Department of Computer Science and Engineering
Islamic University of Technology (IUT)
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Laboratory Report

CSE 4412 : Data Communication and Networking Lab

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Title: Understanding the concept of NAT and configuration of NAT.

Objective:

1. Understand NAT
2. Configuration of NAT

Devices Used In the Experiment:

1. Router
2. Switch
3. PC
4. Server

Theory:

NAT Definition
Network Address Translation (NAT) is a technique used to allow devices on a private network to translate their private IP addresses to public IP addresses.

Usage of NAT:
Explain the usage of NAT with an example.

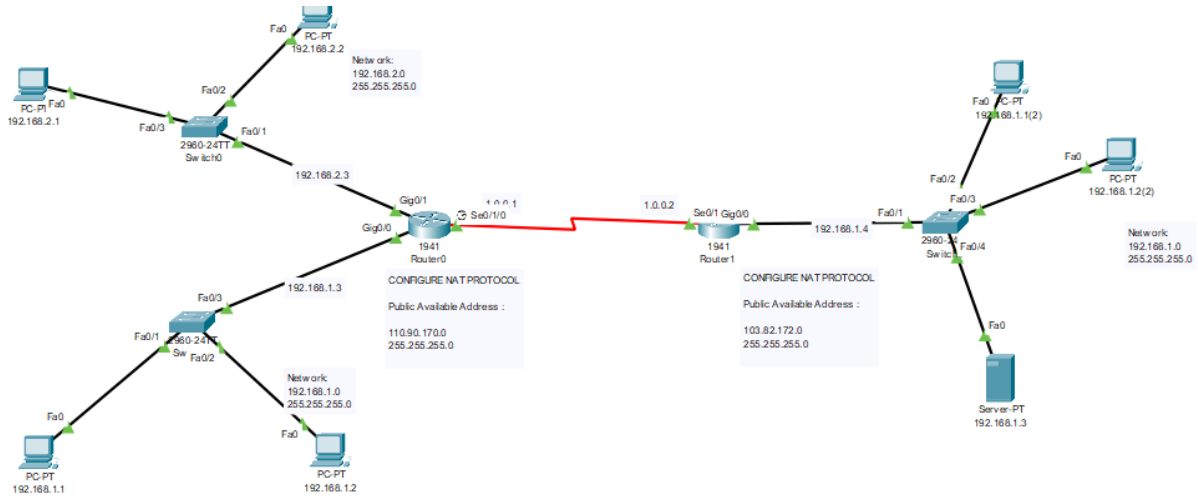
NAT is used because there are not enough public IP addresses available to assign to every device on the Internet. With NAT, a single public IP address can be used to represent an entire private network, allowing multiple devices to share the same public IP address to access the Internet.

In our home, suppose we have a computer with an address of 192.168.1.2 and a smartphone with an address of 192.168.1.3 to access the internet. The Internet Service Provider assigns a public IP address to connect to the internet. In order to access the internet, a request to the router is sent which includes the private IP addresses of the computer and smartphone as the source address and the router's public IP address as the destination address. The response, however, is addressed to the router's public IP address

and the router uses NAT to translate the public IP address into the private IP addresses of the devices.

Diagram of the experiment:

(Take a screenshot of your lab task from packet tracer and paste here)



Configuration of NAT in Router:

Commands for configuring VLAN

Router 0 (Dynamic)

```
Router(config)#int s0/1/0
Router(config-if)#ip nat outside
Router(config-if)#int g0/1
Router(config-if)#ip nat inside
Router(config-if)#int g0/0
Router(config-if)#ip nat inside
Router(config-if)#
Router(config-if)#exit
Router(config)#
Router(config)#
Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat pool pool1 110.90.170.1 110.90.170.10 netmask 255.255.255.0
Router(config)#ip nat inside source list 1 pool pool1 overload
Router(config)#access-list 1 permit 192.168.2.0 0.0.0.255
Router(config)#ip nat inside source list 1 pool pool1
Router(config)#exit
```

```
Router(config)#ip route 103.82.172.0 255.255.255.0 1.0.0.2
Router(config)#exit
```

Router 1 (Static)

```
Router(config-if)#
Router(config-if)#int g0/0
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#int s0/1/0
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip nat inside source static 192.168.1.1 103.82.172.1
Router(config)#ip nat inside source static 192.168.1.2 103.82.172.2
Router(config)#ip nat inside source static 192.168.1.3 103.82.172.3
Router(config)#ip route 110.90.170.0 255.255.255.0 1.0.0.1
Router(config)#exit
```

Observation:

The screenshots of ***show ip nat translations*** command in two routers are shown below:

Router 0

```
Router#show ip nat translations
Pro  Inside global     Inside local       Outside local      Outside global
icmp 110.90.170.1:1024 192.168.1.2:1      103.82.172.3:1     103.82.172.3:1024
icmp 110.90.170.1:1025 192.168.1.1:1      103.82.172.3:1     103.82.172.3:1025
icmp 110.90.170.1:1026 192.168.2.2:2      103.82.172.2:2     103.82.172.2:1026
icmp 110.90.170.1:1027 192.168.1.1:2      103.82.172.3:2     103.82.172.3:1027
icmp 110.90.170.1:1028 192.168.2.2:3      103.82.172.2:3     103.82.172.2:1028
icmp 110.90.170.1:1029 192.168.1.1:3      103.82.172.3:3     103.82.172.3:1029
icmp 110.90.170.1:1030 192.168.1.1:4      103.82.172.3:4     103.82.172.3:1030
icmp 110.90.170.1:1031 192.168.2.2:4      103.82.172.2:4     103.82.172.2:1031
icmp 110.90.170.1:10   192.168.2.1:10     103.82.172.1:10    103.82.172.1:10
icmp 110.90.170.1:11   192.168.2.1:11     103.82.172.1:11    103.82.172.1:11
icmp 110.90.170.1:12   192.168.2.1:12     103.82.172.1:12    103.82.172.1:12
icmp 110.90.170.1:1    192.168.2.2:1      103.82.172.2:1     103.82.172.2:1
icmp 110.90.170.1:2    192.168.1.2:2      103.82.172.3:2     103.82.172.3:2
icmp 110.90.170.1:3    192.168.1.2:3      103.82.172.3:3     103.82.172.3:3
icmp 110.90.170.1:4    192.168.1.2:4      103.82.172.3:4     103.82.172.3:4
icmp 110.90.170.1:9    192.168.2.1:9      103.82.172.1:9     103.82.172.1:9
```

Router 1

```
Router#show ip nat translations
Pro  Inside global     Inside local       Outside local      Outside global
icmp 103.82.172.1:10   192.168.1.1:10     110.90.170.1:10    110.90.170.1:10
icmp 103.82.172.1:11   192.168.1.1:11     110.90.170.1:11    110.90.170.1:11
icmp 103.82.172.1:12   192.168.1.1:12     110.90.170.1:12    110.90.170.1:12
icmp 103.82.172.1:9    192.168.1.1:9      110.90.170.1:9     110.90.170.1:9
icmp 103.82.172.2:1026 192.168.1.2:1026   110.90.170.1:1026  110.90.170.1:1026
icmp 103.82.172.2:1028 192.168.1.2:1028   110.90.170.1:1028  110.90.170.1:1028
icmp 103.82.172.2:1031 192.168.1.2:1031   110.90.170.1:1031  110.90.170.1:1031
icmp 103.82.172.2:1    192.168.1.2:1      110.90.170.1:1     110.90.170.1:1
icmp 103.82.172.3:1024 192.168.1.3:1024   110.90.170.1:1024  110.90.170.1:1024
icmp 103.82.172.3:1025 192.168.1.3:1025   110.90.170.1:1025  110.90.170.1:1025
icmp 103.82.172.3:1027 192.168.1.3:1027   110.90.170.1:1027  110.90.170.1:1027
icmp 103.82.172.3:1029 192.168.1.3:1029   110.90.170.1:1029  110.90.170.1:1029
icmp 103.82.172.3:1030 192.168.1.3:1030   110.90.170.1:1030  110.90.170.1:1030
icmp 103.82.172.3:2    192.168.1.3:2      110.90.170.1:2     110.90.170.1:2
icmp 103.82.172.3:3    192.168.1.3:3      110.90.170.1:3     110.90.170.1:3
icmp 103.82.172.3:4    192.168.1.3:4      110.90.170.1:4     110.90.170.1:4
```

Challenges:

We must never forget to write the Ip route command for each router to make sure packets get transmitted from one router to another router.