Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	[@KLWKS_BOT] THANOS

Lab 9: Configuration of Network address translation in Cisco packet tracer

Date of the Session:_____/___/____   **Session Time:_____to_____**

Learning outcome:

- Learners will gain a solid understanding of Network Address Translation and its role in IP address translation between private and public networks.
- Learners will acquire hands-on experience in configuring different types of NAT in Cisco Packet Tracer.

Pre-Lab Task:

1. What is Network Address Translation (NAT), and what is its primary purpose in networking?

NAT (Network Address Translation) modifies IP addresses in packet headers to enable multiple devices on a private network to access the internet using a single public IP. It conserves IPv4 addresses and enhances security by hiding internal IPs.

2. Explain the difference between static NAT and dynamic NAT. When would you use each of these NAT types?

- **Static NAT:** One-to-one mapping of private to public IP, used for servers requiring fixed public access.

- **Dynamic NAT:** Maps private IPs to available public IPs dynamically, used for general internet access without fixed IP needs.

Course Title	NETWORK PROTOCOLS & SECURITY	ACADEMIC YEAR: 2024-25
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3. What are the benefits and challenges of using NAT in a network environment?

✅ **Benefits:** Saves IPv4 addresses, enhances security, allows private IP use.
❌ **Challenges:** Breaks end-to-end connectivity, adds latency, complicates troubleshooting.

In Lab Task:

Configuration of Network address translation in Cisco packet tracer

Writing space for the Problem:(For Student's use only)

Static NAT Configuration

```
Router(config)#int g0/0
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#int g0/1
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip nat inside source static 192.168.10.2 100.100.100.100
Router(config)#exit
Router# debug ip nat
```

Configuration for PCs

PC0

IP Address: 192.168.10.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.10.1

Server0

IP Address: 192.168.20.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.20.1

Configuration for Routers

Fast Ethernet Port Configuration (Router 1)

```
Router>en
Router#config t
Router(config)#int g0/0
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 g0/1
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#no shut
```
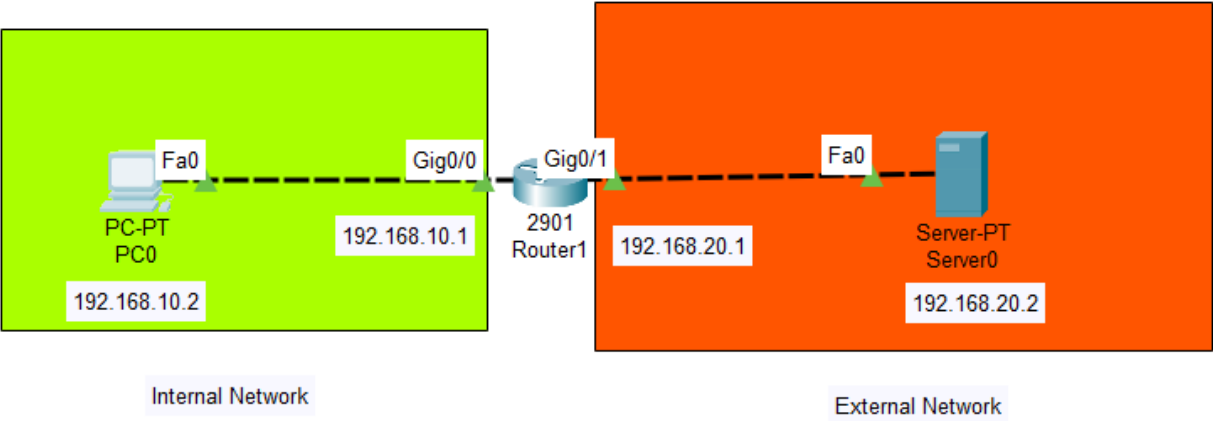
RIP Configuration (Router 2)

```
Router#config t
Router(config)#router rip
Router(config-router)#network 192.168.10.0
Router(config-router)#network 192.168.20.0
```

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DIAGRAM

Internal Network

External Network

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VIVA-VOCE Questions (In-Lab):

1. What is NAT, and what is its primary purpose in computer networks?
2. Explain the difference between private IP addresses and public IP addresses.
3. What is an Access Control List (ACL), and what is its primary purpose in a network?
4. How does an ACL help in controlling traffic flow in a router or a switch?
5. What are the different types of ACLs, and how do they differ in their functionality?

1. **NAT (Network Address Translation):** Converts private IPs to a public IP, enabling multiple devices to share a single public IP and improving security.

2. **Private vs. Public IP:**

   - **Private IPs** (e.g., 192.168.x.x) are used within local networks and not routable on the internet.

   - **Public IPs** are unique and assigned by ISPs for internet access.

3. **Access Control List (ACL):** A set of rules on network devices to allow or deny traffic, enhancing security.

4. **ACL in Traffic Control:** Filters traffic based on rules (IP, protocol, port) to allow or block packets at router interfaces.

5. **Types of ACLs:**

   - **Standard ACL:** Filters by source IP only.

   - **Extended ACL:** Filters by source, destination, protocol, and port.

   - **Named ACL:** Uses names instead of numbers for better management.

Post Lab Task:

1. Describe the network topology you used for configuring Network Address Translation (NAT) in Cisco Packet Tracer. What devices were involved, and how were they interconnected?

- Devices: **Router, Switch, PCs, ISP Router (optional).**

- Interconnections: **PCs (Private IPs) → Switch → Router (Public IP) → ISP (Internet).**

- NAT translates private IPs to public IPs for internet access.

2. Discuss the impact of NAT on network security and addressing.

- **Security:** Hides internal IPs, reduces attack surface, and blocks unsolicited inbound traffic.

- **Addressing:** Conserves IPv4 addresses but affects end-to-end connectivity.

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3. Describe any specific translation rules or access control policies you implemented as part of the NAT configuration.

- **Dynamic NAT / PAT:** Multiple private IPs share a public IP with port-based mapping.

- **ACLs:** Restrict NAT to specific internal addresses and block unauthorized inbound traffic.

Evaluator Remark (if Any):	
	Marks Secured _____ out of 50
	Signature of the Evaluator with Date