Lab 4.2.5b Connectivity Tests – Traceroute
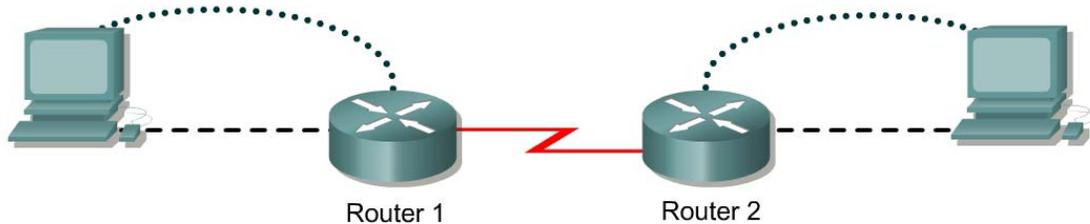
Router designation	Router Name	Enable secret password	Enable, VTY and console password	Routing protocol	RIP network statements	
Router 1	GAD	class	Cisco	RIP	192.168.14.0	192.168.15.0
Router 2	BHM	class	Cisco	RIP	192.168.15.0	192.168.16.0

Router designation	IP host name	Fast Ethernet 0 address	Interface type Serial 0	Serial 0 address	Interface type Serial 1	Serial 1 address	Subnet mask all addresses
Router 1	GAD	192.168.14.1	DCE	192.168.15.1	NA	No address	255.255.255.0
Router 2	BHM	192.168.16.1	DTE	192.168.15.2	NA	No address	255.255.255.0

Straight-through cable	————
Serial cable	——Z——
Console (Rollover)	••••••••••••••
Crossover cable	– – – – – – –

Objective

- Use the `traceroute` Cisco IOS command from source router to destination router.

- Use the `tracert` MS-DOS command from source workstation to destination router. Verify that the network layer between source, destination, and each router along the way is working properly.

- Retrieve information to evaluate the end-to-end path reliability.

- Determine delays at each point over the path and whether the host can be reached.

Background/Preparation

The `traceroute` command, abbreviated as `trace`, is an excellent utility for troubleshooting the path that a packet takes through an internetwork of routers. It can help to isolate problem links and routers along the way. The `traceroute` command uses ICMP packets and the error message generated by routers when the packet exceeds its Time-To-Live (TTL). The Windows version of this command is `tracert`.

Cable a network similar to the one in the diagram. Any router that meets the interface requirements may be used. Possible routers include 800, 1600, 1700, 2500, 2600 routers, or a combination. Refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the

equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output. The following steps are intended to be executed on each router unless specifically instructed otherwise.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Note: Go to the erase and reload instructions at the end of this lab. Perform those steps on all routers in this lab assignment before continuing.

Step 1 Configure the routers

a. If there are any difficulties configuring hostname or passwords, refer to the Configuring Router Passwords lab If there are any difficulties configuring interfaces or the routing protocol, refer to the Configuring Host Tables lab.

b. This lab requires that IP hostnames are configured.

c. Verify the routers configurations by performing a `show running-config` on each router. If not correct, fix any configuration errors and verify.

Step 2 Configure the workstations

a. The configuration for the host connected to the GAD Router is:

IP Address	192.168.14.2
IP subnet mask	255.255.255.0
Default gateway	192.168.14.1

b. The configuration for the host connected to the BHM Router is:

IP Address	192.168.16.2
IP subnet mask	255.255.255.0
Default gateway	192.168.16.1

Step 3 Ping from the workstation

a. From a Windows host, click on **Start** > **Programs** > **Accessories** > **Command Prompt**. This will open a Command Prompt window.

b. To test that the TCP/IP stack and default gateway on the workstation are configured and working properly, use the MS-DOS window to ping the routers by issuing the following command:

```
C:\>ping 192.168.14.1
```

c. The `ping` should respond with successful results. If not, check the configurations on the host and directly connected router.

Step 4 Test Layer 3 connectivity

a. Using the command prompt enter `ping` and the IP address of all routers interfaces.

This will test Layer 3 connectivity between the workstation and the routers.

b. Is the output from the workstation `ping` command the same as the output from the `ping` command from a router?

_____

Step 5 Login to the router in user mode

a. Login to the GAD user EXEC prompt.

Step 6 Discover the trace options

a. Type `traceroute` at the router prompt and press Enter.

b. What did the router respond with? _____

Step 7 Use the help function with trace

    a.   Enter **trace ?** at the router prompt.

    b.   What did the router respond with? _____

Step 8 Continue discovering of the trace options

    a.   Enter into the privileged EXEC mode and type `traceroute ?`.

    b.   What did the router respond with? _____

    c.   Was there anything different between the two trace outputs? _____

    d.   There should have been an added option of <cr>. This allows an extended traceroute at the privileged EXEC mode. This is unavailable at the user EXEC mode.

Step 9 Use the `traceroute` command

    a.   Enter `traceroute ip xxx.xxx.xxx.xxx` where xxx.xxx.xxx.xxx is the IP address of the target destination.

        Note: Use one of the end routers and trace IP to the other end host. The router will respond with:

```
GAD#traceroute 192.168.16.2
Type escape sequence to abort.
Tracing the route to 192.168.16.2
  1 BHM (192.168.15.2) 16 msec 16 msec 16 msec
  2 192.168.16.2 16 msec 16 msec 12 msec
GAD#
```

    b.   If the output is not successful, check the router and host configurations.

Step 10 Continue using traceroute

Login to the other routers and repeat the `traceroute` command.

Step 11 Use the `trace` command from a workstation

    a.   From the console workstation, click on **Start** >**Programs** > **Accessories** > **Command Prompt**. An MS-DOS Command Prompt window will open.

        Enter `tracert` and the same IP address used in Step 9.

    b.   The first hop is the default gateway or the near side router interface on the LAN that the workstation is connected to. List the host names and IP addresses of the routers that the ICMP packet was routed through as well as any other entries displayed in the table below.

Host Name	IP Address

    c.   There is one more entry in the output of the `tracert` command when the trace is from the computer command prompt to the target host.

        Why?

        _____

Step 12 Trace to Cisco and other common Web sites

    a. From a Window host that has Internet access, click on **Start** > **Programs** > **Accessories** > **Command Prompt**. An MS-DOS Command Prompt window will open.

```
C:\>tracert www.cisco.com
C:\>tracert www.yahoo.com
C:\>tracert www.aol.com
```

    b. This procedure will show the IP address and the route of the destination.

    c. What is the IP address of www.cisco.com? _____

    d. How many hops did it take to get to www.cisco.com? _____

If a packet passes through a router it is considered one hop and the TTL of the packet is decremented by one.

Step 13 Look at the ip route traces to Cisco, Yahoo, and AOL

    a. Where are the differences in the traces?

_____

_____

_____

    b. Why are they always the same in the beginning? _____

Upon completion of the previous steps, logoff by typing **exit**. Turn the router off.

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

If prompted for a password, enter **class**. If "class" does not work, ask the instructor for assistance.

```
Router>enable
```

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue?
[confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router(config)#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

Press **Enter**.

The router is ready for the assigned lab to be performed.

Router Interface Summary

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2	Interface #5
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)			
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)	
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)	

In order to find out exactly how the router is configured, look at the interfaces. This will identify the type of router as well as how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.