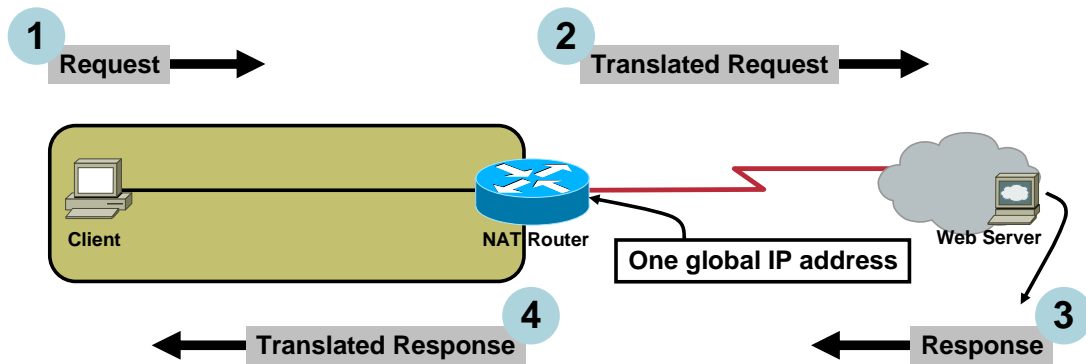# Lab 4.2.4 Determining PAT Translations

1	Client on a private network sends a request to a web server on the public Internet.
2	NAT router translates source address and forwards the request to the web server
3	The web server responds to the client's translated address
4	The NAT router translates the client address (destination) back to the original private address

Objectives

- Explain the active network connections open on a computer when viewing a particular web page.
- Determine what an internal IP address and port number are translated to using port address translation (PAT).
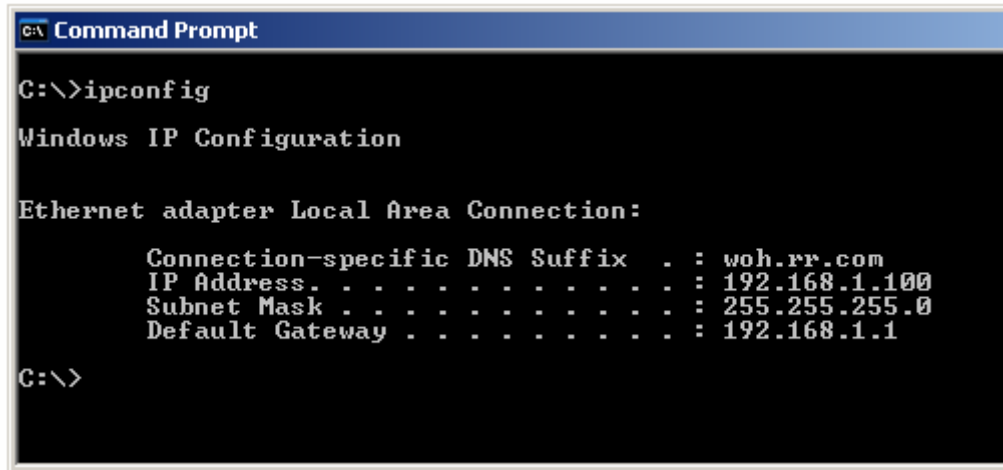
Background / Preparation

Port address translation (PAT) is a form of network address translation (NAT). With PAT, the router translates multiple internal (usually private) addresses to a single public IP address on an interface that is connected to the Internet. Port numbers are used, in combination with IP addresses, to keep track of individual connections. In this lab, you use the **ipconfig** and **netstat** commands to view open ports on a computer. You will be able to see the initial IP address and port combination, and determine the translated IP address and port combination.

The following resources are required:

- Computer running Windows XP Professional
- Connection to a gateway router or an ISR using PAT
- Internet connection
- Access to the PC command prompt.

Step 1: Determine the IP address of the computer

a. Open a **Command Prompt** window by clicking **Start > Run** and typing **cmd**. Alternatively, you may click **Start > All programs > Accessories > Command Prompt**. At the prompt, type the **ipconfig** command to display the IP address of the computer.

```
C:\>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . : woh.rr.com
        IP Address. . . . . . . . . . . . : 192.168.1.100
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.1.1

C:\>
```

b. What is the IP address of the computer? _____

c. Is there a port number shown, and why or why not? _____

_____

_____

Step 2: Determine the IP addresses of the gateway router or ISR

Check with your instructor to get the IP addresses for the ISR NAT router gateway.

Internal Ethernet address: _____

External Internet address: _____

Step 3: Display baseline netstat results

a. At the command prompt, type the **netstat –n** command.

b. What type of information does the **netstat –n** command return?
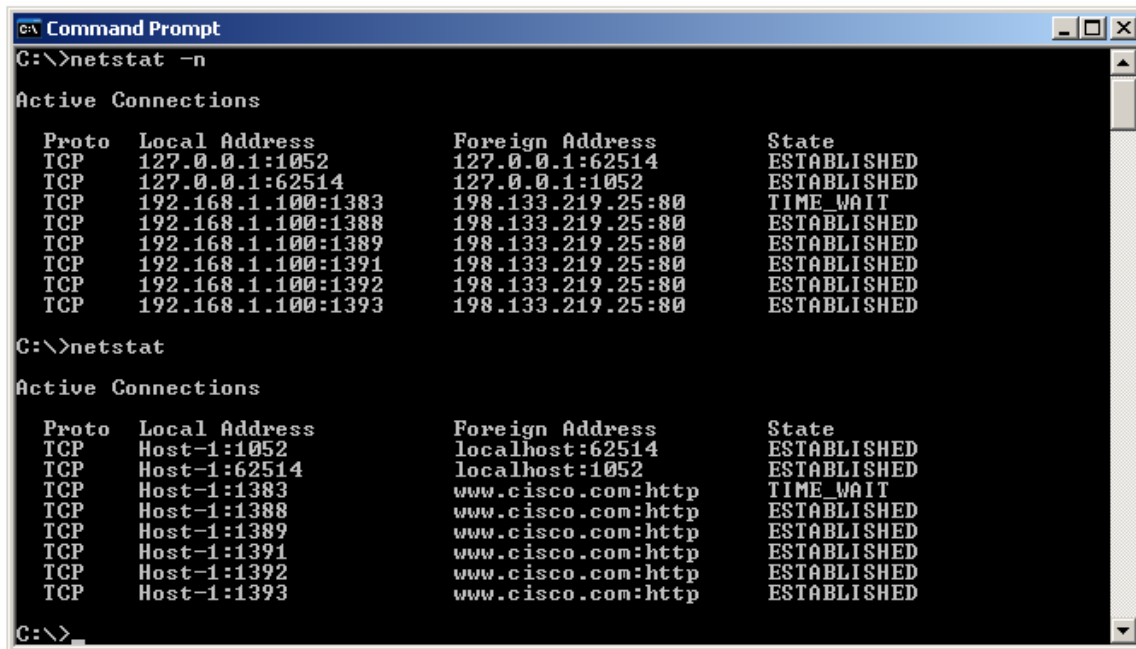
_____

_____

c. Where does the IP address found in Step 1 appear? Is there a port number associated with it? Why or why not? _____

_____

Step 4: Display active network connections

a. Ping **www.cisco.com** and record the address.

_____

b. Open a web browser and enter **www.cisco.com** in the address bar.

c. Go back to the Command Prompt window. Type the **netstat –n** command again, and then type the command without the **–n** option. The output looks similar to the following figure, depending on what other network applications and connections are open when you issued the command.

```
Command Prompt                                                    _ | □ | X
C:\>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:1052         127.0.0.1:62514        ESTABLISHED
  TCP    127.0.0.1:62514        127.0.0.1:1052         ESTABLISHED
  TCP    192.168.1.100:1383     198.133.219.25:80      TIME_WAIT
  TCP    192.168.1.100:1388     198.133.219.25:80      ESTABLISHED
  TCP    192.168.1.100:1389     198.133.219.25:80      ESTABLISHED
  TCP    192.168.1.100:1391     198.133.219.25:80      ESTABLISHED
  TCP    192.168.1.100:1392     198.133.219.25:80      ESTABLISHED
  TCP    192.168.1.100:1393     198.133.219.25:80      ESTABLISHED

C:\>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    Host-1:1052            localhost:62514        ESTABLISHED
  TCP    Host-1:62514           localhost:1052         ESTABLISHED
  TCP    Host-1:1383            www.cisco.com:http     TIME_WAIT
  TCP    Host-1:1388            www.cisco.com:http     ESTABLISHED
  TCP    Host-1:1389            www.cisco.com:http     ESTABLISHED
  TCP    Host-1:1391            www.cisco.com:http     ESTABLISHED
  TCP    Host-1:1392            www.cisco.com:http     ESTABLISHED
  TCP    Host-1:1393            www.cisco.com:http     ESTABLISHED

C:\>
```
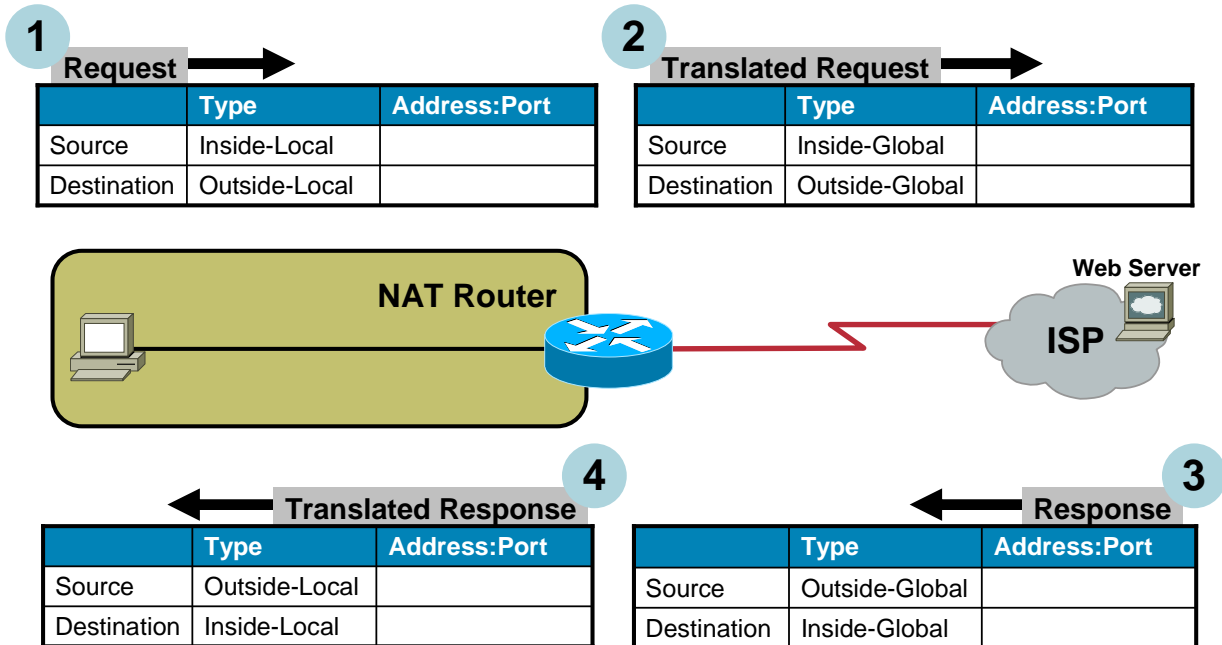
d. What is the difference in the output between the **netstat** and **netstat –n** commands?

    _____

    _____

e. Write down the connection entries for the client IP address and the IP address of the www.cisco.com web server.

    Local client IP address and port number: _____

    Foreign IP Address and port number: _____

f. Are there more **netstat** entries the second time? _____

Step 5: Determine translated addresses

Use the information recorded in steps 2 and 4 and the topology diagram shown at the beginning of the lab to fill in the Address:Port columns.

1 Request →

	Type	Address:Port
Source	Inside-Local	
Destination	Outside-Local	

2 Translated Request →

	Type	Address:Port
Source	Inside-Global	
Destination	Outside-Global	

NAT Router

Web Server

ISP

4 ← Translated Response

	Type	Address:Port
Source	Outside-Local	
Destination	Inside-Local	

3 ← Response

	Type	Address:Port
Source	Outside-Global	
Destination	Inside-Global	

Step 6: Reflection

a. Port address translation (PAT) is also called NAT with overload. What does the term "overload" refer to?

_____

_____

b. The NAT terminology used in the lab includes four types of addresses: inside-local, inside-global, outside-local, and outside-global. In many connections that pass through NAT routers, two of these addresses are often the same. Which two of these four addresses normally remain unchanged, and why do you think that is the case?

_____

_____