NetSim®
NETWORK SIMULATOR®

Lab ID: 9.9K714A047.SAI1.1

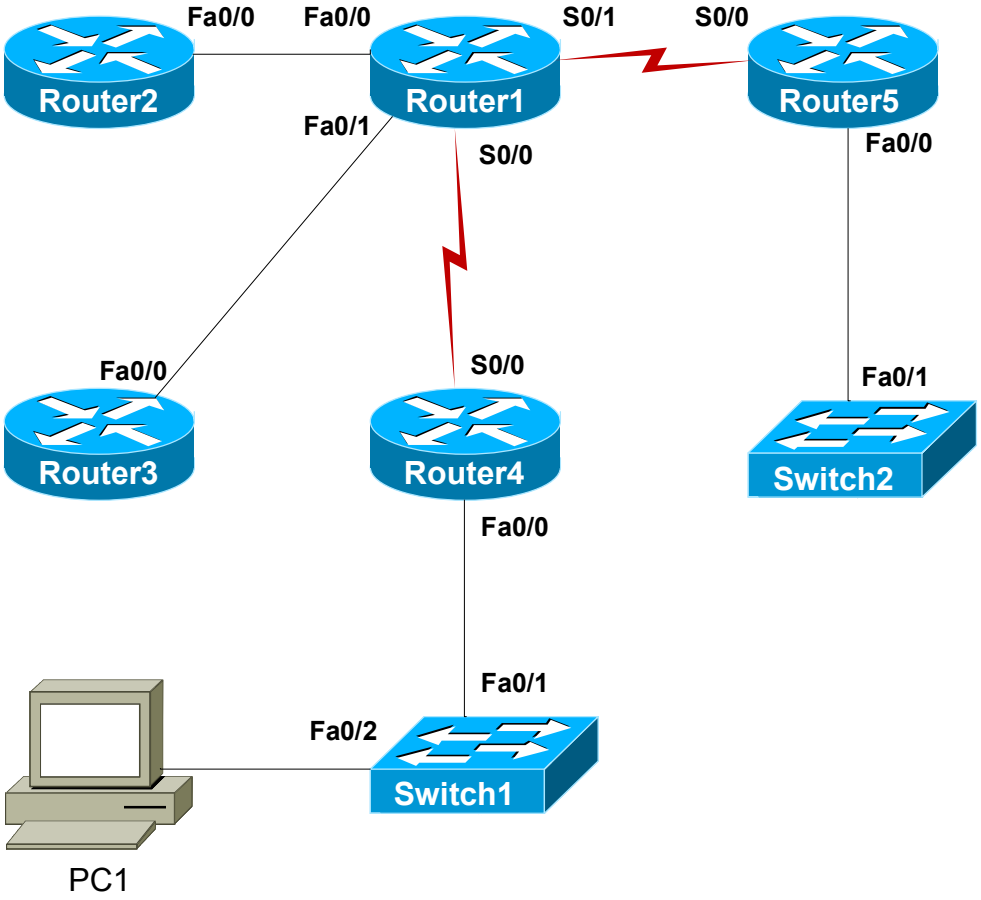
Stand-Alone Lab: Testing Connectivity with Traceroute

Objective

Learn to use the **traceroute** command as a tool to test connectivity between two devices.

Lab Topology

The topology diagram below represents the NetMap in the Simulator.



Command Summary

Command	Description
clock rate *clock-rate*	sets the clock rate for a Data Communications Equipment (DCE) interface
configure terminal	enters global configuration mode from privileged EXEC mode
enable	enters privileged EXEC mode
end	ends and exits configuration mode
exit	exits one level in the menu structure

Command	Description
hostname *host-name*	sets the device name
interface *type number*	changes from global configuration mode to interface configuration mode
ip address *ip-address subnet-mask*	assigns an IP address to an interface
network *network-address*	activates the specified routing protocol on the specified network
no shutdown	enables an interface
ping *ip-address*	sends an Internet Control Message Protocol (ICMP) echo request to the specified address
router rip	enables Routing Information Protocol (RIP) routing
show running-config	displays the active configuration file
traceroute *ip-address*	displays the network path to a given destination
version 2	enables RIP version 2 (RIPv2)

The IP addresses and subnet masks used in this lab are shown in the table below:

IP Addresses

Device	Interface	IP Address	Subnet Mask
Router1	FastEthernet 0/0	192.168.1.1	255.255.255.0
	Serial 0/0	192.168.2.1	255.255.255.0
Router2	FastEthernet 0/0	192.168.1.2	255.255.255.0
Router4	Serial 0/0	192.168.2.2	255.255.255.0

Lab Tasks

Task 1: Configure Router1, Router2, and Router4 to Use RIPv2

1. Configure Router1 with the appropriate host name, IP addresses, and subnet masks; refer to the IP Addresses table. Enable the interfaces. Configure a clock rate of 64 kilobits per second (Kbps) on the Serial 0/0 interface. A clock rate must be configured on Router1 because it is the DCE end of the link to Router4.

2. Configure Router2 with the appropriate host name, IP address, and subnet mask; refer to the IP Addresses table. Enable the interface.

3. Configure Router4 with the appropriate host name, IP address, and subnet mask; refer to the IP Addresses table. Enable the interface.

4. Configure Router1, Router2, and Router4 to use RIPv2, and advertise the networks of each enabled interface.

5. On Router1, ping Router2's FastEthernet 0/0 interface (192.168.1.2) and Router4's Serial 0/0 interface (192.168.2.2). The pings should be successful.

4. On Router2, ping Router4's Serial 0/0 interface (192.168.2.2). The ping should be successful.

Task 2: Use Traceroute

1. What command should you use when you want to trace the route a packet takes as it moves through the network toward its destination? _____
   What is the purpose of this command? _____

2. What protocol does the **traceroute** command use? _____

3. What is a benefit of knowing the path a packet travels? _____
   _____

4. On Router2, trace the route to Router4's Serial 0/0 interface (192.168.2.2).

5. Observe the output from the traceroute command. What can you determine from this information?
   _____
   _____

Lab Solutions

Task 1: Configure Router1, Router2, and Router4 to Use RIPv2

1. Issue the following commands to configure Router1 with the appropriate host name, IP addresses, and subnet masks, to enable the interfaces, and to configure a clock rate on the Serial 0/0 interface:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router1
Router1(config)#interface fastethernet 0/0
Router1(config-if)#ip address 192.168.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#interface serial 0/0
Router1(config-if)#ip address 192.168.2.1 255.255.255.0
Router1(config-if)#clock rate 64000
Router1(config-if)#no shutdown
```

2. Issue the following commands to configure Router2 with the appropriate host name, IP address, and subnet mask, and to enable the interface:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router2
Router2(config)#interface fastethernet 0/0
Router2(config-if)#ip address 192.168.1.2 255.255.255.0
Router2(config-if)#no shutdown
```

3. Issue the following commands to configure Router4 with the appropriate host name, IP address, and subnet mask, and to enable the interface:

```
Router>enable
Router#configure terminal
Router(config)#hostname Router4
Router4(config)#interface serial 0/0
Router4(config-if)#ip address 192.168.2.2 255.255.255.0
Router4(config-if)#no shutdown
```

4. Issue the following commands to configure Router1, Router2, and Router4 to use RIPv2 and to advertise the networks of each enabled interface:

```
Router1(config-if)#router rip
Router1(config-router)#version 2
Router1(config-router)#network 192.168.1.0
Router1(config-router)#network 192.168.2.0

Router2(config-if)#router rip
Router2(config-router)#version 2
Router2(config-router)#network 192.168.1.0
```

(continued on next page)

(continued from previous page)

```
Router4(config-if)#router rip
Router4(config-router)#version 2
Router4(config-router)#network 192.168.2.0
```

5. Pings from Router1 to Router2's FastEthernet 0/0 interface (192.168.1.2) and Router4's Serial 0/0 interface (192.168.2.2) should be successful.

```
Router1(config-router)#end
Router1#ping 192.168.1.2
Router1#ping 192.168.2.2
```

6. A ping from Router2 to Router4's Serial 0/0 interface (192.168.2.2) should be successful.

```
Router2(config-router)#end
Router2#ping 192.168.2.2
```

Task 2: Use Traceroute

1. You should issue the **traceroute** command when you want to trace the route that a packet takes as it moves through the network toward its destination. The **traceroute** command is frequently used in troubleshooting when it is necessary to determine the path a packet is taking to reach a destination device.

2. The **traceroute** command uses the Internet Control Message Protocol (ICMP). When the **traceroute** command is issued, ICMP echo request packets are sent to the destination address, and the time-to-live (TTL) value is increased at each hop. With a TTL value of 1, the echo request packet makes it to only the first router hop. The next echo request is sent with a TTL value of 2, thus identifying the second hop; this process continues until the destination is reached.

3. By knowing the path a packet travels, you might be able to determine at which device between the source and the destination a problem occurred. For example, you could determine whether Router1 is forwarding packets from Router2 to Router4 by issuing the **traceroute 192.168.2.2** command from Router2. If the output from the **traceroute** command lists 192.168.1.1 but does not list 192.168.2.2, you would begin your troubleshooting efforts at Router1.

4. On Router2, trace the route to Router4's Serial 0/0 interface (192.168.2.2). Sample output is shown below:

```
Router2#traceroute 192.168.2.2

"Type escape sequence to abort."
Tracing the route to 192.168.2.2

 1 192.168.1.1 0 msec 16 msec 0 msec
 2 192.168.2.2 20 msec 16 msec *
```

5. The output displayed from the **traceroute** command issued on Router2 lists Router1's FastEthernet 0/0 IP address (192.168.1.1) and Router4's Serial 0/0 IP address (192.168.2.2) as the destination IP address. Therefore, you would begin your troubleshooting efforts at Router1. You can determine that the packet leaves Router2's FastEthernet 0/0 interface and passes through Router1's FastEthernet 0/0 interface before reaching Router4's Serial 0/0 interface.

Sample Configuration Script

Router1

```
Router1#show running-config
Building configuration...
Current configuration : 761 bytes
!
Version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router1
!
ip subnet-zero
!
ip cef
no ip domain-lookup
!
interface Serial0/0
 ip address 192.168.2.1 255.255.255.0
 no ip directed-broadcast
 clock rate 64000
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
```

Router1 (continued)

```
interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 no ip directed-broadcast
!
interface FastEthernet0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router rip
 version 2
 network 192.168.1.0
 network 192.168.2.0
!
ip classless
no ip http server
!
line con 0
line aux 0
line vty 0 4
!
no scheduler allocate
end
```