

7b. Configure and examine Network Address Translation (NAT).

Network Address Translation (NAT)

NAT is a method used to remap IP addresses by modifying network address information in the IP header of packets while they are in transit. NAT is commonly used to enable multiple devices on a local network to share a single public IP address for Internet access.

- **Types of NAT:**

1. **Static NAT:** Maps one private IP address to one public IP address. It's useful for hosting services that must be accessible from outside the network.
2. **Dynamic NAT:** Maps multiple private IP addresses to a pool of public IP addresses.
3. **PAT (Port Address Translation):** Also known as **NAT overload**, it maps multiple private IP addresses to a single public IP address by differentiating sessions with unique port numbers.

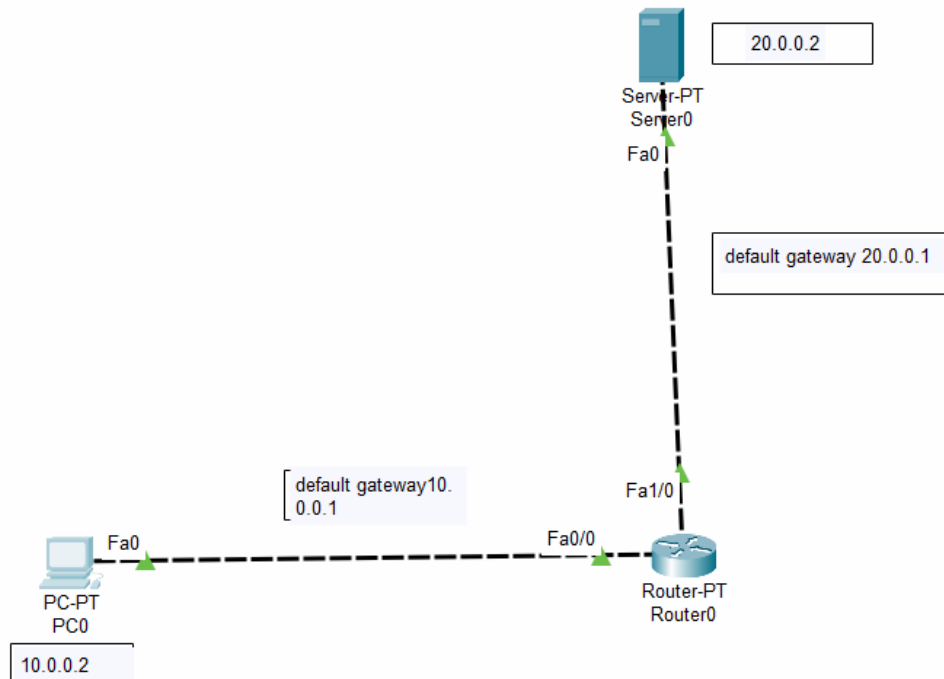
- `ip nat inside source static:`

- This specifies that you are configuring a **static NAT** translation. Static NAT creates a permanent, one-to-one mapping between an inside local address (private IP) and an inside global address (public IP).
- **inside_local_ip:** The private IP address of the internal device.
- **outside_global_ip:** The public IP address accessible from the internet.

Example Use Case

Suppose you have a web server inside your private network with the IP address 10.0.0.2, and you want external users to be able to access it using the public IP address 200.100.50.25. The static NAT configuration ensures that when users connect to 200.100.50.25, the router translates the request to 10.0.0.2 and forwards the traffic to the web server.

i). Static routing



Step 1:

IP configurations:

PC0

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

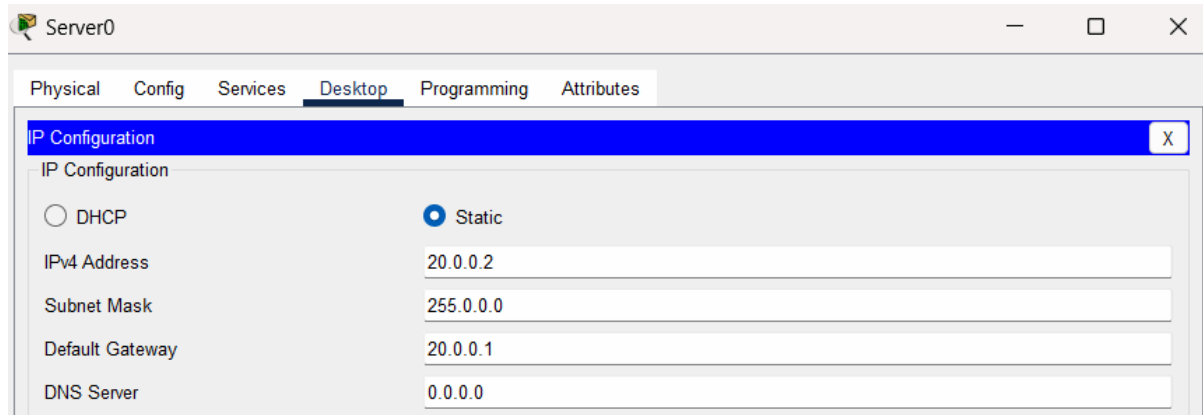
☐ DHCP ☒ Static

IPv4 Address 10.0.0.2

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0



Step 2:

Router configuration:

Router>

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int fa0/0

Router(config-if)#ip add 10.0.0.1

255.0.0.0 Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#ip

nat inside

Router(config-if)#int

fa1/0

Router(config-if)#ip add 20.0.0.1

255.0.0.0 Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#

Router(config-if)#ip nat

outside Router(config-

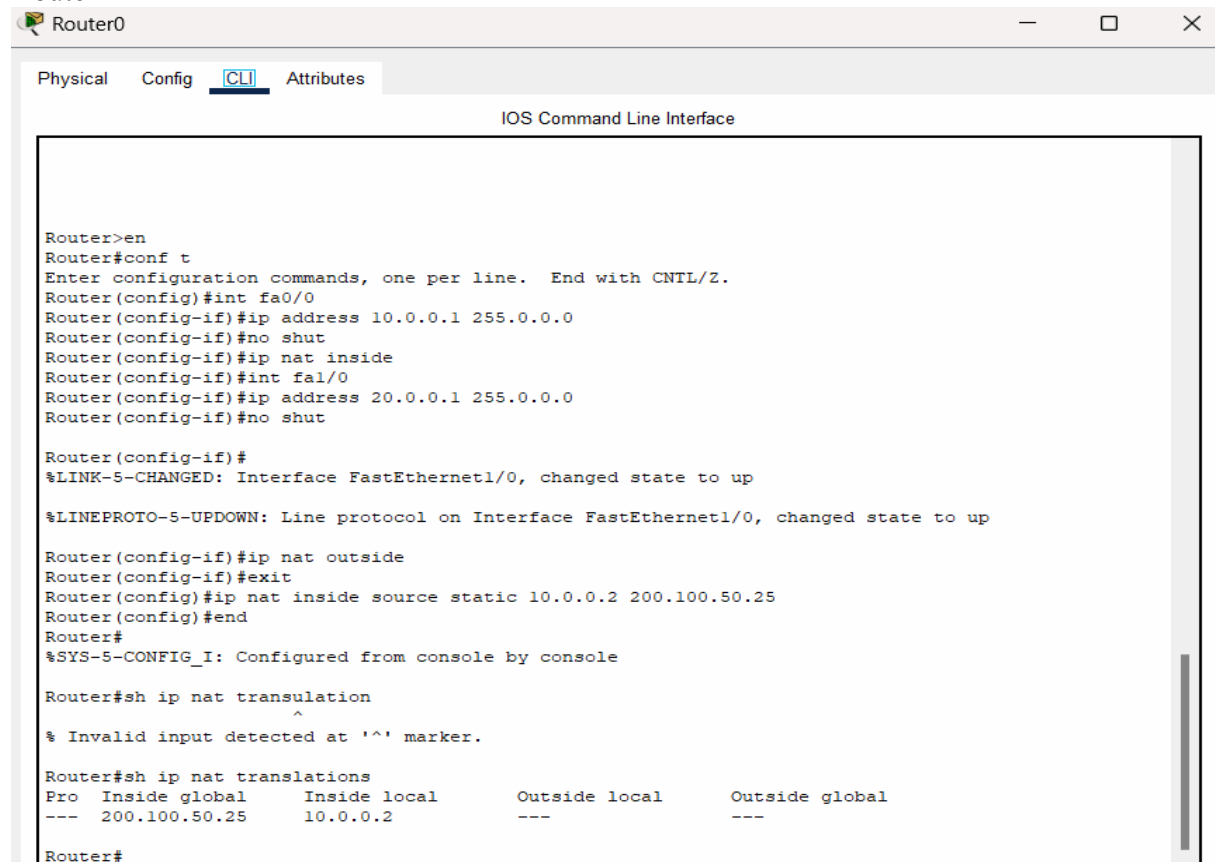
if)#exit

Router(config)#ip nat inside source static 10.0.0.2 200.100.50.25

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

```
Router#
Router#sh ip nat translations
Pro Inside global Inside local Outside local Outside global
--- 200.100.50.25 10.0.0.2 --- ---
```

```
Router#
```



```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#ip nat inside
Router(config-if)#int fal/0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip nat inside source static 10.0.0.2 200.100.50.25
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console

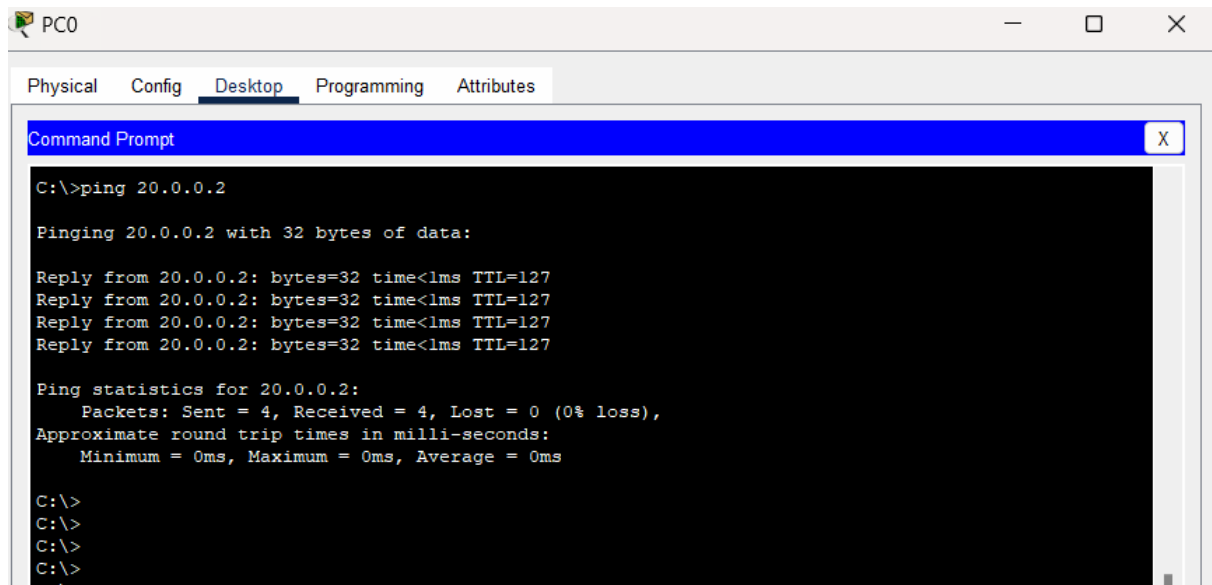
Router#sh ip nat translation
^
% Invalid input detected at '^' marker.

Router#sh ip nat translations
Pro Inside global Inside local Outside local Outside global
--- 200.100.50.25 10.0.0.2 --- ---

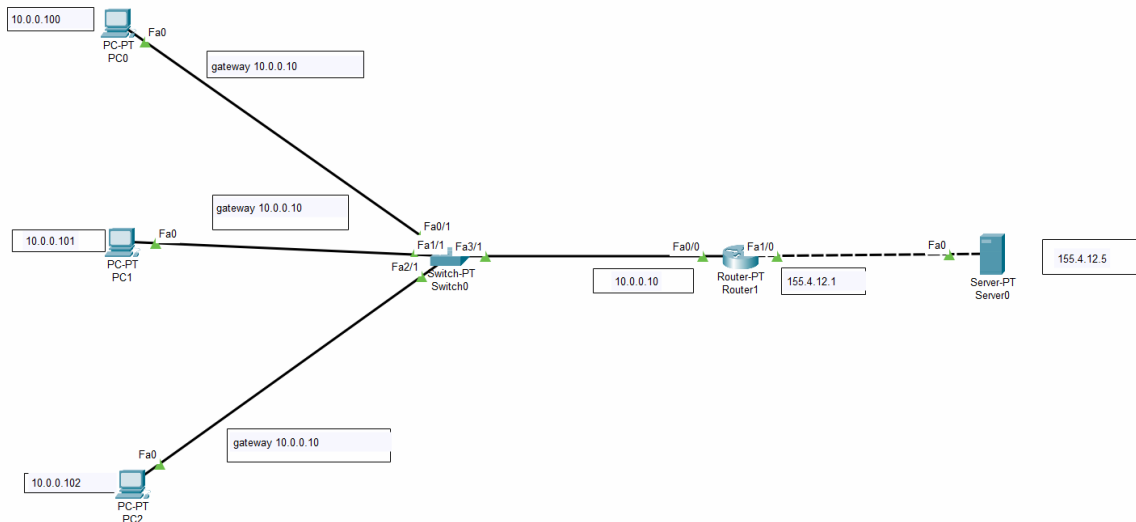
Router#
```

Step 3: Test Connectivity

To test the connection ping from the terminal



ii). Dynamic routing



Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#int fa0/0

Router(config-if)#ip address 10.0.0.10 255.0.0.0

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#ip nat inside

Router(config-if)#ex

Router(config)#int fa1/0

Router(config-if)#ip address 155.4.12.1 255.255.0.0

Router(config-if)#no shut

Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#ip nat outside

Router(config-if)#ex

Router(config)#access-list 1 permit 10.0.0.0 0.0.0.255

Router(config)#ip nat pool newpool 155.4.12.1 155.4.12.3 netmask 255.255.255.0

Router(config)#ip nat inside source list 1 pool newpool

Router(config)#ip route 0.0.0.0 0.0.0.0 155.4.12.5

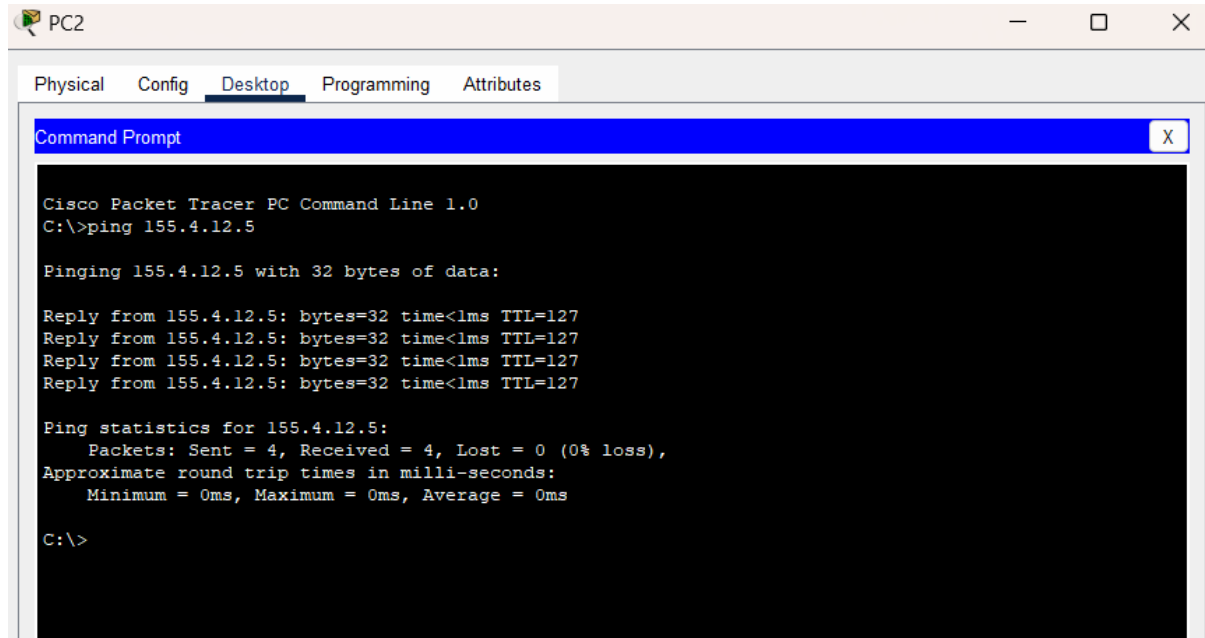
Router(config)#ex

Router#

%SYS-5-CONFIG_I: Configured from console by console

Note:

- To test the nat translations, need ping from source system to destination system.
(Exp:from PC2 **c:\>ping 155.4.12.5**)
- After ping, go to Router configuration and check for nat translations
(**Router#sh ip nat translations**)



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 155.4.12.5

Pinging 155.4.12.5 with 32 bytes of data:

Reply from 155.4.12.5: bytes=32 time<1ms TTL=127
Reply from 155.4.12.5: bytes=32 time<1ms TTL=127
Reply from 155.4.12.5: bytes=32 time<1ms TTL=127
Reply from 155.4.12.5: bytes=32 time<1ms TTL=127

Ping statistics for 155.4.12.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Router#sh ip nat translations

Router#sh ip nat translations

Router#sh ip nat translations

Pro Inside global Inside local Outside local Outside global

icmp 155.4.12.1:1 10.0.0.102:1 155.4.12.5:1 155.4.12.5:1

icmp 155.4.12.1:2 10.0.0.102:2 155.4.12.5:2 155.4.12.5:2

icmp 155.4.12.1:3 10.0.0.102:3 155.4.12.5:3 155.4.12.5:3

icmp 155.4.12.1:4 10.0.0.102:4 155.4.12.5:4 155.4.12.5:4

Router1

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#ip nat inside
Router(config-if)#ex
Router(config)#int fa1/0
Router(config-if)#ip address 155.4.12.1 255.255.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Router(config-if)#ip nat outside
Router(config-if)#ex
Router(config)#access-list 1 permit 10.0.0.0 0.0.0.255
Router(config)#ip nat pool newpool 155.4.12.1 155.4.12.3 netmask 255.255.255.0
Router(config)#ip nat inside source list 1 pool newpool
Router(config)#ip route 0.0.0.0 0.0.0.0 155.4.12.5
Router(config)#ex
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#sh ip nat translations
Router#sh ip nat translations
Router#sh ip nat translations
Pro  Inside global      Inside local      Outside local      Outside global
icmp 155.4.12.1:1        10.0.0.102:1      155.4.12.5:1       155.4.12.5:1
icmp 155.4.12.1:2        10.0.0.102:2      155.4.12.5:2       155.4.12.5:2
icmp 155.4.12.1:3        10.0.0.102:3      155.4.12.5:3       155.4.12.5:3
icmp 155.4.12.1:4        10.0.0.102:4      155.4.12.5:4       155.4.12.5:4

Router#
```

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