

Exercise – 7 Static And Dynamic NAT

Aim

To Configure And Verify Static And Dynamic NAT On Cisco Routers Using Packet Tracer.

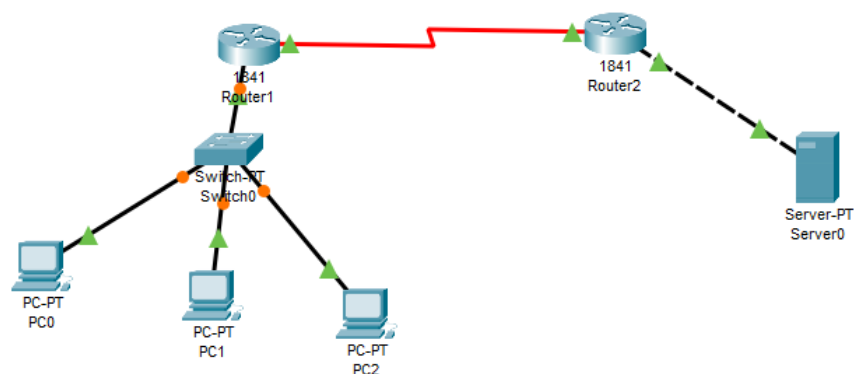
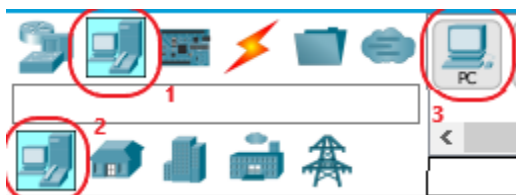
Pre-requisite:

Static NAT, Dynamic Static NAT

Procedure:

To Configure Static NAT in Cisco Packet Tracer

1. Select Router from Network devices. Place Two Routers and connect them using Serial DTE cable.
2. Select a switch and place it and connect it to router using copper straight cable.
3. Select PC from End Devices and place Three PC's and connect them with copper cross over cables.
4. Place a server and connect it to second router using copper cross cable.



5. Configure the PC's using the below configuration table

Initial IP Configuration

Device / Interface	IP Address	Connected With
Laptop0	10.0.0.10/8	Fa0/0 of R0
Laptop1	10.0.0.20/8	Fa0/0 of R0
Laptop2	10.0.0.30/8	Fa0/0 of R0
Server0	192.168.1.10/24	Fa0/0 of R1
Serial 0/0/0 of R1	100.0.0.1/8	Serial 0/0/0 of R2
Serial 0/0/0 of R2	100.0.0.2/8	Serial 0/0/0 of R2

6. Configure Router R0

```
Router>enable
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

Before we configure IP address in interfaces let's assign a unique descriptive name to router.

```
Router(config)#hostname R1
R1#
```

Now execute the following commands to set IP address in FastEthernet 0/0 interface.

```
R1(config)#interface FastEthernet0/0
R1(config-if)#ip address 10.0.0.1 255.0.0.0
R1(config-if)#no shutdown
R1(config-if)#exit
```

```
R1(config)#exit
R1#show controllers serial 0/0/0
Interface Serial0/0/0
Hardware is PowerQUICC MPC860
DCE V.35, clock rate 2000000
[Output omitted]
```

```
R1#configure terminal
R1(config)#interface Serial0/0/0
R1(config-if)#ip address 100.0.0.1 255.0.0.0
R1(config-if)#clock rate 64000
R1(config-if)#bandwidth 64
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
```

IOS Command Line Interface

Compiled Wed Jul 26 01:01:02 by po_vdm

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>en

Router#config t

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

Router(config)#hostname R1

R1(config)#interface FastEthernet0/0

R1(config-if)#ip address 10.0.0.1 255.0.0.0

R1(config-if)#no shutdown

R1(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

R1(config-if)#exit

R1(config)#show controllers serial 0/0/0

^
% Invalid input detected at '^' marker.

R1(config)#exit

R1#

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

R1#show controllers serial 0/0/0

Interface Serial0/0/0

Hardware is PowerQUICC MPC860

ROM: System Bootstrap, Version 1.2.2, 11/11/2006

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Router1

Physical

Config

CLI

Attributes

IOS Command Line Interface

SCC Registers:

General [GSMR]=0x2:0x00000000, Protocol-specific [PSMR]=0x8

Events [SCCE]=0x0000, Mask [SCCM]=0x0000, Status [SCCS]=0x00

Transmit on Demand [TODR]=0x0, Data Sync [DSR]=0x7E7E

Interrupt Registers:

Config [CICR]=0x00367F80, Pending [CIPR]=0x0000C000

Mask [CIMR]=0x00200000, In-srv [CISR]=0x00000000

Command register [CR]=0x580

Port A [PADIR]=0x1030, [PAPAR]=0xFFFF

[PAODR]=0x0010, [PADAT]=0xCBFF

Port B [PBDIR]=0x09C0F, [PBPAR]=0x0800E

[PBODR]=0x00000, [PBDAT]=0x3FFFD

Port C [PCDIR]=0x00C, [PCPAR]=0x200

[PCSO]=0xC20, [PCDAT]=0xDF2, [PCINT]=0x00F

Receive Ring

rmd(68012830): status 9000 length 60C address 3B6DAC4

rmd(68012838): status B000 length 60C address 3B6D444

Transmit Ring

tmd(680128B0): status 0 length 0 address 0

tmd(680128B8): status 0 length 0 address 0

R1#config t

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

R1(config)#interface Serial0/0/0

R1(config-if)#ip address 100.0.0.1 255.0.0.0

R1(config-if)#clock rate 64000

R1(config-if)#bandwidth 64

R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down

R1(config-if)#exit

R1(config)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config)#

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IOS Command Line Interface

Port C [PCDIR]=0x00C, [PCPAR]=0x200
[PCSO]=0xC20, [PCDAT]=0xDF2, [PCINT]=0x00F
Receive Ring
rmd(68012830): status 9000 length 60C address 3B6DAC4
rmd(68012838): status B000 length 60C address 3B6D444
Transmit Ring
tmd(680128B0): status 0 length 0 address 0
tmd(680128B8): status 0 length 0 address 0

R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface Serial0/0/0
R1(config-if)#ip address 100.0.0.1 255.0.0.0
R1(config-if)#clock rate 64000
R1(config-if)#bandwidth 64
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config)#ip nat inside source static 10.0.0.10 50.0.0.10
R1(config)#interface FastEthernet 0/0
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#interface Serial 0/0/0
R1(config-if)#ip nat outside
R1(config-if)#exit
R1(config)#ip nat inside source static 10.0.0.20 50.0.0.20
R1(config)#ip nat inside source static 10.0.0.30 50.0.0.30
R1(config)#
R1#
%SYS-5-CONFIG_I: Configured from console by console

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Router1

Physical

Config

CLI

Attributes

IOS Command Line Interface

Transmit Ring

tmd(680128B0): status 0 length 0 address 0

tmd(680128B8): status 0 length 0 address 0

R1#config t

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

R1(config)#interface Serial0/0/0

R1(config-if)#ip address 100.0.0.1 255.0.0.0

R1(config-if)#clock rate 64000

R1(config-if)#bandwidth 64

R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down

R1(config-if)#exit

R1(config)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config)#ip nat inside source static 10.0.0.10 50.0.0.10

R1(config)#interface FastEthernet 0/0

R1(config-if)#ip nat inside

R1(config-if)#exit

R1(config)#interface Serial 0/0/0

R1(config-if)#ip nat outside

R1(config-if)#exit

R1(config)#ip nat inside source static 10.0.0.20 50.0.0.20

R1(config)#ip nat inside source static 10.0.0.30 50.0.0.30

R1(config)#

R1#

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

R1#en

R1#config t

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

R1(config)#ip route 200.0.0.0 255.255.255.0 100.0.0.2

R1(config)#S

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Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
SCC Registers:
General [GSMR]=0x2:0x00000000, Protocol-specific [PSMR]=0x8
Events [SCCE]=0x0000, Mask [SCCM]=0x0000, Status [SCCS]=0x00
Transmit on Demand [TODR]=0x0, Data Sync [DSR]=0x7E7E
Interrupt Registers:
Config [CICR]=0x00367F80, Pending [CIPR]=0x0000C000
Mask [CIMR]=0x00200000, In-srv [CISR]=0x00000000
Command register [CR]=0x580
Port A [PADIR]=0x1030, [PAPAR]=0xFFFF
[PAODR]=0x0010, [PADAT]=0xCBFF
Port B [PBDIR]=0x09C0F, [PBPAR]=0x0800E
[PBODR]=0x00000, [PBDAT]=0x3FFFD
Port C [PCDIR]=0x00C, [PCPAR]=0x200
[PCSO]=0x0C20, [PCDAT]=0xDF2, [PCINT]=0x00F
Receive Ring
rmd(68012830): status 9000 length 60C address 3B6DAC4
rmd(68012838): status B000 length 60C address 3B6D444
Transmit Ring
tmd(680128B0): status 0 length 0 address 0
tmd(680128B8): status 0 length 0 address 0

R1#config t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface Serial0/0/0
R1(config-if)#ip address 100.0.0.1 255.0.0.0
R1(config-if)#clock rate 64000
R1(config-if)#bandwidth 64
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#exit
R1(config)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up


%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config)#
```

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7. Configure Router R1 using following commands

 Router2

Physical

Config

CLI

Attributes

IOS Command Line Interface

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>en

Router#config t

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

Router(config)#hostname R2

R2(config)#interface FastEthernet0/0

R2(config-if)#ip address 192.168.1.1 255.255.255.0

R2(config-if)#no shutdown

R2(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

R2(config-if)#exit

R2(config)#interface Serial0/0/0

R2(config-if)#ip address 100.0.0.2 255.0.0.0

R2(config-if)#no shutdown

R2(config-if)#

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

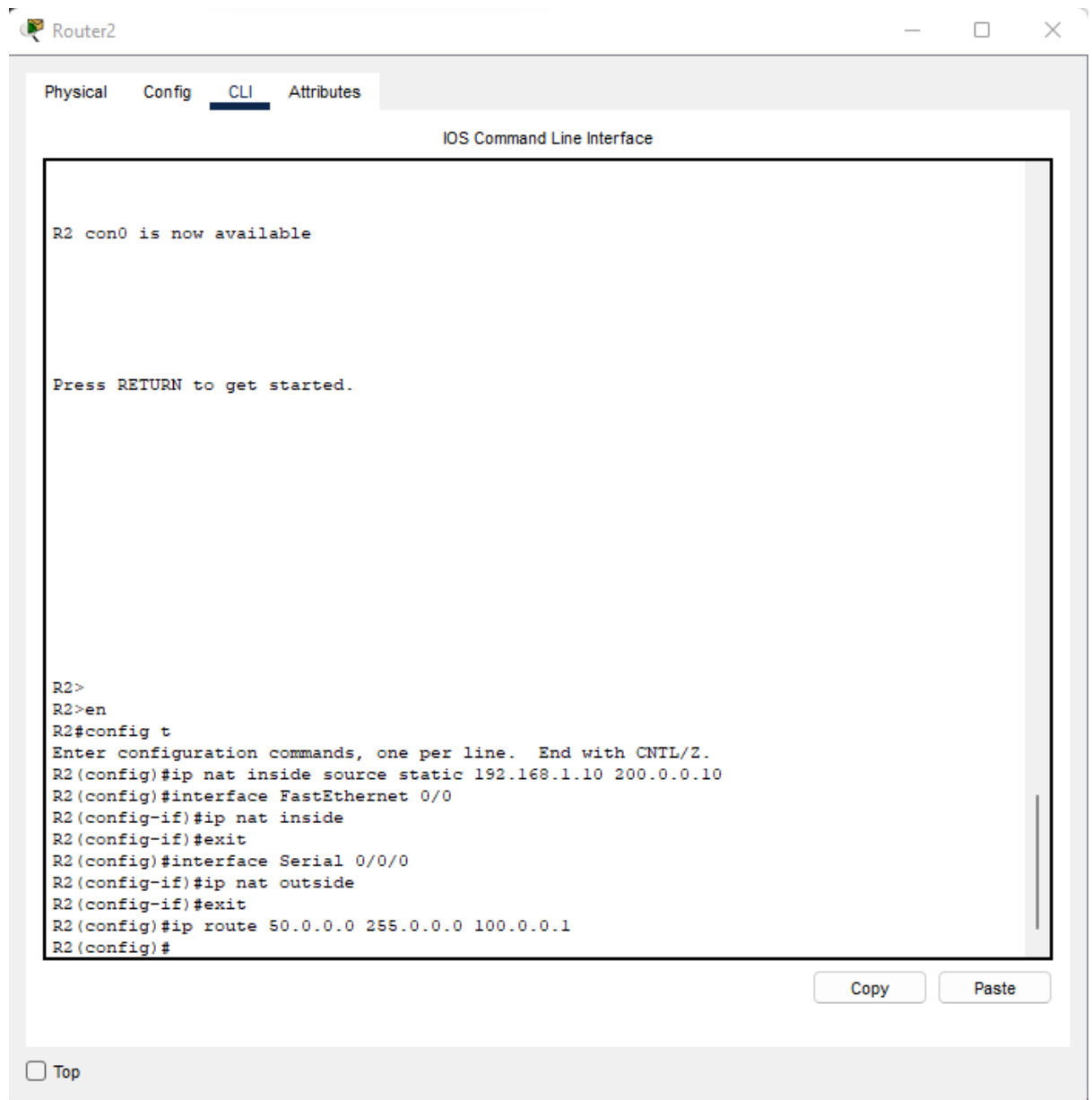
R2(config-if)#exit

R2(config)#

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Configure Static NAT

Static NAT configuration requires three steps: -

1. Define IP address mapping
2. Define inside local interface
3. Define inside global interface

R1 Static NAT Configuration

```
R1(config)#ip nat inside source static 10.0.0.10 50.0.0.10
R1(config)#interface FastEthernet 0/0
R1(config-if)#ip nat inside
R1(config-if)#exit
R1(config)#
```

```
R1(config)#ip nat inside source static 10.0.0.20 50.0.0.20
R1(config)#ip nat inside source static 10.0.0.30 50.0.0.30
```

R2 Static NAT Configuration

```
R2(config)#ip nat inside source static 192.168.1.10 200.0.0.10
R2(config)#interface FastEthernet 0/0
R2(config-if)#ip nat inside
R2(config-if)#exit
R2(config)#
R2(config)#interface Serial 0/0/0
R2(config-if)#ip nat outside
R2(config-if)#exit
```

Configure static routing in R1

```
R1(config)#ip route 200.0.0.0 255.255.255.0 100.0.0.2
```

Configure static routing in R2

```
R2(config)#ip route 50.0.0.0 255.0.0.0 100.0.0.1
```

Testing Static NAT Configuration

Device	Inside Local IP Address	Inside Global IP Address
Laptop0	10.0.0.10	50.0.0.10
Server	192.168.1.10	200.0.0.10

To test this setup click PC0 and Desktop and click Command Prompt.

- Run **ipconfig** command.
- Run **ping 200.0.0.10** command.
- Run **ping 192.168.1.10** command.

PC0

Physical Config **Desktop** Programming Attributes

Command Prompt

```
10.0.0.1

Bluetooth Connection:

Connection-specific DNS Suffix...:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0

C:\>ping 200.0.0.10

Pinging 200.0.0.10 with 32 bytes of data:

Reply from 200.0.0.10: bytes=32 time=2ms TTL=126
Reply from 200.0.0.10: bytes=32 time=3ms TTL=126
Reply from 200.0.0.10: bytes=32 time=3ms TTL=126
Reply from 200.0.0.10: bytes=32 time=1ms TTL=126

Ping statistics for 200.0.0.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 2ms

C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.
Reply from 10.0.0.1: Destination host unreachable.

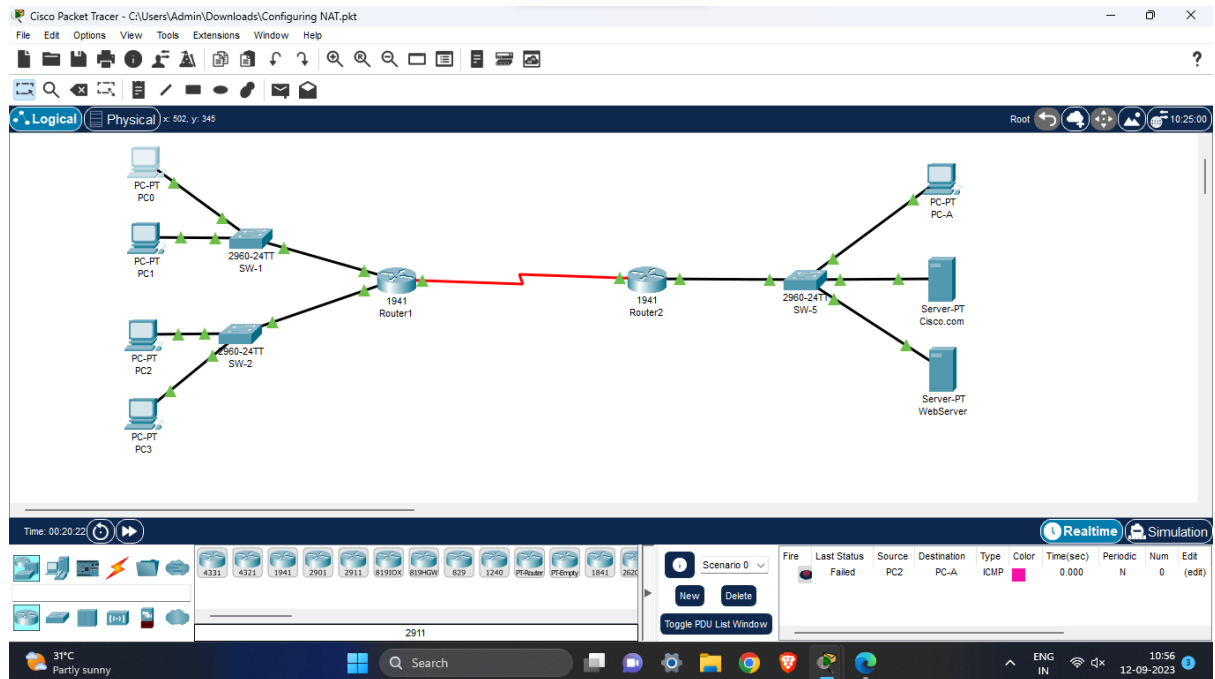
Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

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Dynamic NAT

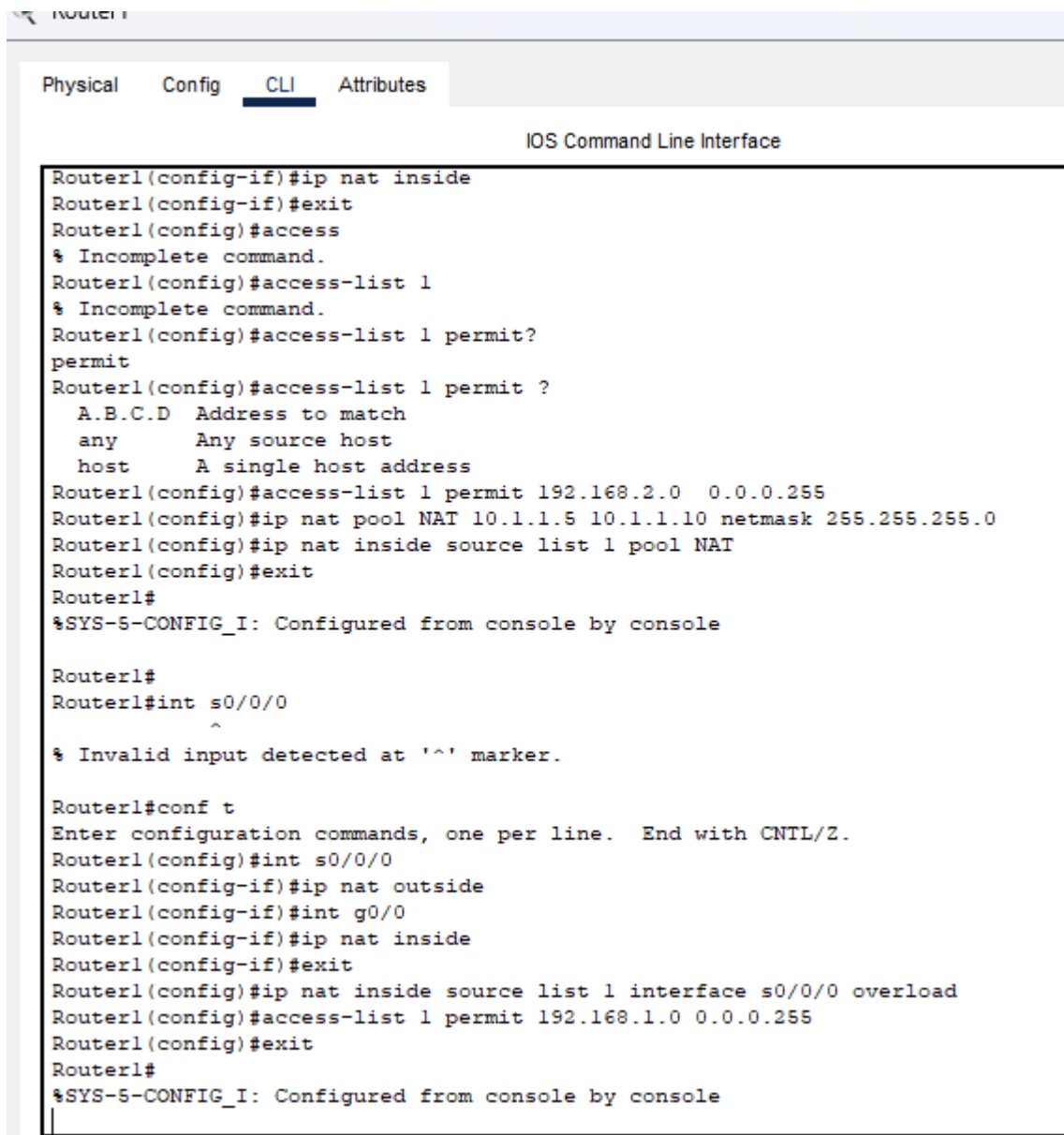
1. Select Router from Network devices. Place Two Routers and connect them using Serial DTE cable.
2. Select a switch and place it on two switches on one side and one switch other side and connect it to router using copper straight cable.
3. Select PC from End Devices and place four PC's and connect them to the two switches with copper cross over cables.
4. Place two servers and a PC and connect it to second router via third switch using copper cross cable.



5. Configure the router using following commands

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface
Router1(config-if)# int g0/0
Router1(config-if)# ip nat inside
Router1(config-if)# # int s0/0/0
Router1(config-if)# ip nat outside
Router1(config-if)# int g0/0
Router1(config-if)# ip nat inside
Router1(config-if)# ip nat inside source static 192.168.1.2 10.1.1.11
Router1(config)# show ip nat translations
Router1(config)# show ip nat translations
Router1(config)# show ip nat translations
Router1(config)#
Router1(config)#
Router1(config)# [p]ping 8.8.8.8
Router1(config)# ping 8.8.8.8
```

6. Configuring the Dynamic NAT



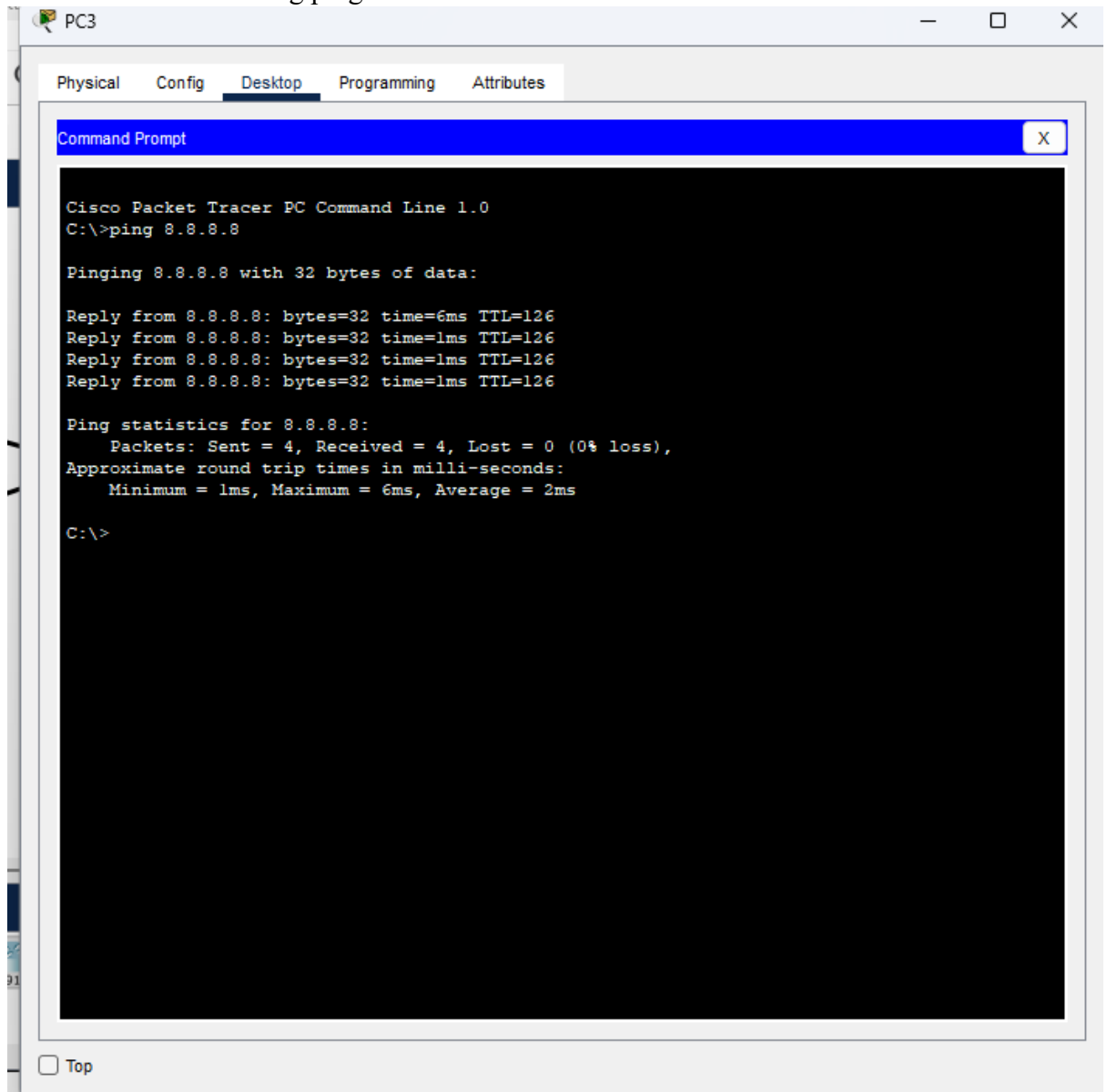
The screenshot shows a network simulator interface with a top bar containing tabs: Physical, Config, CLI, and Attributes. The CLI tab is selected, and the title 'IOS Command Line Interface' is displayed. The main area shows a terminal window with the following commands and output:

```
Router1(config-if)#ip nat inside
Router1(config-if)#exit
Router1(config)#access
% Incomplete command.
Router1(config)#access-list 1
% Incomplete command.
Router1(config)#access-list 1 permit?
permit
Router1(config)#access-list 1 permit ?
  A.B.C.D  Address to match
  any      Any source host
  host     A single host address
Router1(config)#access-list 1 permit 192.168.2.0 0.0.0.255
Router1(config)#ip nat pool NAT 10.1.1.5 10.1.1.10 netmask 255.255.255.0
Router1(config)#ip nat inside source list 1 pool NAT
Router1(config)#exit
Router1#
%SYS-5-CONFIG_I: Configured from console by console

Router1#
Router1#int s0/0/0
      ^
% Invalid input detected at '^' marker.

Router1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#int s0/0/0
Router1(config-if)#ip nat outside
Router1(config-if)#int g0/0
Router1(config-if)#ip nat inside
Router1(config-if)#exit
Router1(config)#ip nat inside source list 1 interface s0/0/0 overload
Router1(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router1(config)#exit
Router1#
%SYS-5-CONFIG_I: Configured from console by console
```

7. Test the connection using ping command on PC3



Conclusion:

We have successfully configured static and default NAT on Cisco routers and verified their functionality.