

## IPv4 Troubleshooting Commands

### Introduction

Your supervisor is tasking you and your team to test and troubleshoot various areas of the overall network. You will be using the IP, Ping and Tracert commands to accomplish this task.



### Objectives

In this lab the student will:

- Examine the IP, Ping and Tracert and use them for troubleshooting purposes.

### Resources

- Computer with Internet connection
- Access to the textbook/lecture presentation for reference

### Procedure

**Note:** This lab assumes you are using any version of Windows. This is a non-destructive lab and you should be able to do it with your home machine without concern of changing your system configuration. Ideally, this lab will be done in a classroom or other LAN with multiple computers connected to the Internet.

#### Examine IP Addressing

1. On Windows, type cmd into the search bar to obtain a command prompt.
2. To obtain the IP address of your computer, type ipconfig/all and press Enter.
3. Record the following information about your computer:
  - a. Physical address (MAC address) - the address embedded in your network card  
74-D8-3E-03-12-7C
  - b. IP address 192.168.1.194
  - c. Subnet Mask address -the subnet mask number tells your computer whether it is located on a subnetwork, a part of a larger network 255.255.255.0
  - d. Default Gateway - router that connects to the rest of the world, outside your subnet or LAN 192.168.1.254

*You should find that the IP address and the default gateway are in the same network or subnet, otherwise this host wouldn't be able to communicate outside the network.*

4. Obtain/Record the IP Address, Subnet Mask, and Default gate (ipconfig information) from at least three other computers within your area. Compare the information gathered and answer the following:

- e. What is similar about the IP addresses? They each have the same Network ID
- f. What is similar about the default gateways? They each have the exact same Gateway address

### Examine Ping

Use the TCP/IP Packet Internet Groper (Ping) and TraceRoute (Tracert) commands for testing connectivity in a network. Ping uses the ICMP “echo reply” feature to test connectivity. Since it reports on four attempts, you have an indication of the reliability of the connection.

- g. Try pinging 127.0.0.1. Were you successful? *Record your results.* YES

```
PS C:\Users\jaydo> ping 127.0.0.1
Pinging 127.0.0.1 with 32 bytes of data: Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Ping statistics for 127.0.0.1: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

The 127 network is reserved for loopback testing. If you can successfully ping the loopback address you know that TCP/IP is properly installed and functioning on this computer.

- h. Try pinging your default gateway's IP address. Type ping and the default gateway IP address. Press Enter. Record your results.

```
PS C:\Users\jaydo> ping 192.168.1.254
Pinging 192.168.1.254 with 32 bytes of data: Reply from 192.168.1.254: bytes=32 time=3ms TTL=64
Reply from 192.168.1.254: bytes=32 time=3ms TTL=64
Reply from 192.168.1.254: bytes=32 time=3ms TTL=64
Reply from 192.168.1.254: bytes=32 time=3ms TTL=64
Ping statistics for 192.168.1.254: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds: Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

If you were able to ping, it means you have physical connectivity to the router on your network and therefore probably the rest of the world.

- i. Try pinging the IP address of another machine in your area. Were you successful? Record your results.

```
PS C:\Users\jaydo> ping 192.168.1.231
Pinging 192.168.1.231 with 32 bytes of data: Reply from 192.168.1.231: bytes=32 time=141ms TTL=128
Reply from 192.168.1.231: bytes=32 time=4ms TTL=128
Reply from 192.168.1.231: bytes=32 time=5ms TTL=128
Reply from 192.168.1.231: bytes=32 time=4ms TTL=128
Ping statistics for 192.168.1.231: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds: Minimum = 4ms, Maximum = 141ms, Average = 38ms
```

You should see a message that tells you that the other computer is responding to your ping. Ping is a utility that sends a message out to another computer or device on the network and receives a message back to let you know that your computer is communicating with other devices on the network. If a computer is not able to connect to a particular server or to another network, the ping utility is used as a troubleshooting tool to determine where the network communication is failing.

- j. Try pinging www.yahoo.com. What is the IP address of the computer you pinged?

2001:4998:44:3507::8000

The first line of output shows you the Fully Qualified Domain Name (FQDN) followed by the IP address. A

(Domain Name Service) DNS server somewhere out in the network was able to resolve the name to an IP address. DNS servers resolve Domain names (not host names) to IP addresses.

Without this name resolution, the ping would have failed because TCP/IP only understands valid IP addresses – not names. You would not be able to use your Web browser without this name resolution.

k. From the command prompt, type the following command: ping /?

**-t** Ping the specified host until stopped.  
To see statistics and continue - type Control-Break;  
To stop - type Control-C.

---

**-a** Resolve addresses to hostnames

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**-n count** Number of echo requests to send

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**-f** Set Don't Fragment flag in packet (IPv4-only)

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**-i TTL** Time To Live

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**-r count** Record route for count hops (IPv4-only)

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**-s count** Timestamp for count hops (IPv4-only)

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**-w timeout** Timeout in milliseconds to wait for each reply.

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### *Examine Tracert*

1. Try typing `tracert www.cisco.com` and press ENTER. Record your results.

a. How many jumps (hops) did it take for you to reach that site?

9 hops

---

b. What is the IP address of the first computer you are routed to?

2001:506:6000:100:76:253:217:11

---

Tracert is TCP/IP's abbreviation for traceroute. The first line of output shows you the Fully Qualified Domain Name (FQDN) followed by the IP address. So we know that a DNS server was able to resolve the name to an IP address. Then there are listings of all routers the Tracert requests had to pass through to get to the destination. Tracert actually uses the same echo requests and replies as the ping command but in a slightly different way. You should see that Tracert actually contacted each router three times. By comparing the results, we can gauge the consistency of the route. Note any relatively long delays. These could be possibly due to congestion. Each router represents a point where one network connected to another and your packet was forwarded through. Note: If you get a couple rows of stars, the destination device has probably been configured to not reply to PINGs.

- c. From the command prompt, type in the following command: `tracert /?`

Document the following options used with the `tracert` command:

`-d` Do not resolve addresses to hostnames

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`-w timeout` Wait timeout milliseconds for each reply

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`-R` Trace round-trip path (IPv6-only)

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`-S srcaddr` Source address to use (IPv6-only).

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`-4` Force using IPv4

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`-6` Force using IPv6.

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- d. Based on what you observed in this lab, what can you deduce about the following results taken from three computers connected to one switch? Should they be able to talk to each other – are they all on the same network? Why or why not? If something is wrong, what is most likely the problem?
- Yes they can communicate due to them being connected to the same gateway and no they are not on the same network Computer 3 has a different network ID

Computer 1 IP Address: 192.168.12.113

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.12.1

Computer 2                      IP Address: 192.168.12.205

   Subnet Mask: 255.255.255.0

   Default Gateway: 192.168.12.1

Computer 3                      IP Address: 192.168.112.97

   Subnet Mask: 255.255.255.0

   Default Gateway: 192.168.12.1

## Reflection

1. How does the ipconfig command compare to the ipconfig /all command?
  2. What is the purpose of the ipconfig /all command?
  3. What is the purpose of the Ping command?
  4. What is the purpose of the Tracert command?
- IP config shows the ip address subnet and default gateway Ip config all shows a indepth descripton of each connection along with your MAC address,DHCP and lease times as well as IPV6 infomation
- To give an in depth overview of your connections
- Ping is used to determine if a device is reachable as well as the amount of time it takes to reach said device
- The tracert command is used to determine the route to another destination by sending Echo packets to said location

## Rubric

<u>Concerns</u> Working Towards Proficiency	<u>Criteria</u> Standards for This Competency	<u>Accomplished</u> Evidence of Mastering Competency
	Criteria #1: Answers given in lab are appropriate and valid information (3 points each line)	
	Criteria #2: Correct answer to reflection question 1 (5 points)	
	Criteria #3: Correct answer to reflection question 2 (5 points)	
	Criteria #4: Correct answer to reflection question 3 (5 points)	
	Criteria #5: Correct answer to reflection question 4 (5 points)	