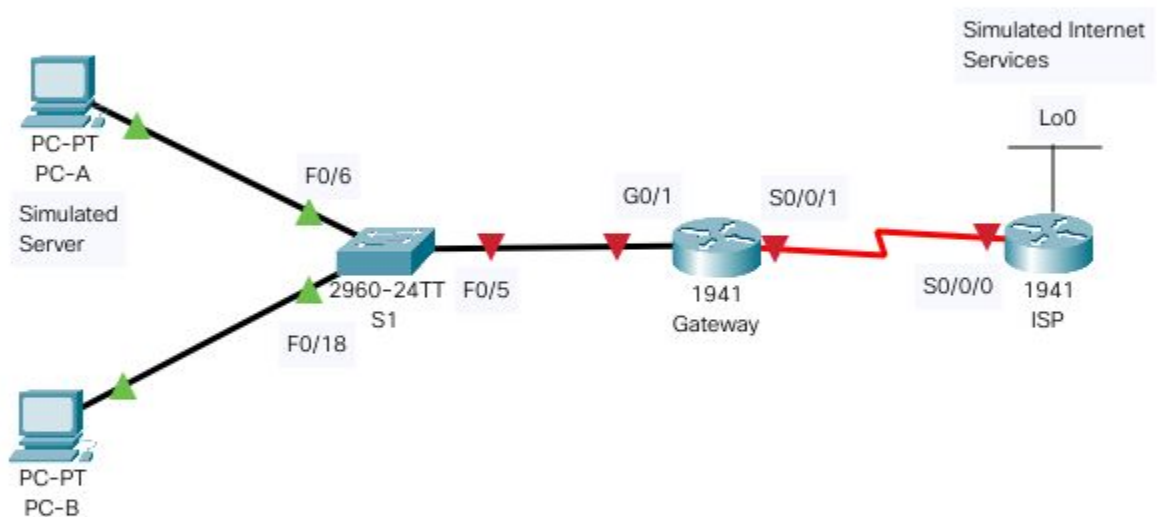


DCCN LAB ISE

Configuring Dynamic and Static NAT

Part 1 : Build the Network and Verify Connectivity

Step 1 : Cable the network as shown in the topology.



Connection : 2PCs, 1Switch, 2 routers

Step 2 : Configure PC hosts

For PC - A :

The screenshot shows the configuration window for PC-A, with the 'Desktop' tab selected. The 'Interface' dropdown is set to 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected, with fields for IPv4 Address (192.168.1.20), Subnet Mask (255.255.255.0), Default Gateway (192.168.1.1), and DNS Server (0.0.0.0). The 'IPv6 Configuration' section has 'Static' selected, with fields for IPv6 Address (empty), Link Local Address (FE80::20B:BEFF:FE79:1946), Default Gateway (empty), and DNS Server (empty). A 'Top' button is at the bottom left.

PC-A

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.20

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::20B:BEFF:FE79:1946

Default Gateway

DNS Server

☐ Top

For PC-B:

PC-B

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.21

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

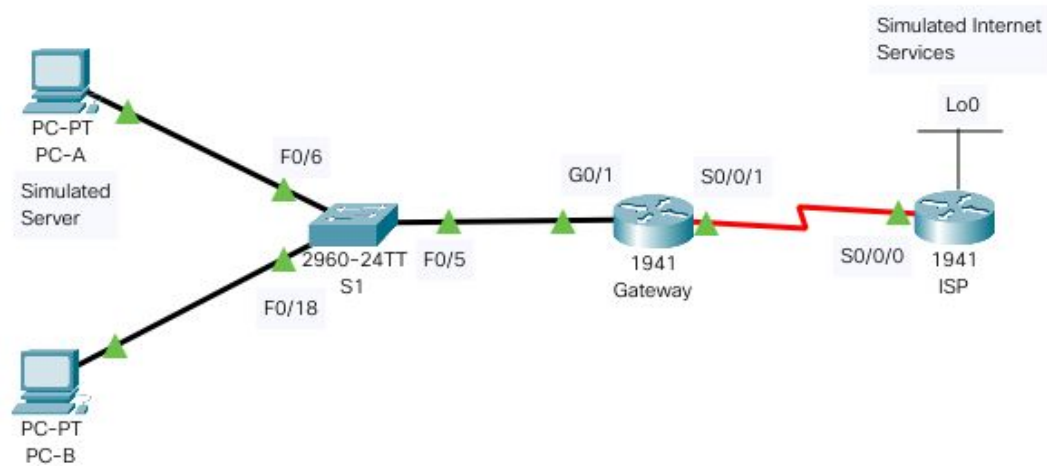
Link Local Address FE80::260:70FF:FE3D:6C6C

Default Gateway

DNS Server

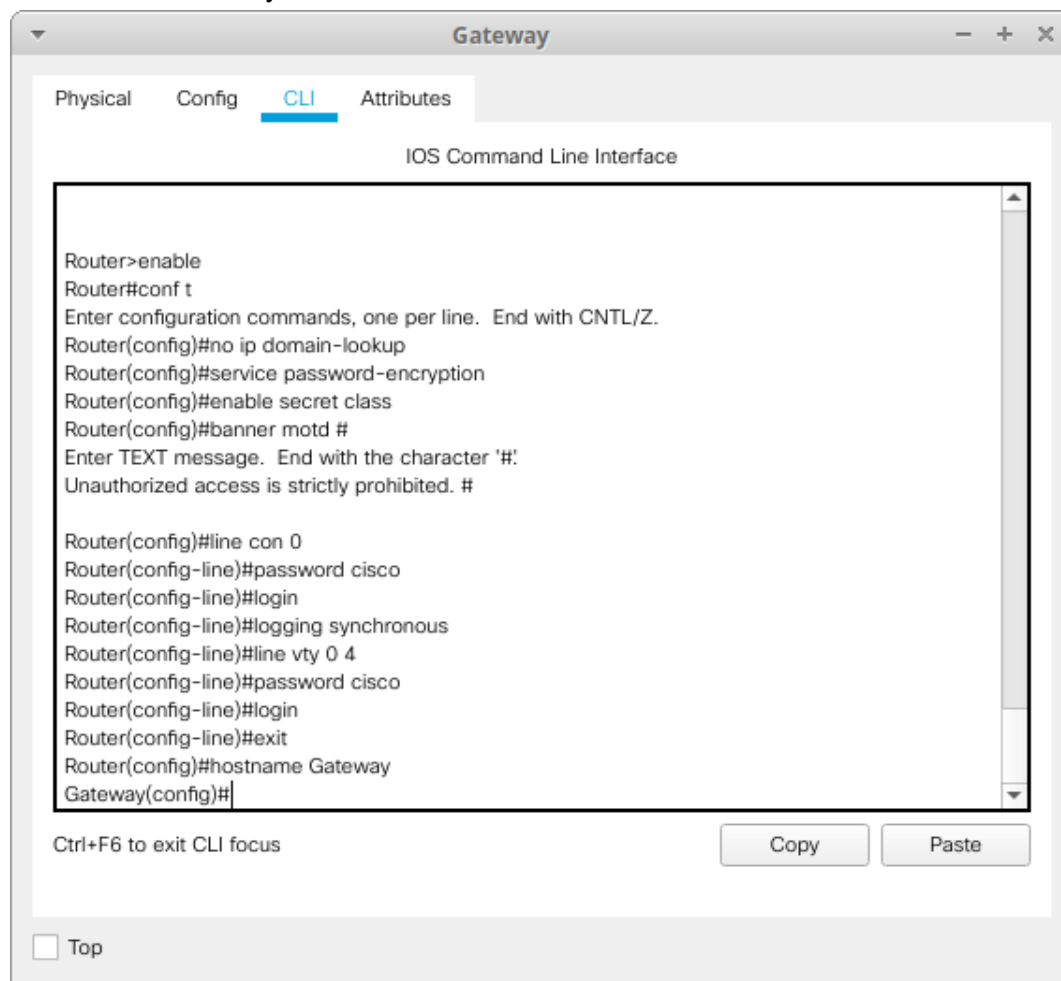
☐ Top

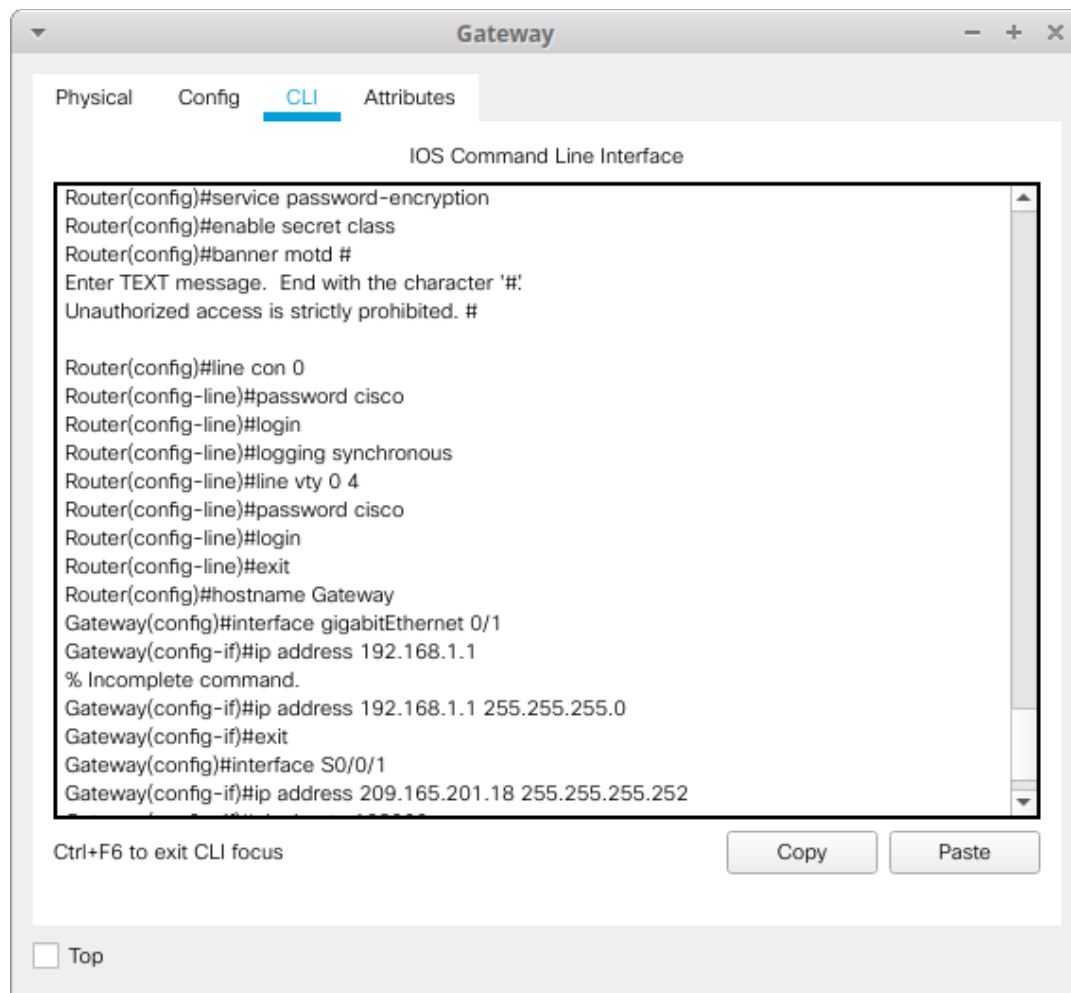
Step 3: Initialize and reload the routers and switches as necessary



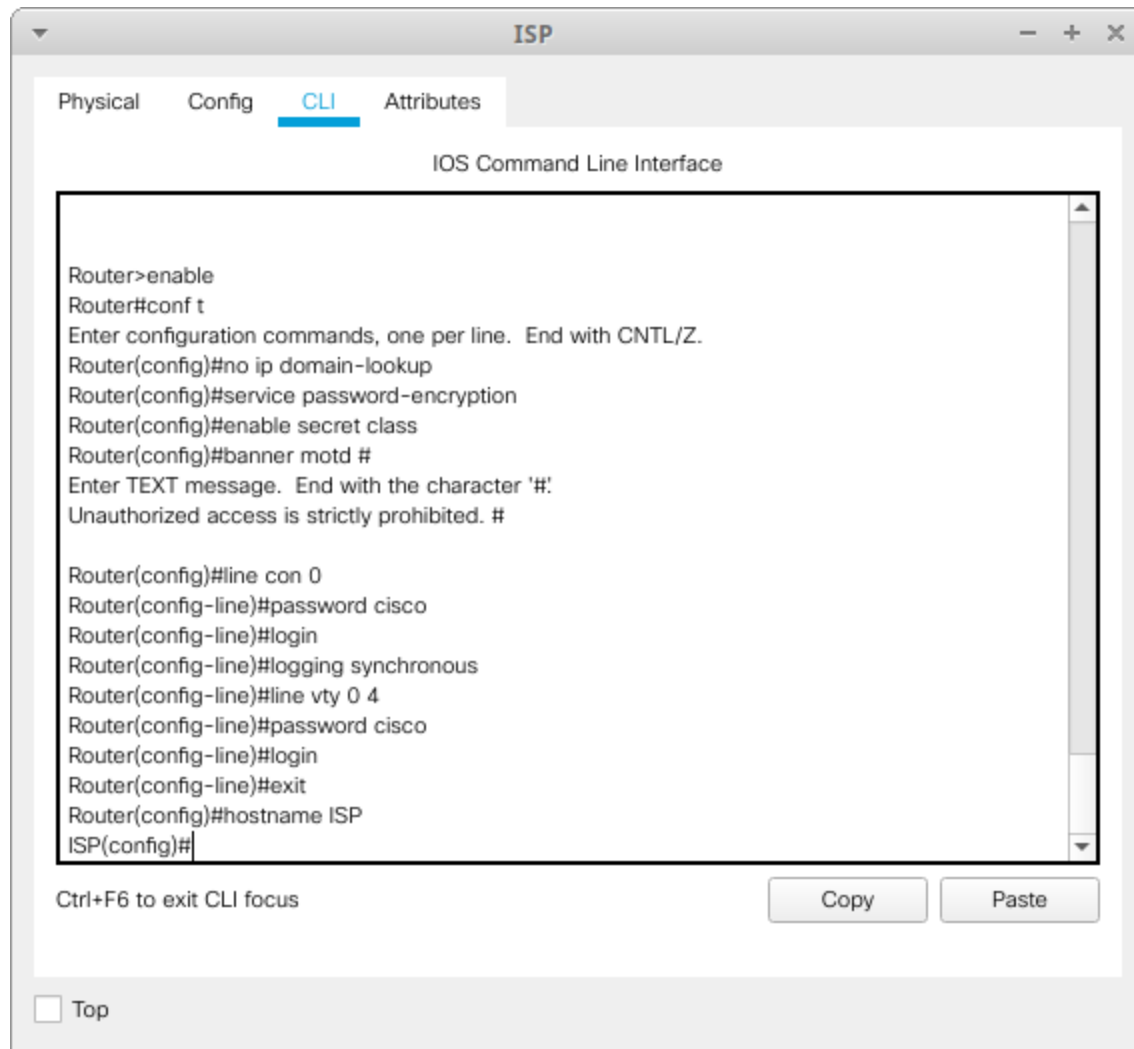
Step 4: Configure basic settings for each router.

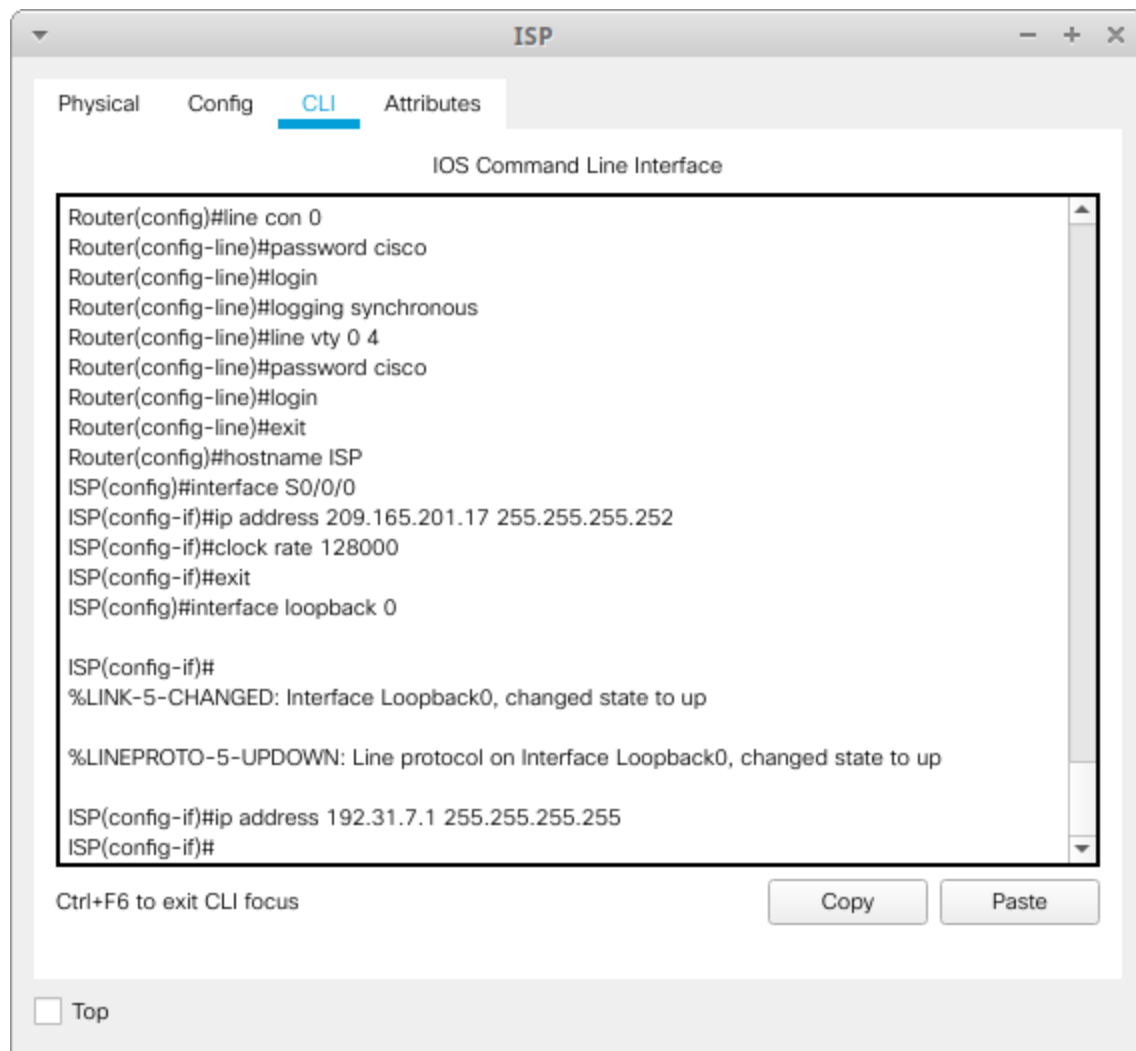
For Router- Gateway



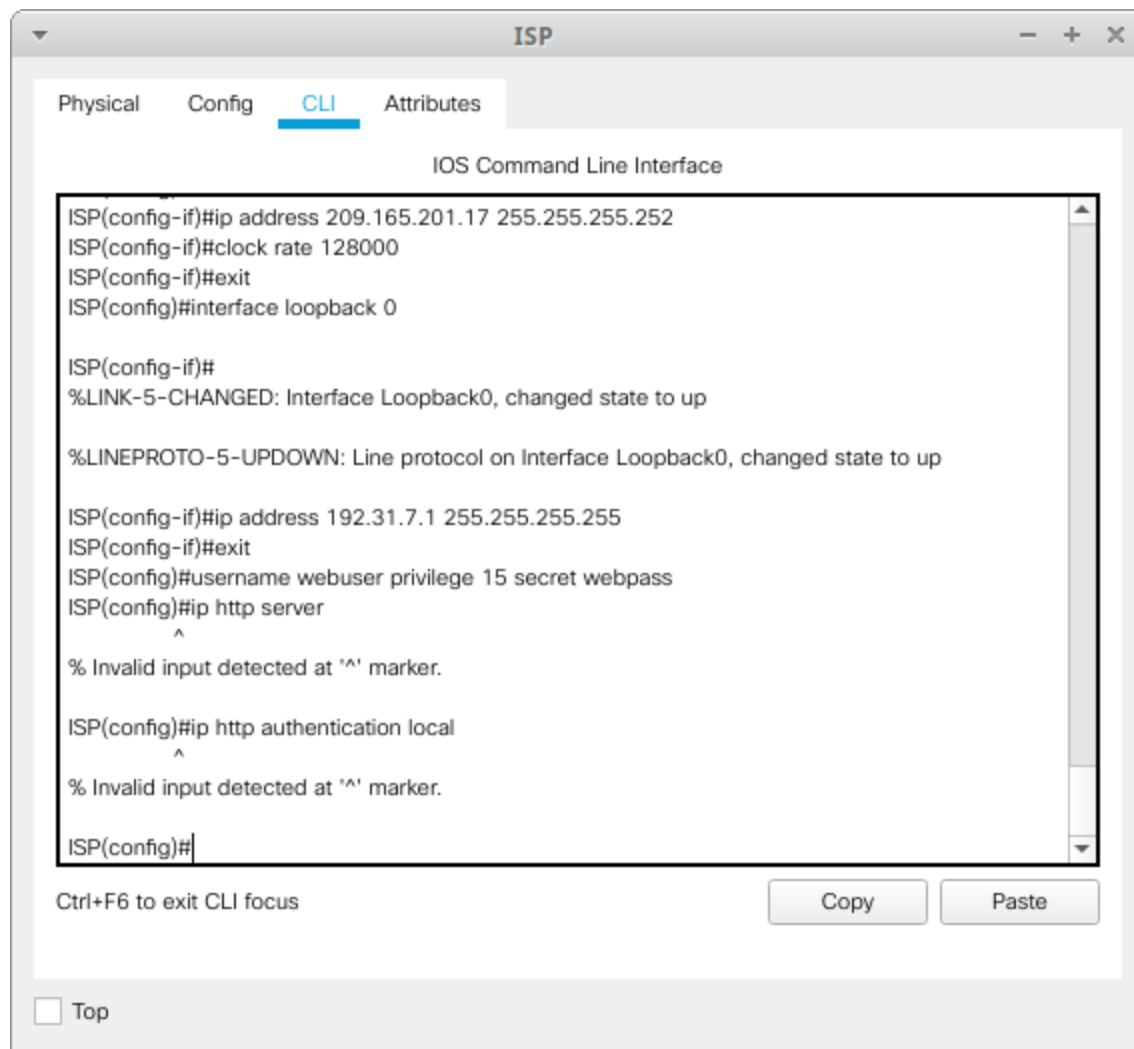


For router- ISP



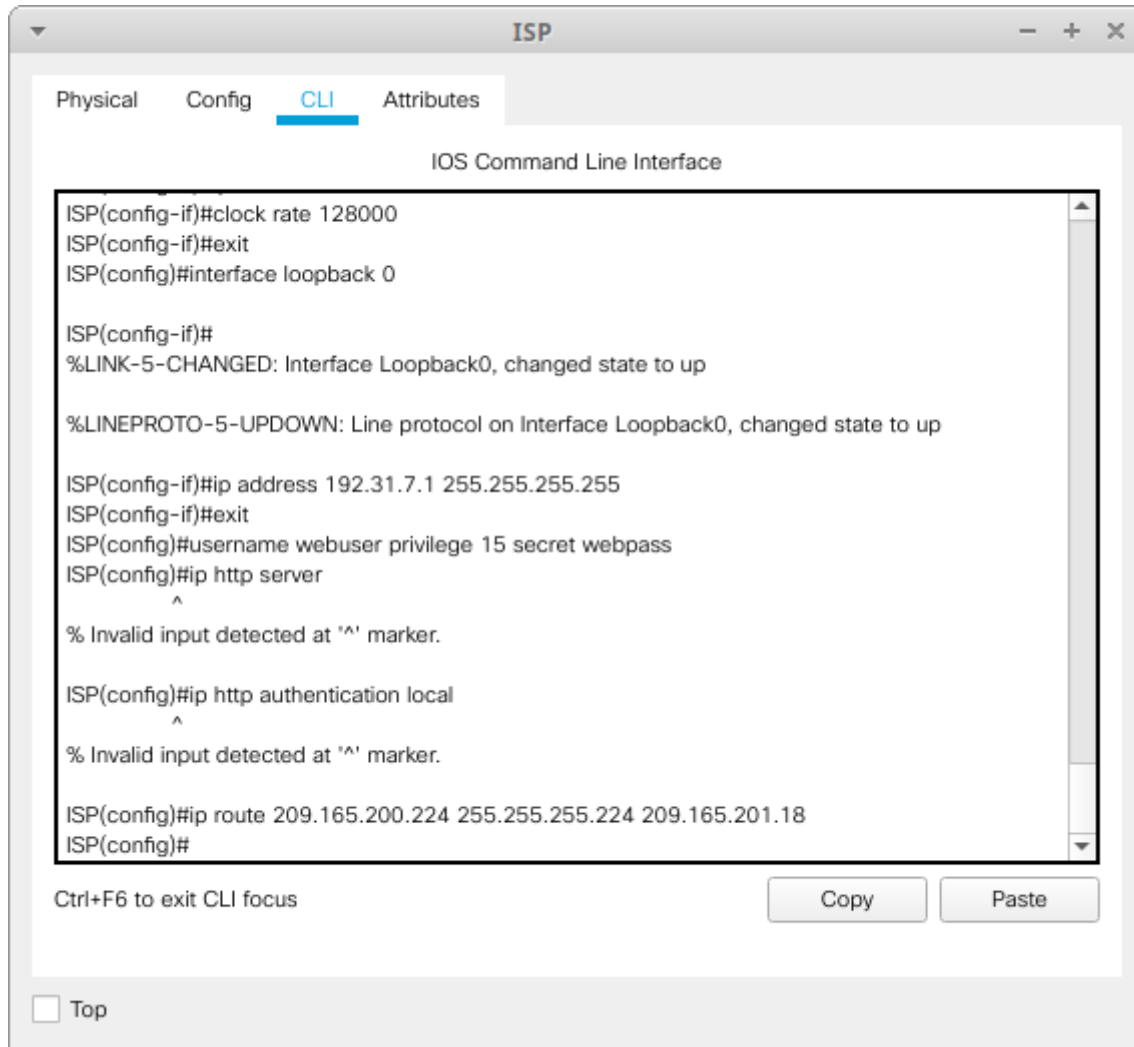


Step 5: Create a simulated web server on ISP.

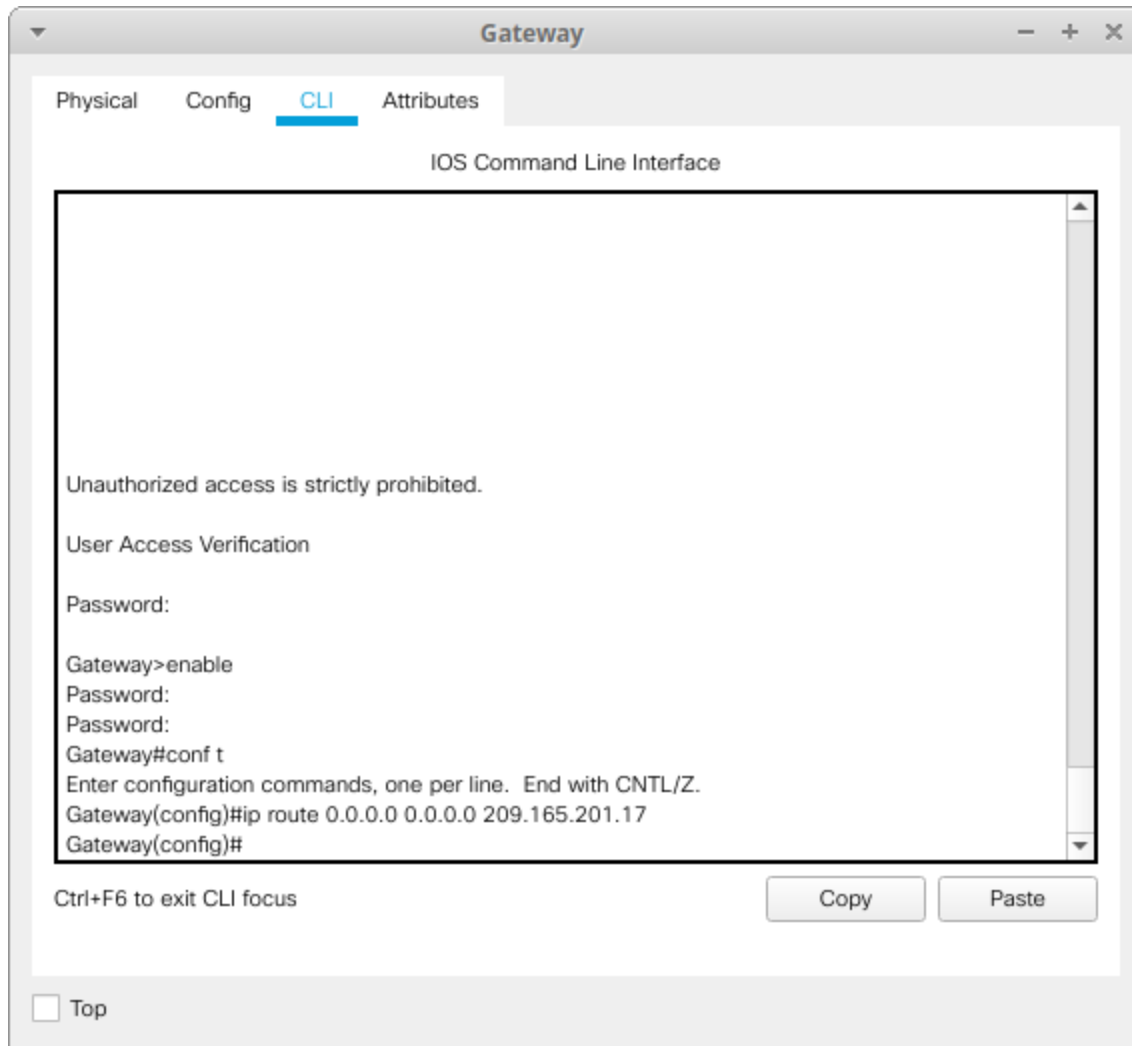


Step 6 : Configure static routing.

a. Create a static route from ISP router to the Gateway router using the assigned public network address range 209.165.200.224/27.

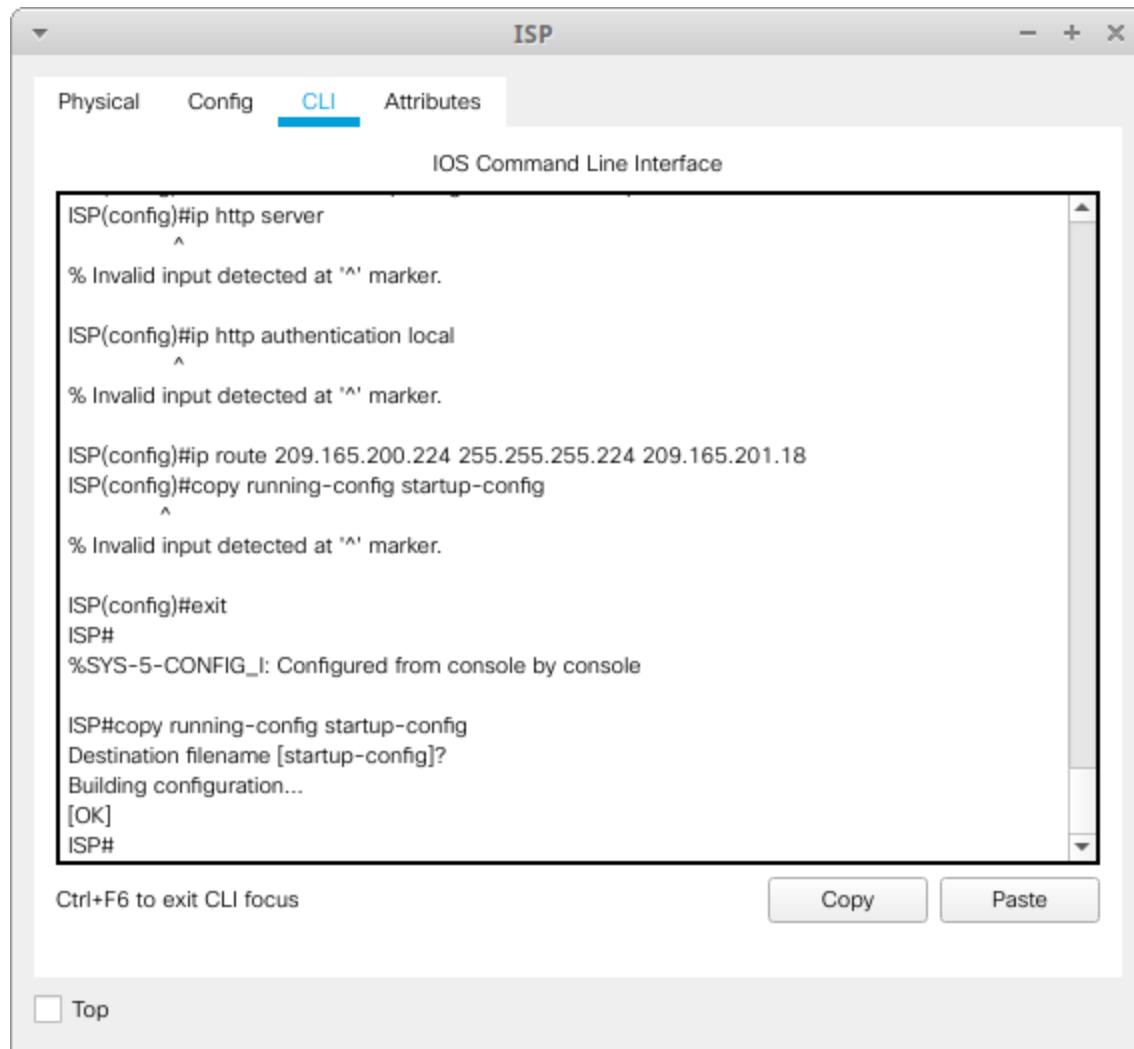


b. Create a default route from the Gateway router to the ISP router.

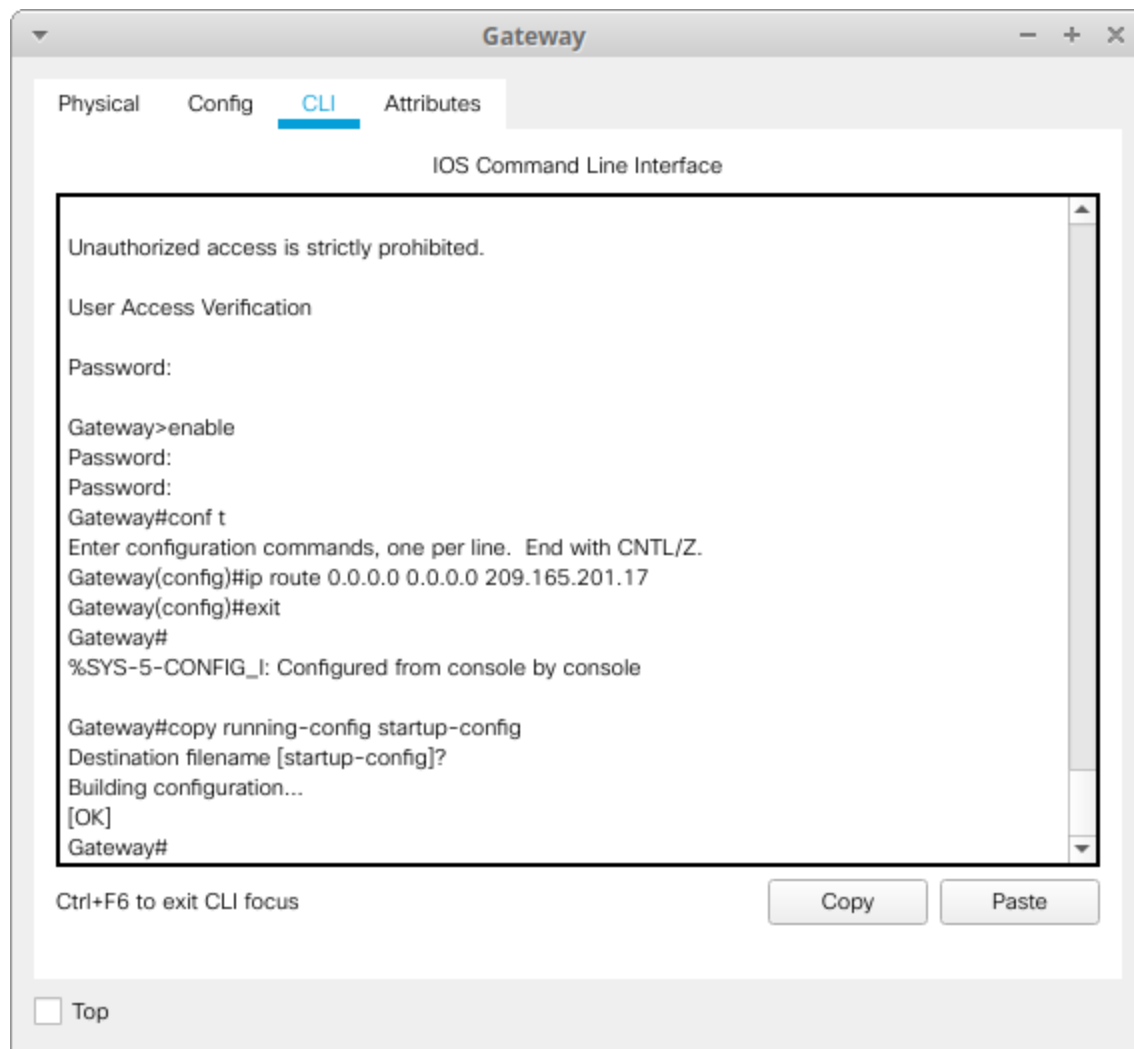


Step 7: Save the running configuration to the startup configuration

For the router- ISP

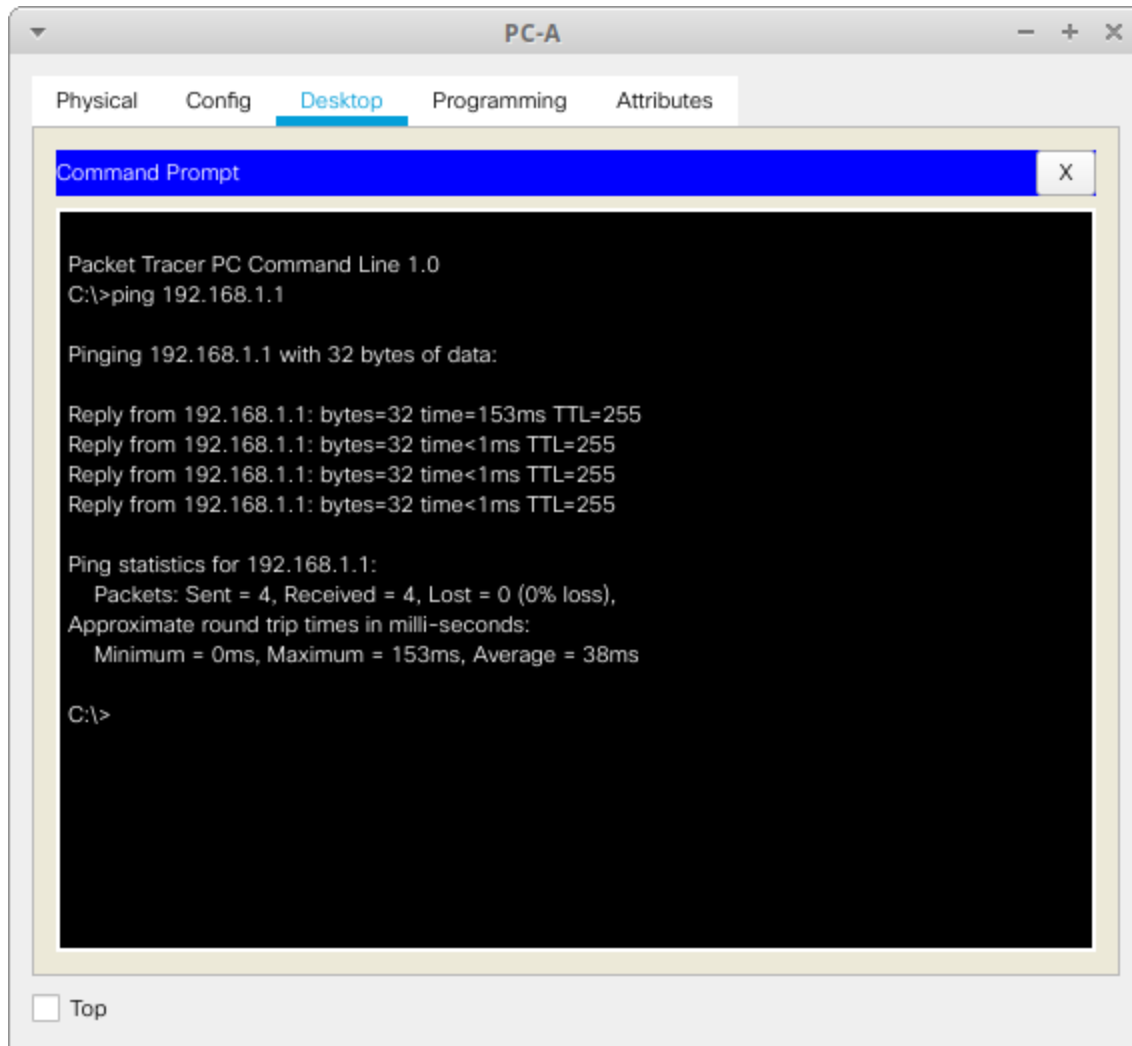


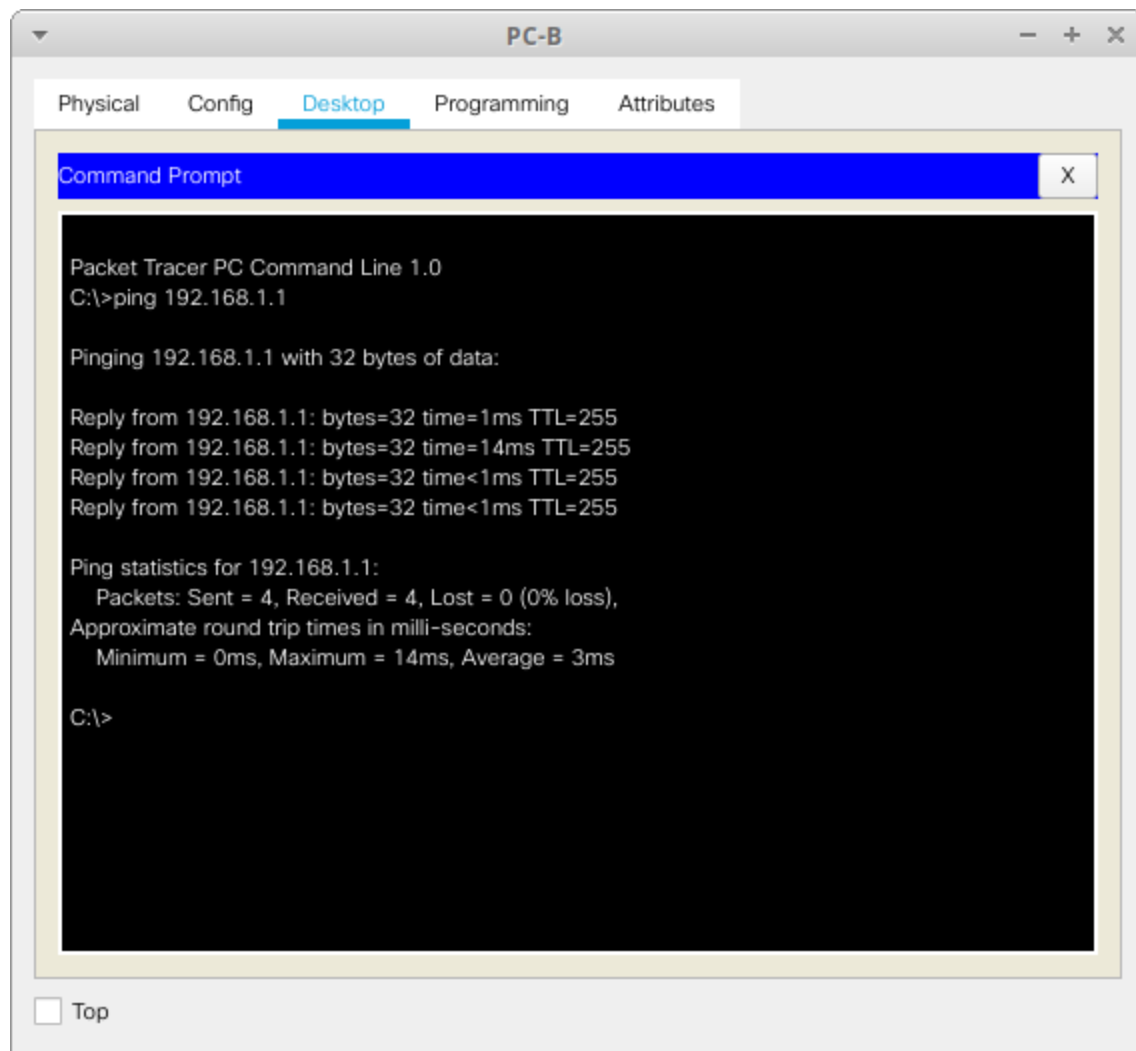
For the router- Gateway



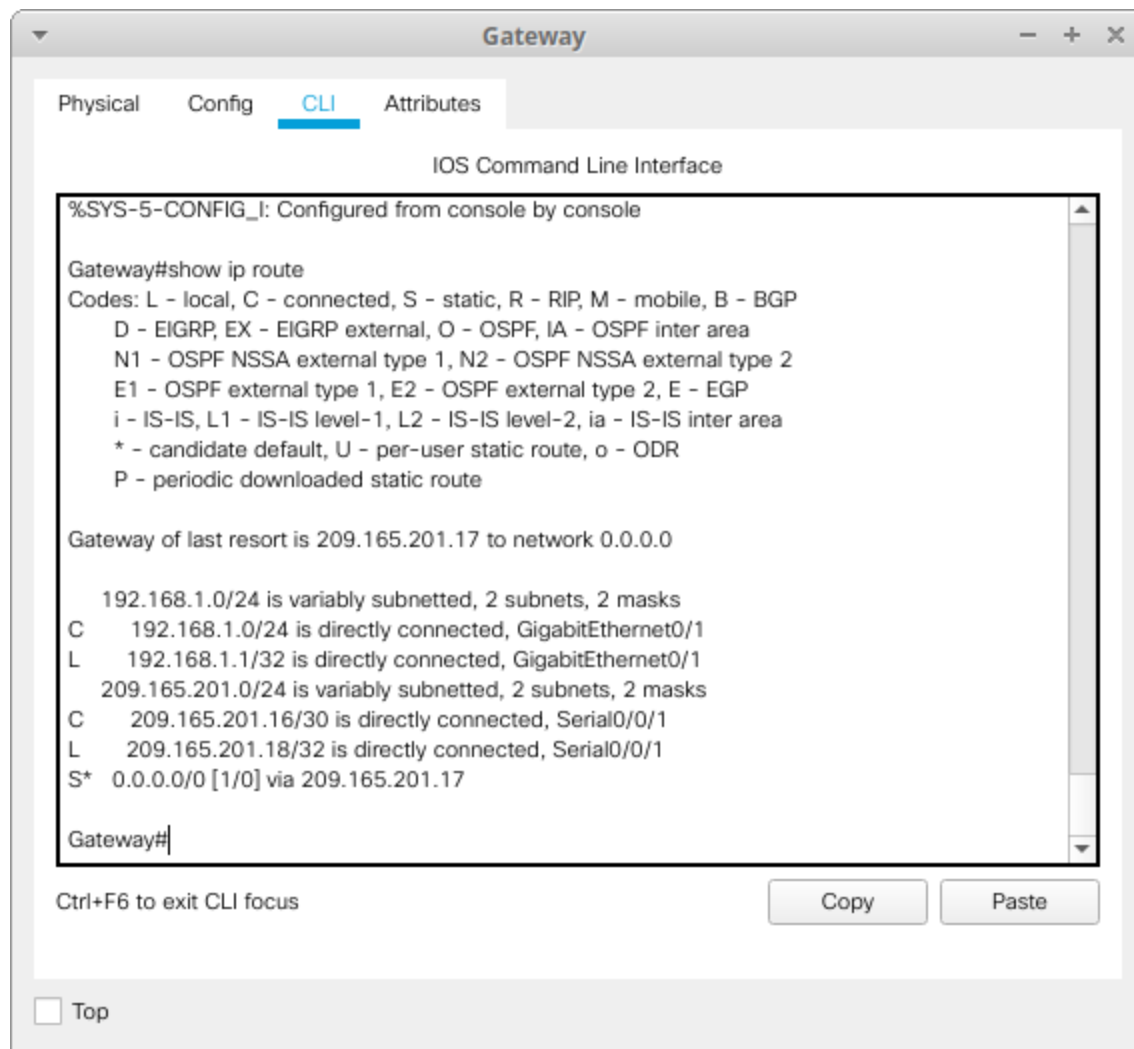
Step 8: Verify network connectivity

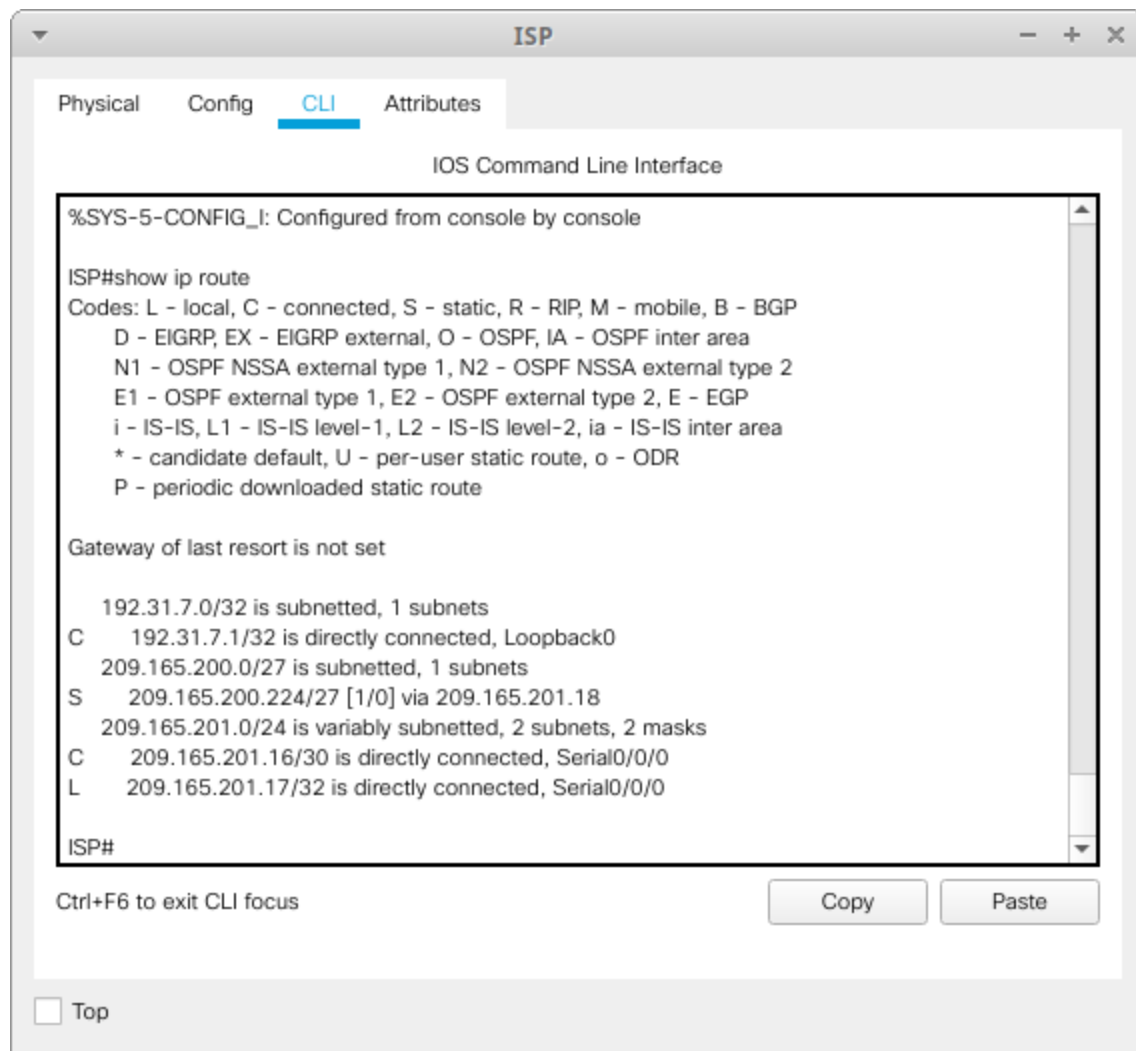
a. From the PC hosts, ping the G0/1 interface on the Gateway router. Troubleshoot if the pings are unsuccessful





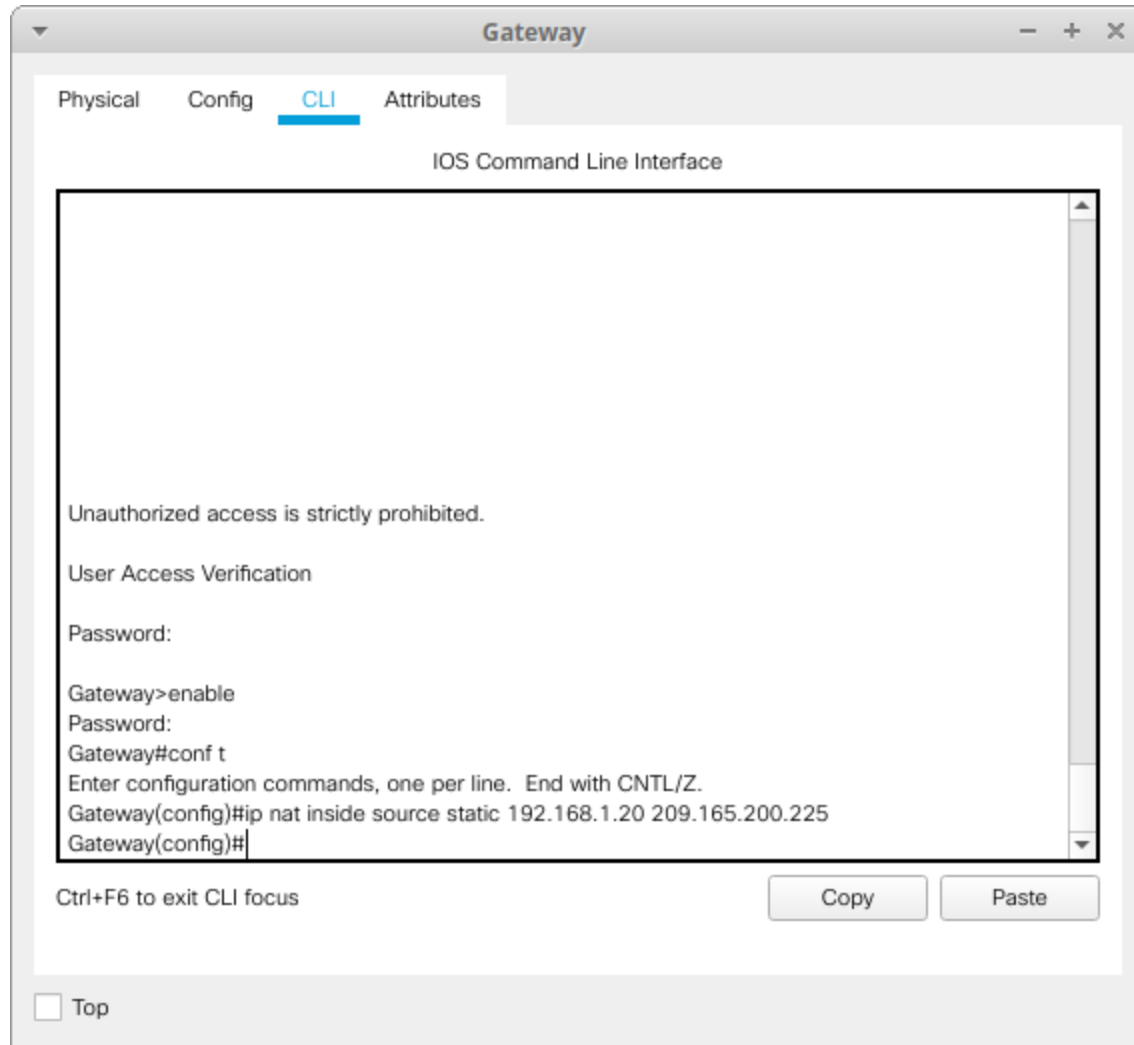
b. Display the routing tables on both routers to verify that the static routes are in the routing table and configured correctly on both routers.



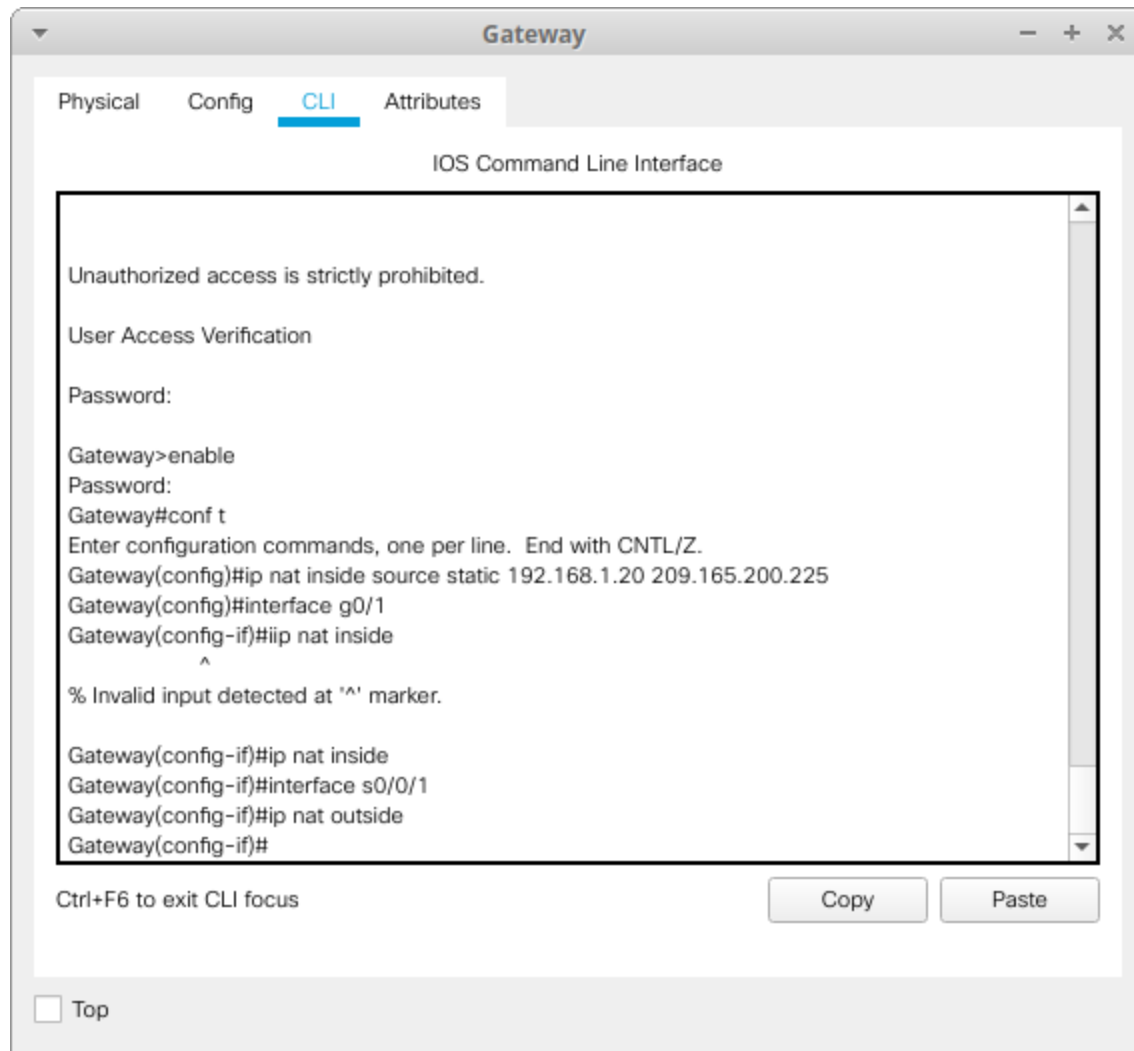


Part 2: Configure and Verify Static NAT

Step 1: Configure a static mapping

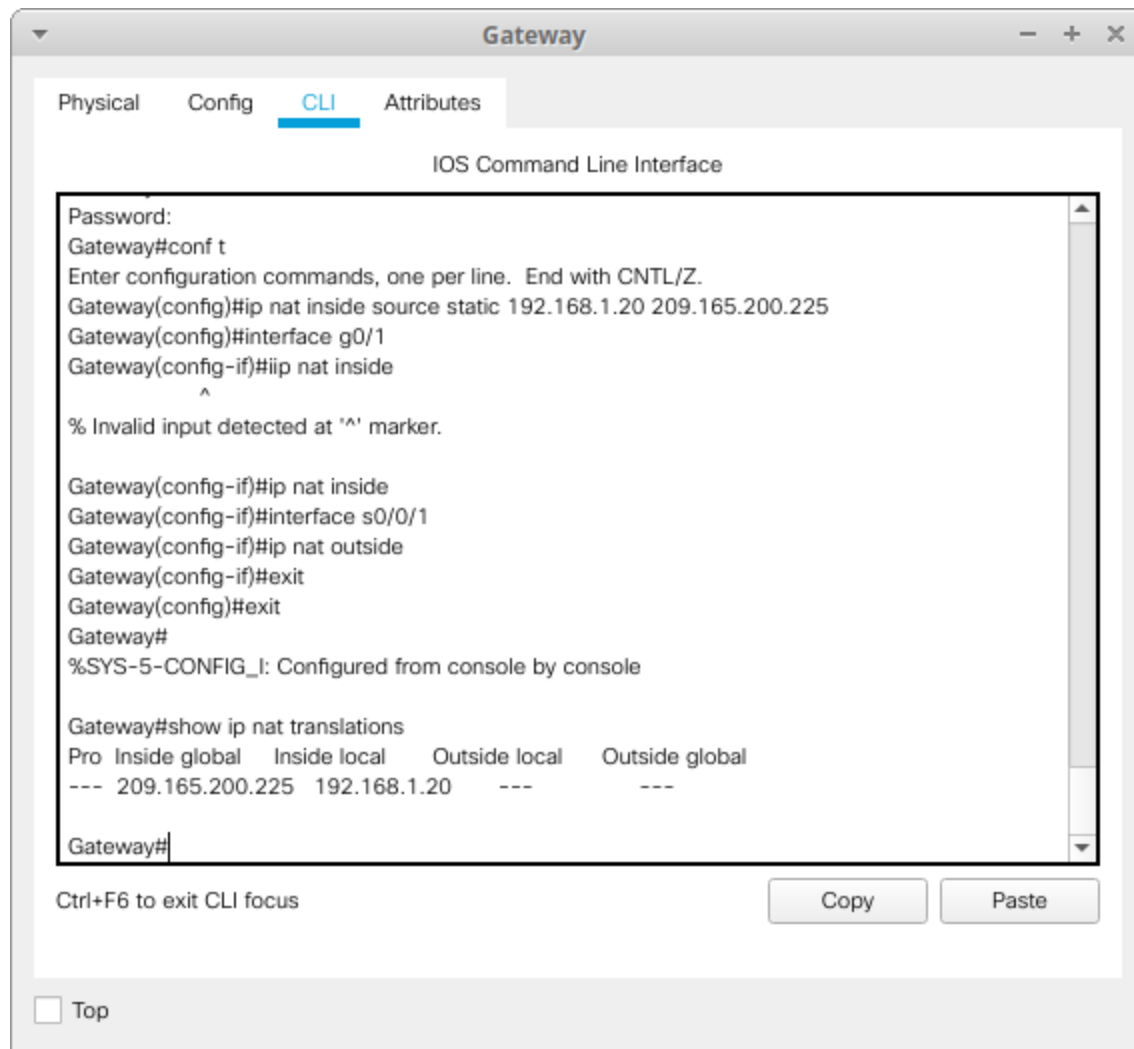


Step 2: Specify the interfaces.



Step 3: Test the configuration.

a. Display the static NAT table by issuing the show ip nat translations command.



What is the translation of the Inside local host address?

192.168.1.20= **209.165.200.225**

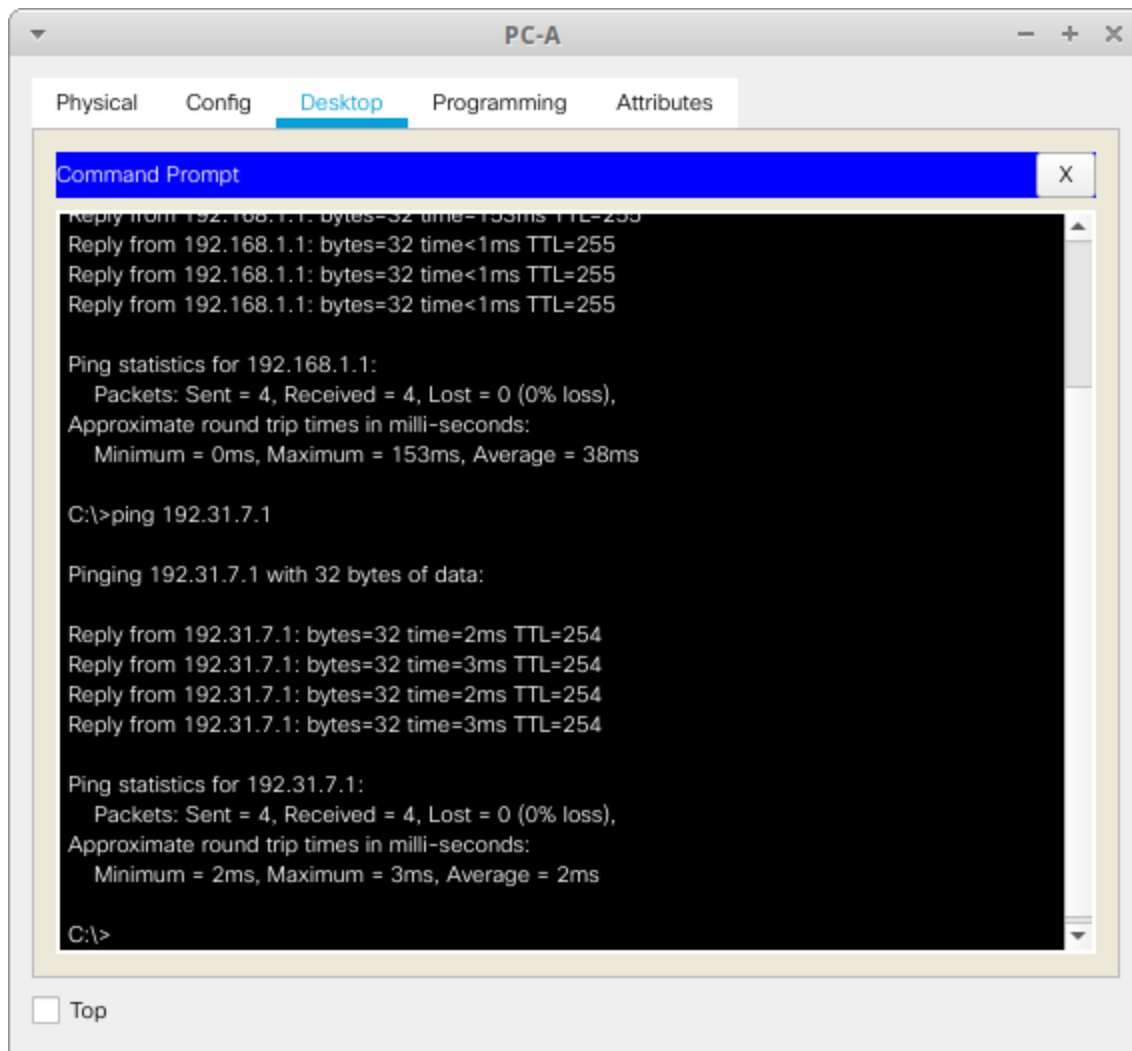
The Inside global address is assigned by?

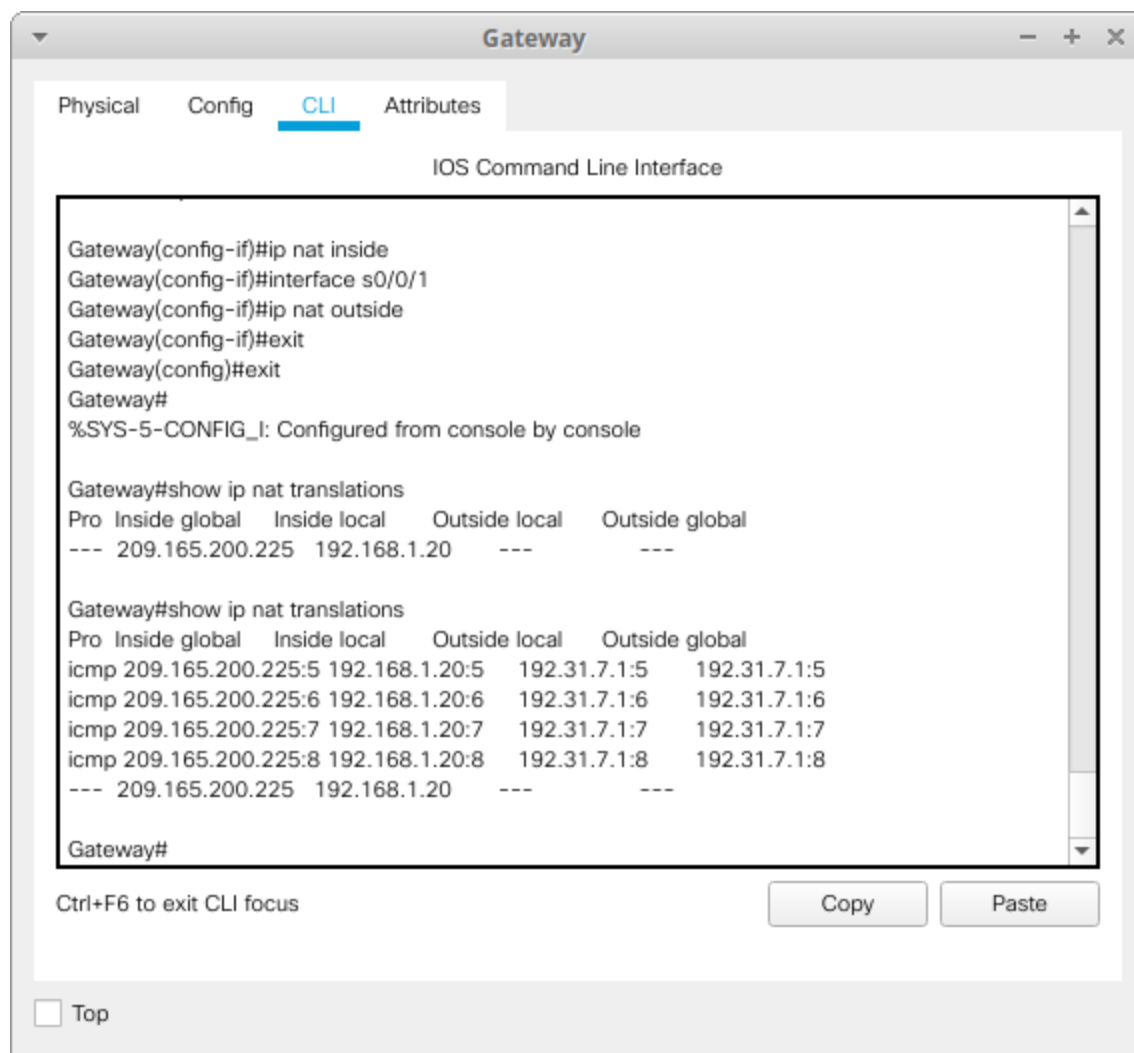
Static: ISP

Dynamic: NAT pool

The Inside local address is assigned by? **Administrator**

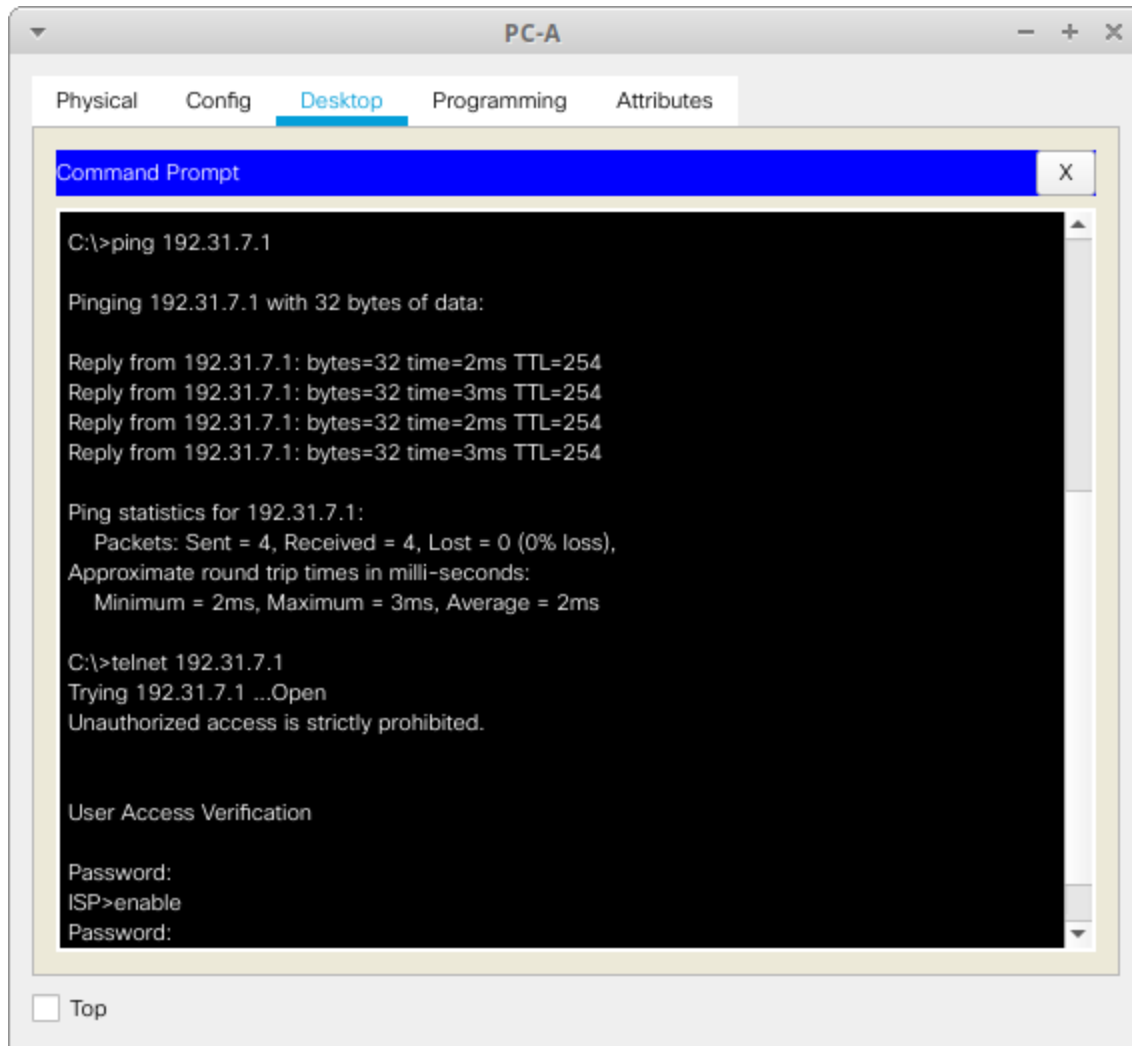
b. From PC-A, ping the Lo0 interface (192.31.7.1) on ISP. If The ping is unsuccessful, troubleshoot and correct the issues. On the Gateway router, display the NAT table

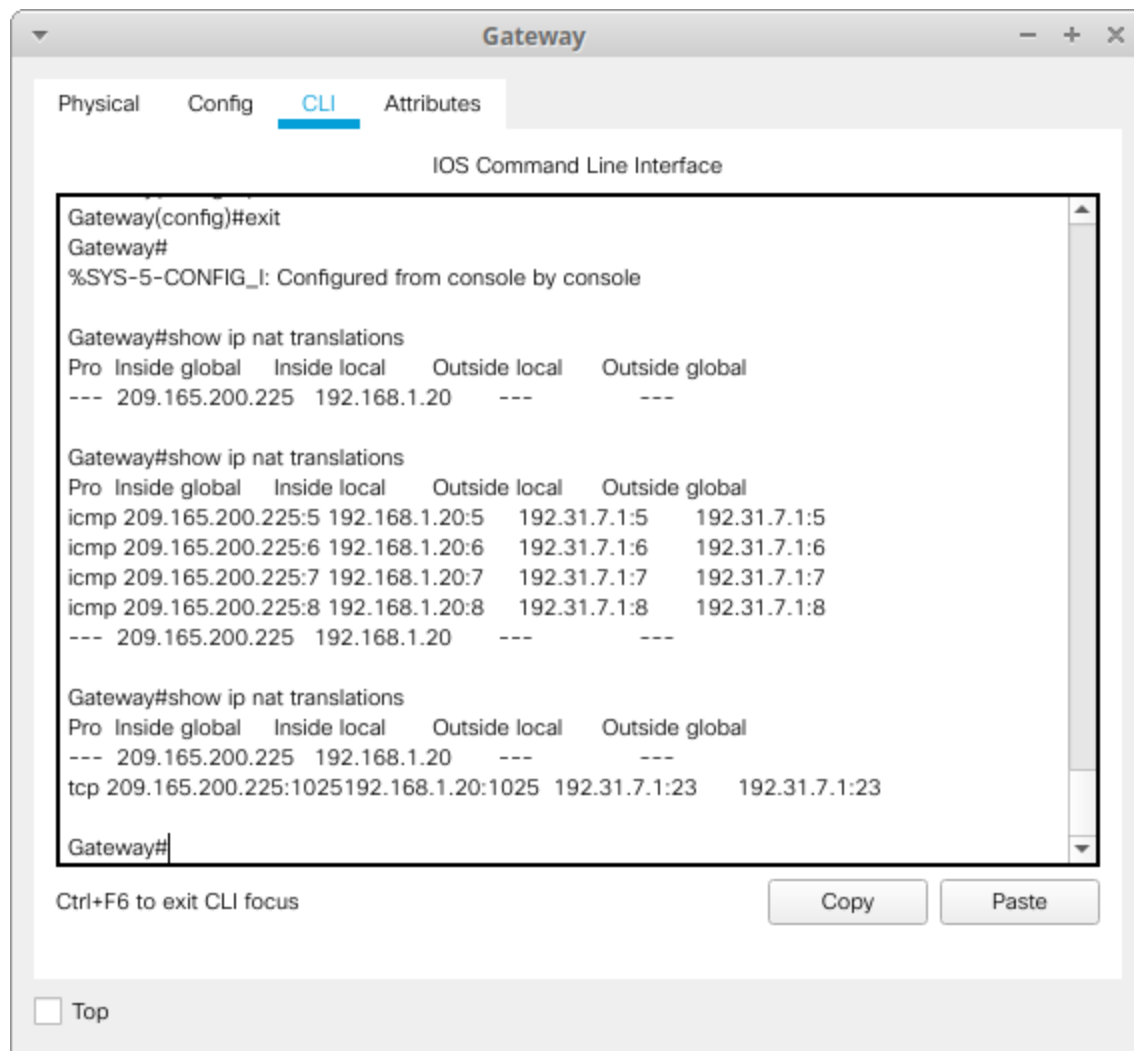




What port number was used in this ICMP exchange? 5,6,7,8

c. From PC-A, telnet to the ISP Lo0 interface and display the NAT table





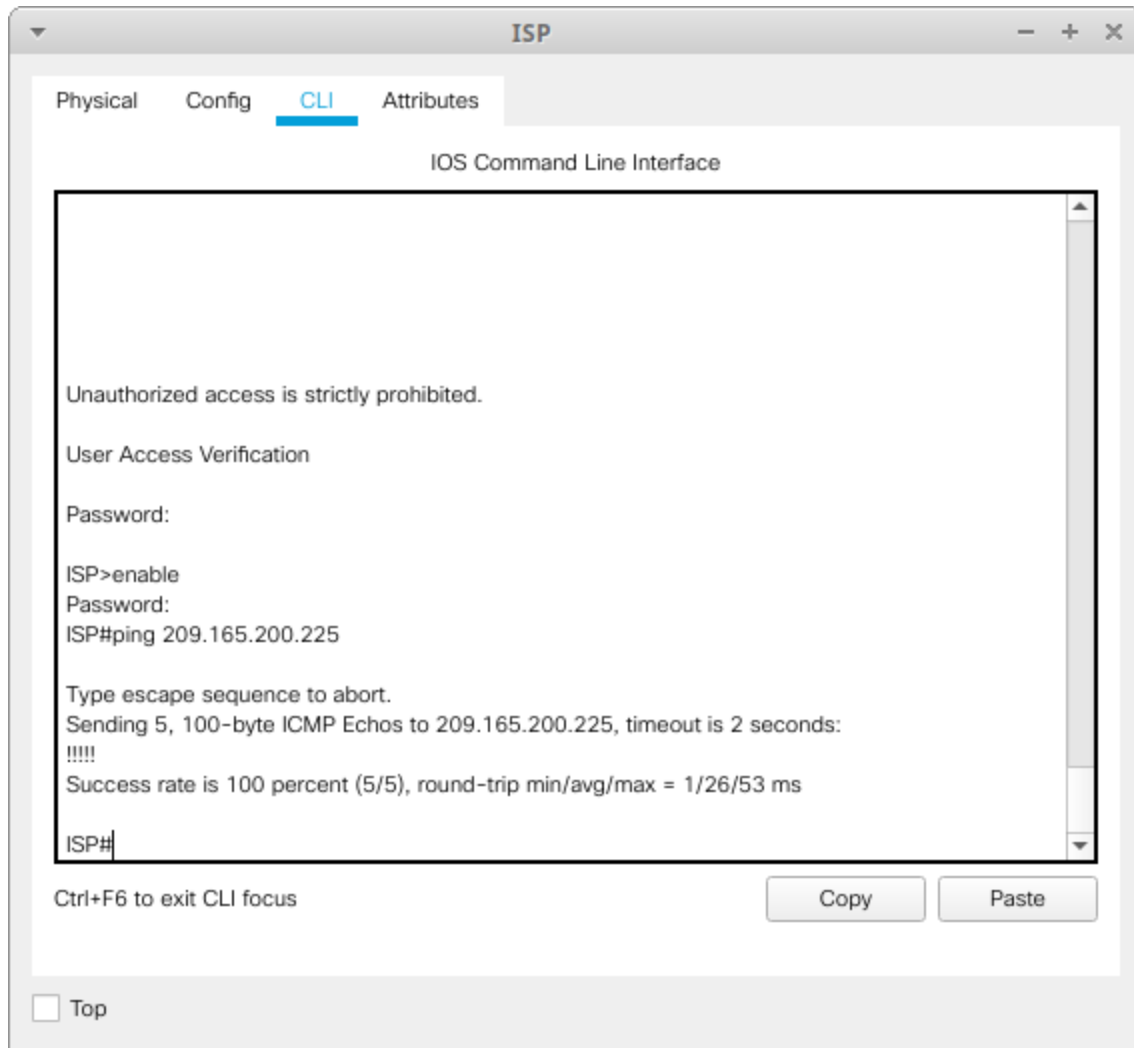
What was the protocol used in this translation? **TCP**

What are the port numbers used?

Inside global / local: **1025**

Outside global / local: **23**

d. Because static NAT was configured for PC-A, verify that pinging from ISP to PC-A at the static NAT public address (209.165.200.225) is successful



e. On the Gateway router, display the NAT table to verify the translation

The screenshot shows the Gateway router's CLI interface with the 'CLI' tab selected. The interface displays the output of the 'show ip nat translations' command, which shows a table of NAT translations. The table has five columns: 'Pro', 'Inside global', 'Inside local', 'Outside local', and 'Outside global'. The output shows four ICMP translations and one TCP translation. The ICMP translations are for ports 5, 6, 7, and 8, and the TCP translation is for port 1025. The translations are from the inside global address 209.165.200.225 to the inside local address 192.168.1.20, and from the outside local address 192.31.7.1 to the outside global address 192.31.7.1. The output also shows the command 'Gateway#show ip nat translations' and the prompt 'Gateway#'. Below the output, there is a 'Ctrl+F6 to exit CLI focus' message and 'Copy' and 'Paste' buttons. At the bottom left, there is a 'Top' link.

```
Gateway#show ip nat translations
Pro Inside global Inside local Outside local Outside global
--- 209.165.200.225 192.168.1.20 --- ---
tcp 209.165.200.225:1025 192.168.1.20:1025 192.31.7.1:23 192.31.7.1:23

Gateway#show ip nat translations
Pro Inside global Inside local Outside local Outside global
icmp 209.165.200.225:1 192.168.1.20:1 209.165.201.17:1 209.165.201.17:1
icmp 209.165.200.225:2 192.168.1.20:2 209.165.201.17:2 209.165.201.17:2
icmp 209.165.200.225:3 192.168.1.20:3 209.165.201.17:3 209.165.201.17:3
icmp 209.165.200.225:4 192.168.1.20:4 209.165.201.17:4 209.165.201.17:4
icmp 209.165.200.225:5 192.168.1.20:5 209.165.201.17:5 209.165.201.17:5
--- 209.165.200.225 192.168.1.20 --- ---
tcp 209.165.200.225:1025 192.168.1.20:1025 192.31.7.1:23 192.31.7.1:23

Gateway#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

f. Verify NAT statistics by using the show ip nat statistics command on the Gateway Router.

The screenshot shows a window titled "Gateway" with tabs for Physical, Config, CLI (selected), and Attributes. The CLI tab displays the "IOS Command Line Interface". The output of the command "show ip nat translations" is shown, followed by the command "show ip nat statistics".

```
Pro Inside global Inside local Outside local Outside global
--- 209.165.200.225 192.168.1.20 --- ---
tcp 209.165.200.225:1025 192.168.1.20:1025 192.31.7.1:23 192.31.7.1:23

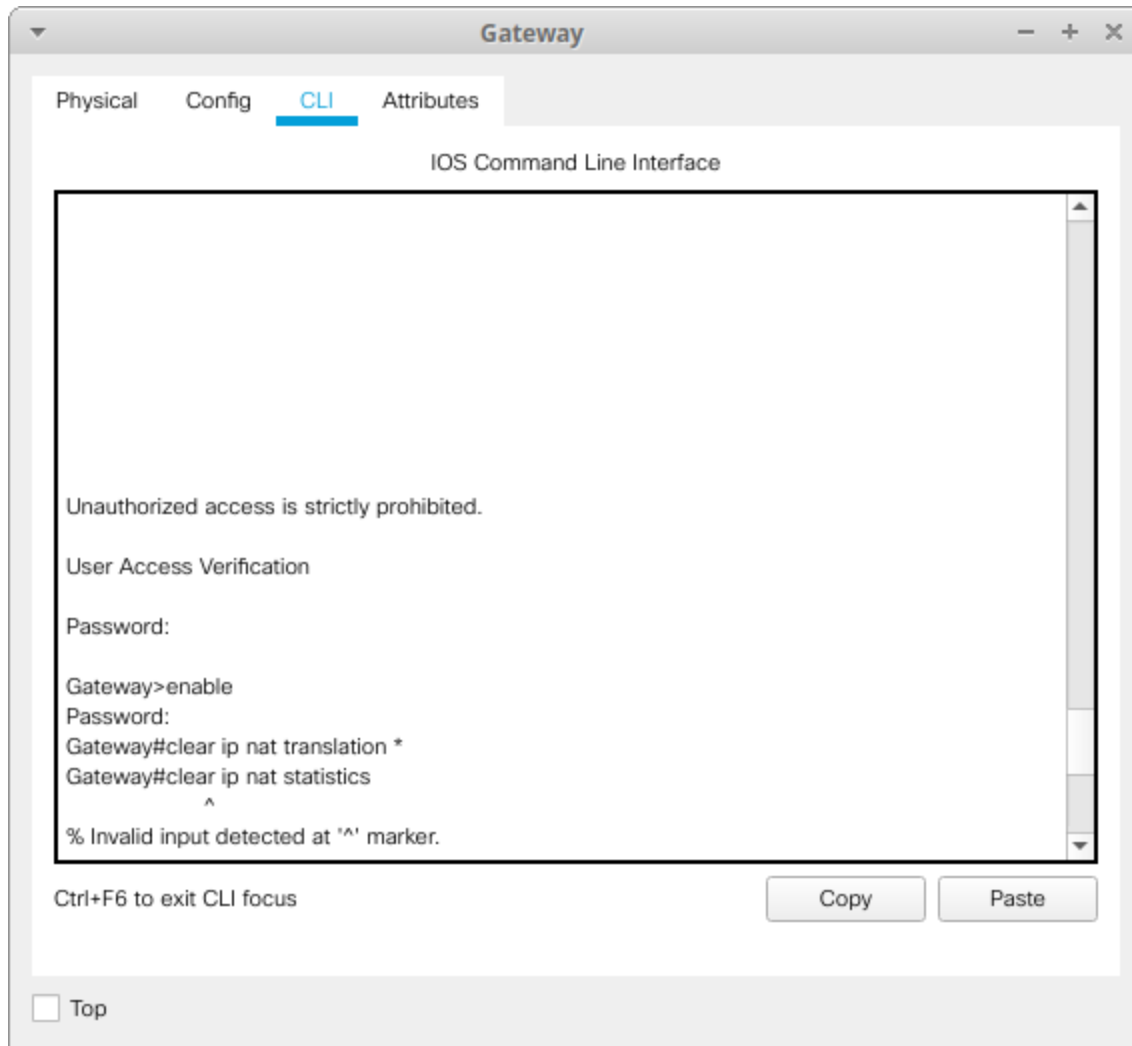
Gateway#show ip nat translations
Pro Inside global Inside local Outside local Outside global
icmp 209.165.200.225:1 192.168.1.20:1 209.165.201.17:1 209.165.201.17:1
icmp 209.165.200.225:2 192.168.1.20:2 209.165.201.17:2 209.165.201.17:2
icmp 209.165.200.225:3 192.168.1.20:3 209.165.201.17:3 209.165.201.17:3
icmp 209.165.200.225:4 192.168.1.20:4 209.165.201.17:4 209.165.201.17:4
icmp 209.165.200.225:5 192.168.1.20:5 209.165.201.17:5 209.165.201.17:5
--- 209.165.200.225 192.168.1.20 --- ---
tcp 209.165.200.225:1025 192.168.1.20:1025 192.31.7.1:23 192.31.7.1:23

Gateway#show ip nat statistics
Total translations: 2 (1 static, 1 dynamic, 1 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/1
Hits: 157 Misses: 10
Expired translations: 9
Dynamic mappings:
Gateway#
```

Below the CLI output, there is a "Ctrl+F6 to exit CLI focus" message and two buttons: "Copy" and "Paste". At the bottom left, there is a checkbox labeled "Top".

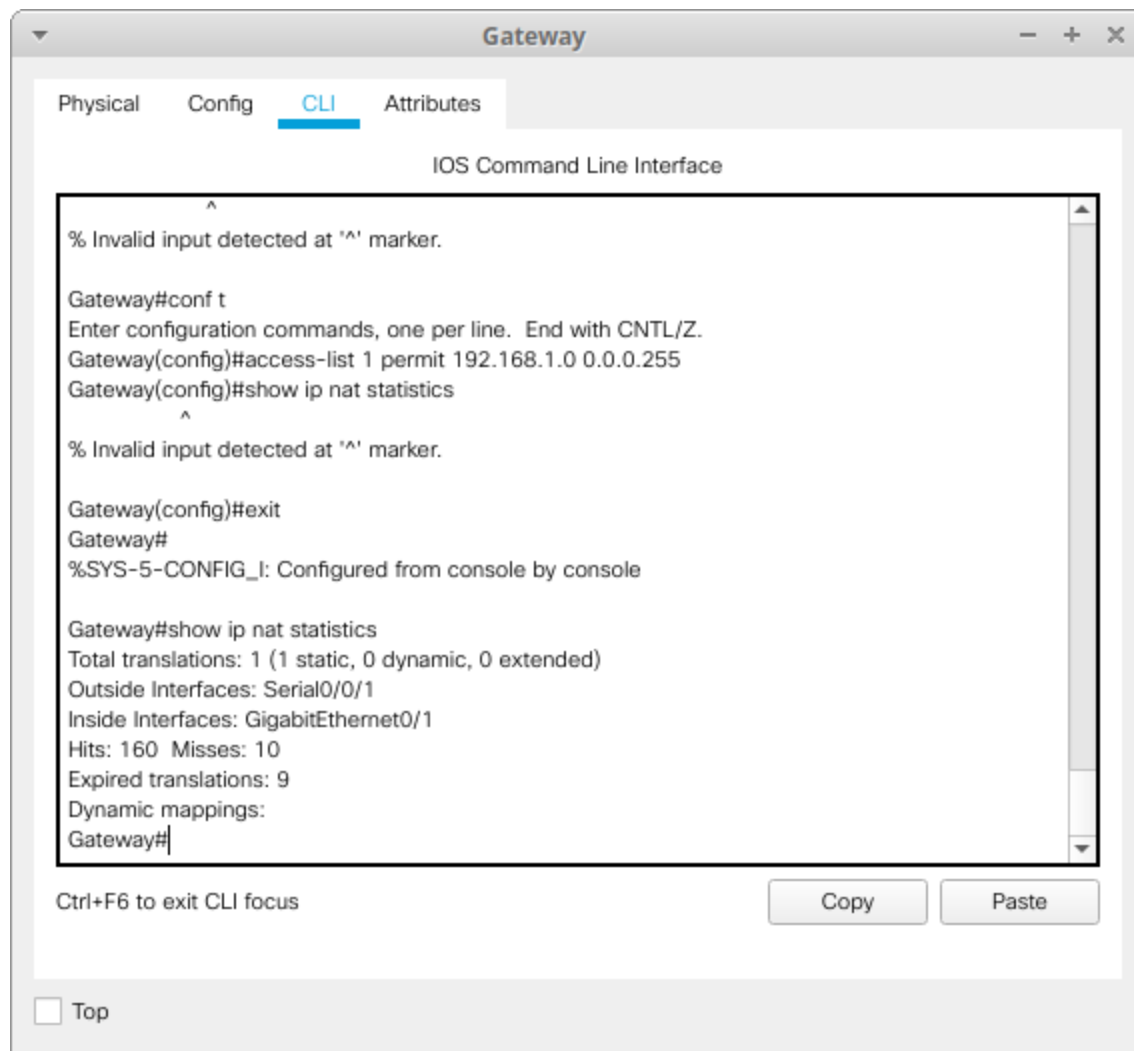
Part 3: Configure and Verify Dynamic NAT

Step 1: Clear NATs.

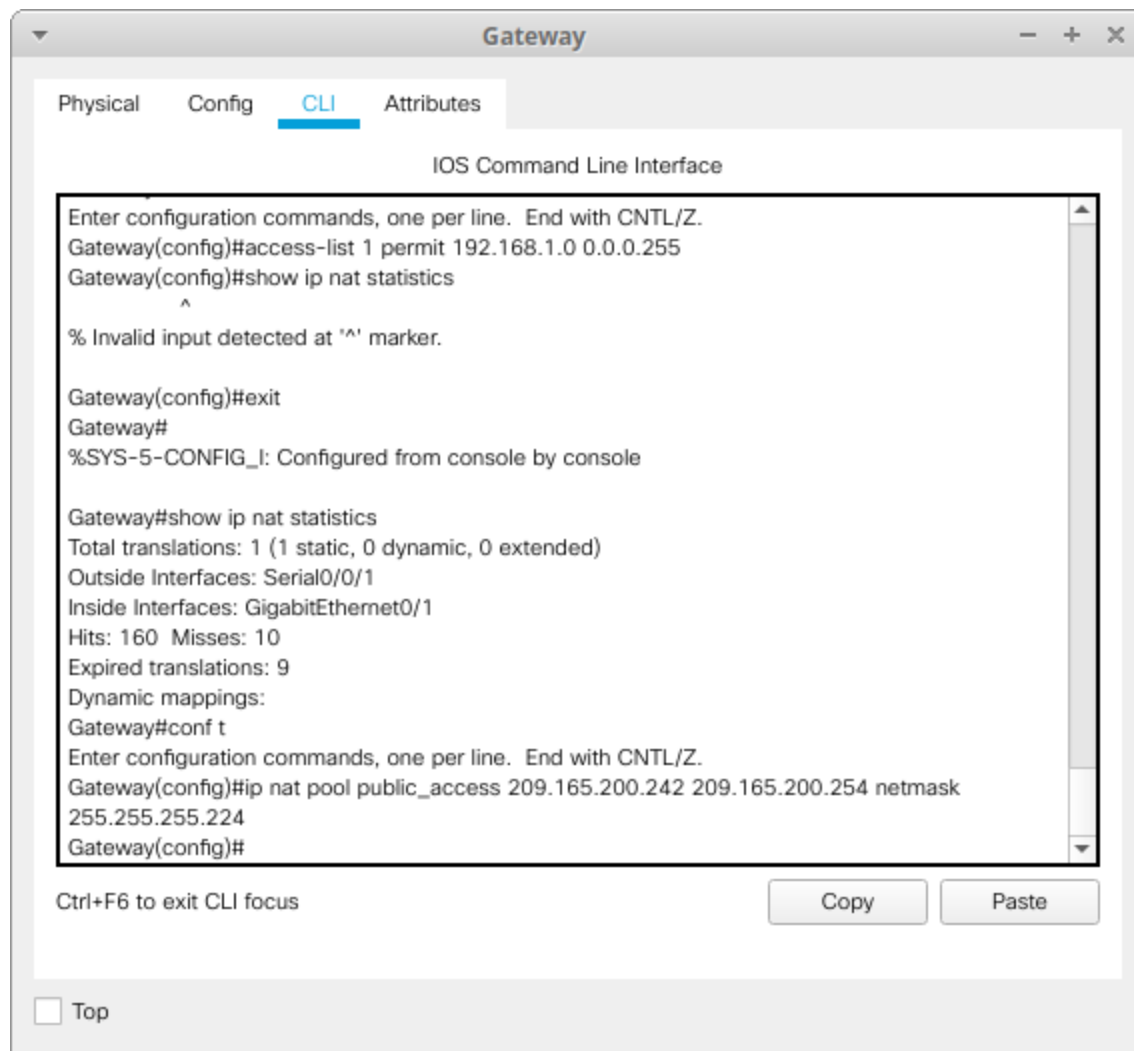


Step 2: Define an access control list (ACL) that matches the LAN private IP address range.

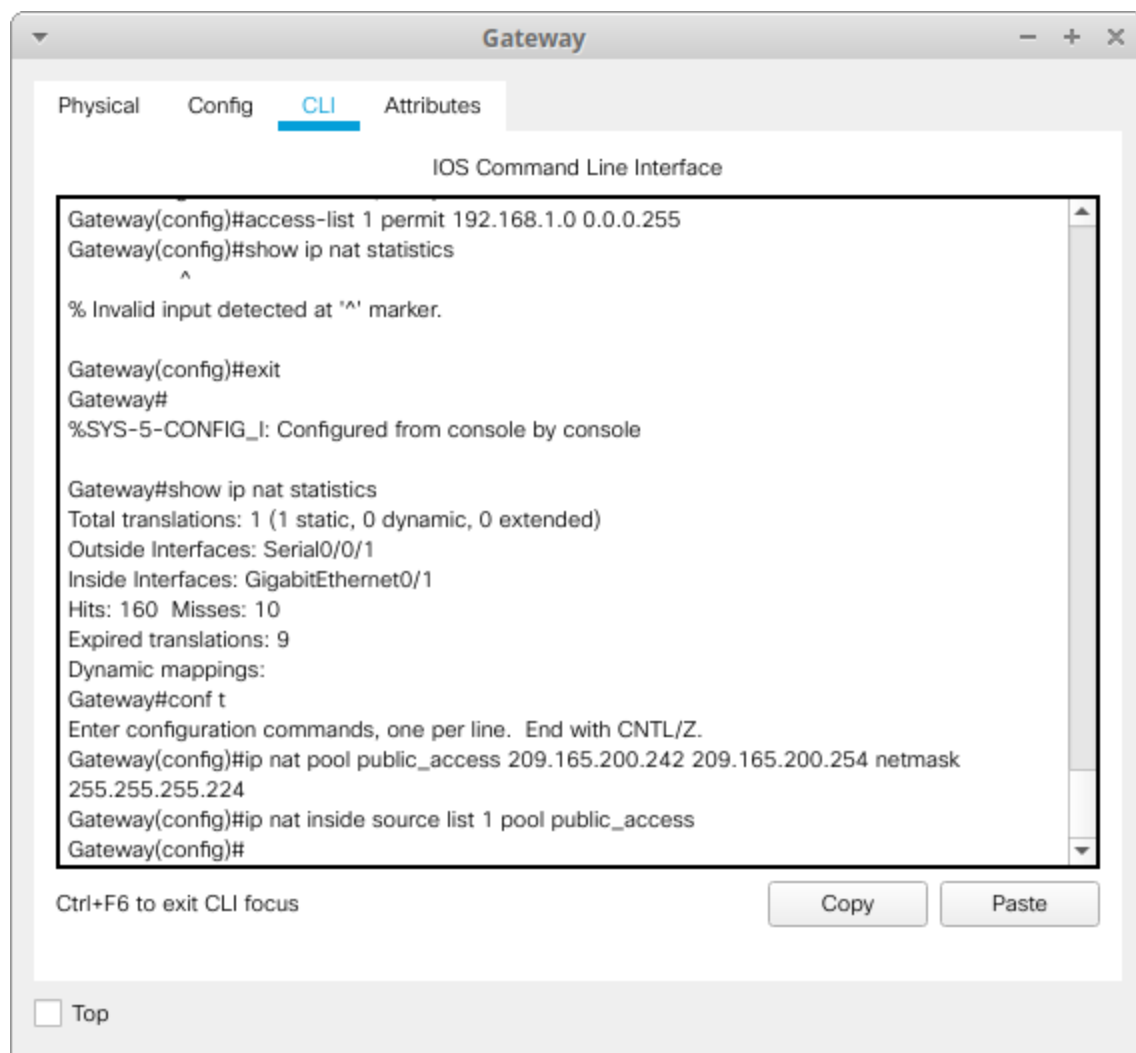
Step 3: Verify that the NAT interface configurations are still valid.



Step 4: Define the pool of usable public IP addresses.

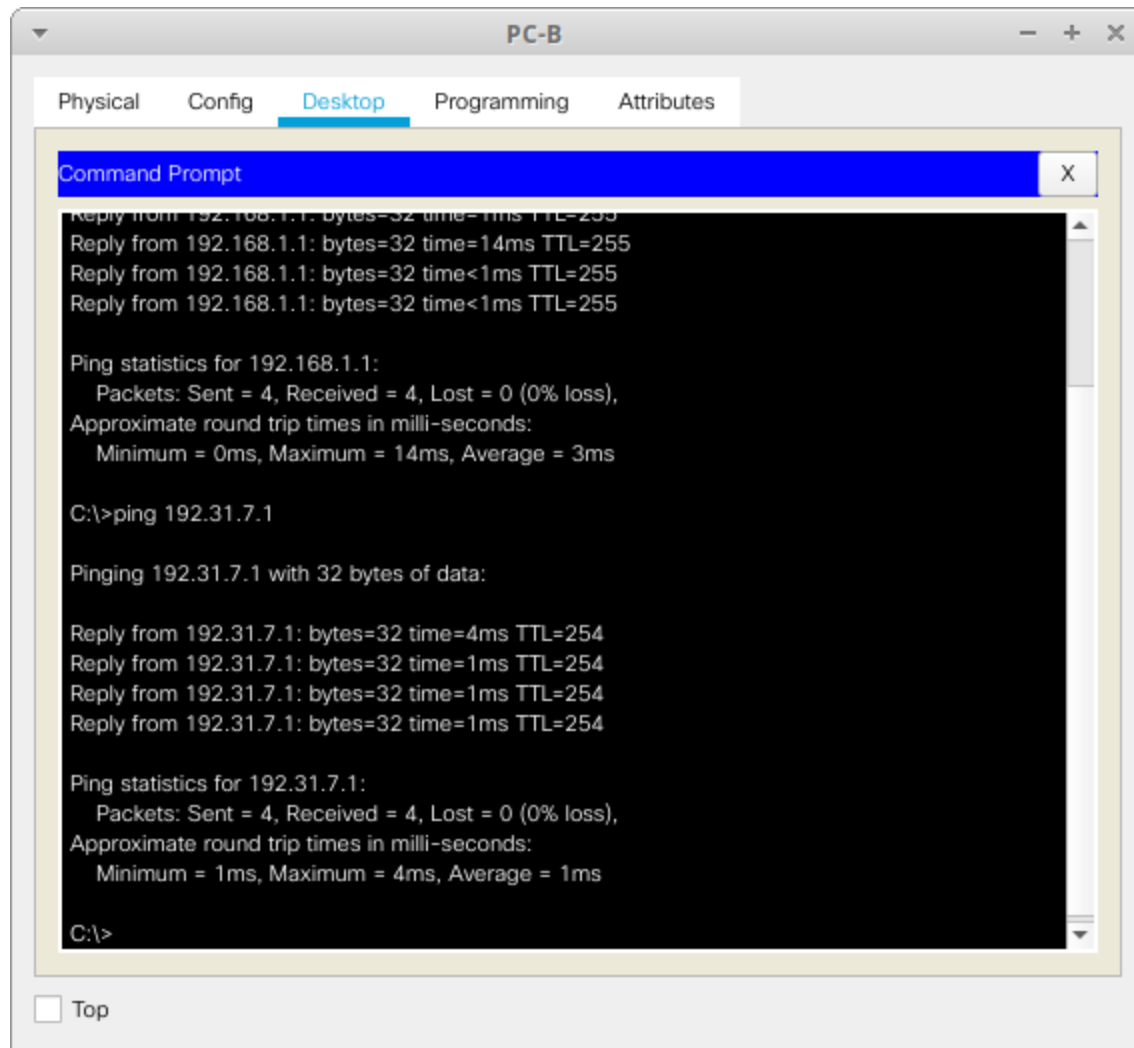


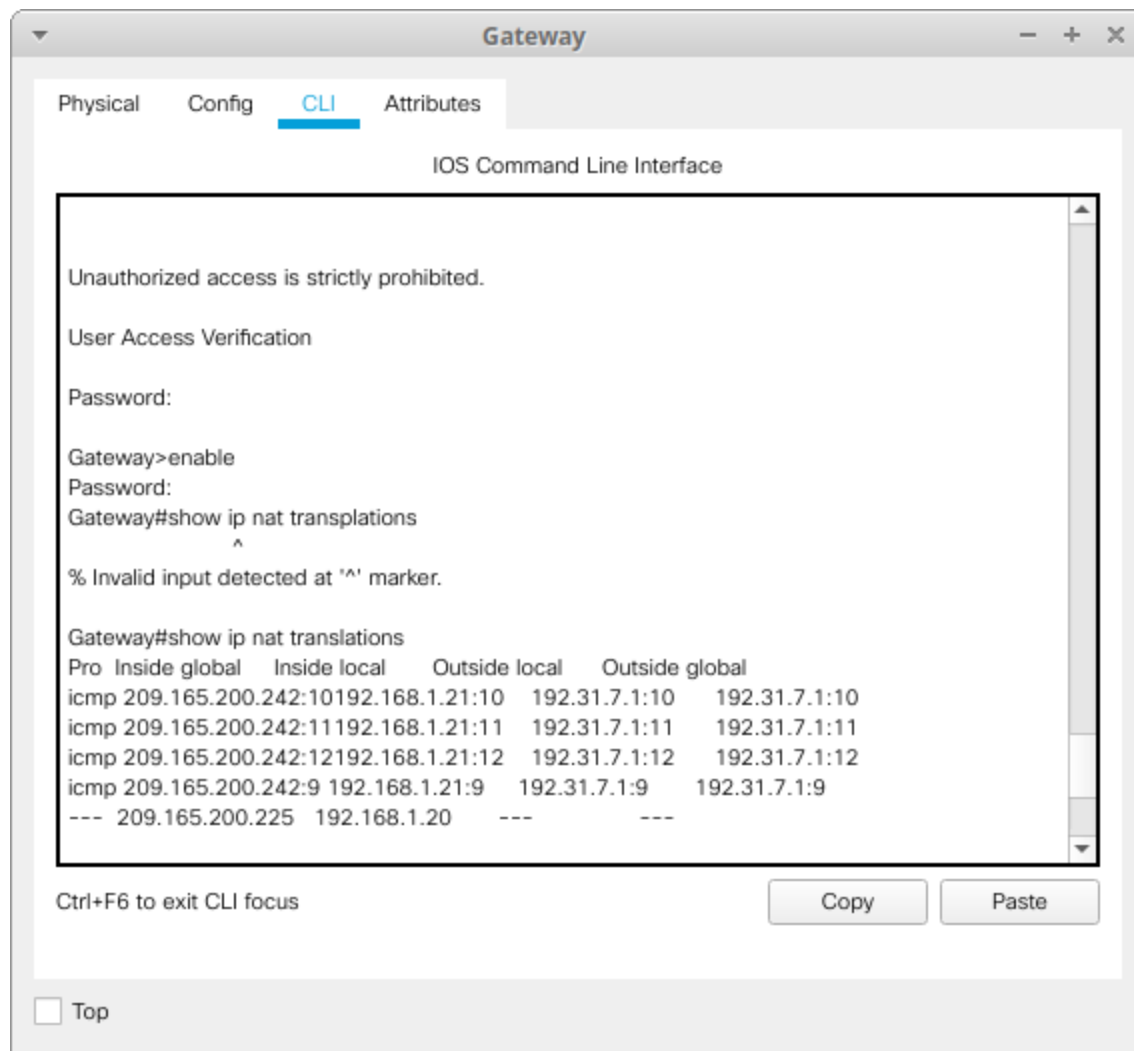
Step 5: Define the NAT from the inside source list to the outside pool.



Step 6: Test the configuration.

a. From PC-B, ping the Lo0 interface (192.31.7.1) on ISP. If the ping was unsuccessful, troubleshoot and correct the issues. On the Gateway router, display the NAT table.





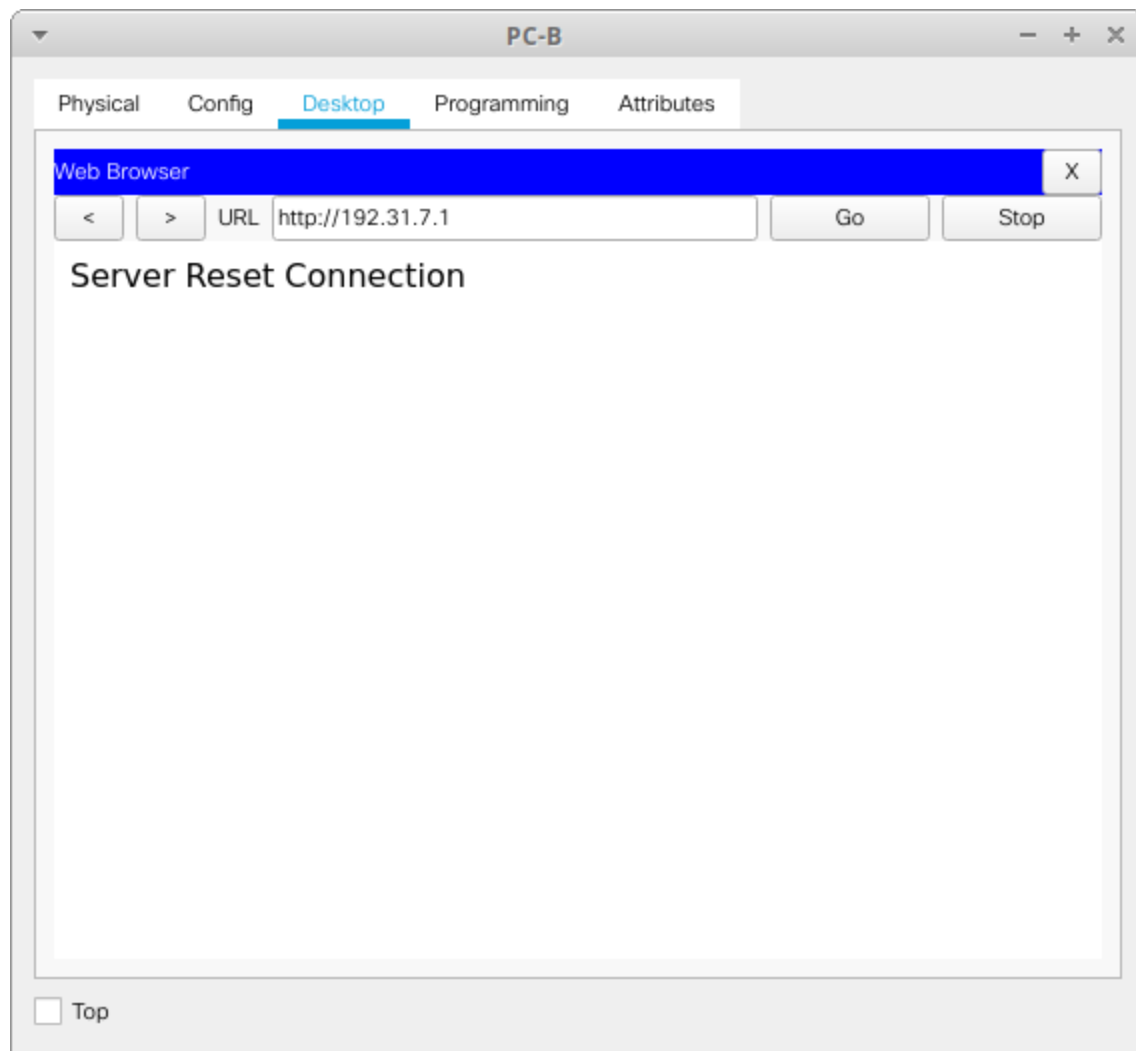
What is the translation of the Inside local host address for PC-B?

192.168.1.21 = 209.165.200.242

What port number was used in this ICMP exchange?

5,6,7,8

b. Cannot implement



c. Cannot implement

d. Verify NAT statistics by using the show ip nat statistics command on the Gateway router.

The screenshot shows the Gateway router's CLI interface. The 'CLI' tab is selected, and the 'IOS Command Line Interface' is active. The user has entered the command 'show ip nat translations', which displays a table of NAT translations. Below this, the user has entered 'show ip nat statistics', which displays detailed NAT statistics, including the number of translations, interfaces, hits, misses, and expired translations. The interface also includes a 'Copy' button and a 'Paste' button.

Gateway

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Gateway#show ip nat translations
Pro Inside global   Inside local   Outside local  Outside global
icmp 209.165.200.242:10 192.168.1.21:10 192.31.7.1:10 192.31.7.1:10
icmp 209.165.200.242:11 192.168.1.21:11 192.31.7.1:11 192.31.7.1:11
icmp 209.165.200.242:12 192.168.1.21:12 192.31.7.1:12 192.31.7.1:12
icmp 209.165.200.242:9 192.168.1.21:9 192.31.7.1:9 192.31.7.1:9
--- 209.165.200.225 192.168.1.20 --- ---

Gateway#show ip nat statistics
Total translations: 5 (1 static, 4 dynamic, 4 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/1
Hits: 173 Misses: 23
Expired translations: 18
Dynamic mappings:
-- Inside Source
access-list 1 pool public_access refCount 4
pool public_access: netmask 255.255.255.224
start 209.165.200.242 end 209.165.200.254
type generic, total addresses 13 , allocated 1 (7%), misses 0
Gateway#
```

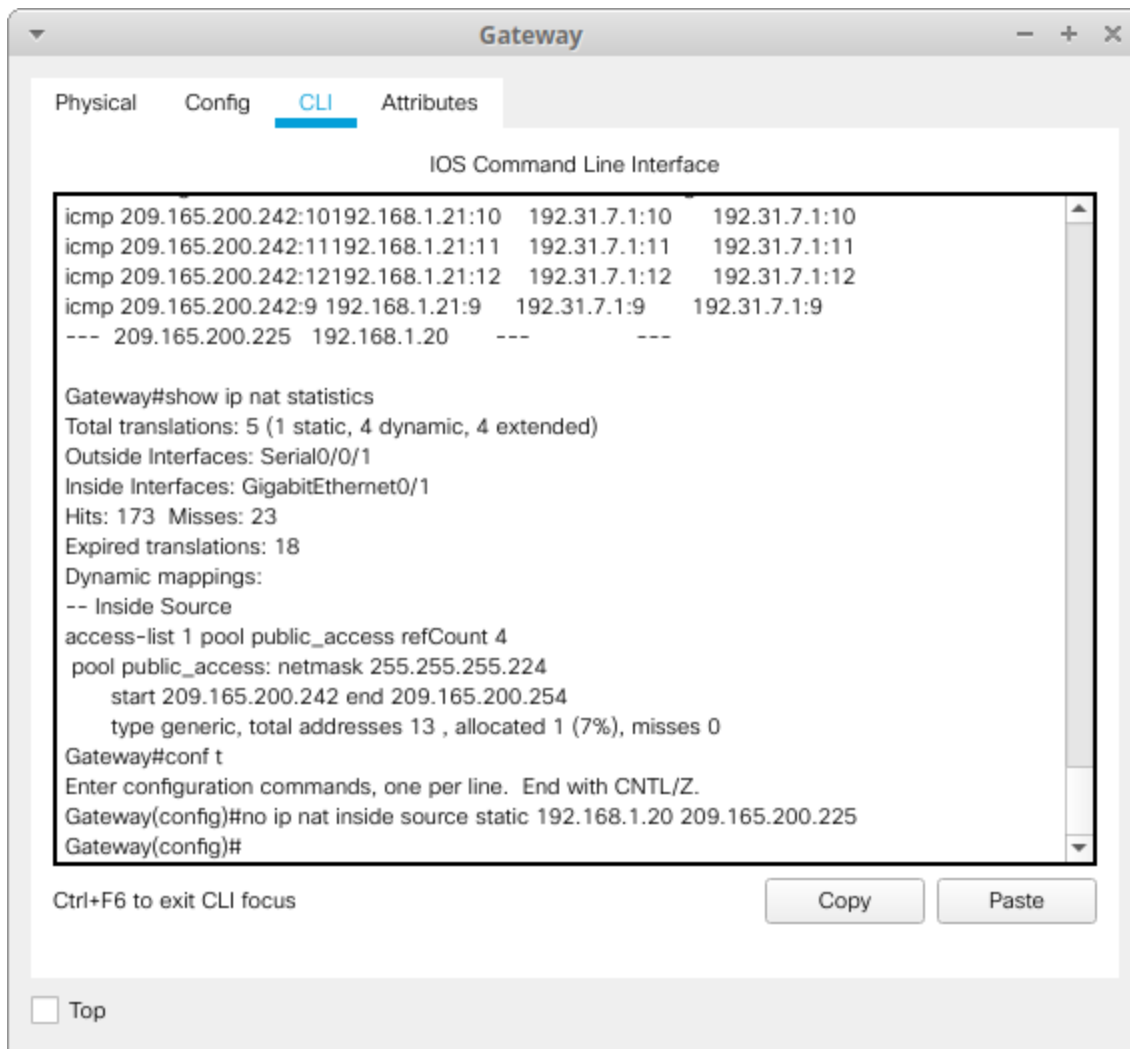
Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

Step 7: Remove the static NAT entry.

- a. Remove the static NAT from Part 2.



The screenshot shows a window titled "Gateway" with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the "IOS Command Line Interface". The interface shows a list of NAT translations for ICMP traffic, followed by the output of the "show ip nat statistics" command. The statistics indicate 5 total translations (1 static, 4 dynamic, 4 extended), with 173 hits and 23 misses. The configuration section shows the removal of a static NAT entry for 192.168.1.20.

```
icmp 209.165.200.242:10 192.168.1.21:10 192.31.7.1:10 192.31.7.1:10
icmp 209.165.200.242:11 192.168.1.21:11 192.31.7.1:11 192.31.7.1:11
icmp 209.165.200.242:12 192.168.1.21:12 192.31.7.1:12 192.31.7.1:12
icmp 209.165.200.242:9 192.168.1.21:9 192.31.7.1:9 192.31.7.1:9
--- 209.165.200.225 192.168.1.20 --- ---

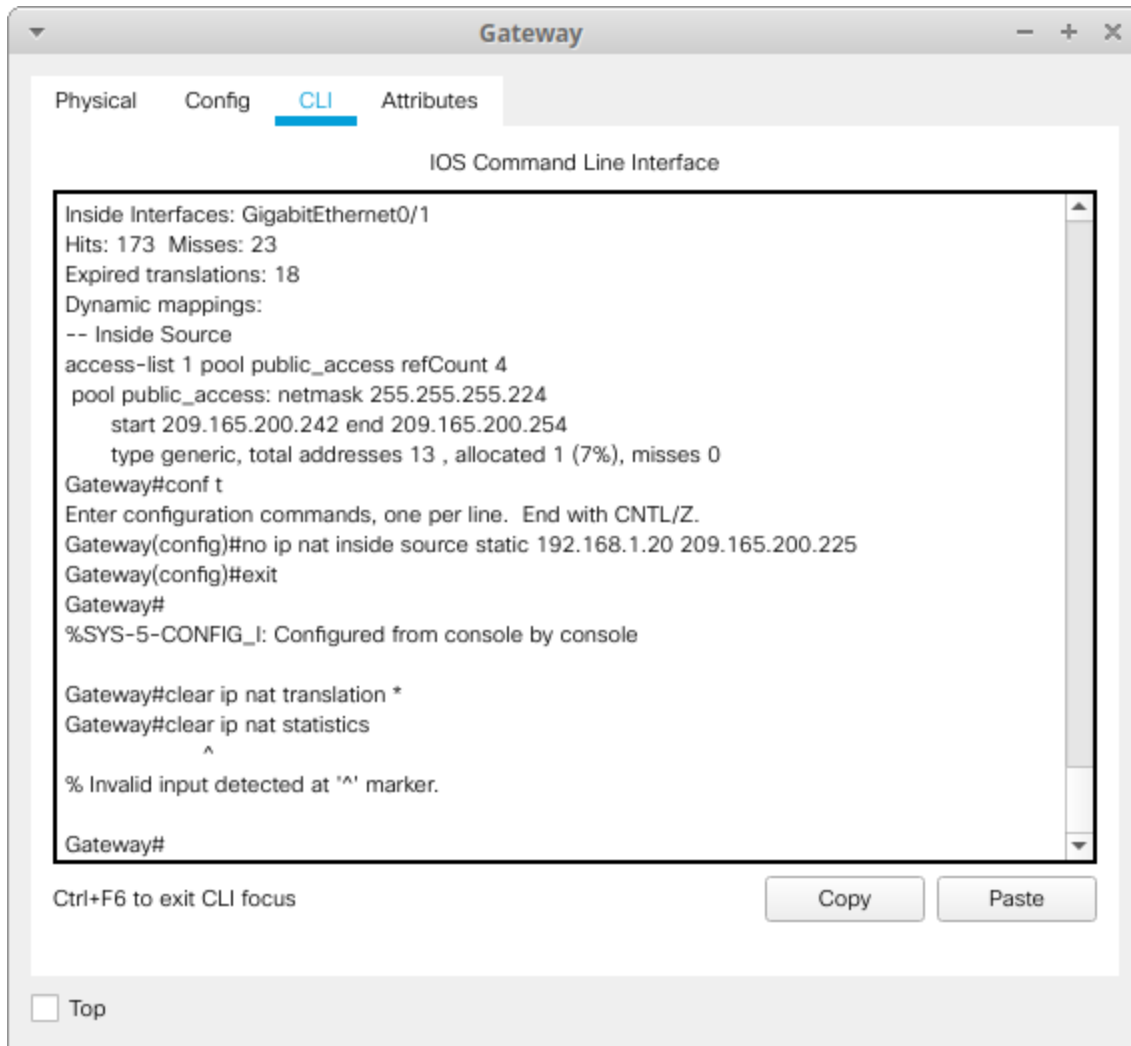
Gateway#show ip nat statistics
Total translations: 5 (1 static, 4 dynamic, 4 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/1
Hits: 173 Misses: 23
Expired translations: 18
Dynamic mappings:
-- Inside Source
access-list 1 pool public_access refCount 4
pool public_access: netmask 255.255.255.224
start 209.165.200.242 end 209.165.200.254
type generic, total addresses 13 , allocated 1 (7%), misses 0
Gateway#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Gateway(config)#no ip nat inside source static 192.168.1.20 209.165.200.225
Gateway(config)#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

b. Clear the NATs and statistics



The screenshot shows a window titled "Gateway" with four tabs: "Physical", "Config", "CLI" (selected), and "Attributes". The "CLI" tab displays the "IOS Command Line Interface". The interface shows the following text:

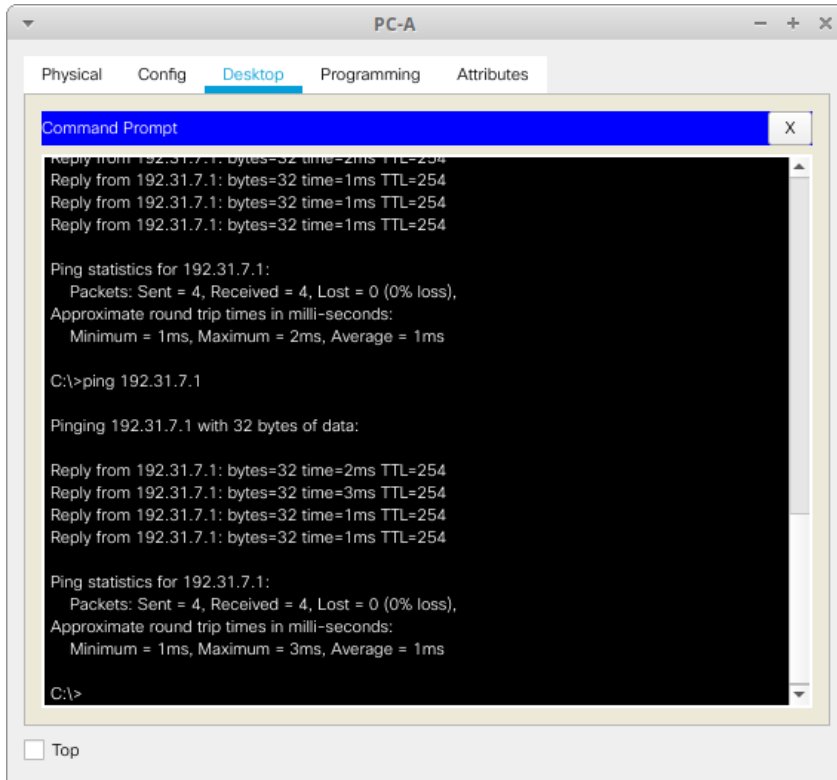
```
Inside Interfaces: GigabitEthernet0/1
Hits: 173 Misses: 23
Expired translations: 18
Dynamic mappings:
-- Inside Source
access-list 1 pool public_access refCount 4
pool public_access: netmask 255.255.255.224
start 209.165.200.242 end 209.165.200.254
type generic, total addresses 13 , allocated 1 (7%), misses 0
Gateway#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Gateway(config)#no ip nat inside source static 192.168.1.20 209.165.200.225
Gateway(config)#exit
Gateway#
%SYS-5-CONFIG_I: Configured from console by console

Gateway#clear ip nat translation *
Gateway#clear ip nat statistics
^
% Invalid input detected at '^' marker.

Gateway#
```

Below the CLI window, there is a text label "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste". At the bottom left, there is a checkbox labeled "Top" which is currently unchecked.

c. Ping the ISP (192.31.7.1) from both hosts.



PC-A

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Reply from 192.31.7.1: bytes=32 time=2ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.31.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>ping 192.31.7.1

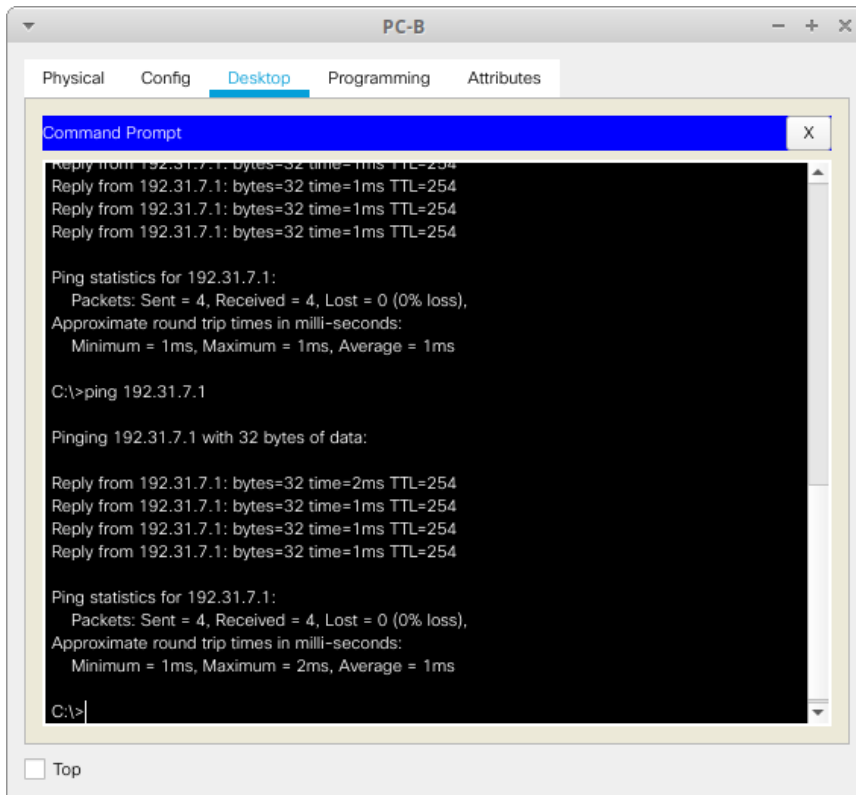
Pinging 192.31.7.1 with 32 bytes of data:

Reply from 192.31.7.1: bytes=32 time=2ms TTL=254
Reply from 192.31.7.1: bytes=32 time=3ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.31.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 1ms

C:\>
```

☐ Top



PC-B

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.31.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 192.31.7.1

Pinging 192.31.7.1 with 32 bytes of data:

Reply from 192.31.7.1: bytes=32 time=2ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254
Reply from 192.31.7.1: bytes=32 time=1ms TTL=254

Ping statistics for 192.31.7.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>
```

☐ Top

d. Display the NAT table and statistics.

Gateway

PhysicalConfigCLIAttributes

IOS Command Line Interface

```
type generic, total addresses 13 , allocated 0 (0%), misses 0
Gateway#show ip nat translations
Pro Inside global   Inside local   Outside local  Outside global
icmp 209.165.200.243:17 192.168.1.20:17 192.31.7.1:17 192.31.7.1:17
icmp 209.165.200.243:18 192.168.1.20:18 192.31.7.1:18 192.31.7.1:18
icmp 209.165.200.243:19 192.168.1.20:19 192.31.7.1:19 192.31.7.1:19
icmp 209.165.200.243:20 192.168.1.20:20 192.31.7.1:20 192.31.7.1:20
icmp 209.165.200.244:17 192.168.1.21:17 192.31.7.1:17 192.31.7.1:17
icmp 209.165.200.244:18 192.168.1.21:18 192.31.7.1:18 192.31.7.1:18
icmp 209.165.200.244:19 192.168.1.21:19 192.31.7.1:19 192.31.7.1:19
icmp 209.165.200.244:20 192.168.1.21:20 192.31.7.1:20 192.31.7.1:20

Gateway#show ip nat statistics
Total translations: 8 (0 static, 8 dynamic, 8 extended)
Outside Interfaces: Serial0/0/1
Inside Interfaces: GigabitEthernet0/1
Hits: 189 Misses: 39
Expired translations: 30
Dynamic mappings:
-- Inside Source
access-list 1 pool public_access refCount 8
pool public_access: netmask 255.255.255.224
start 209.165.200.242 end 209.165.200.254
type generic, total addresses 13 , allocated 2 (15%), misses 0
Gateway#
```

Ctrl+F6 to exit CLI focus

CopyPaste

☐ Top