Investigating routes

# Introduction

This activity uses **Packet Tracer**. This is the same software that was used in Lesson 5. In this activity, you will investigate how different routes are calculated by using a simulated network.

# Access the website .

| **Steps** | **Instructions** |
| --- | --- |
| 1. **Locate** the Packet Tracer software | * Teacher enter the instructions for opening Packet Tracer on your school network here |
| 1. **Open** the A3 Investigating routes file | * Go to File > Open * Teacher enter the instructions for locating the A3 Investigating file here |
| 3. **Open** PC0(1)’s settings. | * Make sure that you have the select tool selected      * Click on PC0(1) in the home network. This is the PC that is on the far left side of the screen. |
| 4. **Open** the web browser | * Click **Desktop** * Click **Web Browser** |
| 5. **Access** the web page that is stored on the web server (far right) | * You are accessing the web page that is stored on the web server with an IP address of 190.0.0.10. This is the server that is in the far right of the screen. * Type 190.0.0.10 into the **URL** section of the Packet tracer web browser. * Press ENTER |
| 6. **View** the webpage | * The web page should have loaded within the Packet tracer web browser. |

# Ping the web server .

A ping is used in networking to check that a connection can be established between two devices on the network. When you ping a device, four packets (pieces) of data will be sent in turn to see if the connection can be established. Four packets are sent because the first few attempts may not work as the route is being established..

| **Steps** | **Instructions** |
| --- | --- |
| 1. **Close** the web browser | * Click the X that is directly above the word Stop on the web browser. * You should now see the desktop options again.   If you have accidentally closed the settings box, then open it again by clicking on PC0(1) and selecting **Desktop**. |
| 1. **Open** the command prompt | * Click on **Command prompt** |
| 3. **Ping** the web server | * Type the following into the command prompt   ping 190.0.0.10   * Press Enter |
| 4. **Observe** the ping taking place | * The ping request should send four packets (pieces) of data to the web server and send them back again. This checks that the home PC can connect to the web server. * Notice that there is a time listed next to each packet in milliseconds (ms). This tells you the latency for each packet. |

# Ping in simulation mode .

By pinging in simulation mode you can observe the actual packets travelling through the network. This will show you the route that the packet has chosen to take. This route has been calculated by finding the ‘lowest cost’ route.

| **Steps** | **Instructions** |
| --- | --- |
| 1. Establish a **continuous ping** | * Type the following into the command prompt   ping -t 190.0.0.10   * Press Enter.   This will continuously ping the web server so that you can see which route the data takes.   * You don’t need to have the settings box open any more so you can close it. This is the window with the command prompt on. |
| 1. Change to **simulation** mode | * Click on **Simulation** in the bottom, right-hand corner of your screen |
| 3. **Start** the simulation | * Click on the play button to start the simulation |
| 4. **Observe** the simulation | * A packet will continuously be sent from the home PC to the web server and back again. This shows you the route that the packet is taking. * Observe this a few times to see what is happening. Note the route that it takes. |

# Lower the bandwidth .

Your ping is currently taking route two (the bottom route) to send packets from the home computer to the web server. This is because it currently has the lowest routing costs. The bandwidth is the same throughout the network but route one (the top route) has more links, giving it a higher overall routing cost. This task will increase the cost of route two by lowering the bandwidth of the link between Blackpool and Cambridge. This will force the network’s routing protocol to find a better route.

| **Steps** | **Instructions** |
| --- | --- |
| 1. **View** the routing table for Blackpool(1) | * Click on the magnifying glass icon in the top left corner      * Click on the **Blackpool(1)** router * Select **Routing table** |
| 1. **Observe** the data in the routing table | * The network 190.0.0.0 is the network that contains the web server (on the right of your screen) * Find this network on the table (it will have /16 at the end of it) * Notice the Port selected for this network is Serial0/0/1. This is labelled on the simulation as the bottom route (route two). * The **Metric** is also listed. This is the routing cost for this route. |
| 3. **Access** the CLI (Command Line Interface) | * **Close** the routing cost table * Click on the select tool in the top left corner * Click on the **Blackpool(1)** router * Click on CLI at the top of the new window |
| 4. **Get started** | * Make sure that you click **inside**the new window and then press the Enter key. You should now see a prompt like the example below:   Blackpool> |
| 5. **Lower** the bandwidth | * Enter the following text into the prompt:   en  conf t  interface s0/0/1  bandwidth 500  Notice how the prompt changes as you access different sublevels in the configuration menu. To go back a level type 'exit'. |
| 6. **Observe** the change in route | * Watch the simulation carefully. The next time it sends a packet from the home computer, it should take route one (the top route). This is because the routing costs are now lower for that route. |
| 7. **Check** the routing table for Blackpool(1) | * Switch back to the magnifying glass and open up the routing table on **Blackpool(1)** again. * Notice that the port selected to reach the web server has now changed to Serial0/0/0 |

# Lower the bandwidth from Cambridge .

As network engineers, we have only let the router from Blackpool know that the bandwidth of its link to Newcastle is now 500 kbps. The Newcastle router still thinks that it is much higher. You will notice that the packets still take the bottom route on the return journey.

Using the instructions for Blackpool above, **lower the bandwidth on the return journey** and notice how the route changes. Make sure you select the correct Serial interface on Newcastle. It is the one for the link back to Blackpool.

# Explorer tasks .

**Task 1**

See what happens to the route when you delete a connection from the top route. Does it change?

* To delete a connection, click on the delete tool in the top left-hand corner
* You will need to press play on the simulation again to see what happens
* Press Undo to bring back the connection

**Task 2**

Try some other bandwidth options to see what happens to the route.