ROLL No:241901095

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Experiment: 11
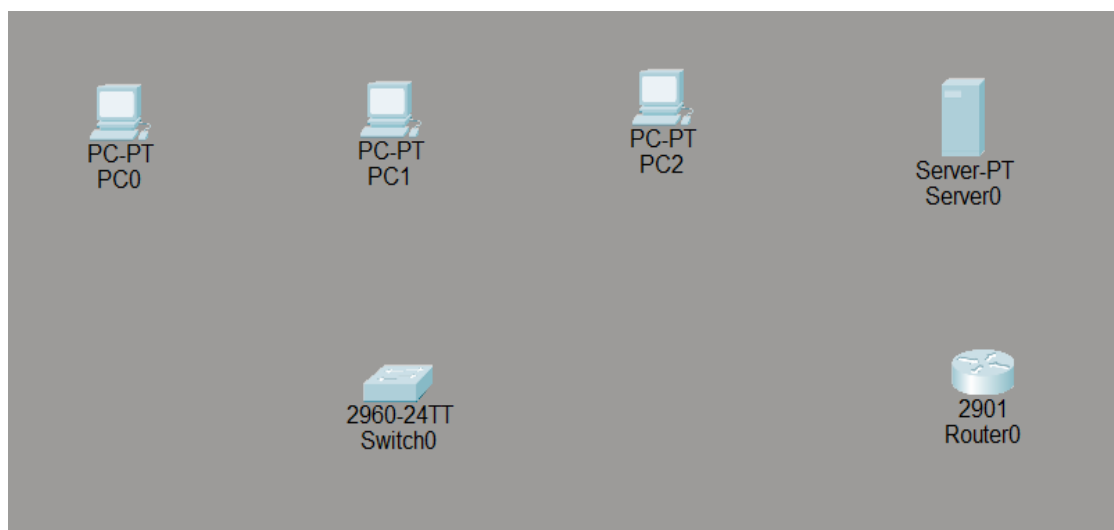
EXAMINE NETWORK ADDRESS TRANSLATION(NAT) USING CISCO PACKET TRACER
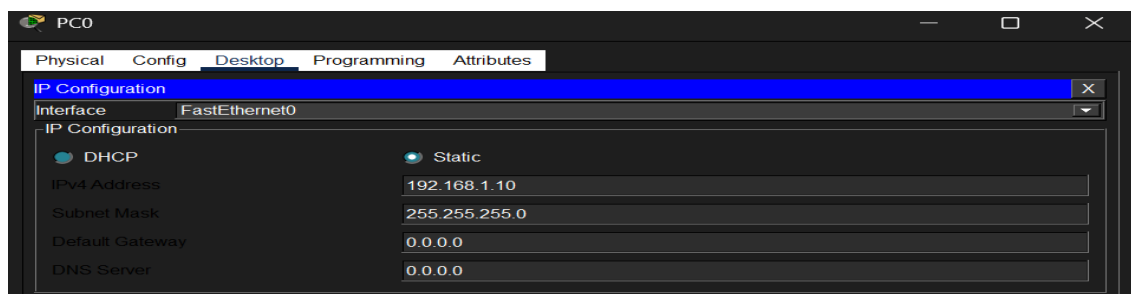
AIM:

   To demonstrate how NAT translates private IP addresses to public IP addresses, enabling private network devices to communicate with external networks. It also includes configuring and verifying different NAT types (Static, Dynamic, and PAT) in Cisco Packet Tracer.
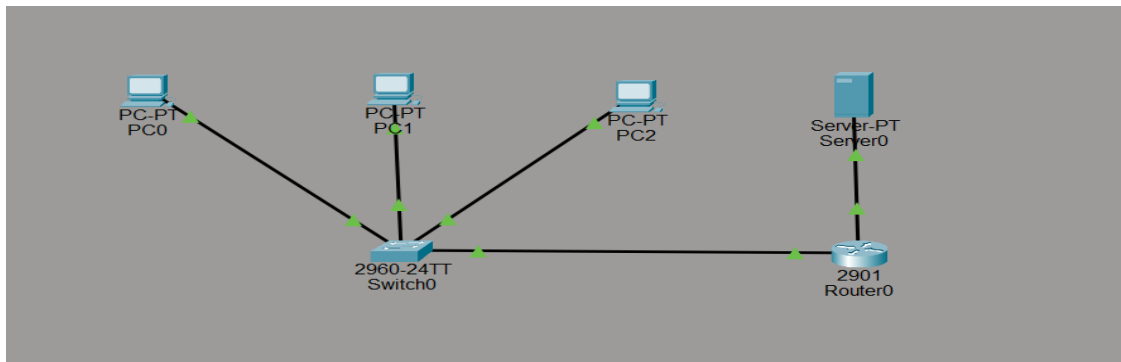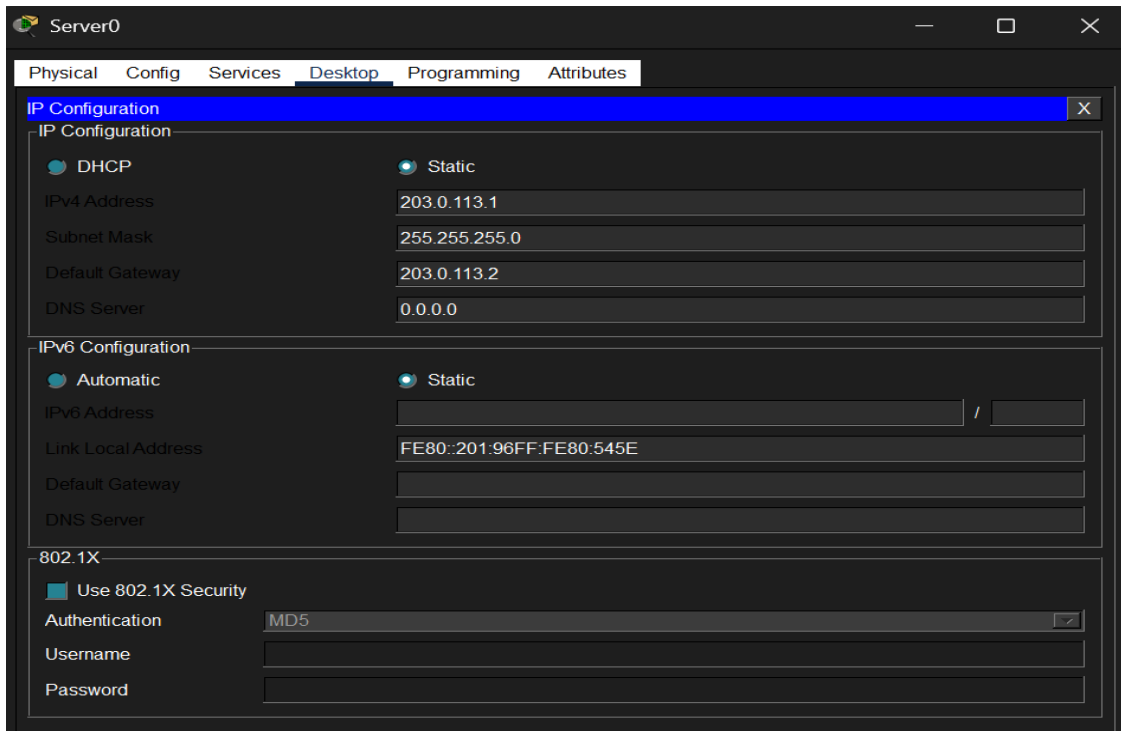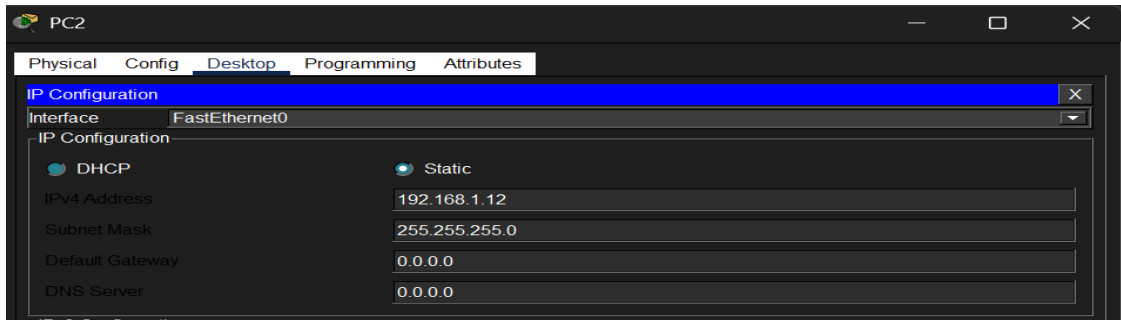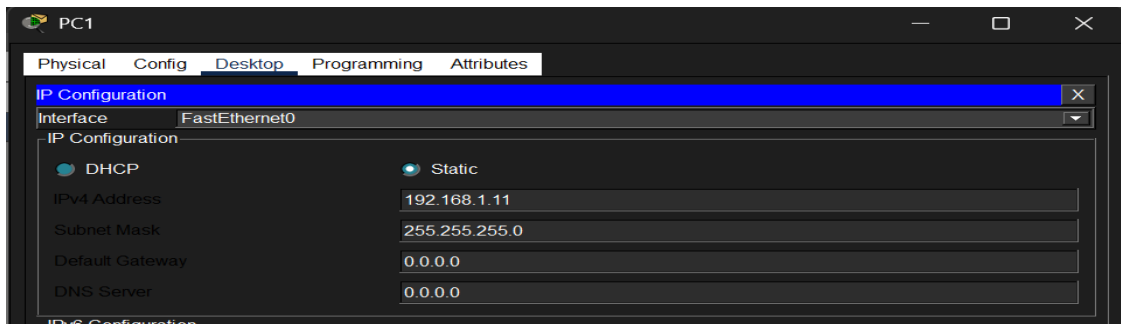
ALGORITHM:

1. Build a simple topology with a router connected to a private internal network and an external network.

2. Assign IP addresses to all devices and router interfaces.

PC1

Physical | Config | **Desktop** | Programming | Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration
- ○ DHCP   ● Static
- IPv4 Address: 192.168.1.11
- Subnet Mask: 255.255.255.0
- Default Gateway: 0.0.0.0
- DNS Server: 0.0.0.0

PC2

Physical | Config | **Desktop** | Programming | Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration
- ○ DHCP   ● Static
- IPv4 Address: 192.168.1.12
- Subnet Mask: 255.255.255.0
- Default Gateway: 0.0.0.0
- DNS Server: 0.0.0.0

Server0

Physical | Config | Services | **Desktop** | Programming | Attributes

IP Configuration

IP Configuration
- ○ DHCP   ● Static
- IPv4 Address: 203.0.113.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 203.0.113.2
- DNS Server: 0.0.0.0

IPv6 Configuration
- ○ Automatic   ● Static
- IPv6 Address: _____ / ____
- Link Local Address: FE80::201:96FF:FE80:545E
- Default Gateway: _____
- DNS Server: _____

802.1X
- ☐ Use 802.1X Security
- Authentication: MD5
- Username: _____
- Password: _____

3. Configure router interfaces as NAT inside (connected to private network) and NAT outside (connected to external network).

4. Define NAT translation rules:

   - Static NAT: Map a specific internal IP to a specific external IP.

   - Dynamic NAT: Use a pool of public IP addresses for translation.

   - PAT (Port Address Translation): Use a single public IP with different port numbers.

5. Create access control lists (ACLs) to match private IP addresses allowed to be translated.

6. Enable the NAT on the router with the appropriate commands.

7. Test connectivity by pinging from inside devices to external devices or servers.

8. Verify NAT translation tables using commands like show ip nat translations.

```
Router(config-if)#interface gigabitethernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
% 192.168.1.0 overlaps with GigabitEthernet0/1
Router(config-if)#no shutdown
% 192.168.1.0 overlaps with GigabitEthernet0/1
GigabitEthernet0/0: incorrect IP address assignment
Router(config-if)#exit
Router(config)#interface gigabitethernet0/0
Router(config-if)#
Router(config-if)#
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#access-list 1 permit 192.168.1.0.0.0.0.255
                                     ^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 permit 192.168.1.0.0.0.0.255
                                     ^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 permit 192.168.1.0.0.0.0.255
                                     ^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 permit192.168.1.0.0.0.0.255
                                    ^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat inside source list 1 interface
% Incomplete command.
Router(config)#ip nat inside source list 1 interface gigabitethernet0/1 overload
Router(config)#show ip nat translations
                    ^
% Invalid input detected at '^' marker.

Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip nat translations
Router#

Router#show ip interface brief
Interface          IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0  192.168.1.1     YES manual administratively down down
GigabitEthernet0/1  192.168.1.1     YES manual up                    up
Vlan1              unassigned      YES unset  administratively down down
Router#
```

```
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gigabitethernet0/1
Router(config-if)#ip address 203.0.113.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface gigabitethernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
|
```

RESULT:

NAT translates private IPs to public IPs for internet access. Routers keep translation tables. NAT enables private devices to communicate externally, verified through Packet Tracer simulations and commands.

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```