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Packet Tracer - Use Diagnostic Commands

Objectives

Part 1: Gather End User Device Settings

Part 2: Gather Information about Network Devices

Part 3: Diagnose Connectivity Issues

Background / Scenario

In this Packet Tracer (PT) activity, you will use various commands to gather device information and troubleshoot device configuration and connectivity issues. Device information includes IP address, default gateway, and DNS server settings. These settings are critical to enable a device to communicate on networks and connect to the internet.

Instructions

Part 1: Gather End User Device Settings

In this part, you will document the IP address settings for end devices.

Step 1: Document the IP address settings for HQ-Laptop-1.

a. The activity opens in the **HQ** cluster. The **Wiring Closet** is the tall, black chassis in the bottom left corner of the first floor. Locate all the devices on the first floor: PCs **1-1**, **1-2**, **1-3**, and **1-4**; printer **FL-1P**; and **HQ-Laptop-1**.

b. Click **HQ-Laptop-1** > **Desktop** tab > **Command Prompt**.

c. Enter the **ipconfig** command.

Which IPv4 address is displayed for the **Wireless0 Connection**?

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

Wireless0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::20A:F3FF:FEE4:EEAA
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.50.4
   Subnet Mask.....: 255.255.255.0
   Default Gateway.....: ::
                                 192.168.50.1
```

- 192.168.50.4

If the IPv4 address is in the 169.254.0.0/16 range, what method is being used to assign IPv4 addresses? Why is the laptop assigned an IPv4 address in the 169.254.0.0/16 range?

- **The device couldn't get an address from the DHCP server, so it assigned itself an IP address from the 169.254.0.0/16 range, which is used for automatic private IP addressing (APIPA).**

If the IPv4 address is in the 169.254.0.0/16, wait a few seconds and repeat the **ipconfig** command.

When the IPv4 address is no longer from 169.254.0.0/16 range, what is the IP addressing information displayed? Record your answers in the table below.

Wireless0	IP Addressing Information
Link-local IPv6 Address	FE80::20A:F3FF:FEE4:EEAA
IPv6 Address	
IPv4 Address	192.168.50.4 (it may vary, but will be within the 192.168.50.0/24 range)
Subnet Mask	255.255.255.0
Default Gateway	192168.50.1
DNS Servers	N/A

Do you see a DNS server address? Explain.

- **The ipconfig command does not report the DNS server address.**

d. Enter the **ipconfig /all** command.

Do you see the DNS server address? What is it?

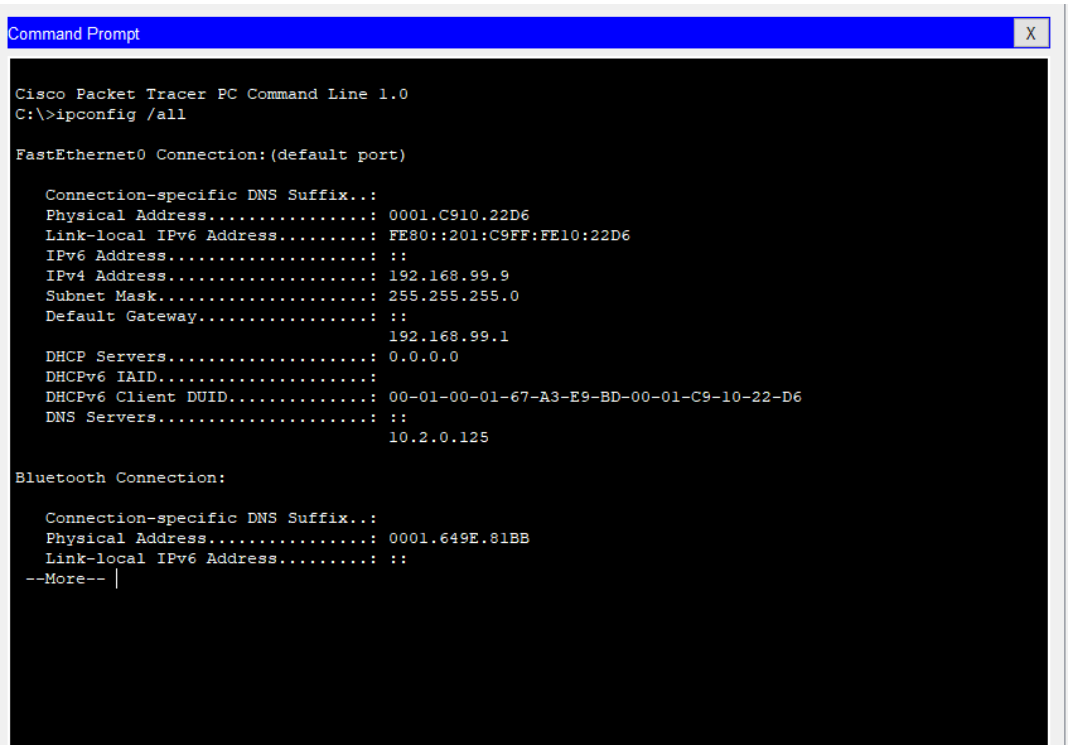
```
C:\>ipconfig /all

Wireless0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Physical Address.................: 000A.F3E4.EEAA
   Link-local IPv6 Address.........: FE80::20A:F3FF:FEE4:EEAA
   IPv6 Address....................: ::
   IPv4 Address....................: 192.168.50.4
   Subnet Mask.....................: 255.255.255.0
   Default Gateway.................: ::
                                     192.168.50.1
   DHCP Servers....................: 192.168.50.1
   DHCPv6 IAID.....................: 156361148
   DHCPv6 Client DUID..............: 00-01-00-01-43-B9-1D-8A-00-0A-F3-E4-EE-AA
   DNS Servers.....................: ::
                                     10.2.0.125

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Physical Address.................: 00E0.A3A2.D8AA
   Link-local IPv6 Address.........: ::
 --More--
```

- **The DNS server address is 10.2.0.125**

Step 2: Document the IP address settings for Net-Admin.

a. Click **Wiring Closet** > **Net-Admin** > **Desktop** tab > **Command Prompt**.

b. Enter the **ipconfig /all** command.



What is the IP addressing information displayed under the FastEthernet0 interface? Record your answers in the table below.

FastEthernet0	IP Addressing Information
Physical Address	0001.C910.22D6 (it may vary)
Link-local IPv6 Address	FE80::201:C9FF:FE10:22D6
IPv6 Address	::
IPv4 Address	192.168.99.9
Subnet Mask	255.255.255.0
Default Gateway	192168.99.1
DNS Servers	0.0.0.0

Part 2: Gather Information about Network Devices

In this part, you will document information about the link to ISP. You will then document the IP addressing information for all the end devices in HQ and discover that devices belong to different virtual local area networks (VLANs).

Step 1: Gather network connection information about the link between HQ and ISP.

The **HQ-Edge** router is the router between the HQ network and the ISP. We need to identify the upstream device information located in the ISP.

a. In the **Wiring Closet** left rack, click **HQ-Edge** > **CLI** tab.

b. Press **Enter** to get the **HQ-Edge>** prompt, and then enter the **enable** command.

c. Enter the **show ip route | begin Gateway** command.

What is the address for the gateway of last resort (or default gateway)?

```
HQ-Edge>show ip route | begin Gateway
Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 6 subnets, 4 masks
O       10.0.0.0/29 [110/2] via 10.0.0.49, 00:17:28, GigabitEthernet0/0/0
O       10.0.0.32/29 [110/2] via 10.0.0.49, 00:17:28, GigabitEthernet0/0/0
C       10.0.0.48/29 is directly connected, GigabitEthernet0/0/0
L       10.0.0.50/32 is directly connected, GigabitEthernet0/0/0
O       10.0.3.0/24 [110/3] via 10.0.0.49, 00:17:18, GigabitEthernet0/0/0
O       10.2.0.0/16 [110/2] via 10.0.0.49, 00:17:28, GigabitEthernet0/0/0
     192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.10.0/24 is directly connected, GigabitEthernet0/0/1.10
L       192.168.10.1/32 is directly connected, GigabitEthernet0/0/1.10
     192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.20.0/24 is directly connected, GigabitEthernet0/0/1.20
L       192.168.20.1/32 is directly connected, GigabitEthernet0/0/1.20
     192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.30.0/24 is directly connected, GigabitEthernet0/0/1.30
L       192.168.30.1/32 is directly connected, GigabitEthernet0/0/1.30
     192.168.50.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.50.0/24 is directly connected, GigabitEthernet0/0/1.50
L       192.168.50.1/32 is directly connected, GigabitEthernet0/0/1.50
     192.168.75.0/24 is variably subnetted, 2 subnets, 2 masks
 --More--
```

- **The default gateway is 0.0.0.0**

Why is the next hop address not displayed?

- Its not explicitly configured.

d. Enter the **show running-config | begin ip route** command.

How is the default route configured? Does it use the next hop address?

```
HQ-Edge>enable
HQ-Edge#show running-config | begin ip route
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/0/0
!
ip flow-export version 9
!
!
ip access-list standard NAT-PERMIT
 permit 192.168.10.0 0.0.0.255
 permit 192.168.20.0 0.0.0.255
 permit 192.168.99.0 0.0.0.15
 permit 192.168.75.0 0.0.0.7
ip access-list standard ADMIN-ONLY
 permit 192.168.99.0 0.0.0.255
 deny any
access-list 101 permit ip 192.168.10.0 0.0.0.255 10.0.3.0 0.0.0.255
access-list 101 permit ip 192.168.20.0 0.0.0.255 10.0.3.0 0.0.0.255
access-list 101 permit ip 192.168.75.0 0.0.0.255 10.0.3.0 0.0.0.255
access-list 101 permit ip 192.168.99.0 0.0.0.255 10.0.3.0 0.0.0.255
access-list 101 permit icmp any 10.0.3.0 0.0.0.255
ip access-list extended NAT-NOVPN
 permit ip 192.168.0.0 0.0.255.255 10.2.0.0 0.0.255.255
 permit ip 192.168.0.0 0.0.255.255 10.1.0.0 0.0.255.255
 permit ip 192.168.0.0 0.0.255.255 192.168.0.0 0.0.0.255
 --More--
```

- It’s configured with the exit interface instead of the next hop address

e. Enter the **show cdp neighbors detail** command.

```
HQ-Edge#
HQ-Edge#show cdp neighbors detail

Device ID: ISP
Entry address(es):
  IP address : 10.0.0.49
Platform: cisco PT1000, Capabilities: Router
Interface: GigabitEthernet0/0/0, Port ID (outgoing port): GigabitEthernet1/0
Holdtime: 151

Version :
Cisco Internetwork Operating System Software
IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 27-Apr-04 19:01 by miwang

advertisement version: 2
Duplex: full
```

What is the IPv4 address of the next hop (ISP) address? **10.0.0.49**

Which port on the ISP router is connected to **HQ-Edge**? **GigabitEthernet1/0**

What IOS version is used on the ISP router? **IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)**

f. Enter the **ping 10.0.0.49** command.

```
HQ-Edge#ping 10.0.0.49

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.49, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

HQ-Edge#
```

g. Enter the **show arp** command.

```
HQ-Edge#show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.0.0.49               5   0060.2FE1.903B  ARPA   GigabitEthernet0/0/0
Internet  10.0.0.50               -   0000.0C99.CB04  ARPA   GigabitEthernet0/0/0
HQ-Edge#
```

What is the MAC address of the interface on the **ISP** router that is connected to **HQ-Edge**?

0060.2FE1.903B

h. Close **HQ-Edge** and exit the **Wiring Closet**.

Step 2: Gather network connection information about the devices in HQ.

a. From **1-1**, **1-2**, **1-3**, **1-4**, **FL-1P**, and **HQ-Laptop-1**, use the **ipconfig** command to find their IPv4 addresses and Default Gateways.

Device	IPv4 Address	Default Gateway
1-1	192.168.10.2	192.168.10.1
1-2	192.168.10.3	192.168.10.1
1-3	192.168.20.2	192.168.20.1
1-4	192.168.20.3	192.168.20.1
FL-1P	192.168.50.2	192.168.50.1

Device	IPv4 Address	Default Gateway
HQ-Laptop-1	192.168.50.3	192.168.50.1

b. From PC **1-1**, open **Command Prompt**, and then enter the **arp -a** command.

What information is displayed?

- No ARP entries found.

c. Use the **ping** command to ping **1-2**, **1-3**, **1-4**, **FL-1P**, and **HQ-Laptop-1**.

d. Enter the **arp -a** command.

What information is displayed?

- No ARP entries found

Why do the entries in the ARP table not contain information about devices in the 192.168.20.0 and 192.168.50.0 networks while the ping is successful?

- because both of the address are on different VLANs

e. To find the route a packet takes to reach the DNS server, enter the tracert 10.2.0.125 command.

What information is displayed?

```
C:\>tracert 10.2.0.125

Tracing route to 10.2.0.125 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      192.168.10.1
  2    0 ms      0 ms      0 ms      10.0.0.49
  3    *         0 ms      0 ms      10.2.0.125

Trace complete.
```

How many routers, or hops, are between PC 1-1 and the DNS server?

- **2**

Part 3: Diagnose Connectivity Issues

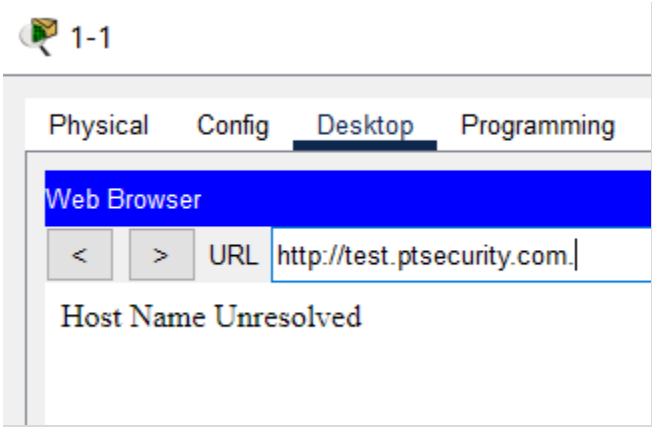
In this part, you will use a variety of diagnostic commands and techniques. You will use the **nslookup** command to query a DNS server and troubleshoot a DNS database. You will then diagnose why a ping fails but web access is successful. Finally, you will use the **netstat** command to discover which ports are listening on the target device.

Step 1: Test a URL to investigate a connectivity issue.

a. On PC **1-1**, close the **Command Prompt**, and then click **Web Browser.**

b. Enter the URL **test.ptsecurity.com**.

Does the web page display? If not, what is the message?



c. Enter the IP address **192.168.75.2**.

Does the web page display?

Yes

Why does the web page display by using the IP address but not the domain name?

- Because the PC cannot resolve the domain name to the IP address.

Step 2: Use the nslookup command to verify DNS service.

a. Close **Web Browser**, and then click **Command Prompt**.

b. Enter the **ping test.ptsecurity.com** command.

What message is displayed?

```
C:\>ping test.ptsecurity.com
Ping request could not find host test.ptsecurity.com. Please check the name and try again.
C:\>
```

What does the message indicate?

- The DNS entry is not in the database of the DNS server

c. Enter the **nslookup test.ptsecurity.com** command.

What message is displayed?

```
C:\>nslookup test.ptsecurity.com

Server: [10.2.0.125]
Address:  10.2.0.125
*** UnKnown can't find test.ptsecurity.com: Non-existent domain.

C:\>
```

Which server is the default DNS server?

- 10.2.0.125

d. The **nslookup** command supports the use of alternate DNS server. Enter the **nslookup /?** command to learn options available for the command.

e. Enter the **nslookup test.ptsecurity.com 192.168.99.3** command and press **Enter**.

Note: Packet Tracer may take several seconds to converge.

What message is displayed?

```
C:\>nslookup test.ptsecurity.com 192.168.99.3

Server: [192.168.99.3]
Address:  192.168.99.3
DNS request timed out.
          timeout was 15000 milli seconds.

Server: [192.168.99.3]
Address:  192.168.99.3

Non-authoritative answer:
Name:   test.ptsecurity.com
Address:   192.168.75.2
```

In Step 2c, why is the domain name unable to be resolved?

- When a domain name is entered, the PC is trying to resolve it through the default DNS server. In this case, the default DNS server does not contain the information in its database.

Step 3: Use output from the ping command to diagnose connectivity issues.

a. Enter the **ping mail.cybercloud.com** command.

What message is displayed?

```
C:\>ping mail.cybercloud.com

Pinging 172.19.0.4 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.19.0.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

What information is indicated by the message?

- The DNS name resolution is successful. However, the ping failed. Possible reasons are that the host is inactive or the ICMP echo/echo-reply is disabled on the host.Type your answers here.

b. Enter the **ping www.ptsecurity.com** command.

What message is displayed?

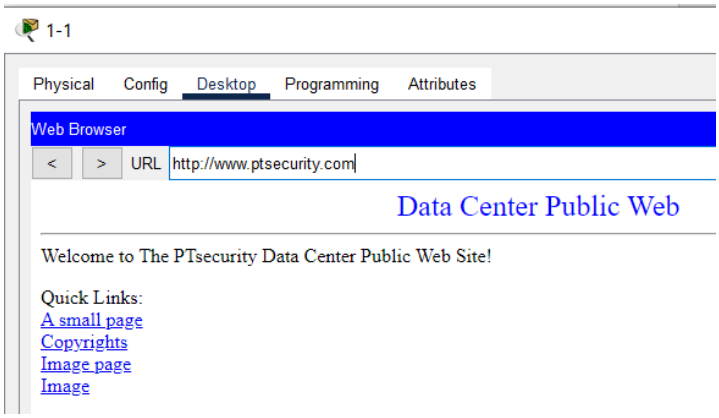
```
C:\>ping www.ptsecurity.com

Pinging 10.0.0.3 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 10.0.0.3: Destination host unreachable.
Reply from 10.0.0.3: Destination host unreachable.

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

What information is indicated by the message?

- There is a firewall in the path that blocks the ping to the destination.

c. Close the **Command Prompt**, open **Web Browser**, and then navigate to **www.ptsecurity.com**.

Does the web page display?



What conclusion can be drawn?

- The web host is running. However, the ping to the web server is blocked.

Step 4: Use the netstat command to find active and listening ports.

a. Close **Web Browser**, and reopen **Command Prompt**.

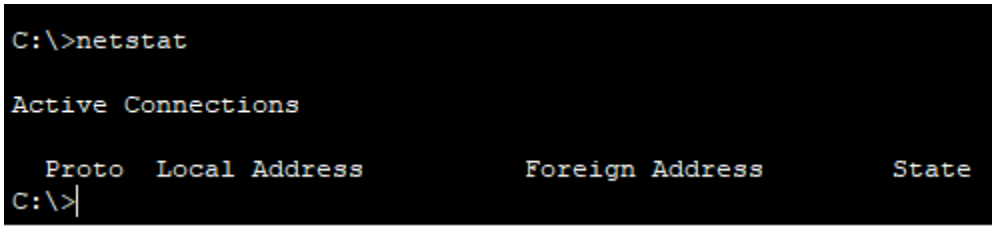
b. In **HQ**, click the **Wiring Closet**

c. From the right rack, click the **FTP** server > **Desktop** tab > **Command Prompt**.

d. Arrange the PC **1-1** and FTP server **Command Prompt** windows side by side.

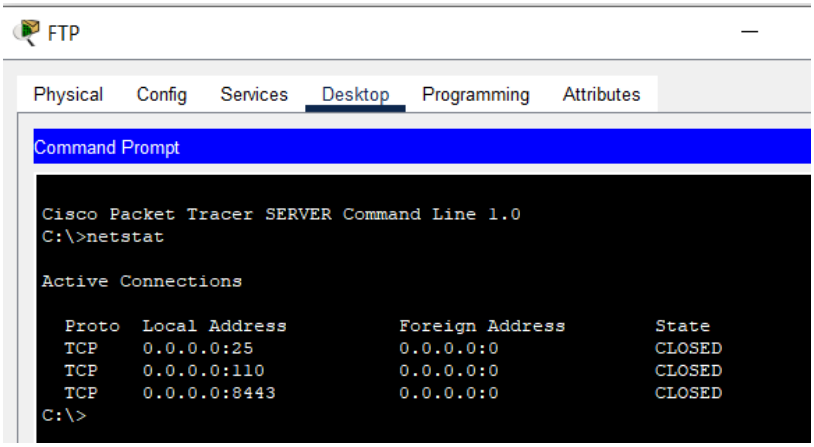
e. From the PC **1-1** window, enter the **netstat** command.

What message is displayed? Does it show any data?



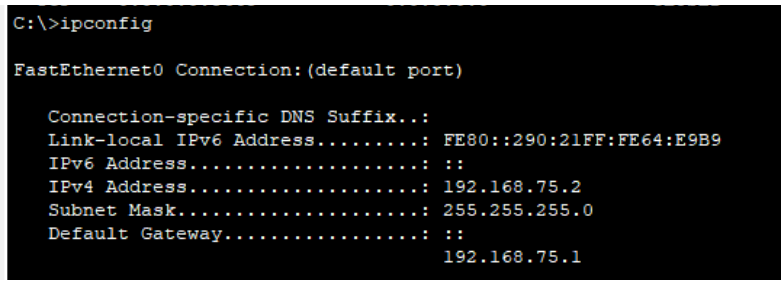
f. From the **FTP** server, enter the **netstat** command.

What message is displayed? Does it show any data?

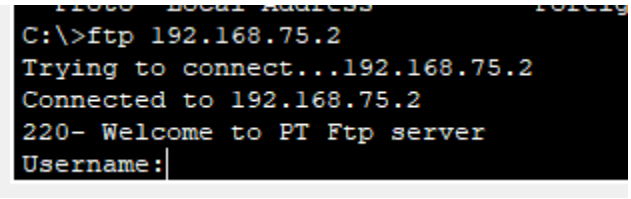


- It shows no active connection to other devices and no listening ports

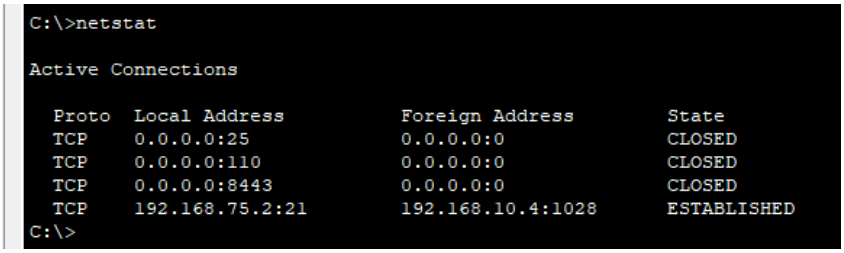
g. On **FTP** server, enter the **ipconfig** command to determine its IP address.



h. From **PC 1-1**, start an FTP session with the FTP server.



i. On the **FTP** server, enter the **netstat** command.



What message is displayed? Is there any new information?

- Yes, a new entry shows TCP 192.168.75.2:21 192.168.10.3:1025 ESTABLISHED

Which port is the listening port and what is the status of the connection?

- The listening port is TCP 21 and the TCP connection is established

j. From PC **1-1**, enter **bob** as the username.

k. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

- No

l. From **PC 1-1**, enter **cisco123** as the password.

m. From **PC 1-1**, enter the **dir** command.

```
ftp>dir

Listing /ftp directory from 192.168.75.2:
ftp>
```

n. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

- No

What is indicated by this new entry?

- No new entry

o. From **PC 1-1**, enter the **put Sample2.txt** command and press **Enter**. This will upload the Sample2.txt file to the **FTP** server.

```
Listing /ftp directory from 192.168.75.2:
ftp>put Sample2.txt

Writing file Sample2.txt to 192.168.75.2:
File transfer in progress...

[Transfer complete - 43 bytes]

43 bytes copied in 0.044 secs (977 bytes/sec)
ftp>
```

p. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

- No

q. Wait for a few seconds and then enter the **netstat** command again.

Does the displayed information change?

- No

r. From **PC 1-1**, enter the **quit** command.

```
43 bytes copied in 0.044 secs (977 bytes/sec)
ftp>quit

221- Service closing control connection.
C:\>
```

s. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

```
C:\>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:25             0.0.0.0:0              CLOSED
  TCP    0.0.0.0:110            0.0.0.0:0              CLOSED
  TCP    0.0.0.0:8443           0.0.0.0:0              CLOSED
C:\>
```

- Yes. The TCP connection between 192.168.72.2:21 and 192.169.10.2:1027 is closed

t. From **PC 1-1**, close **Command Prompt**, and then open **Web Browser**.

u. Navigate to **192.168.75.2**.

v. From the **FTP** server, enter the **netstat** command.

```
C:\>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:25             0.0.0.0:0              CLOSED
  TCP    0.0.0.0:110            0.0.0.0:0              CLOSED
  TCP    0.0.0.0:8443           0.0.0.0:0              CLOSED
  TCP    192.168.75.2:80        192.168.10.4:1031      CLOSED
C:\>
```

Does the displayed information change?

- Yes. A new entry shows TCP 192.168.75.2:80 192.168.10.2:1030 CLOSED.

What does this new entry indicate?

- A web page request is made by the host 192.168.10.2. The web page is transmitted (displayed on the web browser of PC 1-1) and the TCP connection is closed.