

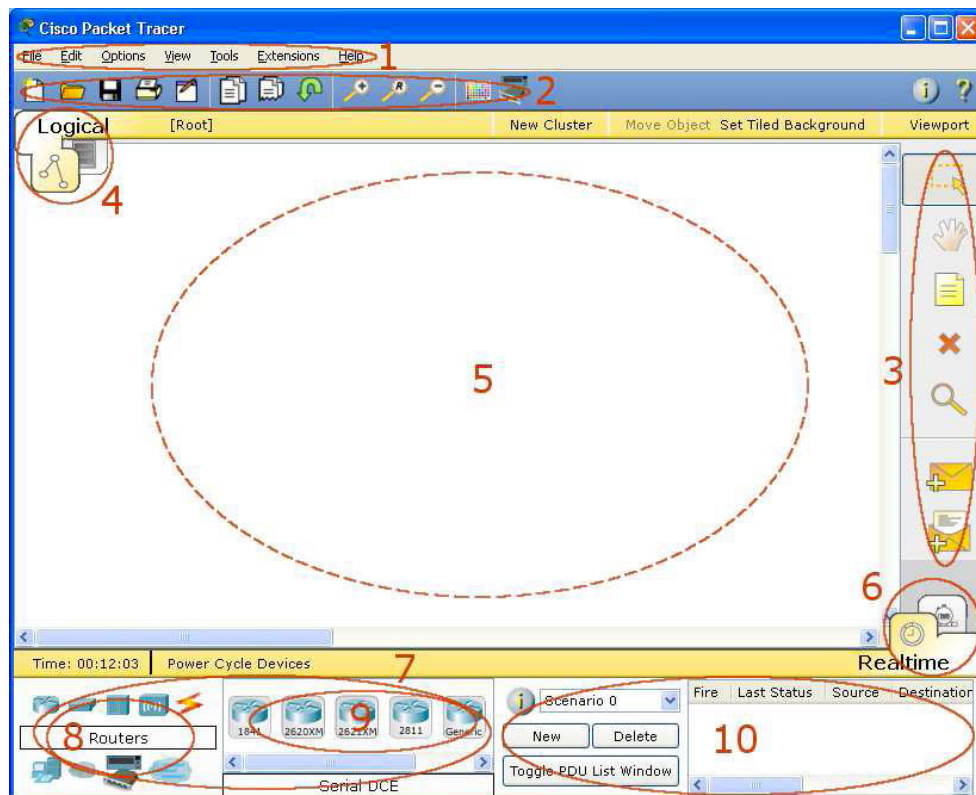
Computer Network Lab

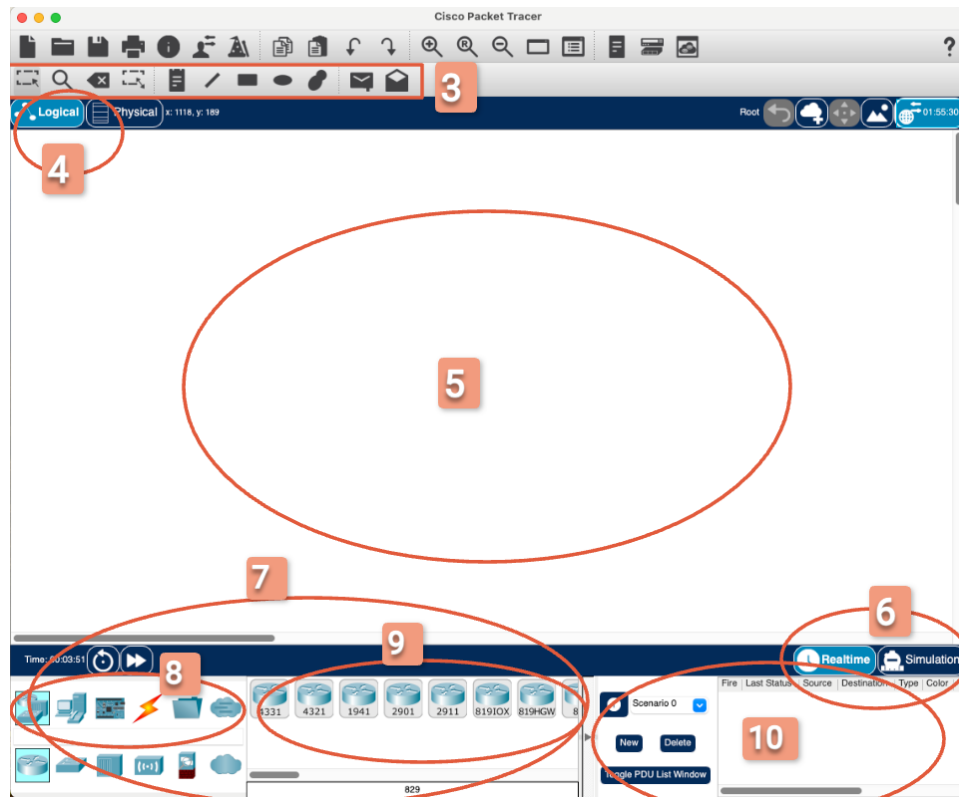
Assist. Prof. Dr. Abdul Hadi Mohammed

## Introduction to Packet Tracer

Packet Tracer is a standalone, medium-fidelity, simulation-based learning environment for networking novices to design, configure, and troubleshoot computer networks at a CCNA-level of complexity. Packet Tracer supports student and instructor creation of simulations, visualizations, and animations of networking phenomena. Like any simulation, Packet Tracer relies on a simplified model of networking devices and protocols. However, real computer networks remain the benchmark for understanding network behavior. Packet Tracer was created to help address the “digital divide” in networking education, where many students and teachers lack access to equipment, bandwidth, and interactive modes of learning networking.

1. Open Packet Tracer by Double-Click; the following screen represents the home screen for the simulator.





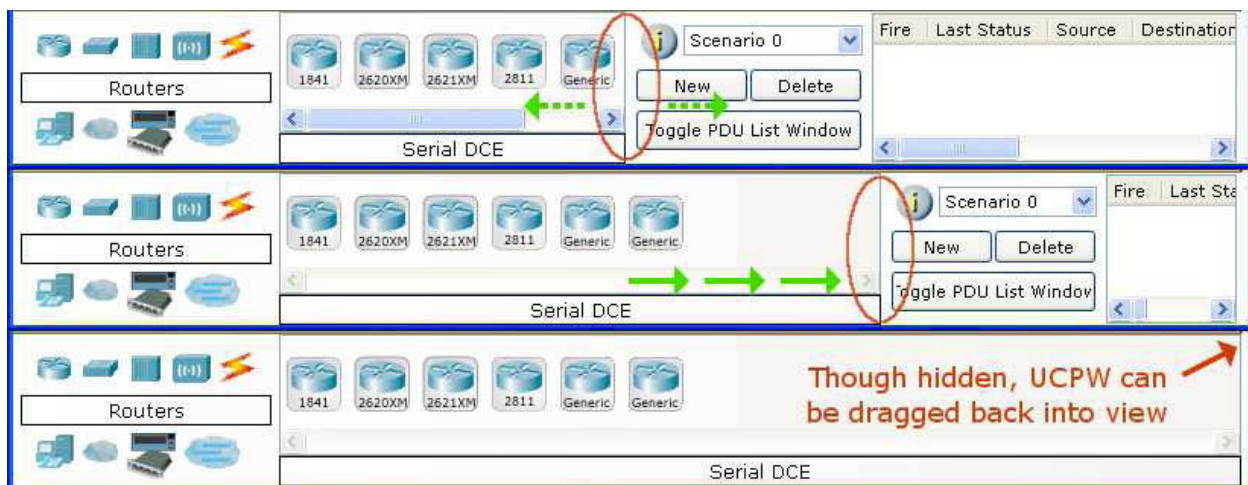
**The packet tracer Consists from:**

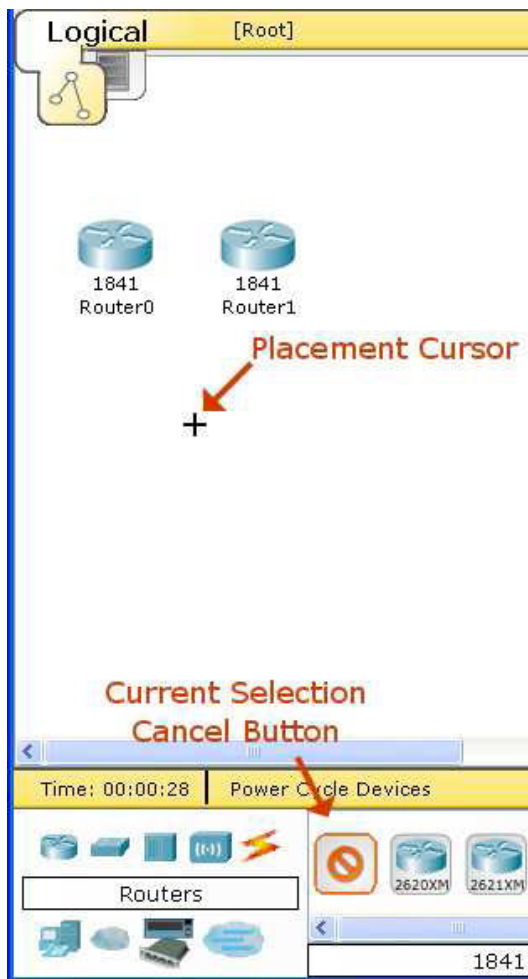
- 1      **Menu Bar**                      This bar provides the File, Edit, Options, View, Tools, Extensions, and Help menus. You will find basic commands such as Open, Save, Print, and Preferences in these menus. You will also be able to access the Activity Wizard from the Extensions menu.
- 2      **Main Tool Bar**                This bar provides shortcut icons to the File and Edit menu commands. This bar also provides buttons for Zoom, the drawing Palette, and the Device Template Manager. On the right, you will also find the Network Information button, which you can use to enter a description for the current network (or any text you wish to include).
- 3      **Common Tools Bar**            This bar provides access to these commonly used workspace tools: Select, Move Layout, Place Note, Delete, Inspect, Add Simple PDU, and Add Complex PDU. See "Workspace Basics" for more information.
- 4      **Logical/Physical Workspace and Navigation Bar**      You can toggle between the Physical Workspace and the Logical Workspace with the tabs on this bar. In Logical Workspace, this bar also allows you to navigate through levels of a cluster, create a new New Cluster, Move Object, Set Tiled Background, and Viewport. In Physical Workspace, this bar allows you to navigate through physical locations, create a New City, create a New Building, create a New Closet, Move Object, apply Grid to the background, Set Background, and go to the Working Closet.

- |    |                                      |  |
|----|--------------------------------------|--|
| 5  | <b>Workspace</b>                     | This area is where you will create your network, watch simulations, and view many kinds of information and statistics.   |
| 6  | <b>Real-time /Simulation Bar</b>     | You can toggle between Real-time Mode and Simulation Mode with the tabs on this bar. This bar also provides buttons to Power Cycle Devices as well as the Play Control buttons and the Event List toggle button in Simulation Mode. Also, it contains a clock that displays the relative Time in Real-time Mode and Simulation Mode. |
| 7  | <b>Network Component Box</b>         | This box is where you choose devices and connections to put into the workspace. It contains the Device-Type Selection Box and the Device-Specific Selection Box.   |
| 8  | <b>Device-Type Selection Box</b>     | This box contains the type of devices and connections available in Packet Tracer 5.1. The Device-Specific Selection Box will change depending on which type of device you choose.  |
| 9  | <b>Device-Specific Selection Box</b> | This box is where you choose specifically which devices you want to put in your network and which connections to make.   |
| 10 | <b>User Created Packet Window*</b>   | This window manages the packets you put in the network during simulation scenarios. See the "Simulation Mode" section for more details.  |

### Devices and connection supported

1. Choose a device type from the Device- Type Selection box
2. Click on the desired device model from the Device-Specific Selection box
3. Click on a location in the workspace to put your device in that location
4. If you want to cancel your selection, press the Cancel icon for that device
5. Alternatively, you can click and drag a device from the Device Specific Selection box onto the workspace
6. You can also click and drag a device directly from the Device-Type Selection box and a default device model will be Chosen.





# Lab 1:

## Introduction to Cisco Packet Tracer and Basic PC-to-PC Communication

### Objective:

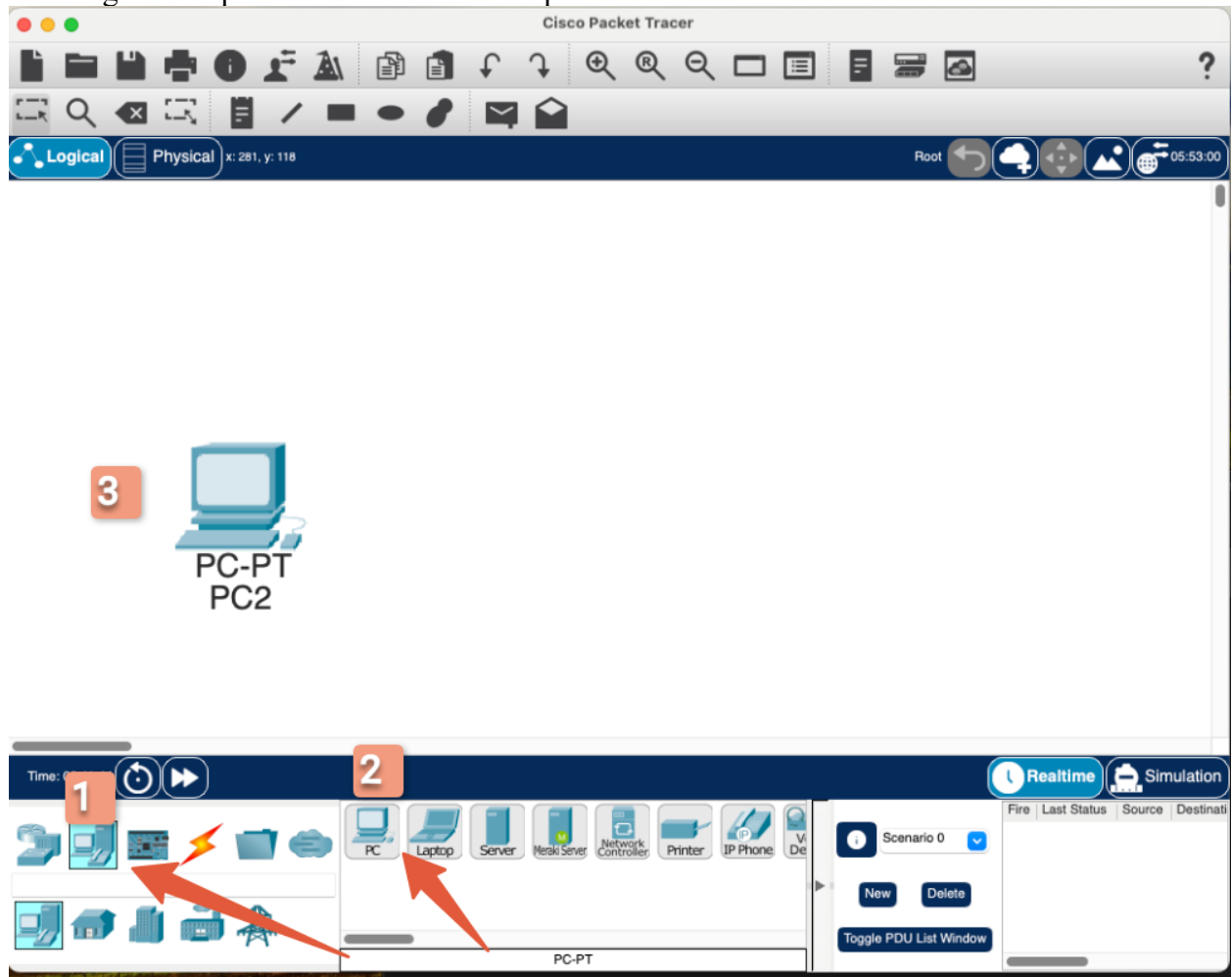
- Learn the basics of Cisco Packet Tracer.
- Set up a basic network connection between two PCs.
- Configure IP addresses on both PCs.
- Send a simple message and analyze the network traffic using the simulation mode.

### Step-by-Step Instructions:

#### Step 1: Open Cisco Packet Tracer

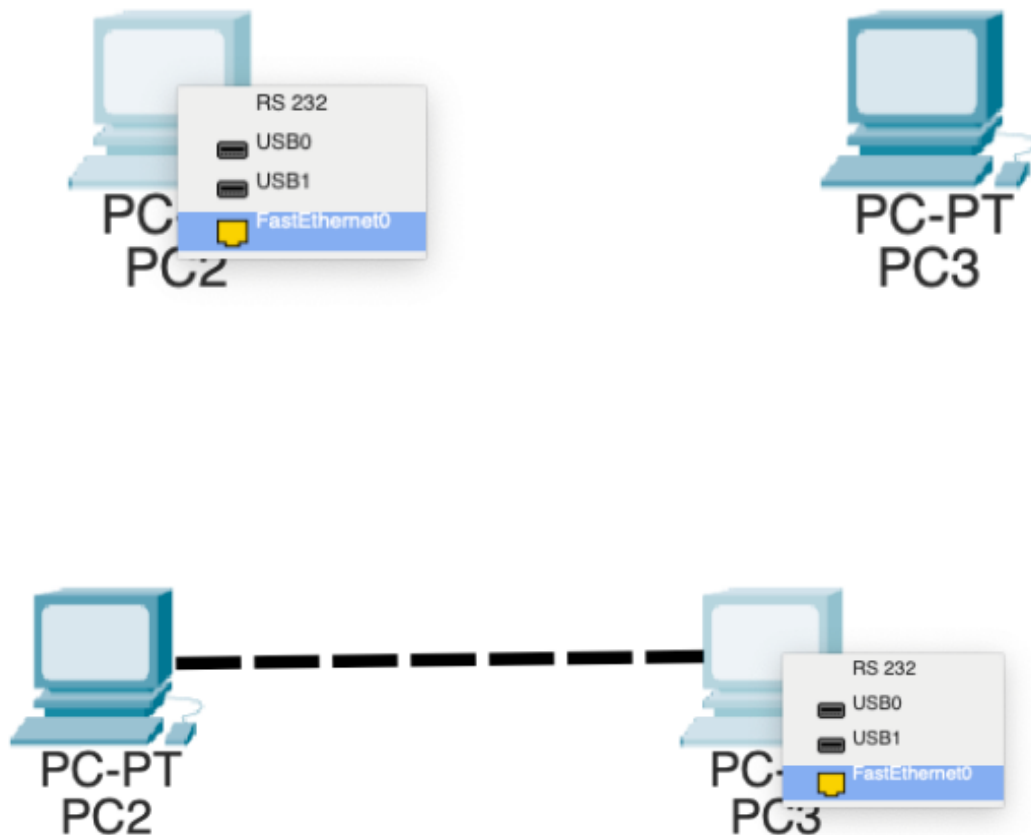
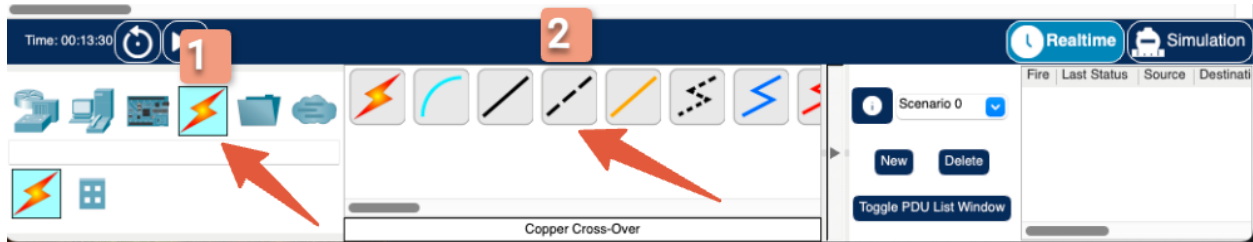
#### Step 2: Add Two PCs to the Workspace

- In the **Devices** section at the bottom of the screen, locate the **End Devices** category.
- Drag and drop two PCs onto the workspace from the End Devices section.



### Step 3: Connect the Two PCs

- Click on the **Connections** icon (represented by a lightning bolt).
- Choose the **Copper Cross-Over** cable.
- Click on **PC1**, select the **FastEthernet0** port, and then click on **PC2** and select **FastEthernet0**.



This establishes a physical connection between the two PCs.

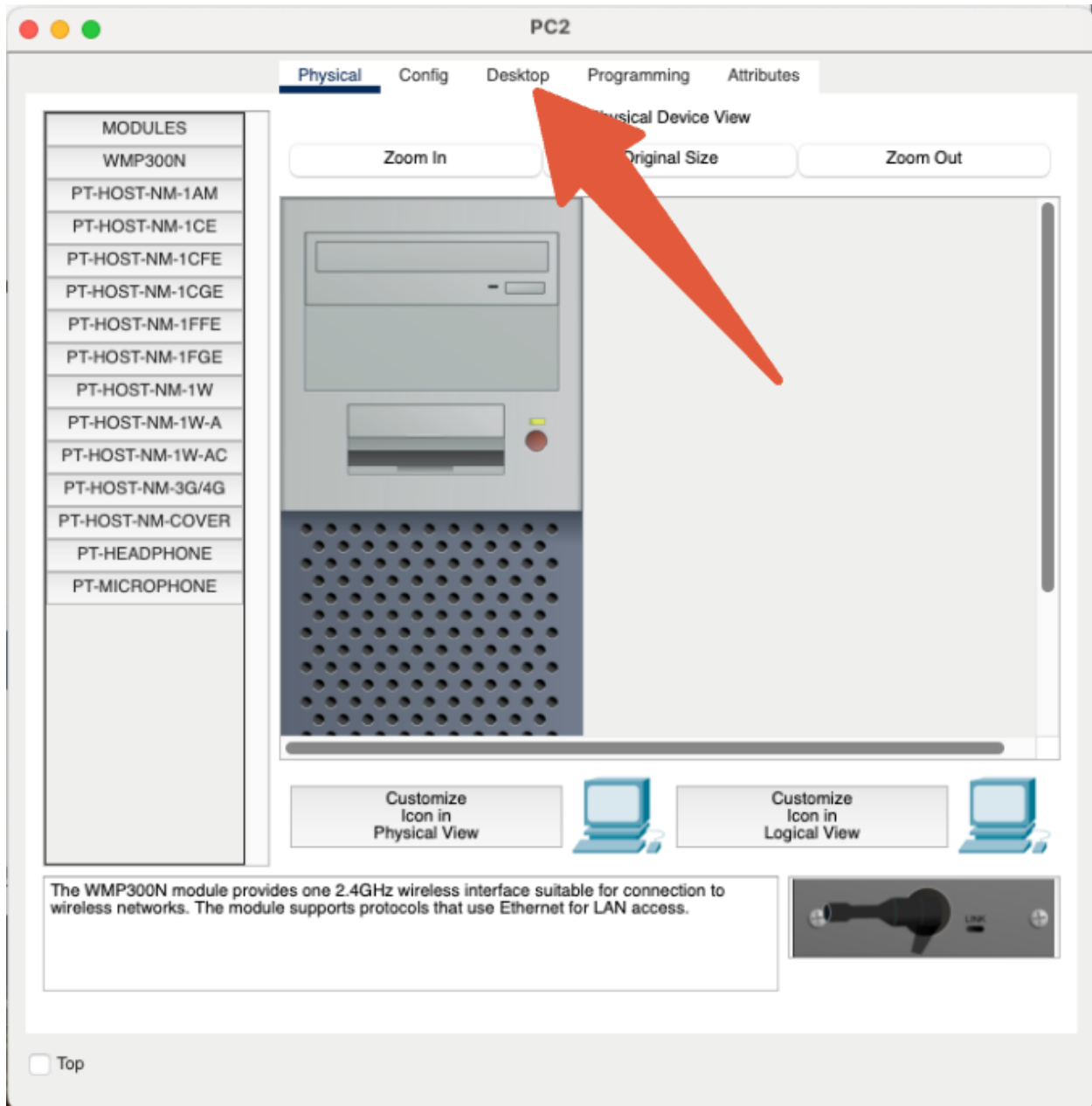
### Step 4: Configure IP Addresses

### 1. PC1 Configuration:

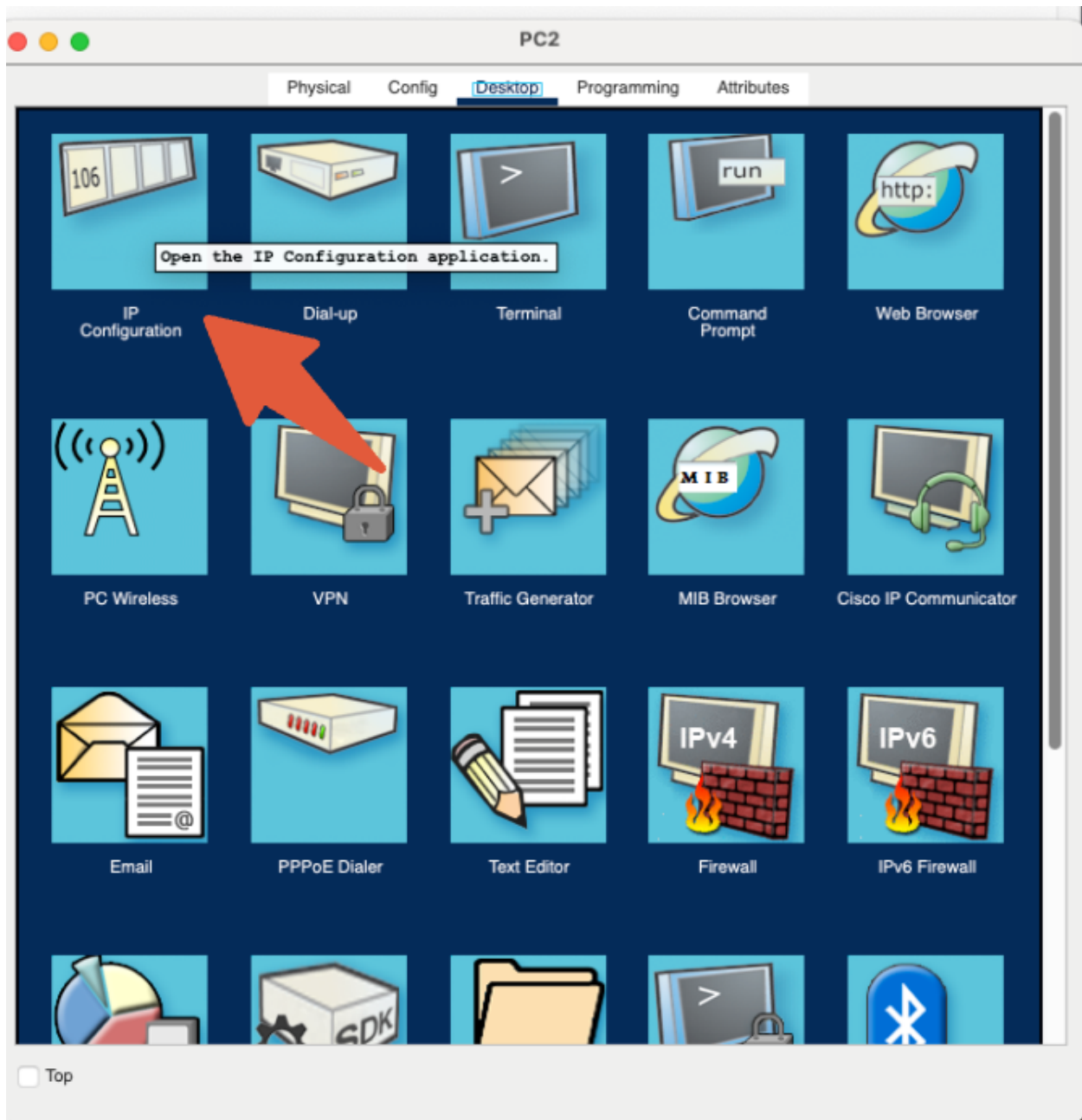
- Click on **PC1** to open its settings.
- Go to the **Desktop** tab and click on **IP Configuration**.
- Assign the following IP details:
  - **IP Address:** 192.168.0.2
  - **Subnet Mask:** 255.255.255.0

### 2. PC2 Configuration:

- Click on **PC2** and repeat the steps above, but this time assign these IP details:
  - **IP Address:** 192.168.0.3
  - **Subnet Mask:** 255.255.255.0







PC2

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0 ↕

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.0.2

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::260:47FF:FE61:7B17

Default Gateway

DNS Server

802.1X

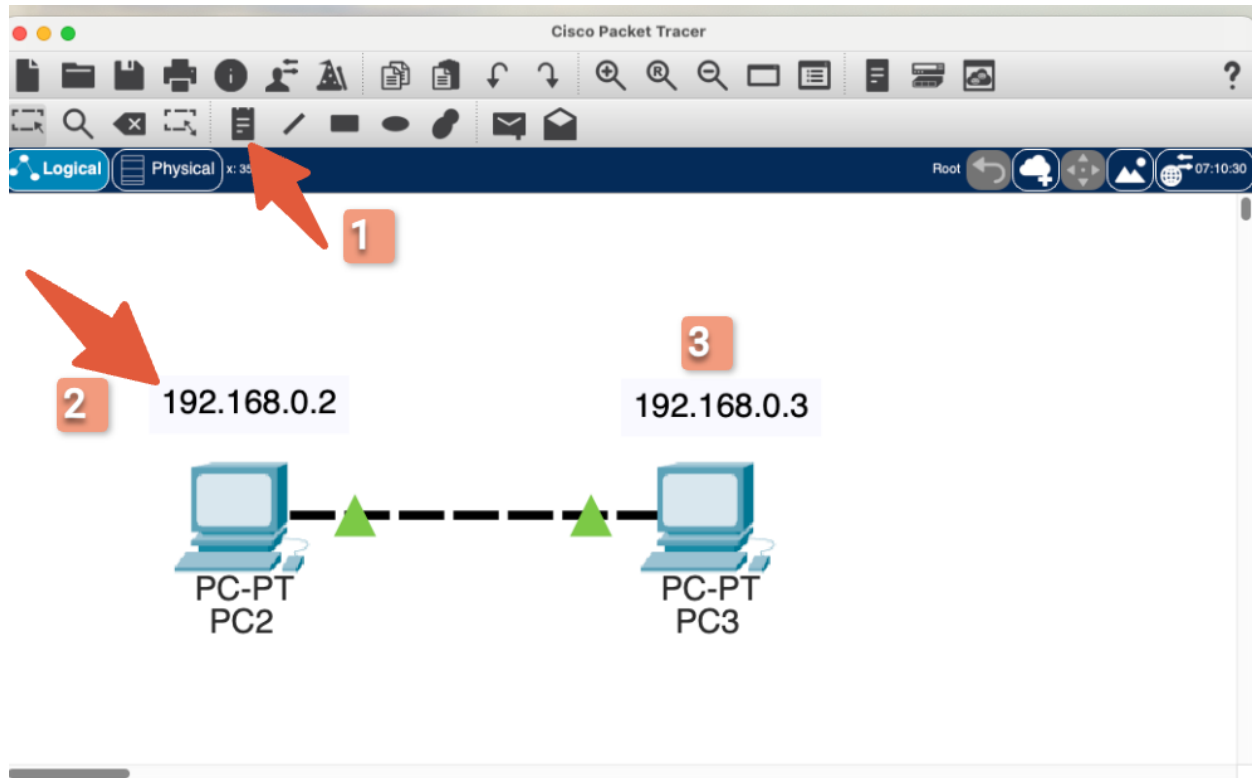
☐ Use 802.1X Security

Authentication MD5 ↕

Username

Password

☐ Top



### Step 5: Send a Message Using Simulation Mode

#### 1. Switch to Simulation Mode:

- In the bottom-right corner of the Packet Tracer screen, switch from **Real-Time** mode to **Simulation** mode.

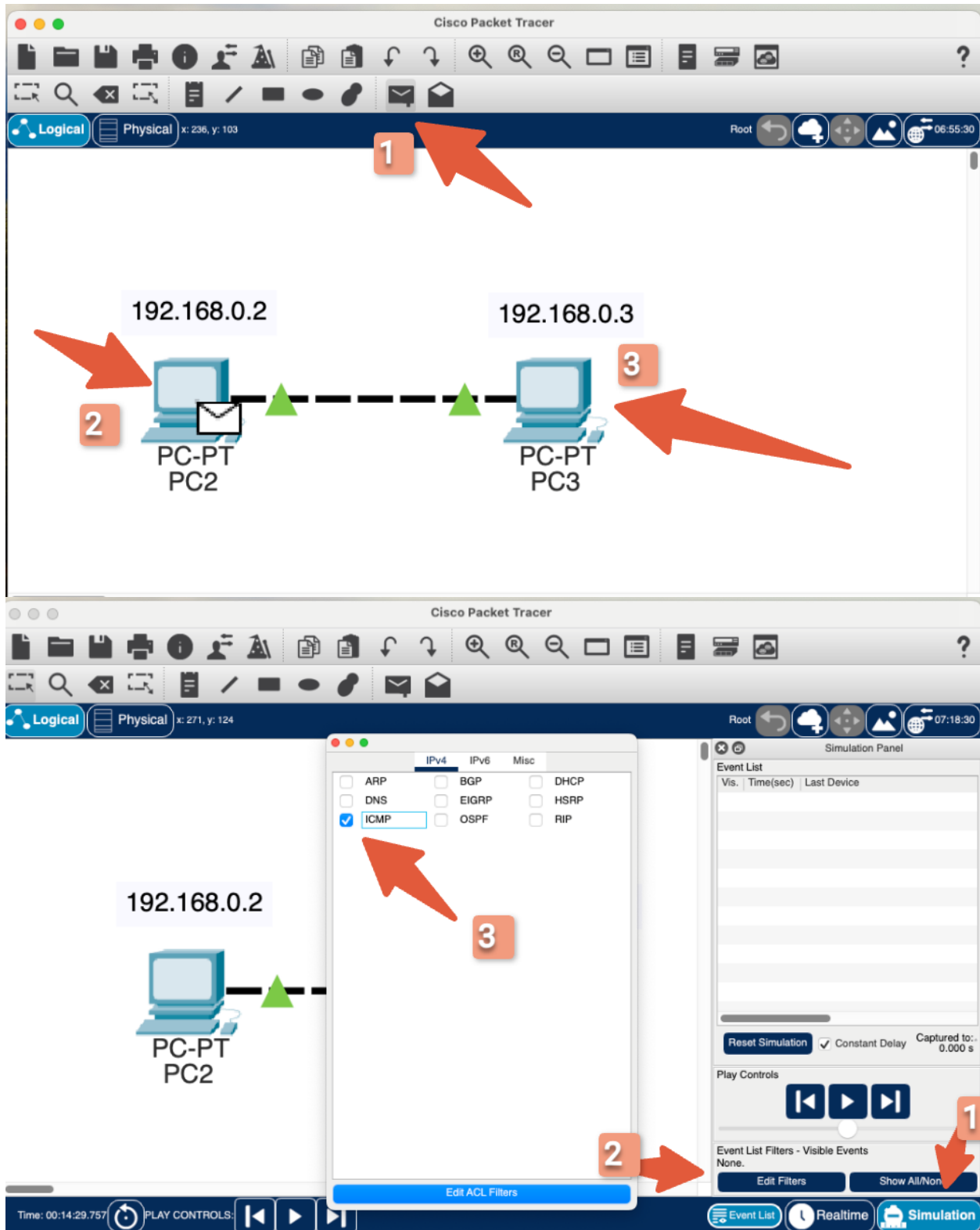
#### 2. Send a Message:

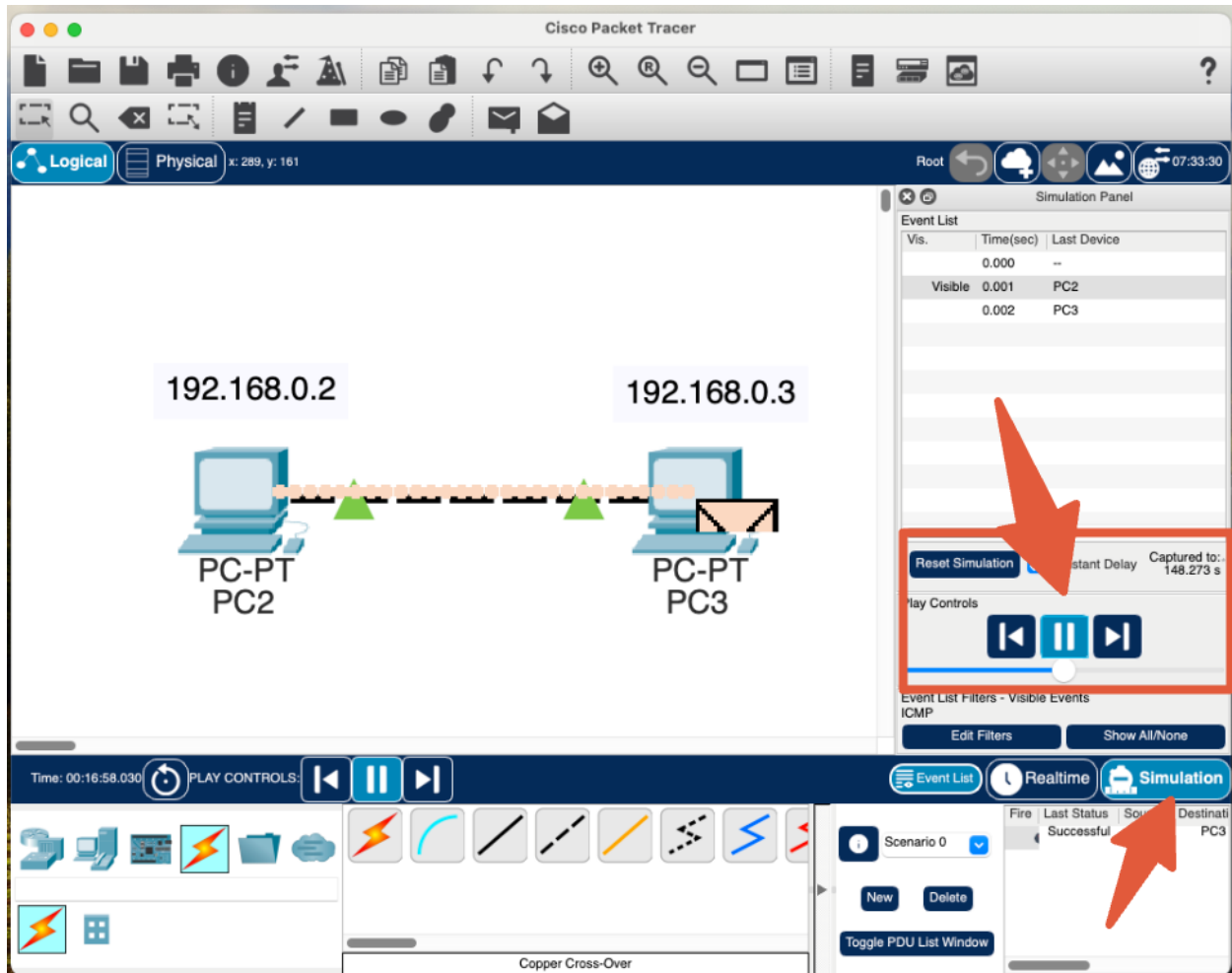
- Click on **Add Simple PDU** message.
- Click on **PC1** and then on **PC2** to send a simple PDU (packet data unit) from PC1 to PC2.

#### 3. Make sure to select only ICMP from the filter.

#### 4. Simulate the Packet Transmission:

- Press the **Play** button (in the Simulation pane) to see the packet being transmitted from **PC1** to **PC2**.
- You can observe the layers of the OSI model and how the packet travels through each.





### Step 6: Analyze the Results

- If the message successfully reaches **PC2**, the simulation will show the packet arriving without errors.
- If there's an issue (e.g., incorrect IP configuration), the packet might drop, and you can analyze why it failed.

### Conclusion:

In this lab, you've familiarized yourself with Cisco Packet Tracer, learned how to connect two PCs, assign IP addresses, and send a message using the simulation mode. You also observed how Packet Tracer simulates network traffic, offering valuable insight into how data travels between devices in a network.

### Extra Task:

- Try adding more PCs and repeat the process of configuring IP addresses and testing connectivity.
- Experiment with different connection types (e.g., adding a switch or router between PCs).

## Lab 2

### Creating a Bus Topology with Two PCs

#### Objective:

- Simulate a Bus Topology by connecting two PCs directly using a crossover cable (simulating a shared medium).
- Learn how data is transmitted between devices in a bus topology.
- Configure IP addresses on both PCs.
- Test network connectivity using pings and Packet Tracer simulation.

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#### Step-by-Step Instructions:

##### Step 1: Open Cisco Packet Tracer

##### Step 2: Add Two PCs to the Workspace

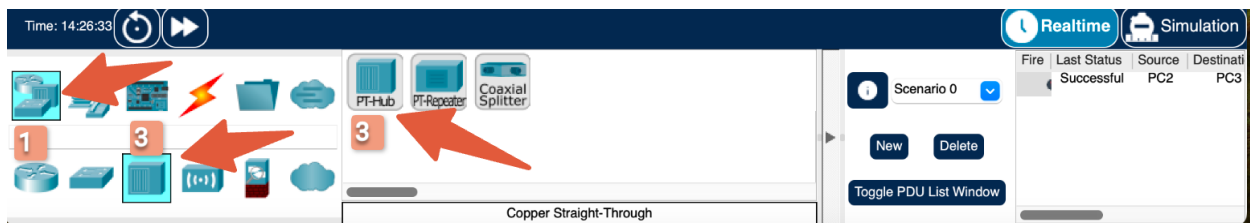
- Go to the **End Devices** section and drag two **PCs** into the workspace.

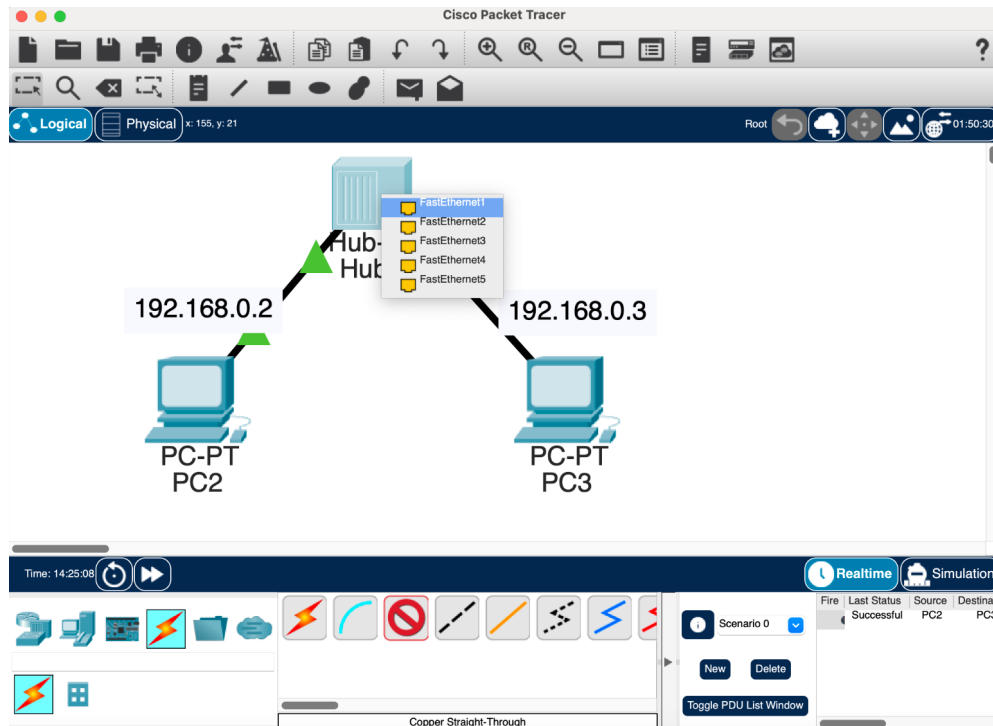
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##### Step 3: Connect the Two PCs with a Crossover Cable

- Click on the **Connections** icon (lightning bolt symbol).
- Select the **Copper Cross-Over** cable from the connections menu (used for direct PC-to-PC connections in a bus topology).
- Click on **PC1**, select **FastEthernet0**, then click on **PC2** and select **FastEthernet0**.

This simulates a direct connection between the two PCs, behaving like a bus topology, where all devices share a common communication medium.





#### Step 4: Configure IP Addresses

##### 1. PC1 Configuration:

- Click on **PC1** to open its settings.
- Go to the **Desktop** tab and click on **IP Configuration**.
- Assign the following IP details:
  - **IP Address:** 192.168.0.2
  - **Subnet Mask:** 255.255.255.0

##### 2. PC2 Configuration:

- Click on **PC2** and follow the same steps as above, but assign these IP details:
  - **IP Address:** 192.168.0.3
  - **Subnet Mask:** 255.255.255.0

#### Step 5: Use Simulation Mode to Analyze the Packet Transmission

##### 1. Switch to Simulation Mode:

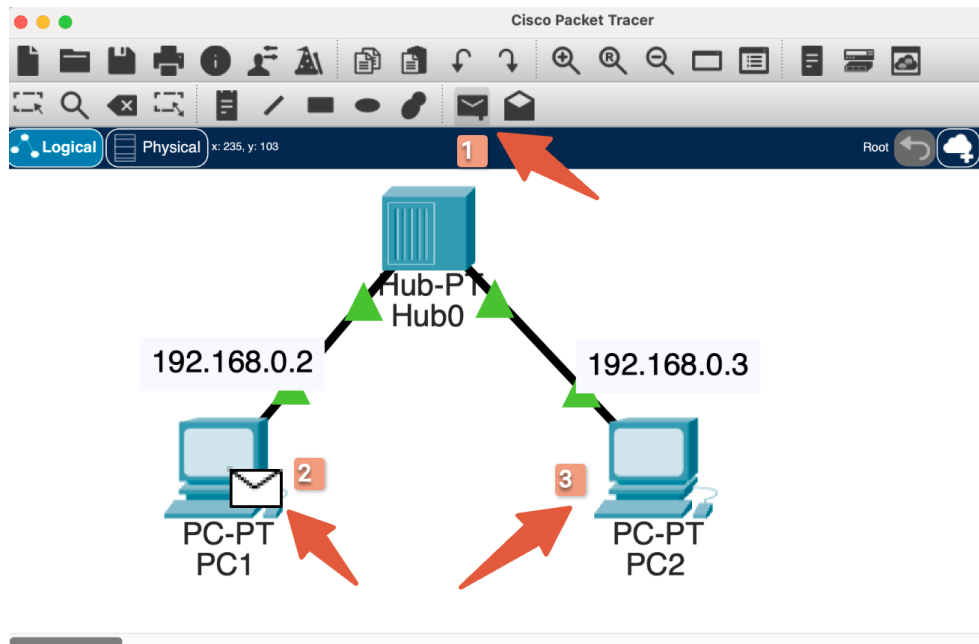
- In the bottom-right corner of Packet Tracer, switch from **Real-Time** mode to **Simulation** mode.

##### 2. Send a Message:

- Click on **PC1**, go to the **Desktop** tab, and select **Add Simple PDU**.
- Click on **PC1** and then on **PC2** to send the message from **PC1** to **PC2**.

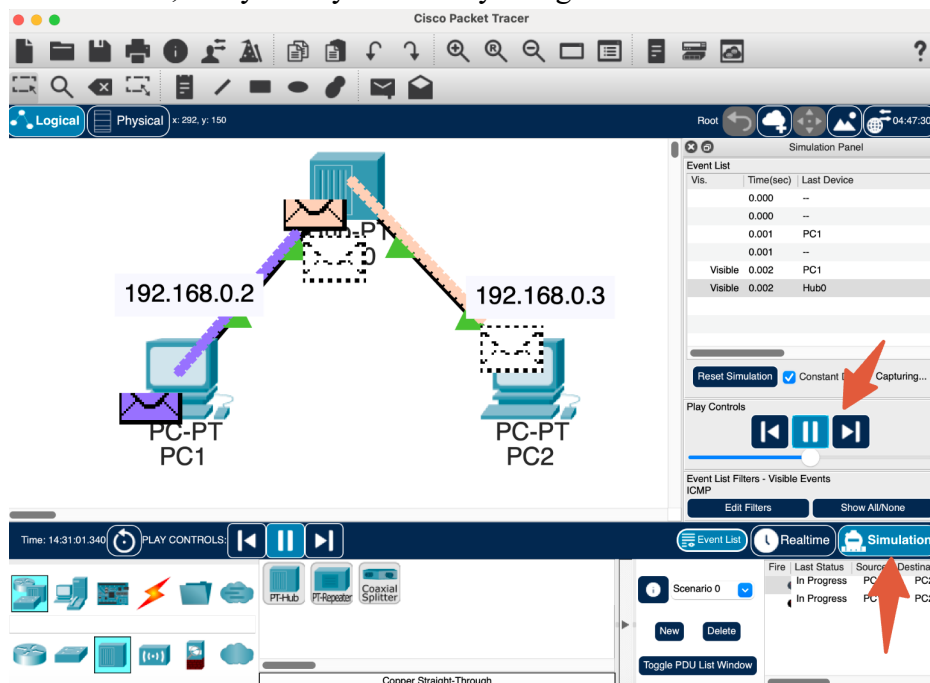
##### 3. Simulate the Transmission:

- Press the **Play** button in the simulation controls to see the data packet being transmitted from **PC1** to **PC2** directly, simulating the bus topology's shared communication medium.

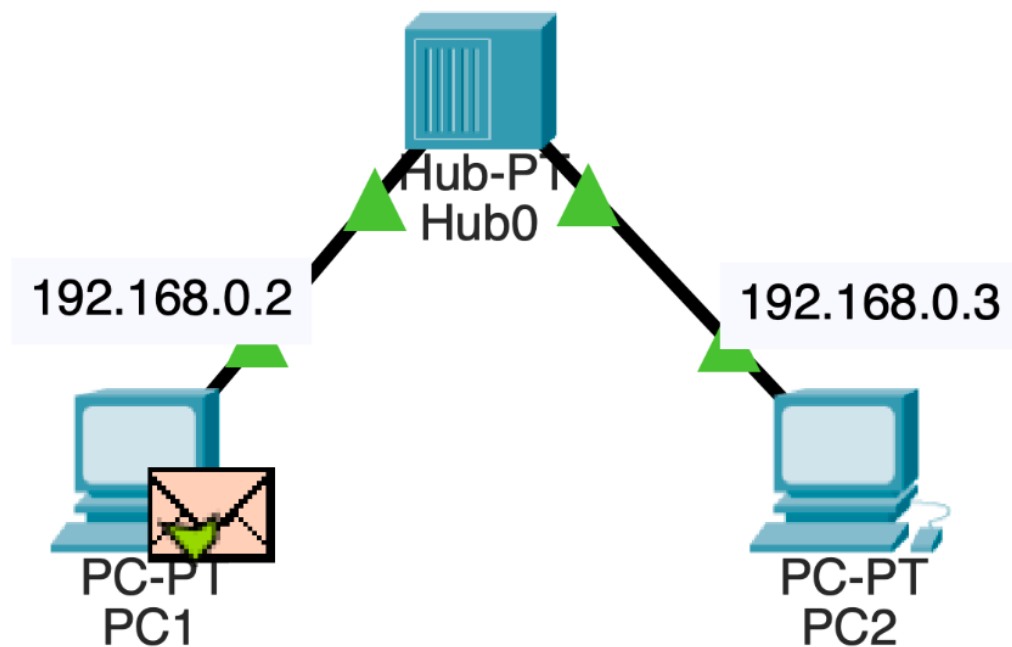


### Step 6: Analyze the Results

- You should observe the data packet being sent from **PC1** to **PC2** along the shared communication medium.
- If the IP configuration is correct, the packet will be successfully transmitted and received.
- If there's a failure, analyze why it failed by using the simulation breakdown.







**Conclusion:**

In this lab, you've set up a simple **Bus Topology** by connecting two PCs directly using a crossover cable, simulating a shared communication medium. You configured the IP addresses on both PCs and tested the network by sending messages between the PCs.

### Lab 3

#### Connecting Three PCs via a Switch in Cisco Packet Tracer

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##### Objective:

- Set up a basic network with three PCs connected to a switch.
  - Learn how a switch operates by forwarding data only to the intended recipient.
  - Configure IP addresses on all three PCs.
  - Test network connectivity using pings and Packet Tracer simulation.
- 

##### Step-by-Step Instructions:

###### Step 1: Open Cisco Packet Tracer

###### Step 2: Add Three PCs to the Workspace

- In the **End Devices** section, drag and drop three **PCs** into the workspace. Label them as **PC1**, **PC2**, and **PC3** for easy reference.
- 

###### Step 3: Add a Switch to the Workspace

- Go to the **Network Devices** section and click on the **Switches** category.
  - Select a **Switch** (e.g., **2960** series) and drag it into the workspace.
- 

###### Step 4: Connect the PCs to the Switch

1. **PC1 to Switch:**
    - Click on the **Connections** icon (lightning bolt symbol).
    - Choose the **Copper Straight-Through** cable.
    - Click on **PC1**, select **FastEthernet0**, and then click on the switch to connect it to **FastEthernet0/1**.
  2. **PC2 to Switch:**
    - Repeat the process for **PC2**, connecting it to the switch's **FastEthernet0/2** port.
  3. **PC3 to Switch:**
    - Finally, connect **PC3** to the switch's **FastEthernet0/3** port.
- 

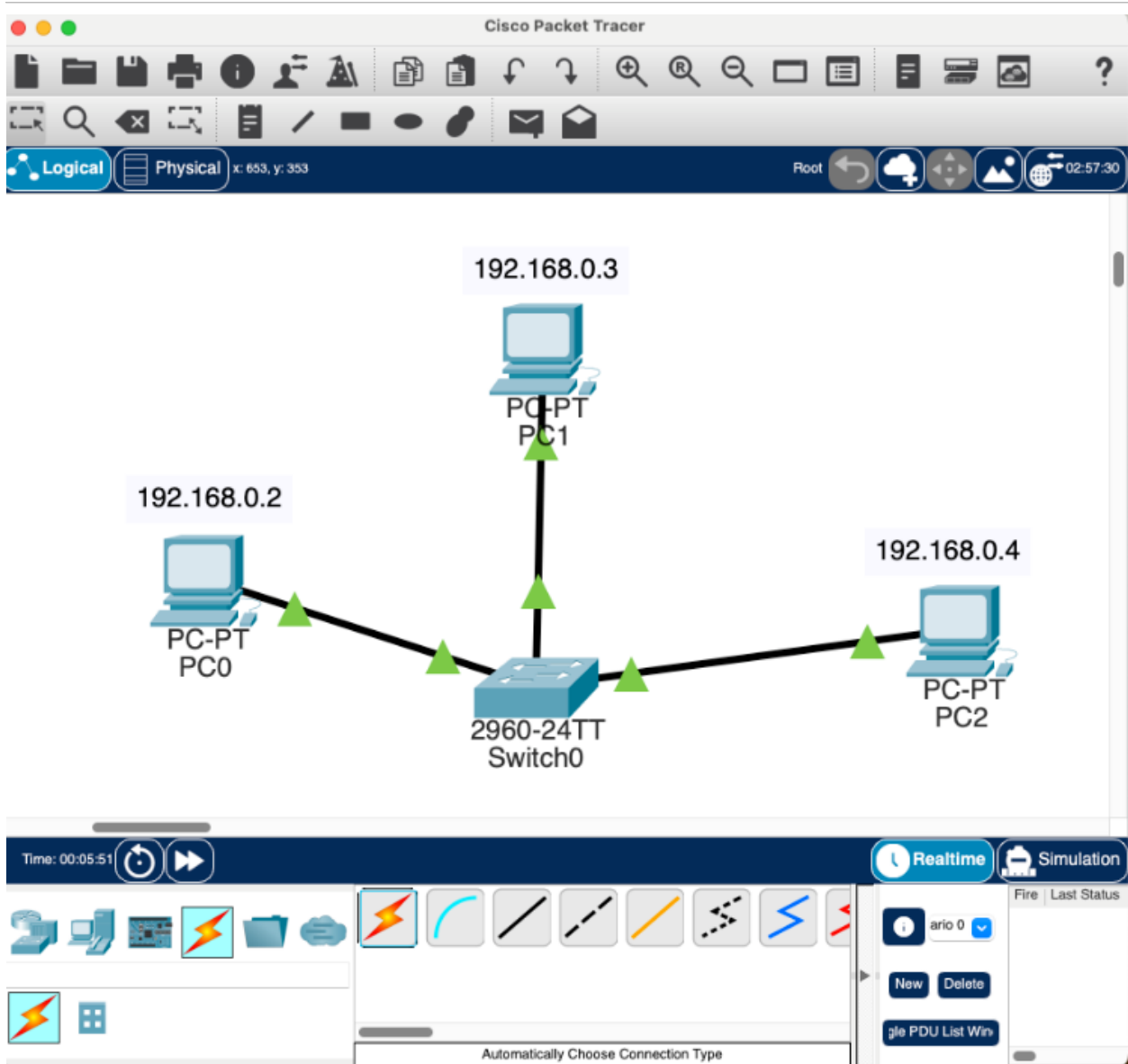
###### Step 5: Configure IP Addresses

1. **PC1 Configuration:**
  - Click on **PC1** to open its settings.
  - Go to the **Desktop** tab and click on **IP Configuration**.
  - Assign the following IP details:
    - **IP Address:** 192.168.0.2
    - **Subnet Mask:** 255.255.255.0
2. **PC2 Configuration:**
  - Click on **PC2** and assign the following IP details:
    - **IP Address:** 192.168.0.3

- **Subnet Mask:** 255.255.255.0

### 3. PC3 Configuration:

- Click on **PC3** and assign the following IP details:
  - **IP Address:** 192.168.0.4
  - **Subnet Mask:** 255.255.255.0



### Step 6: Test Connectivity (Ping Test)

#### 1. PC1 to PC2:

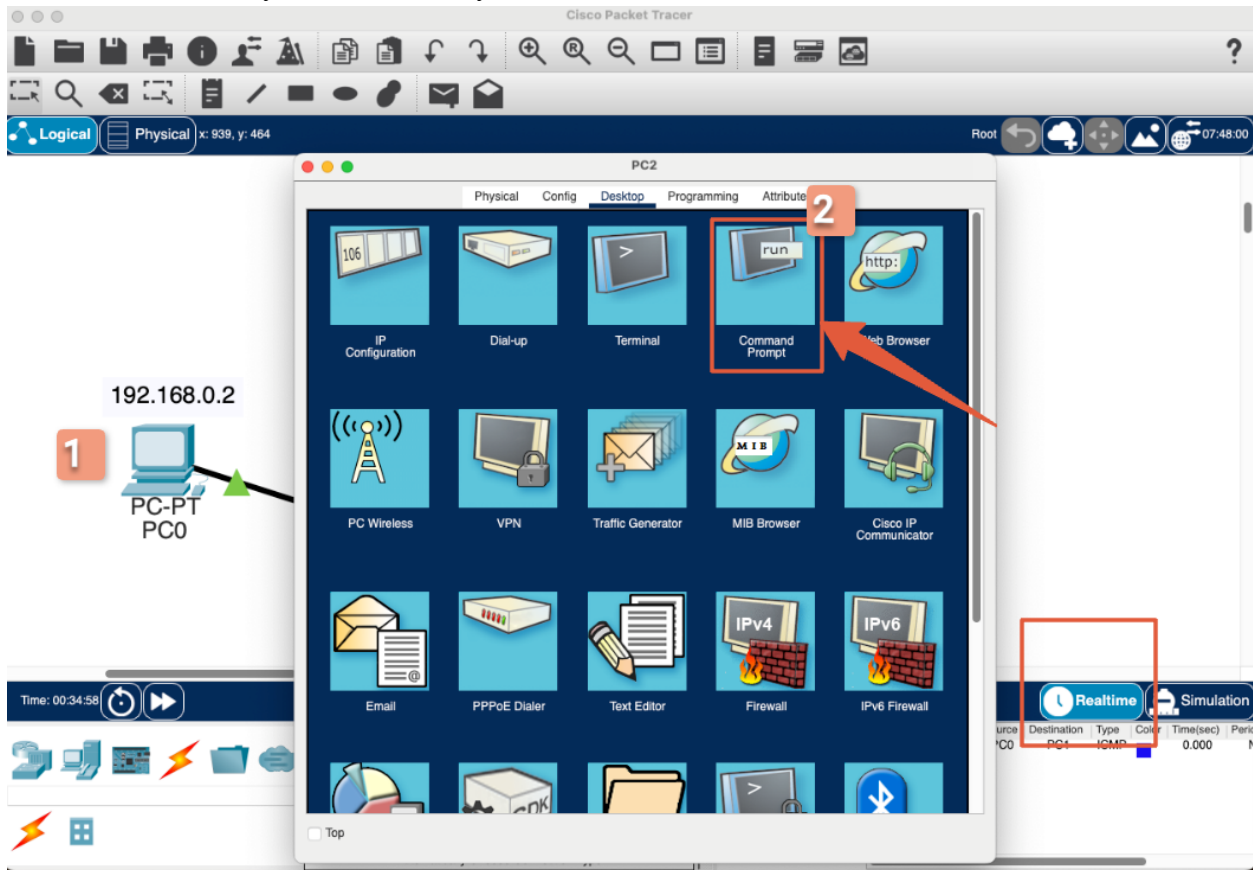
- Go to **PC1**, open the **Command Prompt** in the Desktop tab.
- Type the command `ping 192.168.0.3` and press **Enter**.
- You should see replies from **PC2** if the connection is successful.

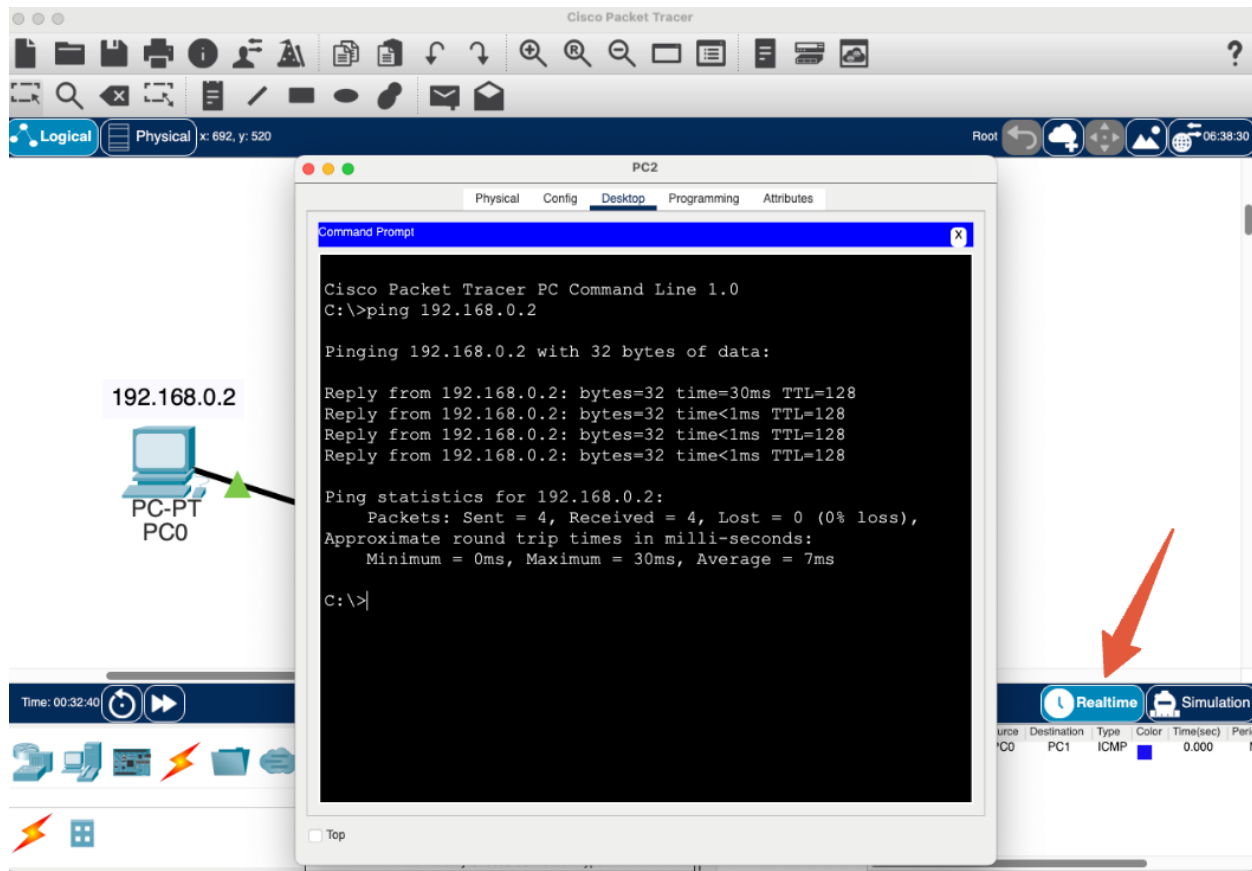
2. **PC1 to PC3:**

- Similarly, from **PC1**, type the command ping 192.168.0.4 and press **Enter**.
- If successful, you'll see replies from **PC3**.

3. **PC2 to PC3:**

- Now go to **PC2**, open the Command Prompt, and type ping 192.168.0.4.
- Verify the connectivity between **PC2** and **PC3**.





## Step 7: Use Simulation Mode to Observe Packet Transmission

### 1. Switch to Simulation Mode:

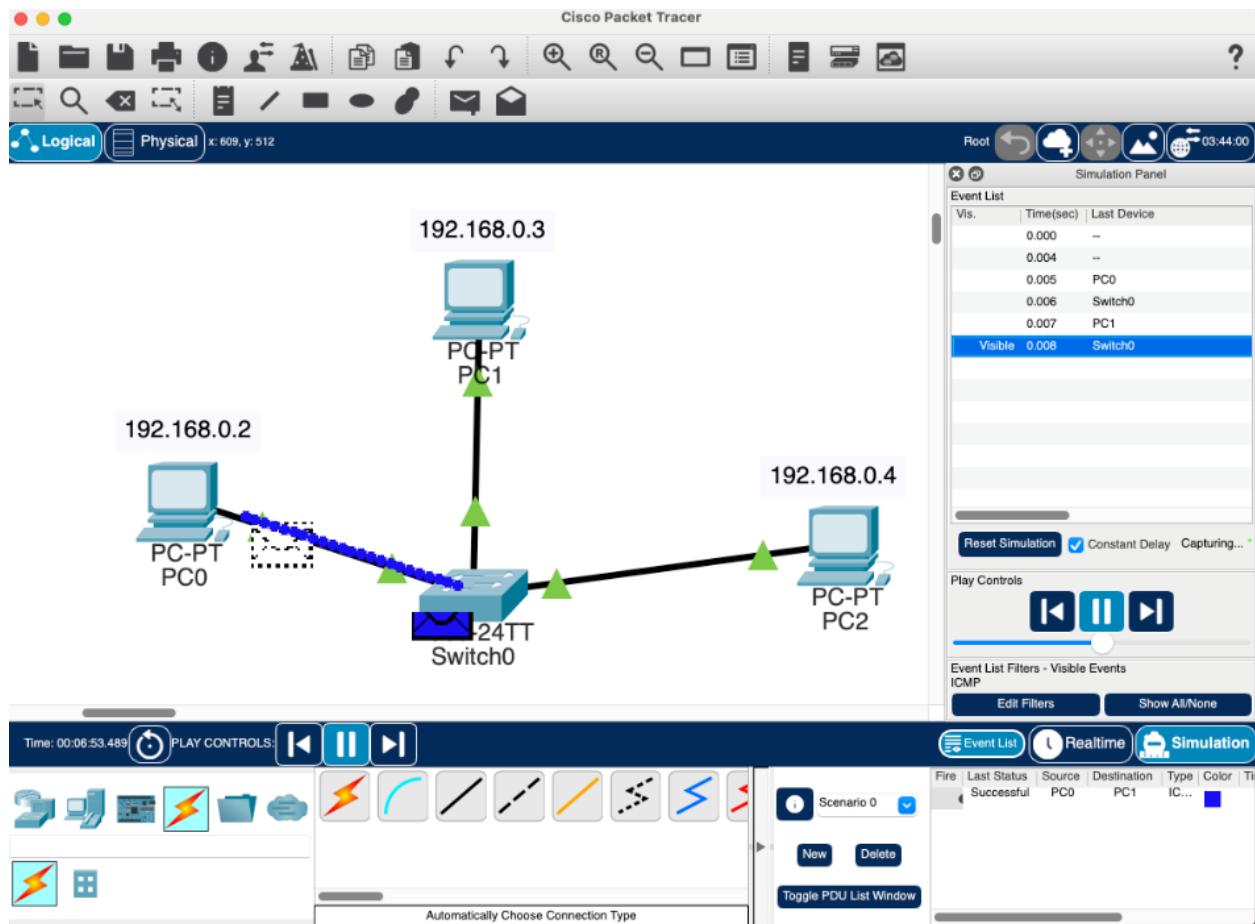
- In the bottom-right corner of Packet Tracer, switch from **Real-Time** mode to **Simulation** mode.

### 2. Send a Message:

- Click on **PC1**, go to the **Desktop** tab, and select **Add Simple PDU**.
- Click on **PC1** and then on **PC2** to send the message from **PC1** to **PC2**.

### 3. Simulate the Transmission:

- Press the **Play** button in the simulation controls to see the packet being sent from **PC1** to the switch, and then from the switch to **PC2**.
- The switch forwards the packet only to **PC2**, as it knows which port the destination device is connected to, demonstrating the efficiency of a switch compared to a hub.



### Step 8: Analyze the Results

- Observe the switch's behavior in forwarding data only to the intended recipient, reducing network congestion.
- Check for successful packet delivery in each case (pinging between PCs) to confirm that the configuration is correct.

### Conclusion:

In this lab, you've set up a small network using three PCs connected to a switch. You learned how a switch forwards data intelligently to the intended device, unlike a hub, which broadcasts to all devices. You also configured IP addresses on each PC and tested network connectivity by pinging between them.

### Extra Task:

- Add more PCs to the network and see how the switch handles communication.
- Experiment by adding a **Router** to connect this local network to another network or the internet.