

Packet Tracer – Router and Switch Redundancy

Addressing Table

Device	IP Address	Subnet Mask	Default Gateway	Site
External Web Server	209.165.201.10	255.255.255.0	N/A	Internet
R1	10.44.1.2	255.255.255.0	N/A	Metropolis Bank HQ
R2	10.44.1.3	255.255.255.0	N/A	Metropolis Bank HQ
Phil's computer	10.44.1.12	255.255.255.0	10.44.1.1	Metropolis Bank HQ
Tim's computer	10.44.2.11	255.255.255.0	10.44.2.1	Gotham Healthcare Branch

Objectives

Part 1: Observe a Network Failover with Redundant Routers.

Part 2: Observe a Network Failover with Redundant Switches.

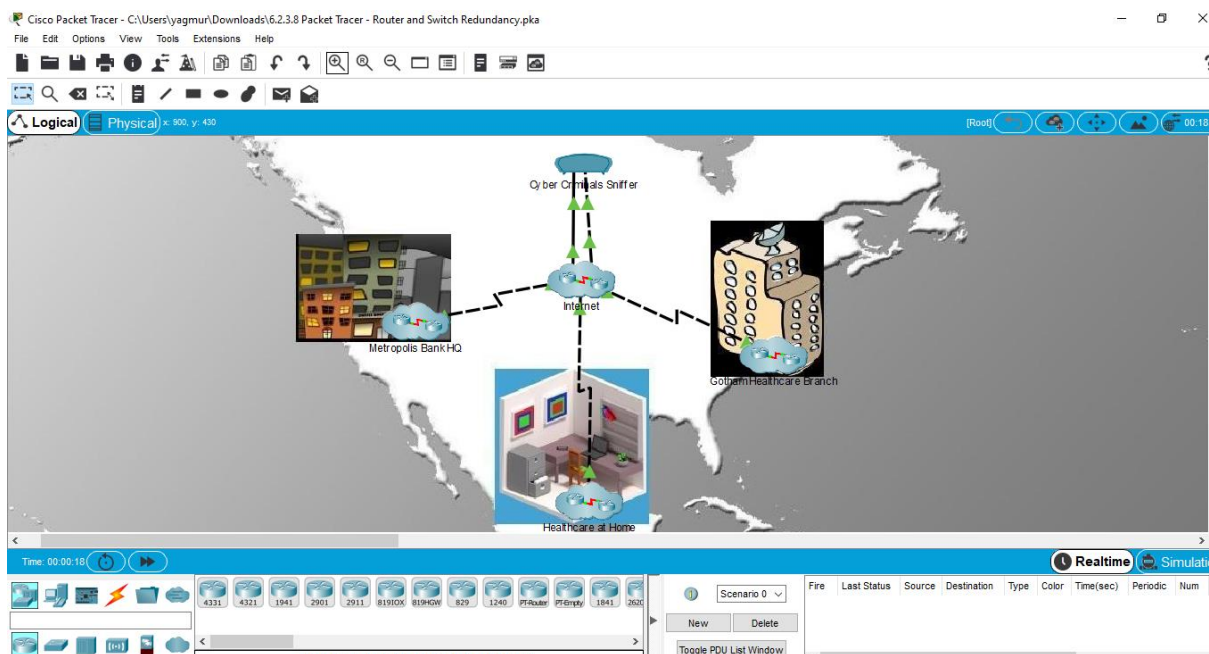
Background

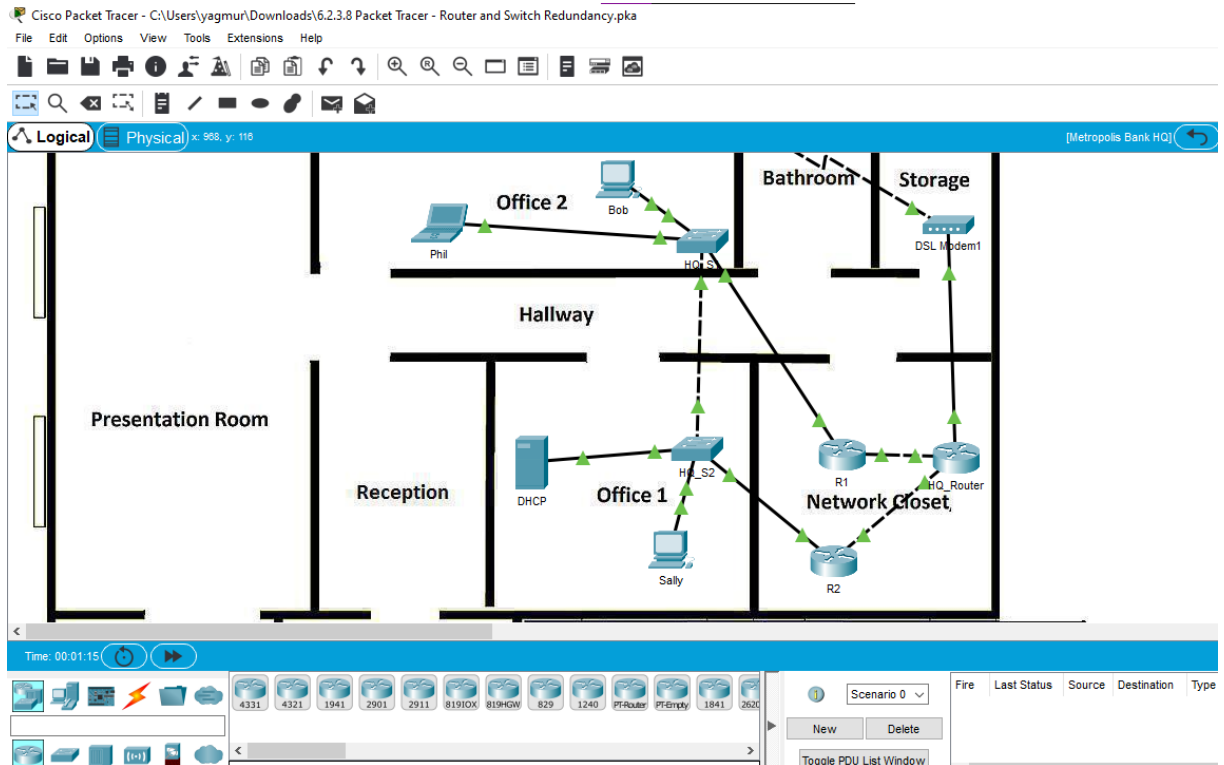
In this activity, you will observe the successful failover of the Metropolis network utilizing multiple routers to provide default gateway redundancy. Afterwards across the world, you will observe the successful network failover of the Gotham network utilizing multiple switches to provide redundant network pathways. The IP addressing, network configuration, and service configurations are already complete. You will use the client devices in the differing geographic regions to test the pathways before and after successful network failover.

Part 1: Observe a Network Failover with Redundant Routers.

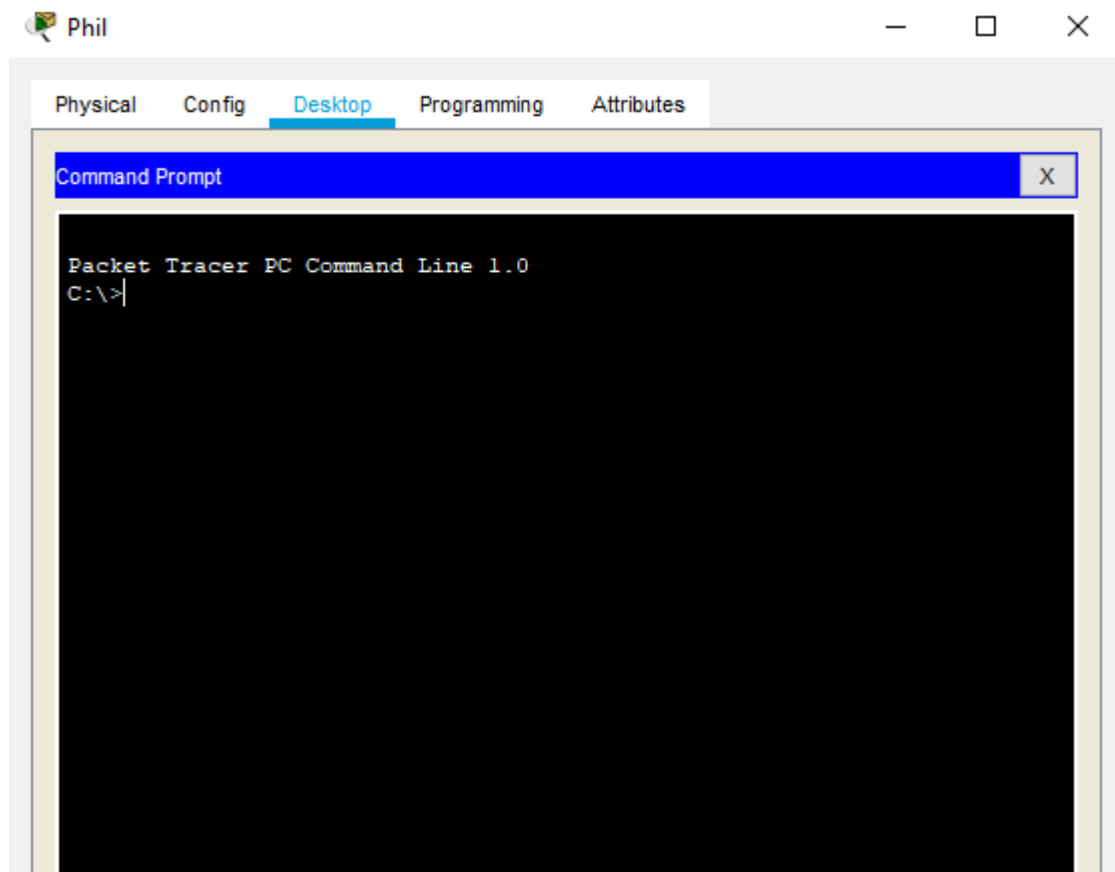
Step 1: Access the command prompt on Phil's computer.

- a. Click the **Metropolis Bank HQ** site and then click the laptop **Phil**.



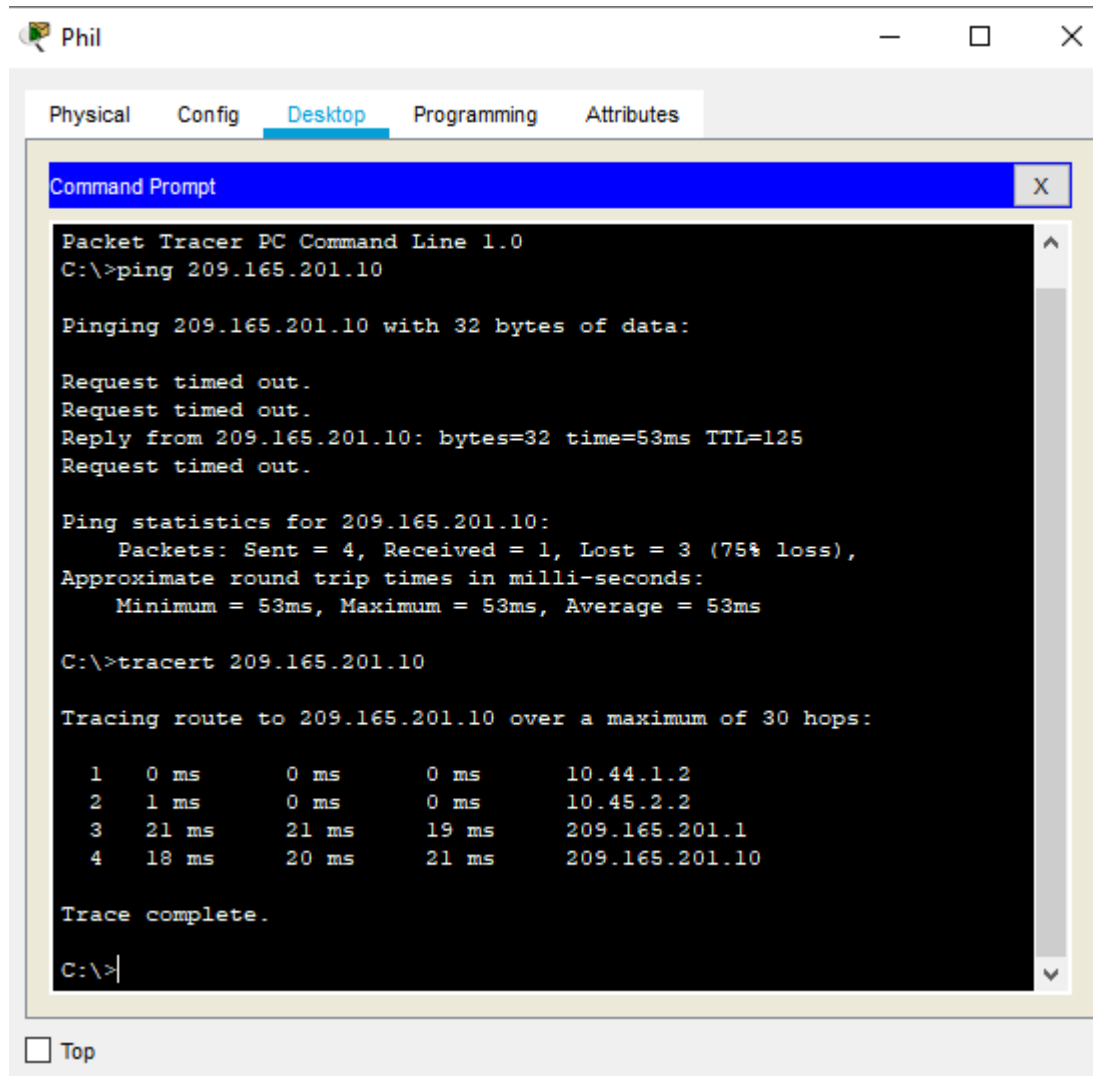


- b. Click the **Desktop** tab and then click **Command Prompt**.



Step 2: Trace the pathway to the External Web server.

- Ping the **External Web** server on the **Internet** by entering **ping 209.165.201.10** in the command prompt.
- Trace the pathway to the **External Web** server on the **Internet** by entering **tracert 209.165.201.10** in the command prompt.



The screenshot shows a Packet Tracer PC Command Line window for a device named 'Phil'. The 'Desktop' tab is selected. The Command Prompt window displays the following output:

```
Packet Tracer PC Command Line 1.0
C:\>ping 209.165.201.10

Pinging 209.165.201.10 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 209.165.201.10: bytes=32 time=53ms TTL=125
Request timed out.

Ping statistics for 209.165.201.10:
    Packets: Sent = 4, Received = 1, Lost = 3 (75% loss),
Approximate round trip times in milli-seconds:
    Minimum = 53ms, Maximum = 53ms, Average = 53ms

C:\>tracert 209.165.201.10

Tracing route to 209.165.201.10 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    10.44.1.2
  2  1 ms    0 ms    0 ms    10.45.2.2
  3  21 ms   21 ms   19 ms   209.165.201.1
  4  18 ms   20 ms   21 ms   209.165.201.10

Trace complete.

C:\>
```

- Each IP address shown in the output of the **tracert** command is a network device that network traffic is crossing.

What are the IP addresses of the devices that the traffic from Phil's laptop is crossing to reach the External Web server?

10.44.1.2 , 10.45.2.2 , 209.165.201.1 , 209.165.201.10

The first address of the **tracert** output is the default gateway (exit point) of the network.

- Comparing the output of the tracert command to the Addressing Table at the beginning of this lab, which router is operating as the current default gateway?**

Router R1

Step 3: Cause a network failover.

- Within the **Metropolis Bank HQ** site, click the switch **HQ_S1**.
- Click the **CLI** tab.
- Disable the uplink port Gig0/2 using the following commands:

```
HQ_S1#enable
HQ_S1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
HQ_S1(config)#interface GigabitEthernet0/2
HQ_S1(config-if)#shutdown

HQ_S1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to
administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2,
changed state to down
```

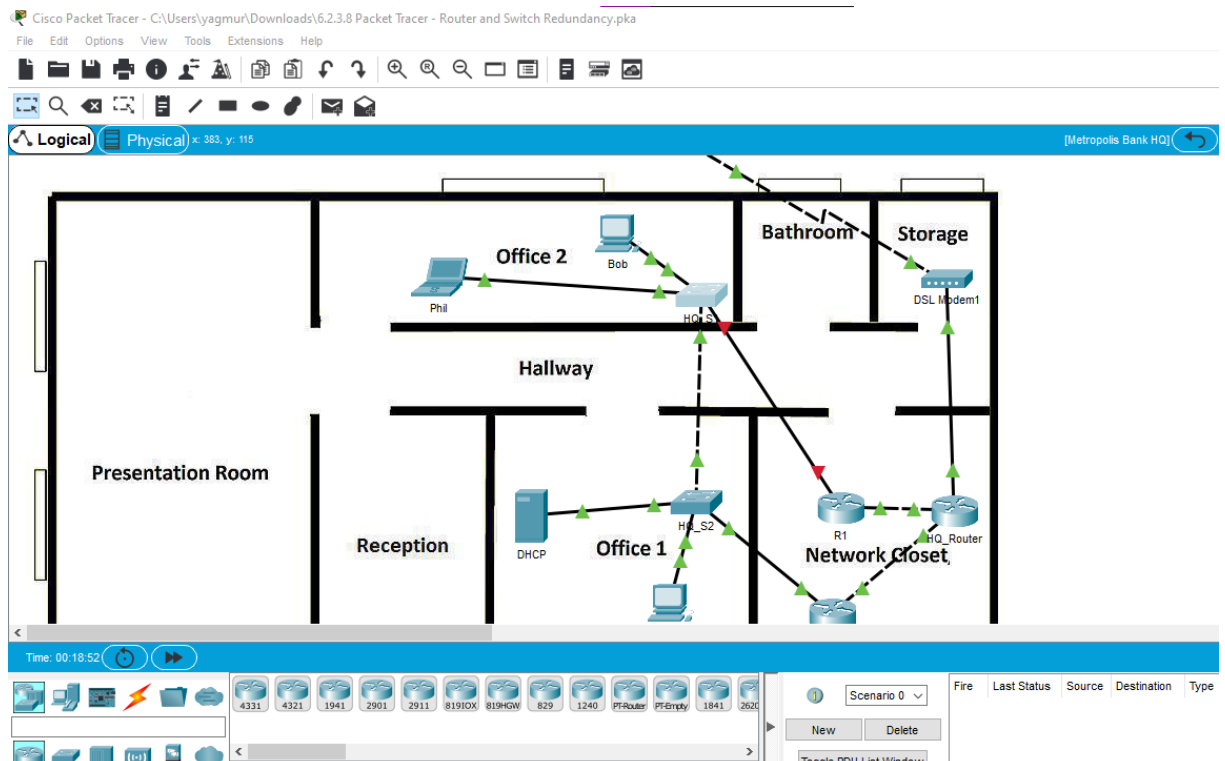
Ctrl+F6 to exit CLI focus

Copy

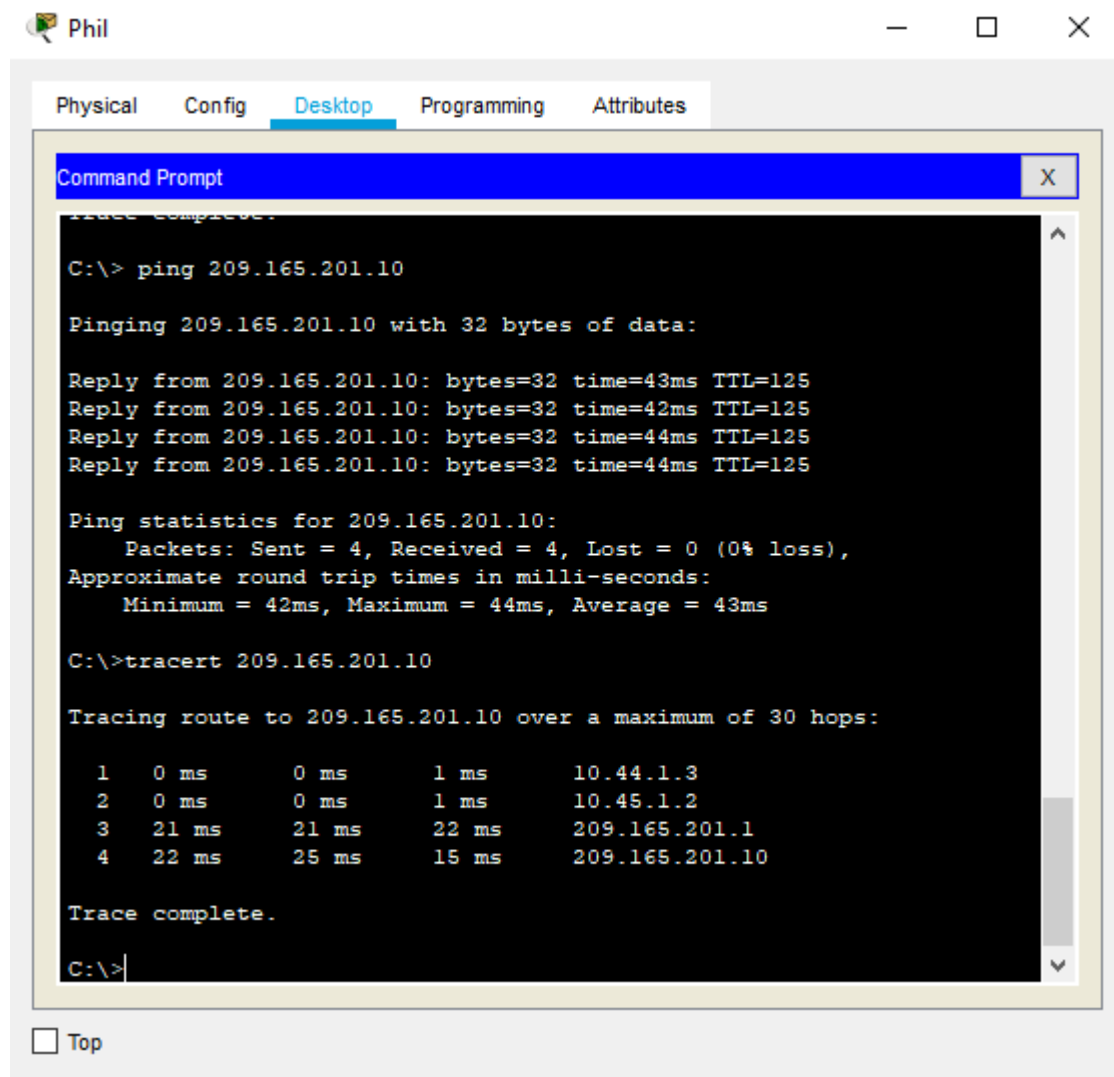
Paste

Step 4: Trace the pathway to the External Web server again.

- Within the **Metropolis Bank HQ** site, click the laptop **Phil**.



- b. Click the **Desktop** tab and then click **Command Prompt**.
- c. Ping the **External Web** server on the **Internet** by entering **ping 209.165.201.10** in the command prompt.



- d. Trace the pathway to the **External Web** server on the **Internet** by entering **tracert 209.165.201.10** in the command prompt.

Each IP address shown in the output of the **tracert** command is a network device that network traffic is crossing.

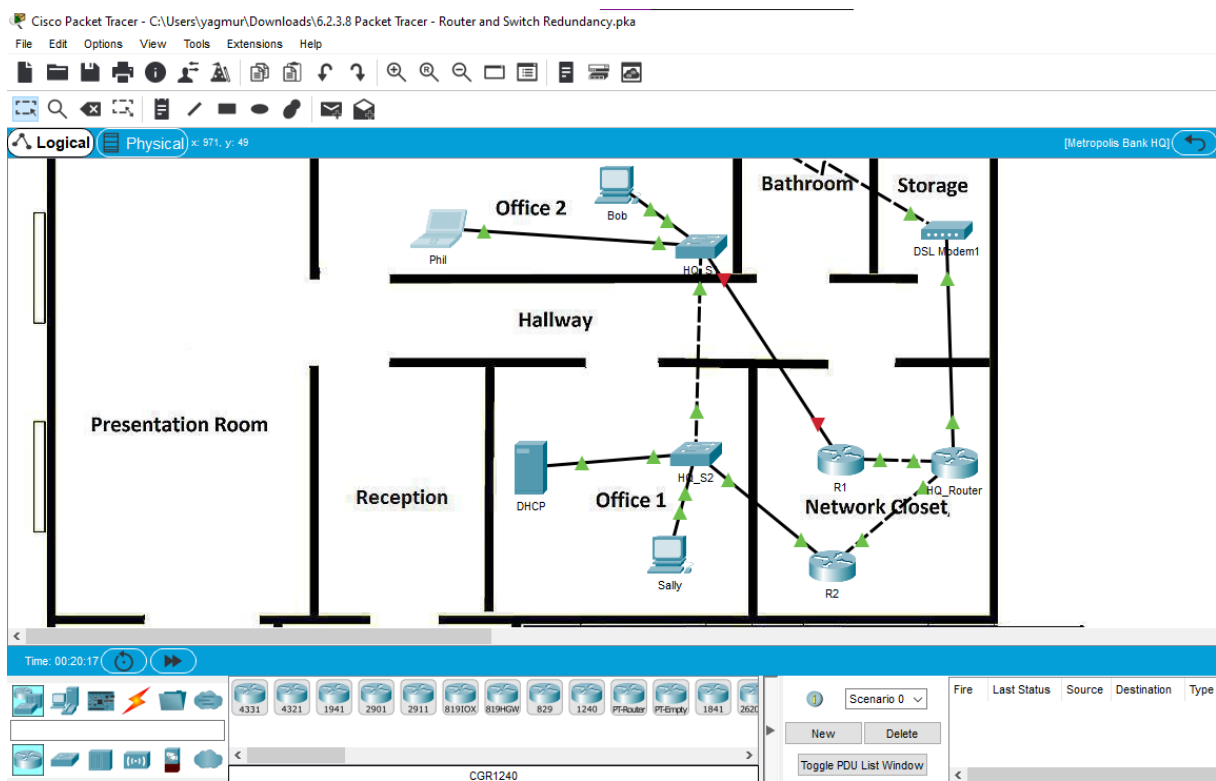
What are the IP addresses of the devices that the traffic from Phil's laptop is crossing to reach the External Web server?

10.44.1.3 , 10.45.1.2 , 209.165.201.1 , 209.165.201.10

- e. The first address of the tracer output is the default gateway (exit point) of the network. Which router is now operating as the current default gateway?

Router R2

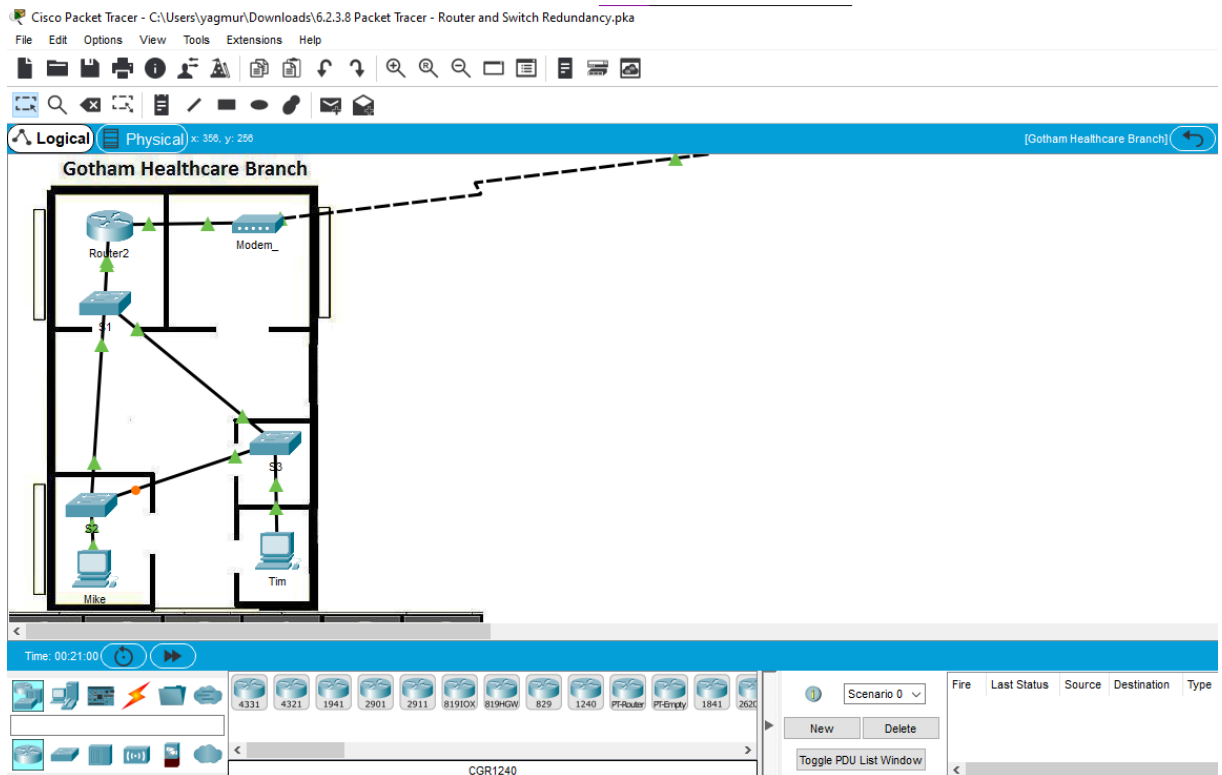
- f. In the **Command Prompt** enter the command **ipconfig**. The default gateway is listed as 10.44.1.1 which is neither 10.44.1.2 from the first time the tracer command was given, nor 10.44.1.3 from the second time the tracer command was given. This shows that the default gateway of 10.44.1.1 is actually routed through redundant routers with different IP addresses, router R1 at 10.44.1.2 or router R2 at 10.44.1.3 if R1 is not available.



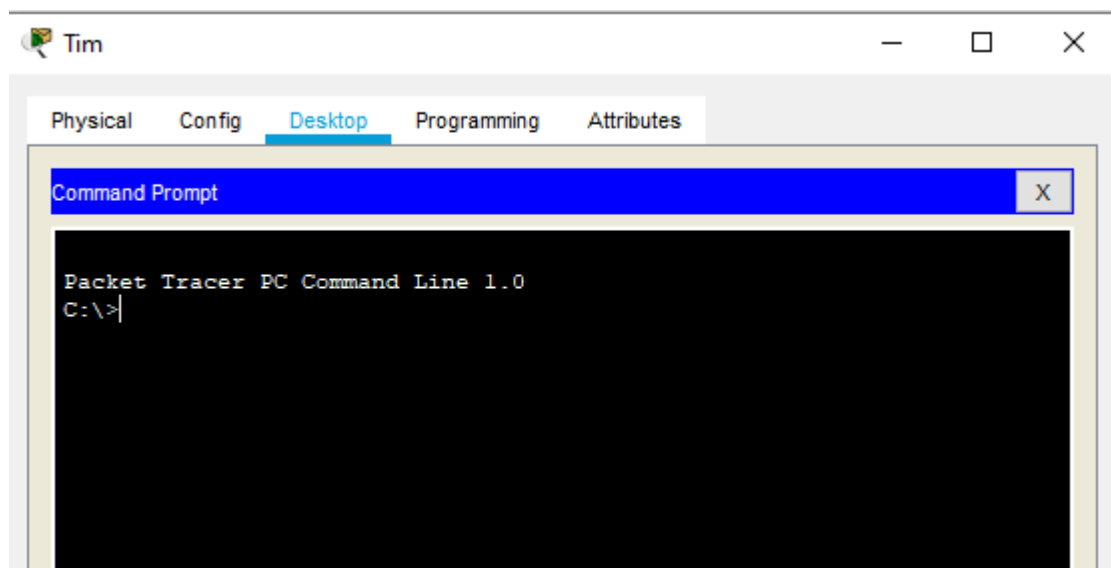
Part 2: Observe a Network Failover with Redundant Switches

Step 1: Access the command prompt on Tim's computer.

- a. Click the **Gotham Healthcare Branch** site and then click the computer **Tim**.



- b. Click the **Desktop** tab and then click **Command Prompt**.

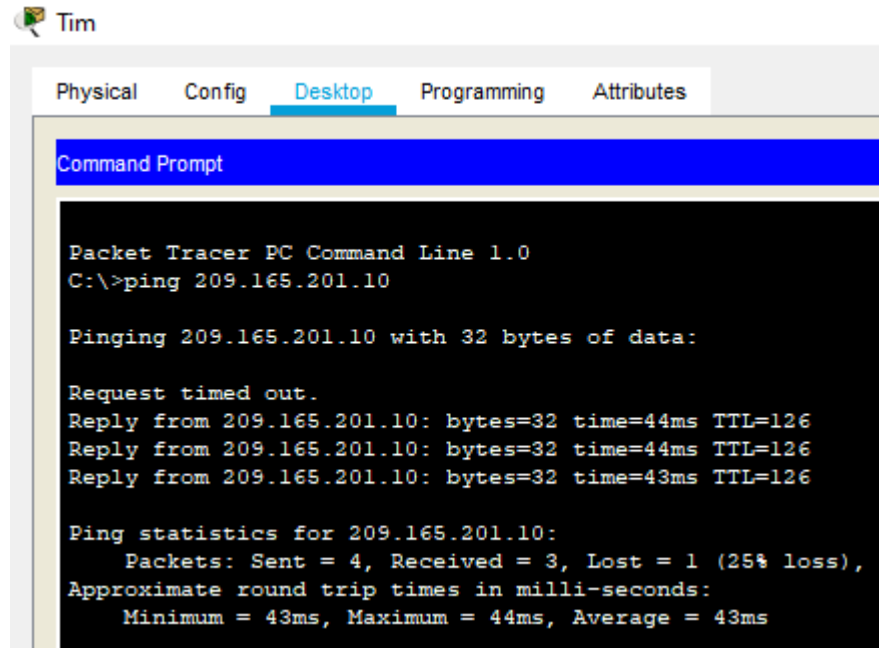


Step 2: Trace the pathway to the External Web server.

- Ping the **External Web** server on the **Internet** by entering **ping 209.165.201.10** in the command prompt.
- In order to observe the network failover, a constant ping can be used.

Ping the **External Web** server with a constant ping by entering **ping -t 209.165.201.10** in the command prompt.

Minimize the Tim computer window.



The screenshot shows a window titled "Tim" with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a Command Prompt window. The Command Prompt shows the output of a ping command to 209.165.201.10. The output indicates that the first ping request timed out, while the subsequent three replies were successful with a 32-byte payload, 44ms or 43ms round-trip time, and a TTL of 126. The ping statistics show 4 packets sent, 3 received, and 1 lost (25% loss), with round-trip times ranging from 43ms to 44ms.

```
Packet Tracer PC Command Line 1.0
C:\>ping 209.165.201.10

Pinging 209.165.201.10 with 32 bytes of data:

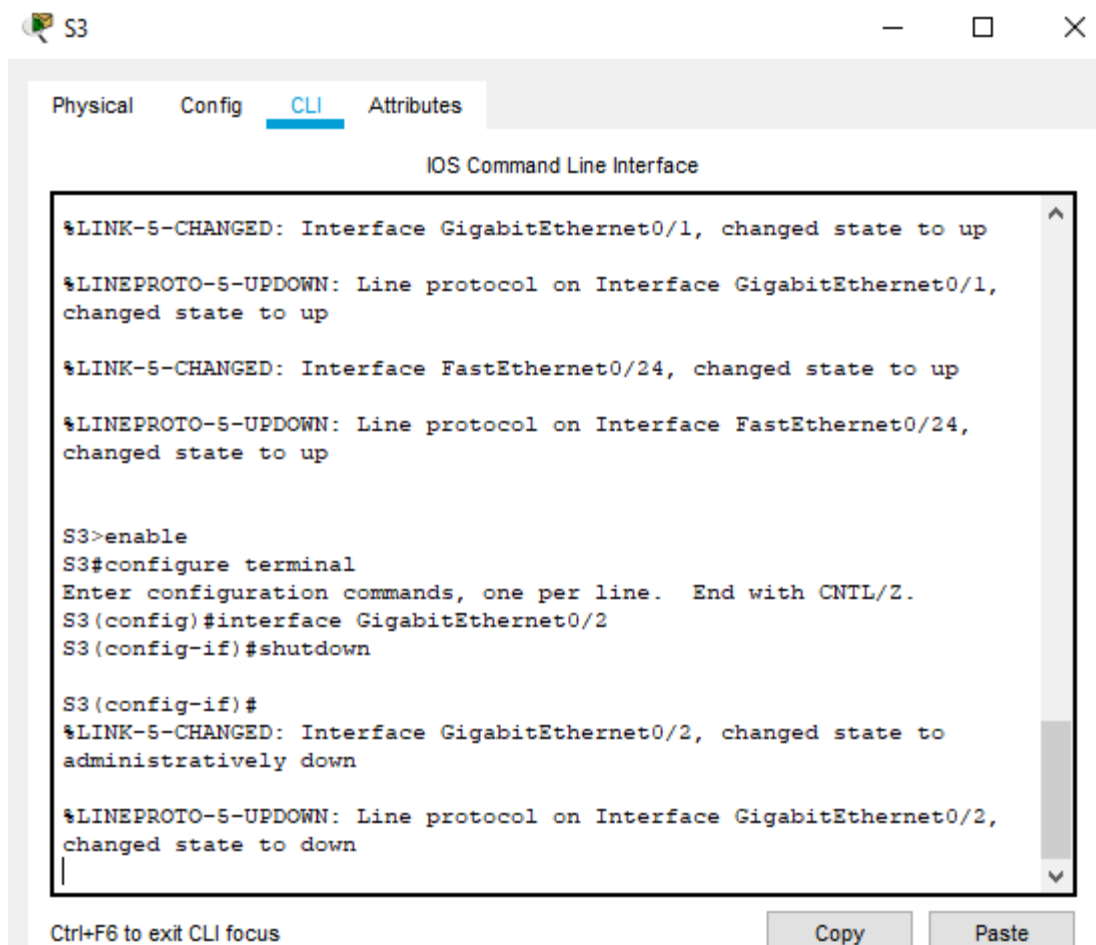
Request timed out.
Reply from 209.165.201.10: bytes=32 time=44ms TTL=126
Reply from 209.165.201.10: bytes=32 time=44ms TTL=126
Reply from 209.165.201.10: bytes=32 time=43ms TTL=126

Ping statistics for 209.165.201.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 43ms, Maximum = 44ms, Average = 43ms
```


Step 3: Cause a network failover.

- Within the **Gotham Healthcare Branch** site, click the switch **S3**.
- Click on the **CLI** tab.
- Disable the uplink port Gig0/2 using the following commands:

```
enable
configure terminal
interface GigabitEthernet0/2
shutdown
```



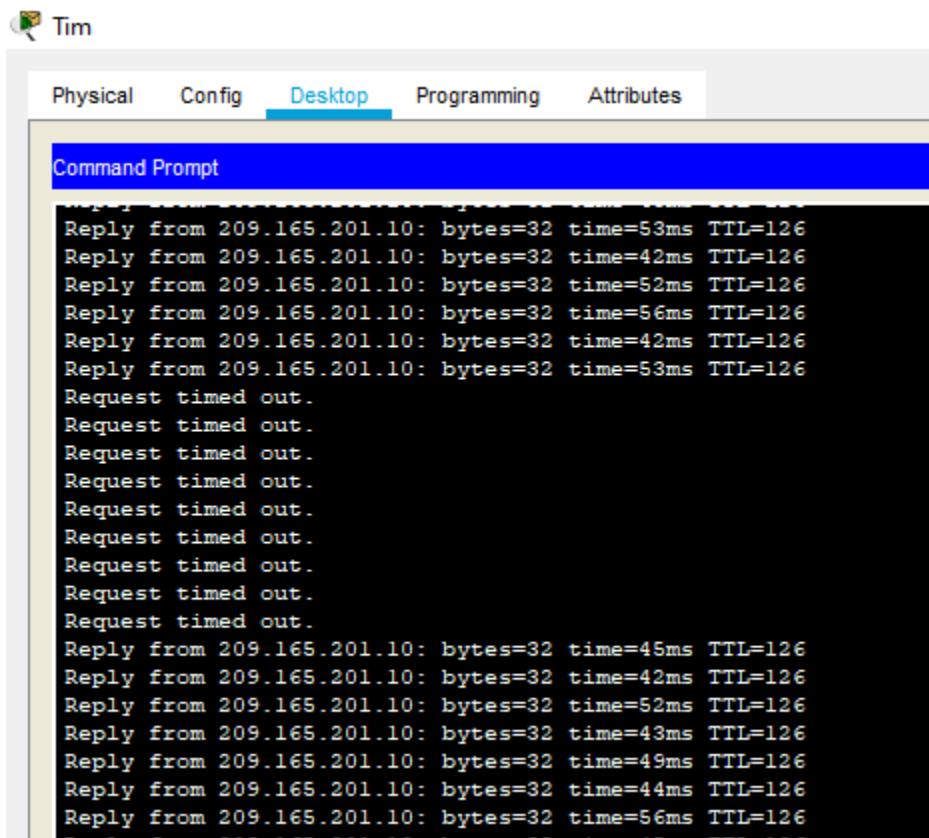
Step 4: Trace the pathway to the External Web server again.

- Within the **Gotham Healthcare Branch** site, maximize the Tim computer window.
- Wait about 30-60 seconds. You can also watch the switchport link lights in the Gotham Healthcare Branch network.

- c. The output on Tim's computer should be similar to the following:

```
PC> ping -t 209.165.201.10
Pinging 209.165.201.10 with 32 bytes of data:

Reply from 209.165.201.10: bytes=32 time=47ms TTL=126
Reply from 209.165.201.10: bytes=32 time=42ms TTL=126
Reply from 209.165.201.10: bytes=32 time=42ms TTL=126
Reply from 209.165.201.10: bytes=32 time=43ms TTL=126
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 209.165.201.10: bytes=32 time=41ms TTL=126
Reply from 209.165.201.10: bytes=32 time=42ms TTL=126
Reply from 209.165.201.10: bytes=32 time=42ms TTL=126
```



- d. Close the window.

Which cable was the data crossing during the successful ping replies before the “Request timed out” message occurred?

Gigabit Ethernet 0/2, the cable connecting switch S1 to switch S3

Which cable was the data crossing during the successful ping replies after the “Request timed out” message occurred?

Gigabit Ethernet 0/1, the cable connecting switch S2 to switch S3

- e. **What does this scenario prove about switch failover redundancy when a Gigabit Ethernet port is shutdown all of a sudden?**

It proves that another switchport can be turned on automatically and traffic can take a redundant path.

