology

Sending a PDU from PC0 to an External Network

1. Open the simulation mode in Packet Tracer.

2. Send a PDU from PC0 to a simulated external IP (e.g., 8.8.8.8):

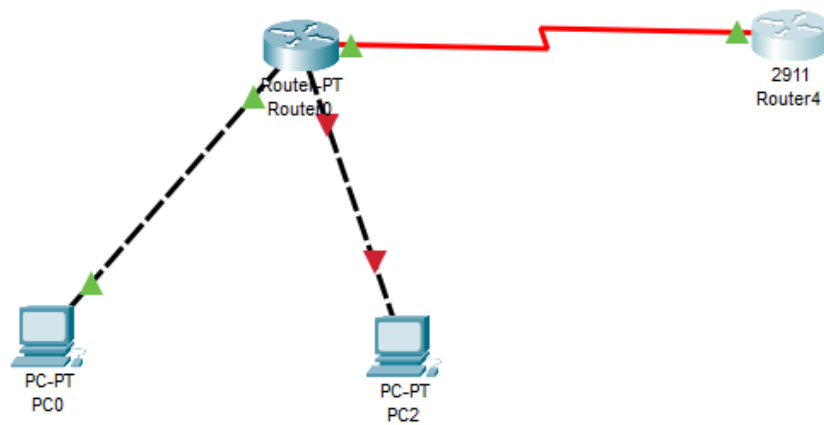
- Observe the packet traveling from PC0 to Router1, NAT translation occurring, then to the ISP Router and the external network.

Acknowledgment from External Network to PC0

1. Observe the acknowledgment packet:

- Ensure that the acknowledgment packet travels back from the external network to PC0, confirming successful NAT configuration and communication.

Results:



Router0

Physical

Config

CLI

Attributes

IOS Command Line Interface

X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/9
%Invalid interface type and number
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
Router(config-if)#interface SerialEnter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 200.0.0.1 255.255.255.252
Router(config-if)#no shutdown

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

Copy

Paste

☐ Top

The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a Command Prompt window. The Command Prompt shows the following text:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 200.0.0.2

Pinging 200.0.0.2 with 32 bytes of data:

Reply from 200.0.0.2: bytes=32 time=11ms TTL=254
Reply from 200.0.0.2: bytes=32 time=8ms TTL=254
Reply from 200.0.0.2: bytes=32 time=9ms TTL=254
Reply from 200.0.0.2: bytes=32 time=9ms TTL=254

Ping statistics for 200.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 11ms, Average = 9ms

C:\>
```

At the bottom of the window, there is a checkbox labeled "Top".

Conclusion:

In this experiment, we successfully implemented Network Address Translation (NAT) on a router to allow internal network devices to access external networks. By configuring NAT, we translated private IP addresses from the local network into a public IP address, enabling communication with the internet. The successful ping tests and observations of the NAT translation table confirmed that NAT was correctly configured, allowing for seamless communication between the internal and external networks. This exercise highlighted the essential role of NAT in modern networking, ensuring both security and efficient use of public IP addresses.