

Lab 6 Instructions

Marking Scheme:

Packet Tracer Activity: 30% ; Answers to questions: 70%.

A portion of this lab must be demoed during the lab class to receive marks.

Task 0: Preparation

1. Open the Lab 6 PacketTracer activity (.pka file)
2. You will be prompted to set your profile.

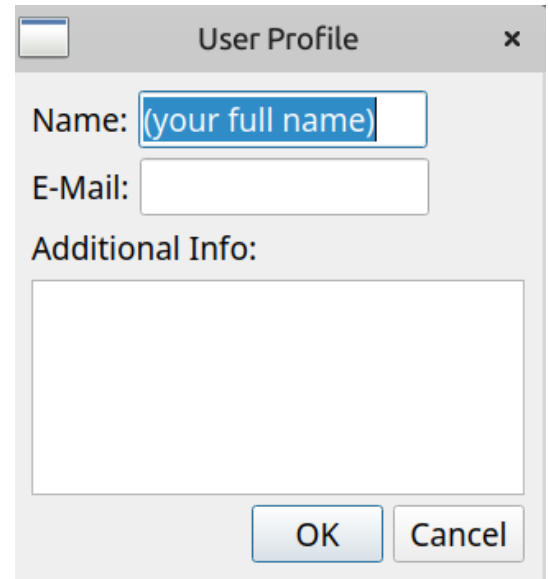
Enter your **full Name as shown on Brightspace** in the profile window. You can leave the E-Mail field empty.

NOTE: Lab submissions without a profile name matching your full name will not receive marks.

To make corrections to the profile, select in the menu bar: **Options** -> **User Profile**. Note that this will reset the activity.

3. Locate the **PT Activity** window to see the IP addresses you've been assigned.

Note that this contains the IP information for all the devices interfaces in each of the 3 networks: A, B and C. You will need to understand and use this information in the next task.

A screenshot of the 'User Profile' dialog box. It has a title bar with a close button (X). The dialog contains three input fields: 'Name:' with the placeholder text '(your full name)', 'E-Mail:', and 'Additional Info:' which is a larger text area. At the bottom right are 'OK' and 'Cancel' buttons.

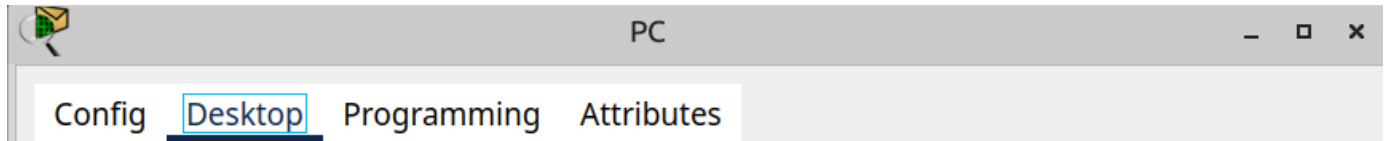
Task 1: Cabling and IP Configurations

1. Cable the network: (remember Packet Tracer devices are not AutoMDIX)
 - a. Connect the PC interface FastEthernet0 to Router0 interface FastEthernet0/0
 - b. Connect Router0 interface FastEthernet0/1 to Router1 interface FastEthernet0/1
 - c. Connect Router1 interface FastEthernet0/0 to the Server Interface FastEthernet0

All link lights should turn green, and **your PT completion should now be 6/24 as shown in the bottom of the PT activity window:**

A screenshot of the bottom of the Packet Tracer activity window. It shows a progress bar with an orange arrow pointing to the right. Below the bar are several buttons: 'Top', 'Dock', 'Check Results', 'Back', '1/1', and 'Next'. The text 'Completion: 6/24' is displayed on the right side of the progress bar.

2. Open the **PC** device and use the **Desktop** tab to set its IP configuration.



Refer to the IP information in your **PT Activity** window for the correct configuration values.

- a. Use Static addressing
- b. Assign the IP Address and Subnet Mask
- c. Assign the correct Default Gateway

Your PT completion should now be 9/24

3. Routers have multiple interfaces (for example: FastEthernet0/1 or Fa0/1 in short), and each needs to be configured individually.

To configure a router's interface use the **Config** tab and select on the left the interface you wish to configure.

Refer to the IP information in your **PT Activity** window for the correct configuration values.

Pay attention to which network each interface is in - the routers use 2 interfaces and each is in a different network!

4. Configure Router0:
- a. Assign the IP address and Subnet Mask to FastEthernet0/0
 - b. Assign the IP address and Subnet Mask to FastEthernet0/1

your PT completion should now be 13/24

5. Configure Router1:
- a. Assign the IP address and Subnet Mask to FastEthernet0/0
 - b. Assign the IP address and Subnet Mask to FastEthernet0/1

your PT completion should now be 17/24

6. Configure the Server:
- a. Use Static addressing
 - b. Assign the IP Address and Subnet Mask
 - c. Assign the correct Default Gateway

your PT completion should now be 20/24

Task 2: Configure Routing and Verify Connectivity

1. As you learned in Module 8 - The Network Layer, a router uses the routing table to decide on the "Next Hop" when it is required to transfer a packet to a certain destination network.

In this part we will set a **static route** in each router.

It can be set under the **config** tab, by selecting the **Static** label under **ROUTING** on the left side of the window:

The screenshot shows the Cisco Packet Tracer configuration interface. On the left, the 'Config' tab is selected, and the 'ROUTING' section is expanded, with 'Static' highlighted. The main area is titled 'Static Routes' and contains three input fields: 'Network', 'Mask', and 'Next Hop'. Below these fields is an 'Add' button. At the bottom right, there is a 'Remove' button. The 'Network Address' section is currently empty.

There are 3 fields to be set:

Network - The destination network's IP

Mask - The destination network's subnet mask

Next Hop - The next hop's interface IP

Once the fields are set, the static route can be applied by clicking the **Add** button.

Note: the Next Hop interface must be in the same network as one of the router's interfaces, otherwise it wouldn't be reachable from the router in a single hop.

2. Assign the correct static route to Router0 so that traffic from NetA can reach NetC
 3. Assign the correct static route to Router1 so that traffic from NetC can reach NetA
- your PT completion should now be 24/24**
4. Test the network to be sure the PC can reach the server. The first request(s) may timeout.
 5. Save your PT file for later submission to Brightspace

Demo this task and show your ping result from PC to Server to your lab instructor.

In the tasks below you will be asked some questions. Answer them in your answer-sheet.

Read all the words and follow all the instructions accurately to avoid losing marks.

Task 3: IP and ICMP

1. Open the Desktop command prompt on the PC and ping the server. We want to make sure that the ARP tables are populated. The first Ping request may timeout.

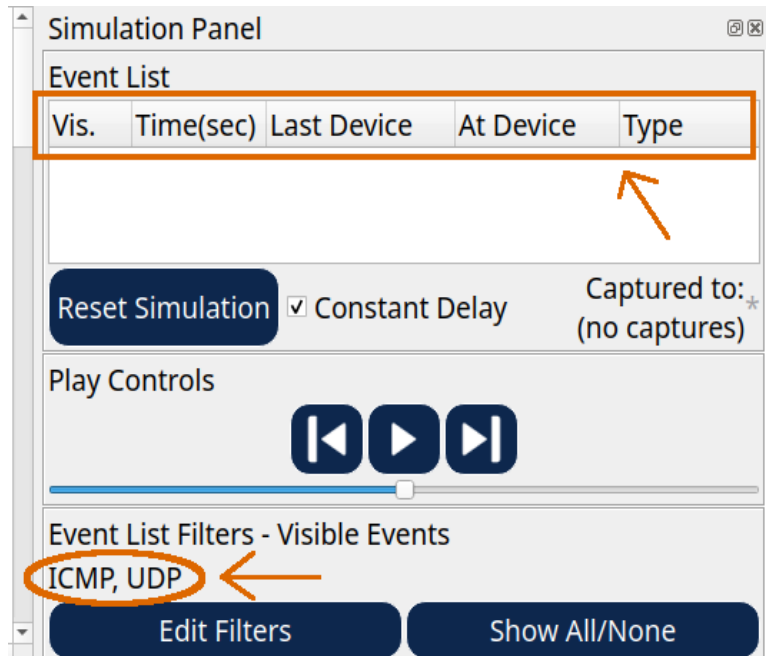
2. Switch PT from Realtime into **Simulation Mode**:



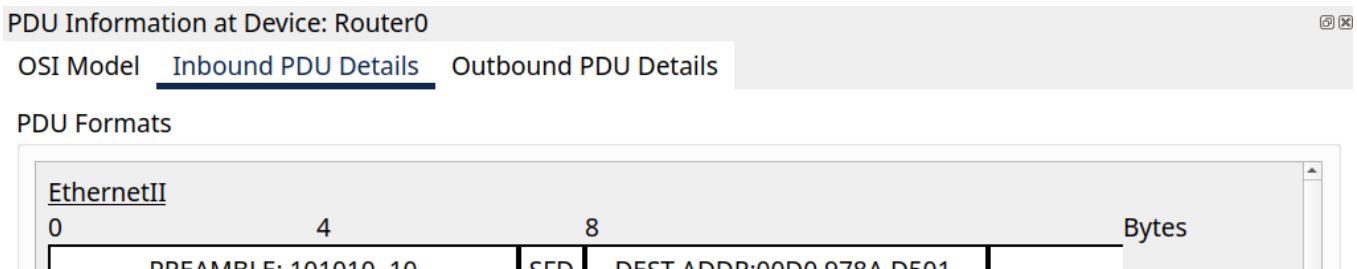
Make sure that in the Simulation Panel:

(a) The **Events List** is wide enough to see all **5** fields, including **At Device** and **Type**.

(b) The **Event List Filters** include only **ICMP** and **UDP**.



3. Open the Desktop command prompt on the PC and ping the server again.
Click on the **Capture/Forward** (▶) button once to move the packet to **Router0**. Click on that PDU (where At Device is Router0) and then the **Inbound PDU Details** tab:



- a. What is the value of the **TTL** field in the **IP Header**?
 - b. What are the values of the **Type** and **Code** fields in the **ICMP header**?
4. Look at the Outbound PDU details tab. Have any of the values recorded in the step above changed? What field and value (if any) changed?

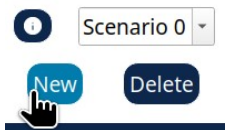
5. Close the PDU information window. Use the capture forward button to move the PDU to the Server until it is back at Router0. Click on that PDU and the **Inbound PDU Details** tab.
 - a. What is the value of the **TTL** field in the **IP Header**?
 - b. What are the values of the Type and Code fields in the **ICMP header**?


Make sure you can answer these before starting Task 4:

- What do you think would be different in the **IP header** between the Inbound and outbound PDUs in this device? Verify.
- What has changed in the **ICMP header** between the PDU that entered Router0 from the PC (see **3.b.**) and the PDU that returned to Router0 from the server? (see **5.b.**)
- Use the Lab 2 Reference document to find what the **ICMP type** values before and after mean in words.

Task 4: Complex PDUs

1. In this task you need to build a series of “Complex PDUs” and use them to observe the behaviour of the network.
Make sure you are still in Simulation Mode. Reset the simulation (click the **New** button under the scenario name as shown on the right (should become “Scenario 1”)



2. Click on the **Create Complex PDU** icon () in the Tool Bar and then click on the **PC**. A “Create Complex PDU” window like the window on the right should open.
3. Create the PDU with the parameters below.
 - a. Select Application: **PING**
 - b. Destination IP Address: **(The server's IP)**
 - c. Source IP Address: **(The PC's IP)**
 - d. TTL: **1**
 - e. Sequence number: **1**
 - f. Simulation settings: **One Shot ; 1 second**
 - g. Keep the rest at the default and click **Create PDU**
4. Use the “Capture/Forward” button to move the PDU to **Router0**. Once arrived to router0, a second PDU should be created.
5. Examine this new PDU (it will only have an **Outbound PDU Details** tab) and answer the following:
 - a. Which device matches the **source IP**?
 - b. Which device matches the **destination IP**?
 - c. Examine the ICMP Type and Code. What does the **type** value mean in words? (Convert it to decimal and check the Lab 2 reference document)
 - d. If you keep on scrolling after the ICMP Header, what comes below it? Describe it. Hint: examine the PDU that arrived to Router0 before the one you selected (The inbound PDU).

A screenshot of the 'Create Complex PDU' dialog box. It is divided into three sections: 'Source Settings', 'PDU Settings', and 'Simulation Settings'.
- 'Source Settings': 'Source Device' is set to 'PC', 'Outgoing Port' is 'FastEthernet0', and 'Auto Select Port' is checked.
- 'PDU Settings': 'Select Application' is a dropdown menu. Below it are input fields for 'Destination IP Address', 'Source IP Address', 'TTL', 'TOS', 'Sequence Number', and 'Size'.
- 'Simulation Settings': There are two radio buttons. 'One Shot' is selected with a time of 1 second. 'Periodic' is unselected with an interval of 1 second.
A 'Create PDU' button is at the bottom right.

6. **Create another new scenario** as you've done in step 1. (Should become "Scenario 2")
7. Create another complex PDU with the same parameters as above except this time set the **TTL** value to **2**.
8. Use the capture forward button to see how far from the PC this PDU will travel.
 - a. A new PDU was created at the final device. Examine the **Outbound PDU Details** for that PDU. To what device does the destination IP belong?
 - b. Why did the PDU we created in this scenario moved farther than the one we created in the previous scenario (step 2)?
 - c. Why both PDUs never reached the Server?

9. **Create another new scenario** (should be "Scenario 3") and a new Complex PDU from PC as following:
 - a. Select Application: **PING**
 - b. Destination IP Address: **205.211.22.33**
 - c. Source IP Address: **(The PC's IP)**
 - d. TTL: **32**
 - e. Sequence number: **2**
 - f. Simulation settings: **One Shot ; 1 second**
 - g. Keep the rest at the default and click **Create PDU**
10. Use the Capture/forward button to advance the PDU until a return PDU is generated. Examine the returned PDU at the device that created it (Outbound PDU Details) and answer the following:
 - a. How far (to which device) did the PDU travel?
 - b. Examine the ICMP Type and Code. What do both Type and Code values mean in words? (Check the Lab 2 reference document)
11. **Create another new scenario** (should be "Scenario 4") and a new Complex PDU from PC with the as following:
 - a. Select Application: **TFTP**
 - b. Destination IP Address: **(The Server's IP)**
 - c. Source IP Address: **(The PC's IP)**
 - d. TTL: **32**
 - e. Starting Source Port: **1025**
 - f. Simulation settings: **One Shot ; 1 second**
 - g. Keep the rest at the default and click **Create PDU**
12. Use the Capture/Forward button to move the PDU to the server. At the Server a new PDU will be created.
 - a. Look at the Simulation Panel's Event List. What was the **type** of the PDU that was moving towards the Server?
 - b. Examine the ICMP PDU that was created at the server (Outbound PDU Details). What do the ICMP **Type** and **Code** values mean in words?

Task 5: Clean up and submission

1. Save your Packet tracer file and the completed answer-sheet. Upload them both to the Lab 6 submission on Brightspace by the deadline.
2. Complete the Post-Lab 6 Quiz by the deadline