

### Using ipconfig

The **ipconfig** command will provide you with all the information you can get from using the Network Connections folder to check the status of your network connections and adapters on a Windows machine directly from the command-line interface. You can enter the code by itself to display connection information such as the IP address, default gateway (also an IP address), and subnet mask in use.

Note: You should be familiar with this command and what it returns from the earlier lab in which you tested your ability to access the command line. This time, you should have a better understanding of the information it returns.

Your default gateway is the device through which you connect to the Internet or any other interconnected networks.

You can add arguments to **ipconfig** to make it more useful for gathering and setting network information. There are two arguments in particular that you will practice here: **release** and **renew**.

#### Exercise 5.3.1

For this exercise, you will release your IP address using **ipconfig**. This is a beneficial tool for troubleshooting your own local network and correcting any problems with the assignment of IP addresses. This exercise requires that you have DHCP in use for assigning IP addresses, which is a typical default setting. To begin, you should type the command **ipconfig** at the command-line interface and press **Enter**. Record the information it presents for the IP address and default gateway; you can ignore the rest of the information for now.

When you have completed this, type the following command to release the IP address:

**ipconfig /release**

What information is displayed as a result?

To renew your lease on the IP address for your network card or adapter, you will use the following command:

**ipconfig /renew**

This will create a new lease on an IP address for your network card or adapter. When the command to renew the IP address is complete, you should compare the result to the initial run of **ipconfig** and compare the results. Are the entries the same for the IP address and for the default gateway?

### Using ping

The **ping** command is used to test connectivity between two hosts on a network (or interconnected network). On Windows machines, this is activated by entering **ping** at the command-line interface. However, **ping** requires arguments to function. In the exercises for this lab, you will explore the functionality and format of using the **ping** command.

#### Exercise 5.3.2

You can use the **ping** command on your local machine. This does not send traffic out onto the network, but it is an effective means of making sure that your network adapter is functional. To ping the local host, use the following command:

##### **ping localhost**

What address is returned as the IP address of localhost? How many times is the ping message sent by default?

#### Exercise 5.3.3

For this exercise, you will ping the default gateway and two web addresses to see the difference in timing of the response. First, ping the default gateway (which you can get from running the **ipconfig** command if you forgot what it is) using the following format (replace the IP address given with the address of your default gateway):

##### **ping 192.168.1.1**

How much time (in the *time=* part of the output) did it take for the ping response to come back to the local machine? If there were different values, report the average response time.

Next you will ping a destination farther away than your local network. You must have Internet connectivity enabled for this to work.

Note: The ping command is a professional tool for troubleshooting and investigating networks, but most networks disable this message from crossing network boundaries because it has a high potential to clog the network.

Execute the following command from the command-line interface:

##### **ping www.google.com**

How much time (on average) did it take to get a response from the host? How does this compare to the time it took to get a response from the default gateway? Choose another web address and send a **ping** command to it. Did the **ping** command get a response? If so, how long did it take (on average)? What makes the difference in the timing of these messages?

#### **Exercise 5.3.4**

For this exercise, you will use the **-a** argument for **ping**. This will force the **ping** command to return the host name as well as the IP address. To force a host name return, enter the following command (replacing the IP address with that of your default gateway):

```
ping -a 192.168.1.1
```

What is the name of the host for the default gateway? Use this argument to ping localhost. What name does it return?

#### **Exercise 5.3.5**

You can use the **-n** argument and a number to specify the number of ping messages that should be sent. To ping the default gateway six times, enter the following command (again you should replace the IP address given with the IP address of your default gateway):

```
ping -n 6 192.168.1.1
```

What is the benefit of being able to send a set number of ping messages to a host? You can use your textbook and Internet research to compose your answer.

#### **Using tracert**

The **tracert** command is used to determine the complete path between your machine and a network destination (to trace the route). In Windows, this command is given as **tracert**; this command requires a destination IP address or web address to work. The **tracert** command is an extension of the **ping** command, which pings each device in the path between the originating host and the destination host requesting a reply message.

#### **Exercise 5.3.6**

For this exercise, you will compare the **tracert** results for two different web addresses. To begin, though, you will start with running **tracert** to your default gateway with the following command (replacing the IP address shown with your default gateway IP address):

**tracert 192.168.1.1**

How many devices are returned in the path between your machine and the default gateway?

Now you will use the **tracert** command to access two different web hosts and compare the devices returned in the path. To begin, use the following command:

**tracert www.google.com**

Record the path that is returned from the host. Next, choose another web host (such as [www.microsoft.com](http://www.microsoft.com)) and run the **tracert** command to it. Record the path that is returned. How many lines of the device path do these two hosts have in common? What do these devices represent?

**Using netstat**

The **netstat** command is used to determine the network status of any currently active connections. This will return only recent activity because the cache for this empties as the active connections are closed. This is a helpful command to determine what protocols are in use and what hosts are being contacted by your machine.

**Exercise 5.3.7**

Run the **netstat** command (without any arguments) on your machine from the command-line interface. How many active connections are returned? What protocols are in use?

Open a web browser such as Internet Explorer and enter a destination web address in the address bar. When this page has loaded, run the **netstat** command from the command-line interface again. How many connections are returned this time? Where did these connections originate? Use your textbook and Internet research to compose your answer.

**Lab 5.3 Review**

1. The **ping** command has an argument, **-t**, that allows the ping to send messages repeatedly until it is manually stopped by a user pressing **Ctrl+C**. Why would this functionality be beneficial in networking? How could it be misused?
2. Running commands such as **ping** and **tracert** initiates connections to external hosts; this will also send ARP requests as the hosts are connected. Run one of these commands for a web host and then run the **arp -a** command. What IP/MAC address pairs are returned? Why is this the case?

Source: Richardson, T. (2013). *Introduction to networking lab manual*. Boston, MA: Pearson IT Certification.