

PC0 IP Configuration

PC0

Physical Config Desktop Programming Attributes

IP Configuration

InterfaceFastEthernet0

IP Configuration

☐ DHCP

☒ Static

IPv4 Address

192.168.1.10

Subnet Mask

255.255.255.0

Default Gateway

192.168.1.1

DNS Server

0.0.0.0

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

/

Link Local Address

FE80::201:64FF:FEA6:22B

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication

MD5

Username

Password

☐ Top

PC1 IP Configuration

PC1

Physical

Config

Desktop

Programming

Attributes

IP Configuration

InterfaceFastEthernet0

IP Configuration

DHCP

Static

IPv4 Address192.168.1.20

Subnet Mask255.255.255.0

Default Gateway192.168.1.1

DNS Server0.0.0.0

IPv6 Configuration

Automatic

Static

IPv6 Address

Link Local AddressFE80::260:2FFF:FE1D:5DD

Default Gateway

DNS Server

802.1X

Use 802.1X Security

AuthenticationMD5

Username

Password

Top

Router 0 Configuration

Router0

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

FastEthernet0/1/0

FastEthernet0/1/1

FastEthernet0/1/2

FastEthernet0/1/3

GigabitEthernet0/2/0

GigabitEthernet0/0

Port Status

Bandwidth

Duplex

MAC Address

IP Configuration

IPv4 Address

Subnet Mask

Tx Ring Limit

On

Auto

1000 Mbps

100 Mbps

10 Mbps

Half Duplex

Full Duplex

Auto

0030.A33A.8E01

192.168.1.1

10

Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
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
```

Top

Router0

PhysicalConfigCLIAttributes

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VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

FastEthernet0/1/0

FastEthernet0/1/1

FastEthernet0/1/2

FastEthernet0/1/3

GigabitEthernet0/2/0

Serial0/0/0

Port Status

On

Duplex

Full Duplex

Clock Rate

2000000

IP Configuration

IPv4 Address

200.200.200.1

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

```
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
ip address 192.168.1.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#no ip address
Router(config-if)#ip address 200.200.200.1 255.255.255.0
Router(config-if)#
```

Top

Router1 Configuration

Router1

Physical

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CLI

Attributes

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SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0

GigabitEthernet0/1

Serial0/0/0

Serial0/0/1

FastEthernet0/1/0

FastEthernet0/1/1

FastEthernet0/1/2

FastEthernet0/1/3

GigabitEthernet0/2/0

Serial0/0/0

Port Status

Duplex

Clock Rate

IP Configuration

IPv4 Address

Subnet Mask

Tx Ring Limit

Serial0/0/0

Port Status

Duplex

Clock Rate

IP Configuration

IPv4 Address

Subnet Mask

Tx Ring Limit

Full Duplex

1200

200.200.200.2

255.255.255.0

10

Equivalent IOS Commands

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 GigabitEthernet0/0

Router(config-if)#

Router(config-if)#exit

Router(config)#interface Serial0/0/0

Router(config-if)#ip address 200.200.200.2 255.255.255.0

Router(config-if)#ip address 200.200.200.2 255.255.255.0

Router(config-if)#

Top

Router1

Physical **Config** CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
Serial0/0/0
Serial0/0/1
FastEthernet0/1/0
FastEthernet0/1/1
FastEthernet0/1/2
FastEthernet0/1/3
GigabitEthernet0/2/0

GigabitEthernet0/0
Port Status ☒ On
Bandwidth ☐ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
Duplex ☐ Half Duplex ☐ Full Duplex ☒ Auto
MAC Address 0050.0F34.BB01
IP Configuration
IPv4 Address 8.8.8.1
Subnet Mask 255.0.0.0
Tx Ring Limit 10

Equivalent IOS Commands

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

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
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
ip address 8.8.8.1 255.0.0.0
Router(config-if)#
```

☐ Top

IP Routing

```
Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.1.0 255.255.255.0 200.200.200.1
exit
Router(config-if)#
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

```
Router#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	8.8.8.1	YES	manual	up	up
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	200.200.200.2	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
FastEthernet0/1/0	unassigned	YES	unset	up	down
FastEthernet0/1/1	unassigned	YES	unset	up	down
FastEthernet0/1/2	unassigned	YES	unset	up	down
FastEthernet0/1/3	unassigned	YES	unset	up	down
GigabitEthernet0/2/0	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

Router#

☐ Top

Server Setup

Server0
—
□
×

Physical
Config
Services
Desktop
Programming
Attributes

IP Configuration
X

IP Configuration

☐ DHCP
☒ Static

IPv4 Address
8.8.8.8

Subnet Mask
255.0.0.0

Default Gateway
8.8.8.1

DNS Server
0.0.0.0

IPv6 Configuration

☐ Automatic
☒ Static

IPv6 Address
/

Link Local Address
FE80::201:C9FF:FE57:973E

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication
MD5

Username

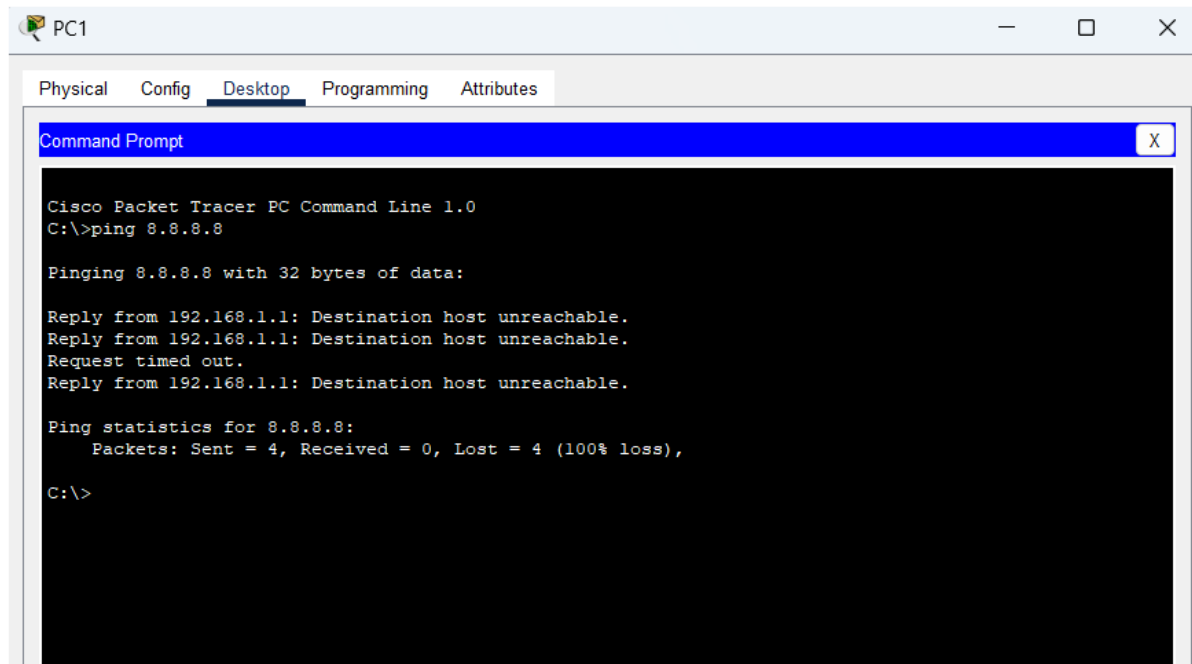
Password

☐ Top

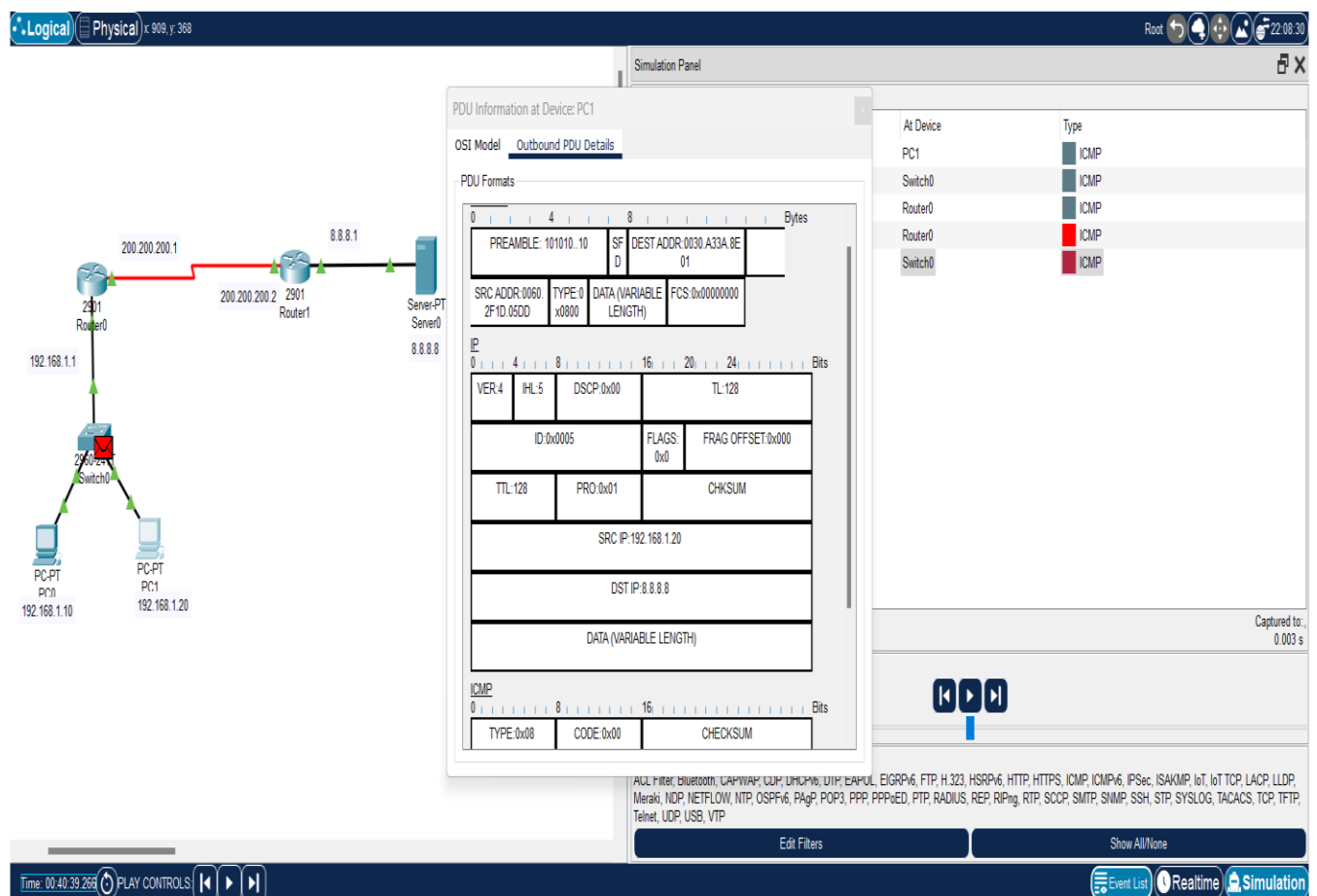
Before NAT Translation

PC1

Pinging to server



In Simulation Mode



NAT Configuration on Router0

```
Router#
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip nat inside
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 200.200.200.2 255.255.255.252
Router(config-if)#ip nat outside
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#ip nat inside source list 1 interface Serial0/0/0 overload
Router(config)#ip route 0.0.0.0 0.0.0.0 200.200.200.1
Router(config)#
```

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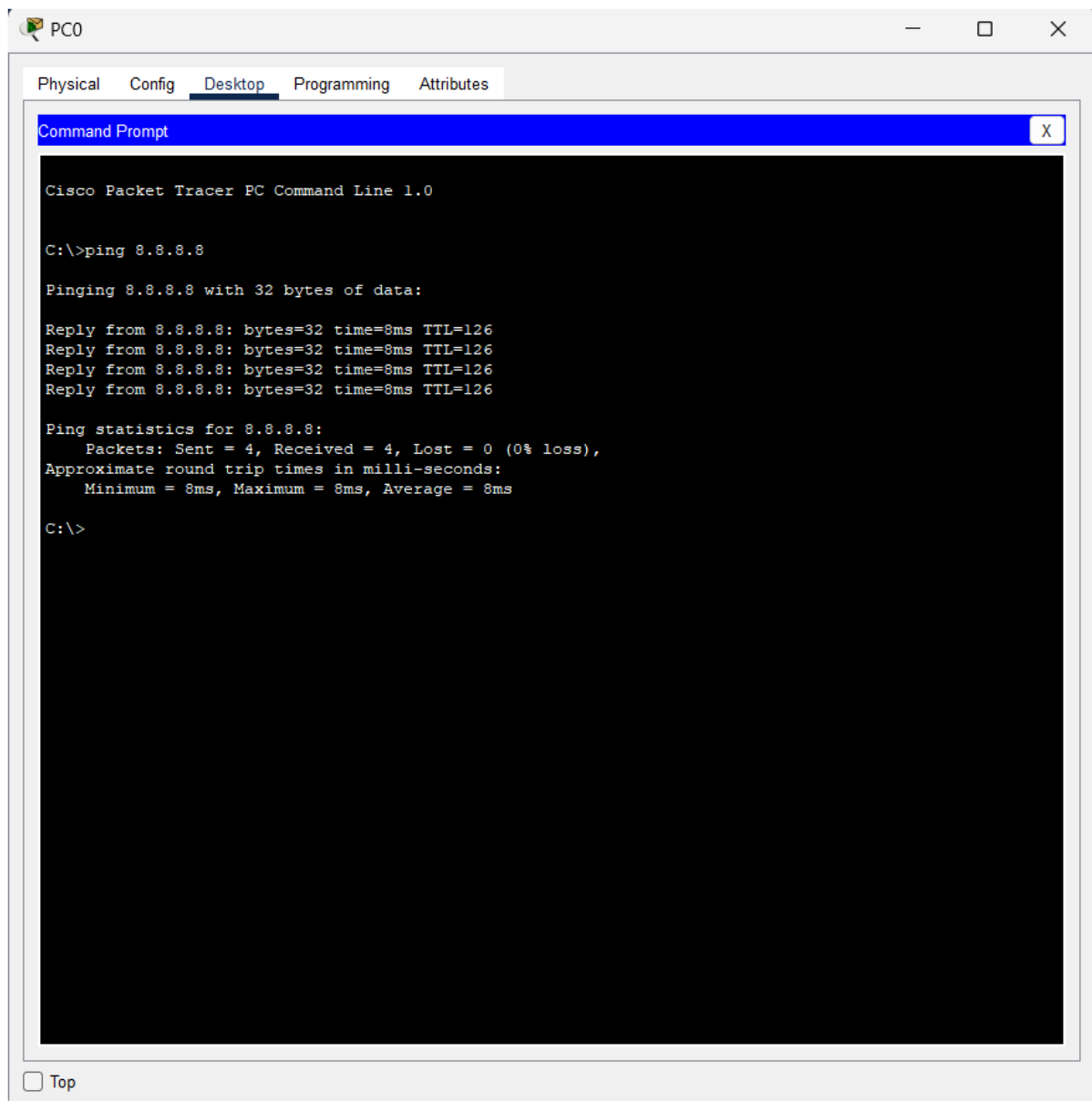
NAT Configuration on Router1

```
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 200.200.200.1 255.255.255.252
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 8.8.8.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#ip route 192.168.1.0 255.255.255.0 200.200.200.2
Router(config)#ip route 0.0.0.0 0.0.0.0 8.8.8.8
Router(config)#
```

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Pinging from PC0 to Server successful



Source IP address changed (NAT Successful)

The simulation shows a network topology where NAT is being configured on Router1. The network diagram displays Router0 (200.200.200.1) connected to Router1 (200.200.200.2), which is connected to Server-PT (8.8.8.8). Router0 is also connected to Switch0, which has two PCs (PC0: 192.168.1.10, PC1: 192.168.1.20). A PDU information window is open, showing the details of an ICMP packet being sent from Router0 to Router1. The packet's source IP is 200.200.200.2 and the destination IP is 8.8.8.8. The packet structure shows HDLC and IP headers, with the source IP field in the IP header set to 200.200.200.2.

PDU Information at Device: Router1

OST Model: Inbound PDU Details Outbound PDU Details

PDU Formats

HDLC

0 8 16 Bits

FLG: 0x7E ADR: 0x8f CONTROL: 0x0000

DATA (VARIABLE LENGTH)

FCS: 0x0000 FLG: 0x7E

IP

0 4 8 16 20 24 Bits

VER: 4 IHL: 5 DSCP: 0x00 TL: 128

ID: 0x000a FLAGS: 0x0 FRAG OFFSET: 0x000

TTL: 127 PRO: 0x01 CHKSUM

SRC IP: 200.200.200.2

DST IP: 8.8.8.8

DATA (VARIABLE LENGTH)

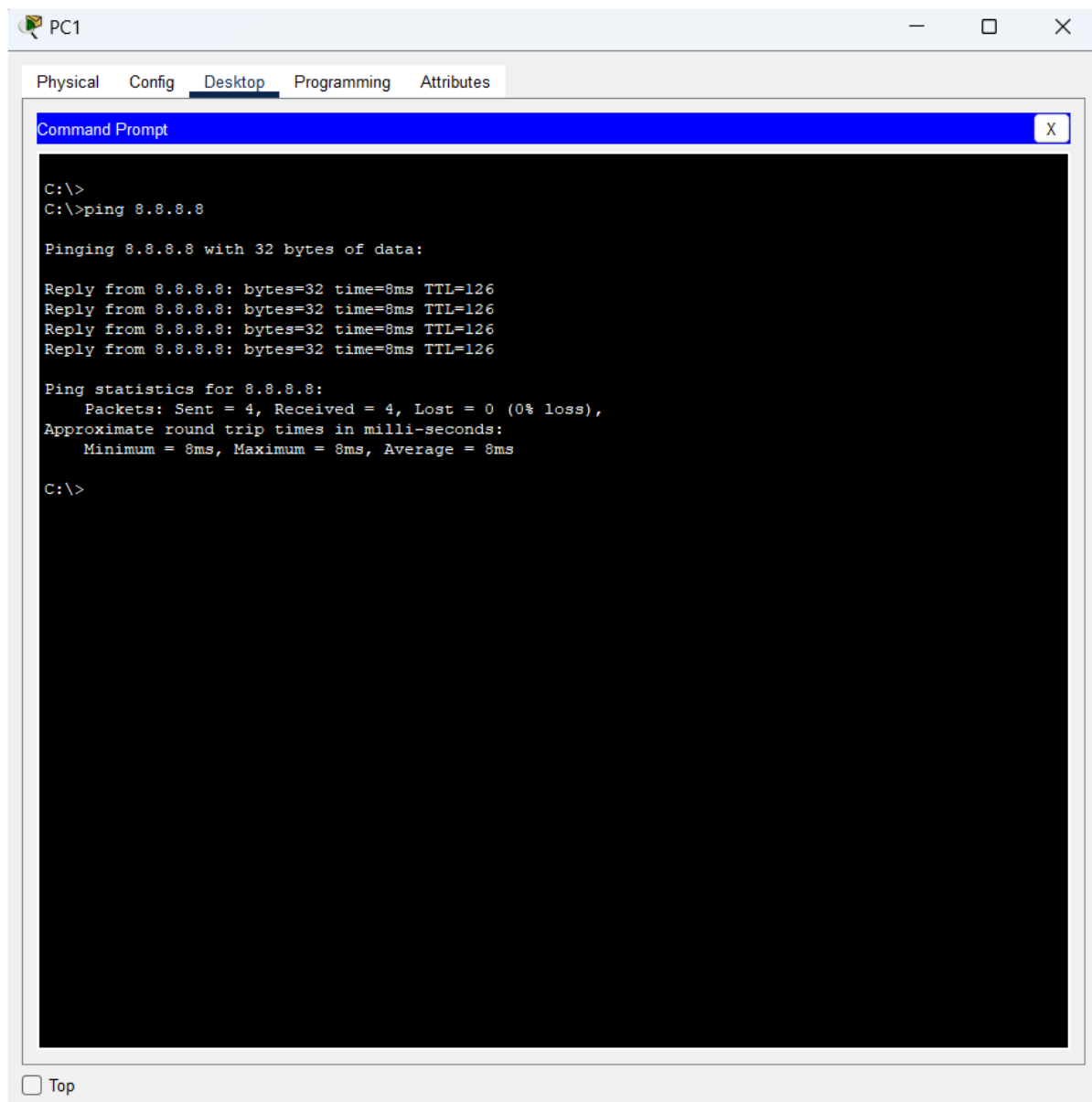
At Device Type

At Device	Type
PC0	ICMP
Switch0	ICMP
Router0	ICMP
Router1	ICMP
Server0	ICMP
Router1	ICMP
Router0	ICMP
Switch0	ICMP

Time: 00:46:06.281 PLAY CONTROLS

Event List Realtime Simulation

Pinging from PC1 to server succesful



The screenshot shows a virtual desktop environment for PC1. The desktop has a taskbar with icons for Physical, Config, Desktop (selected), Programming, and Attributes. A Command Prompt window is open, displaying the results of a ping command to 8.8.8.8. The output shows four successful replies with 32 bytes of data, a time of 8ms, and a TTL of 126. Ping statistics indicate 4 packets sent, 4 received, and 0% loss, with round trip times of 8ms (minimum, maximum, and average).

```
C:\>
C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time=8ms TTL=126
Reply from 8.8.8.8: bytes=32 time=8ms TTL=126
Reply from 8.8.8.8: bytes=32 time=8ms TTL=126
Reply from 8.8.8.8: bytes=32 time=8ms TTL=126

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 8ms, Average = 8ms

C:\>
```

☐ Top

Source IP address changed (NAT Successful)

Logical Physical x:1038, y:40

Simulation Panel

PDU Information at Device: Router1

OSI Model Inbound PDU Details Outbound PDU Details

PDU Formats

HDLC

0 8 16 Bits

FLG: 0x7E ADR: 0x8f CONTROL: 0x0000

DATA (VARIABLE LENGTH)

FCS: 0x0000 FLG: 0x7E

IP

0 4 8 16 20 24 Bits

VER: 4 IHL: 5 DSCP: 0x00 TL: 128

ID: 0x000e FLAGS: 0x0 FRAG OFFSET: 0x000

TTL: 127 PRO: 0x01 CHKSUM

SRC IP: 200.200.200.2

DST IP: 8.8.8.8

DATA (VARIABLE LENGTH)

At Device	Type
PC1	ICMP
Switch0	ICMP
Router0	ICMP
Router1	ICMP
Switch0	STP
PC1	STP
Router0	STP
PC0	STP
Switch0	STP
PC1	STP
Router0	STP
PC0	STP
PC0	ICMP

Captured to: 2.842 s

ACL Filter: bluetooth, CAPWAP, CDP, DHCPv6, DHCP, EAPOL, EIGRPv6, FTP, H.323, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIPv6, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Time: 00:41:07.260 PLAY CONTROLS

Event List Realtime Simulation

Verification

Command: show ip nat translations() on Router0

```
Router#
Router#show ip nat translations
Pro  Inside global      Inside local       Outside local      Outside global
icmp 200.200.200.2:10   192.168.1.10:10   8.8.8.8:10        8.8.8.8:10
icmp 200.200.200.2:11 192.168.1.10:11   8.8.8.8:11        8.8.8.8:11
icmp 200.200.200.2:12 192.168.1.10:12   8.8.8.8:12        8.8.8.8:12
icmp 200.200.200.2:19 192.168.1.20:19   8.8.8.8:19        8.8.8.8:19
icmp 200.200.200.2:20 192.168.1.20:20   8.8.8.8:20        8.8.8.8:20
icmp 200.200.200.2:21 192.168.1.20:21   8.8.8.8:21        8.8.8.8:21
icmp 200.200.200.2:22 192.168.1.20:22   8.8.8.8:22        8.8.8.8:22
icmp 200.200.200.2:6   192.168.1.10:6    8.8.8.8:6         8.8.8.8:6
icmp 200.200.200.2:7   192.168.1.10:7    8.8.8.8:7         8.8.8.8:7
icmp 200.200.200.2:8   192.168.1.10:8    8.8.8.8:8         8.8.8.8:8
icmp 200.200.200.2:9   192.168.1.10:9    8.8.8.8:9         8.8.8.8:9

Router#
```

☐ Top

Before NAT Translation

Source IP Address: 198.168.1.10(PC0)

Source IP Address: 198.168.1.20(PC1)

After NAT TRANSLATION

Source IP Address:200.200.200.2(for both PC)

Key Learning:

1. NAT Translates Private IPs to Public IPs
2. The router must have a default route (0.0.0.0/0) pointing to the ISP gateway (201.20.20.5). Without this, internet-bound packets won't know where to go.
3. NAT Requires Proper Configuration & ACLs. We must define inside (ip nat inside) and outside (ip nat outside) interfaces. An ACL (Access Control List) is needed to specify which traffic gets translated.
4. Use ping to test connectivity at each step (PC → Router → ISP → Internet).
5. Commands like show ip nat translations and show ip route help diagnose issues.