

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.

- 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**.
- Click **HQ-Laptop-1** > **Desktop** tab > **Command Prompt**.
- Enter the **ipconfig** command.

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

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?

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	
IPv6 Address	
IPv4 Address	
Subnet Mask	
Default Gateway	

Wireless0	IP Addressing Information
DNS Servers	

Do you see a DNS server address? Explain.

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

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

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

- Click **Wiring Closet > Net-Admin > Desktop** tab > **Command Prompt**.
- 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	
Link-local IPv6 Address	
IPv6 Address	
IPv4 Address	
Subnet Mask	
Default Gateway	
DNS Servers	

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.

- In the **Wiring Closet** left rack, click **HQ-Edge > CLI** tab.
- Press **Enter** to get the **HQ-Edge>** prompt, and then enter the **enable** command.
- Enter the **show ip route | begin Gateway** command.

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

Why is the next hop address not displayed?

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

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

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

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

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

What IOS version is used on the ISP router?

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

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

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

- 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		
1-2		
1-3		
1-4		
FL-1P		
HQ-Laptop-1		

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

What information is displayed?

- 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?

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?

- 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?

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

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?

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

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?

What does the message indicate?

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

What message is displayed?

Which server is the default DNS server?

- 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?

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

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

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

What message is displayed?

What information is indicated by the message?

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

What message is displayed?

What information is indicated by the message?

- 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?

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?

- 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?

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

- j. From PC **1-1**, enter **bob** as the username.
- k. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

- l. From **PC 1-1**, enter **cisco123** as the password.
- m. From **PC 1-1**, enter the **dir** command.
- n. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

What is indicated by this 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.
- p. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

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

Does the displayed information change?

- r. From **PC 1-1**, enter the **quit** command.
- s. From the **FTP** server, enter the **netstat** command.

Does the displayed information change?

- 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.

Does the displayed information change?

What does this new entry indicate?

Answer Key

Part 1: Gather End User Device Settings

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

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

It may show as 169.254.0.0/16 address because the wireless connection may not be established yet. The address will be within the 192.168.50.0/24 network.

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?

It indicates that the device was unable to obtain addressing from a DHCP server. Therefore, the device assigned itself an address 169.254.0.0/16 pool 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	192.168.50.1
DNS Servers	N/A

Do you see a DNS server address? Explain.

The ipconfig command does not report the DNS server address.

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

10.2.0.125

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

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

FastEthernet0	IP Addressing Information
Default Gateway	192.168.99.1
DNS Servers	0.0.0.0

Part 2: Gather Information about Network Devices

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

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

0.0.0.0

Why is the next hop address not displayed?

It is not explicitly configured.

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

It is configured with the exit interface instead of next hop address.

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**?

GigabitEthernet 1/0

What IOS version is used on the ISP router?

IOS (tm) PT1000 Software (PT1000-I-M), Version 12.2(28), RELEASE SOFTWARE (fc5)

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

0060.2FE1.903B

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

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
HQ-Laptop-1	192.168.50.3	192.168.50.1

What information is displayed?

No ARP Entries Found.

What information is displayed?

Internet Address	Physical Address	Type
192.168.10.1	000a.41ea.6b47	dynamic
192.168.10.3	0002.4a8a.d20e	dynamic

ARP provides a table that maps known MAC addresses to their associated IP addresses.

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?

192.168.10.0/24, 192.168.20.0/24, and 192.168.50.0/24 are on different VLANs. Ping from 192.168.10.0 network to other VLAN networks would need to go through the default gateway first. Therefore, the ARP table only contains the information about devices within the same network or the same VLAN.

What information is displayed?

Tracing route to 10.2.0.125 over a maximum of 30 hops:

1	0 ms	2 ms	0 ms	192.168.10.1
2	12 ms	0 ms	0 ms	10.0.0.49
3	1 ms	0 ms	0 ms	10.2.0.125

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

2

Part 3: Diagnose Connectivity Issues

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

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

No, it does not. The message is "Host Name Unresolved".

Does the web page display?

Yes

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

The PC cannot resolve the domain name to the IP address.

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

What message is displayed?

Ping request could not find host test.ptsecurity.com. Please check the name and try again.

What does the message indicate?

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

What message is displayed?

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

Which server is the default DNS server?

10.2.0.125

What message is displayed?

```
C:\> nslookup test.ptsecurity.com 192.168.99.3
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 in the URL box, 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.

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.

What message is displayed?

```
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.

Does the web page display?

Yes

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.

What message is displayed? Does it show any data?

```
C:\>netstat  
  
Active Connections  
  
Proto Local Address Foreign Address State  
C:\>
```

No data is shown.

What message is displayed? Does it show any data?

```
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:\>
```

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

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.

Does the displayed information change?

No.

Does the displayed information change?

Yes. A new entry shows TCP 192.168.75.2:1028 192.168.10.3:1028 CLOSED.

What is indicated by this new entry?

A new TCP connection is opened to transfer the file names in the FTP directory and the connection is closed after the operation completes.

Does the displayed information change?

**Yes. A new entry shows:
TCP 192.168.75.2:1030 192.168.10.3:1029 CLOSING.**

Does the displayed information change?

Yes. The "CLOSING" line is gone.

Does the displayed information change?

Yes. Now the TCP connection between 192.168.75.2:21 and 192.168.10.2:1027 is CLOSED.

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.