



University of Alexandria

Faculty of Engineering

Department of Electrical Engineering

Course Title: Networks

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Course Code: EE486

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## Lab 1: Introduction to Packet Tracer

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### Objectives

1. To become familiar with the network simulator Packet Tracer.
2. To use the packet tracer to simulate a simple network.(Hub and PCs)

### Objectives:

1. You are required to carry out the procedure described in this document and demonstrate the simulation to the TA.
2. you are required to **submit a short report** (max. 2 pages) about **Ping utility** and the **ICMP** (the protocol used by ping in this lab).

### Part 1:Packet Tracer

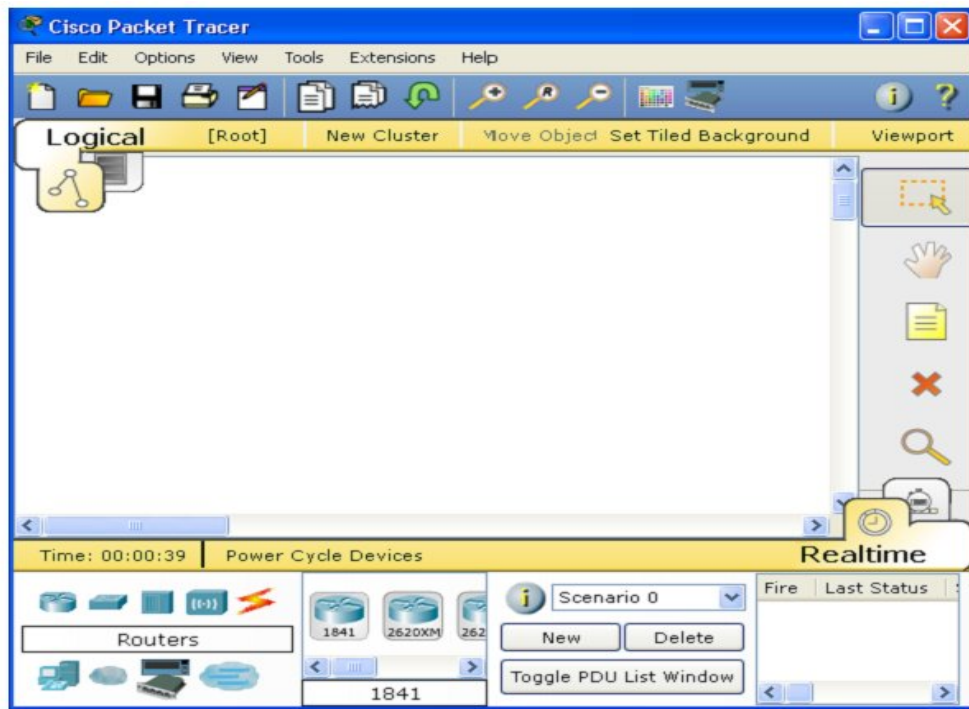
Packet Tracer is a protocol simulator developed by Dennis Frezzo and his team at Cisco Systems. Packet Tracer (PT) is a powerful and dynamic tool that displays the various protocols used in networking, in either Real Time or Simulation mode.

Before starting to follow the procedures below you should:

1. Download Packet Tracer Simulation Tool on your PC.
2. To get familiar with the Packet Tracer environment, watch this video named "Interface Overview" from the Help Tutorials.

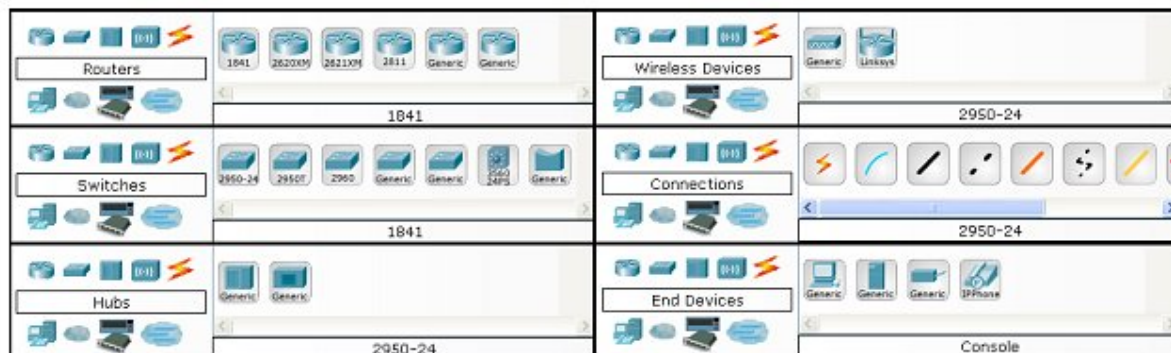
## Introduction to the Packet Tracer Interface using a simple network (Hub and PCs):

### **Step 1:** Start Packet Tracer and Enter Simulation Mode



### **Step 2:** Choosing Devices and Connections

We will begin building our network topology by selecting devices and the media in which to connect them. Several types of devices and network connections can be used. For this lab we will keep it simple by using End Devices, Hubs, and Connections. Single click on each group of devices and connections to display the various choices



### Step 3: Building the Topology – Adding Hosts

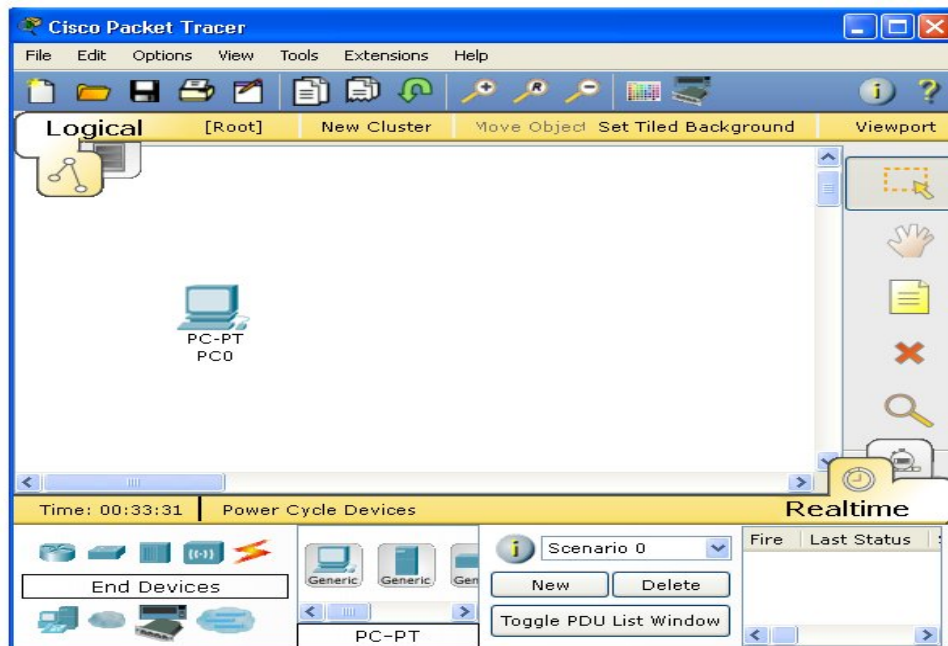
- Single click on the End Devices.



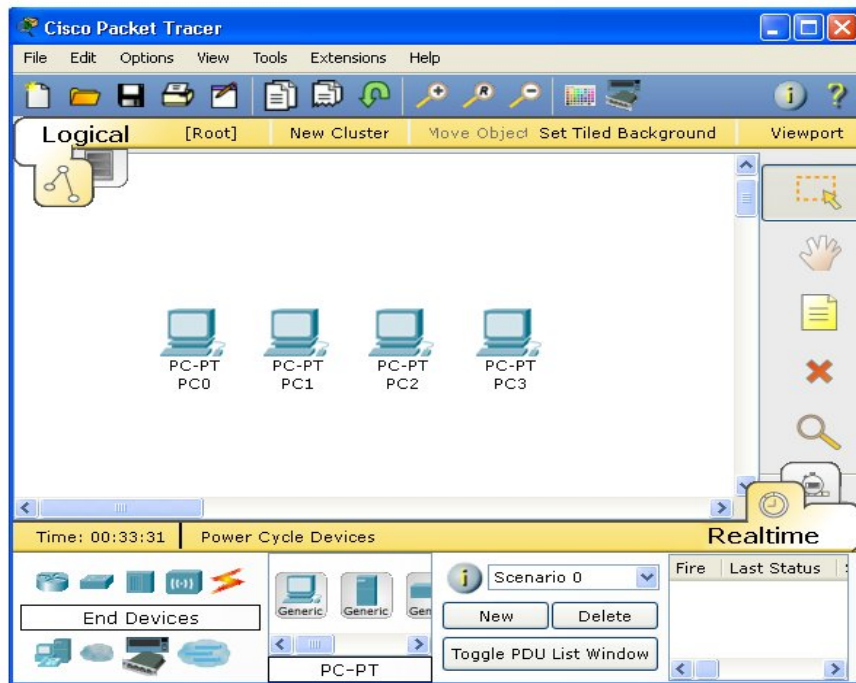
- Single click on the Generic host.



- Move the cursor into topology area. You will notice it turns into a plus “+” sign. Single click in the topology area and it copies the device.

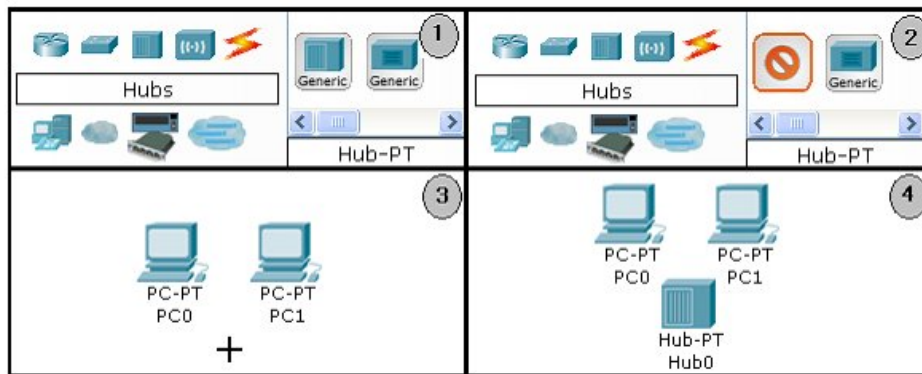


- Add three more hosts

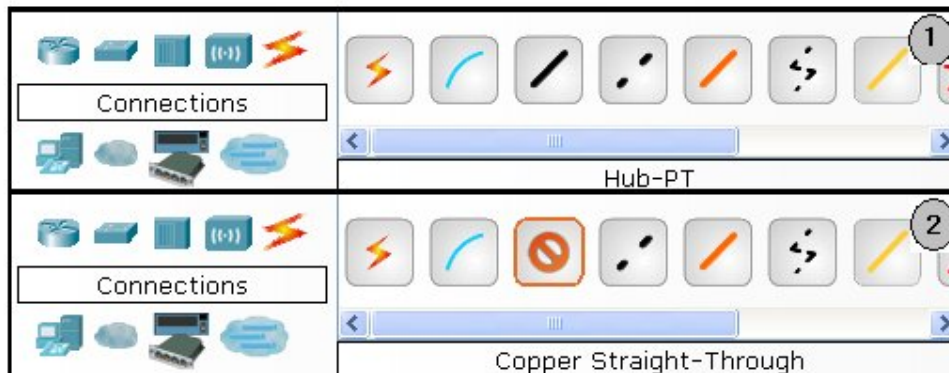


#### Step 4: Building the Topology – Connecting the Hosts to Hub

- Adding a Hub: Select a hub, by clicking once on Hubs and once on a Generic hub.

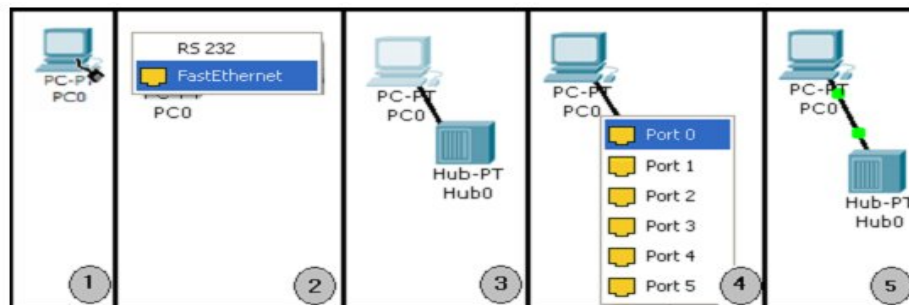


- Connect PC0 to Hub0 by first choosing Connections.
- Click once on the Copper Straight-through cable.



Perform the following steps to connect PC0 to Hub0:

1. Click once on PC0
2. Choose Fast Ethernet
3. Drag the cursor to Hub0
4. Click once on Hub0 and choose Port0
5. Notice the green link lights on both the PC0 Ethernet NIC and the Hub0 Port0 showing that the link is active.



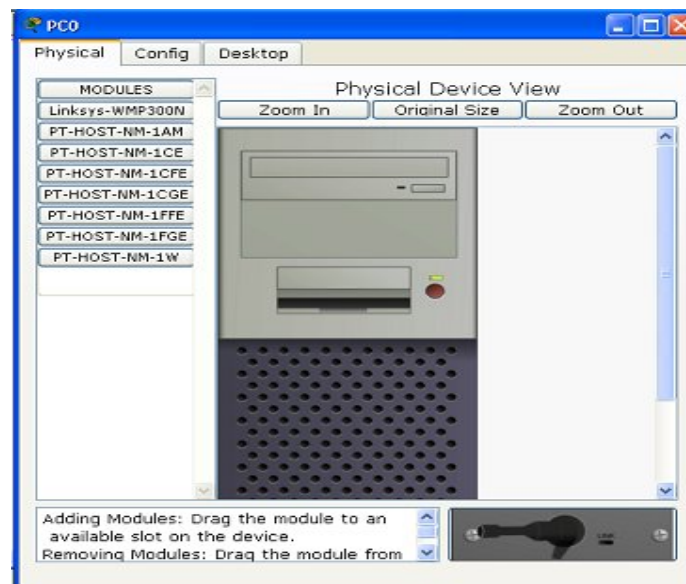
Repeat the steps above for PC1, PC2 and PC3 connecting it to Port1 on Hub0. (The actual hub port you choose

does not matter.

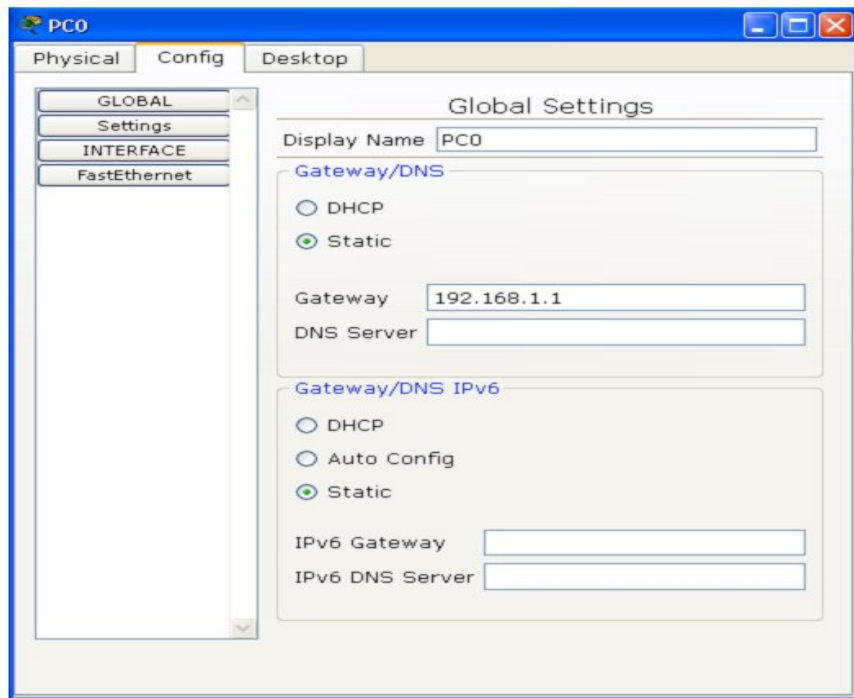
### **Step 5:** Configuring IP Addresses and Subnet Masks on the Hosts

Before we can communicate between the hosts we need to configure IP Addresses and Subnet Masks on the devices.

- Click once on PC0.

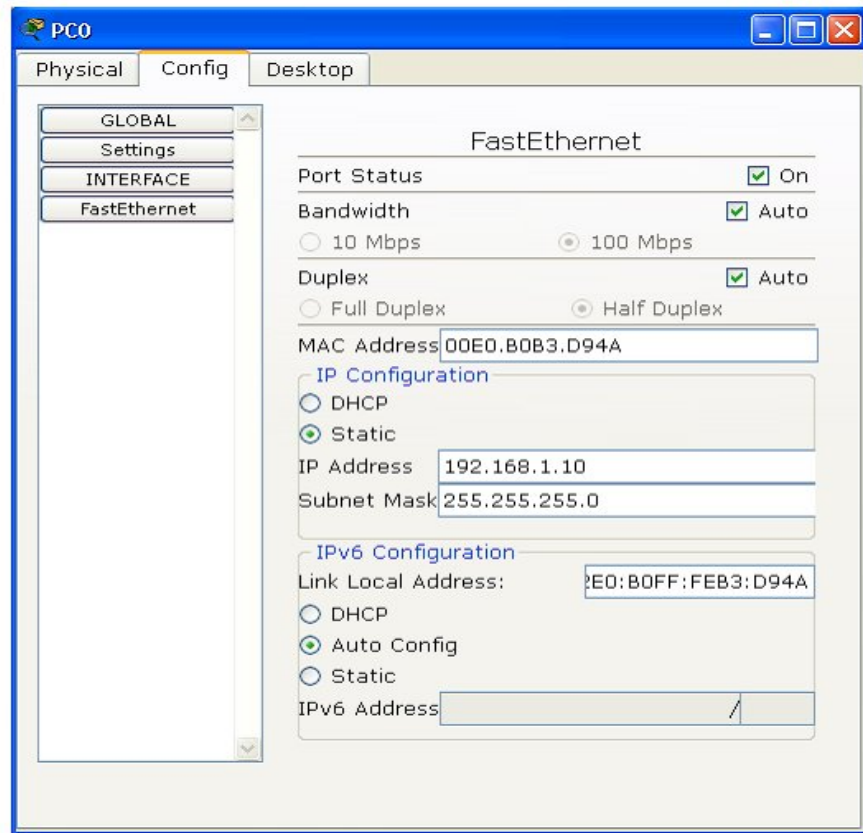


Choose the **Config** tab. It is here that you can change the name of PC0. It is also here where you would enter a Gateway IP Address, also known as the default gateway. We will discuss this later, but this would be the IP address of the local router. If you want, you can enter the IP Address 192.168.1.1.



Click on **FastEthernet**. Although we have not yet discussed IP Addresses, add the IP Address to 192.168.1.10. Click once in the Subnet Mask field to enter the default Subnet Mask. You can leave this at 255.255.255.0. We will discuss this later.

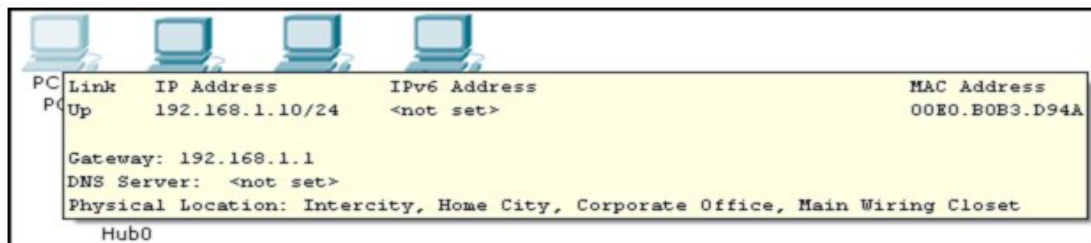




- Repeat these steps for the other hosts. Use the information below for IP Addresses and Subnet Masks.

Host	IP Address	Subnet Mask
PC0	192.68.1.10	255.255.255.0
PC1	192.68.1.11	255.255.255.0
PC2	192.68.1.12	255.255.255.0
PC3	192.68.1.13	255.255.255.0

- Verify the information: To verify the information that you entered, move the Select tool (arrow) over each host.



- Deleting a Device or Link: To delete a device or link, choose the Delete tool and click on the item you wish to delete.



## **Part 2 :Network Simulation**

In this part, we are going to use the simulator to simulate traffic between hosts.

### **Task 1:**

Observe the flow of data from PC0 to PC1 by creating network traffic.

#### **PC0 pinging PC1**

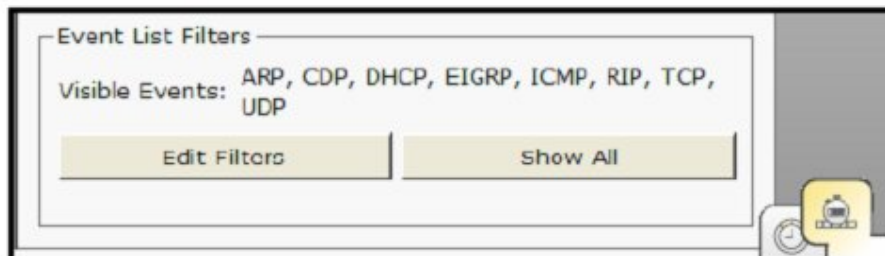
For those not familiar with ping: We will examine pings and the ICMP protocol . **Packet Tracer** allows us to either issue the command from the command prompt or to use the Add Simple PDU tool. We will look at both ways to do this.

- Switch to Simulation Mode by selecting the tab that is partially hidden behind the Real Time tab in the bottom right-hand corner. The tab has the icon of a stopwatch on it.

**HINT:** the **Simulation icon allows you to enter simulation mode. Simulation mode allows you to view the a sequence of events associated with the communications between two or more devices. Real time mode performs the operation with all of the sequence of events happening at “real time”.**



- . Click on Edit Filters, and then select All/None to deselect every filter. Then choose ARP and ICMP and click in the workspace to close the Edit Filters window

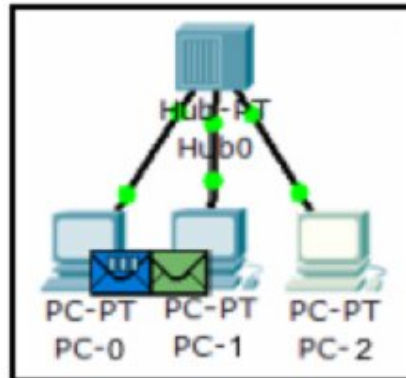


- Select a **Simple PDU** by clicking the closed envelope in the Common Tools Bar on the right.

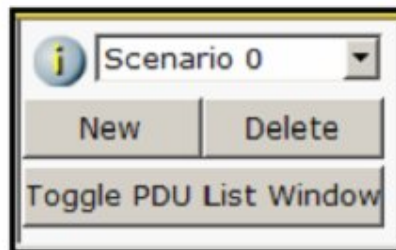




Move to PC0 and click to establish the source. Move to PC1 and click to establish the destination. Notice that two envelopes are now positioned beside PC0. This is referred to as a data traffic scenario. One envelope is an ICMP packet, while the other is an ARP packet. The Event List in the Simulation Panel will identify exactly which envelope represents ICMP and which represents an ARP.



A scenario may be deleted by clicking on the Delete button in the Scenario panel.



- d. Select Auto Capture / Play from the Simulation Panel Play Controls. Below the Auto Capture / Play button is a horizontal bar, with a vertical button that controls the speed of the simulation. Dragging the button to the right will speed up the simulation, while dragging is to the left will slow down the simulation.

- e. Choose the Reset Simulation button in the Simulation window.



Notice that the ARP envelope is no longer present. This has reset the simulation but has not cleared any configuration changes or MAC / ARP table entries.

f. Choose the Capture / Forward button.



Notice that the ICMP envelope moved forward one device and stopped. The Capture / Forward button will allow you to move the simulation one step at a time.

**Notice that** the hub floods all of the frames out all ports **except** the port incoming port. Normally, before the ICMP Echo Request, ping, is sent out by PC0, an ARP Request might first be sent. Note: Using this tool, only a **single ping, ICMP Echo Request** is sent by PC0, **instead of the four pings** when using the command prompt.

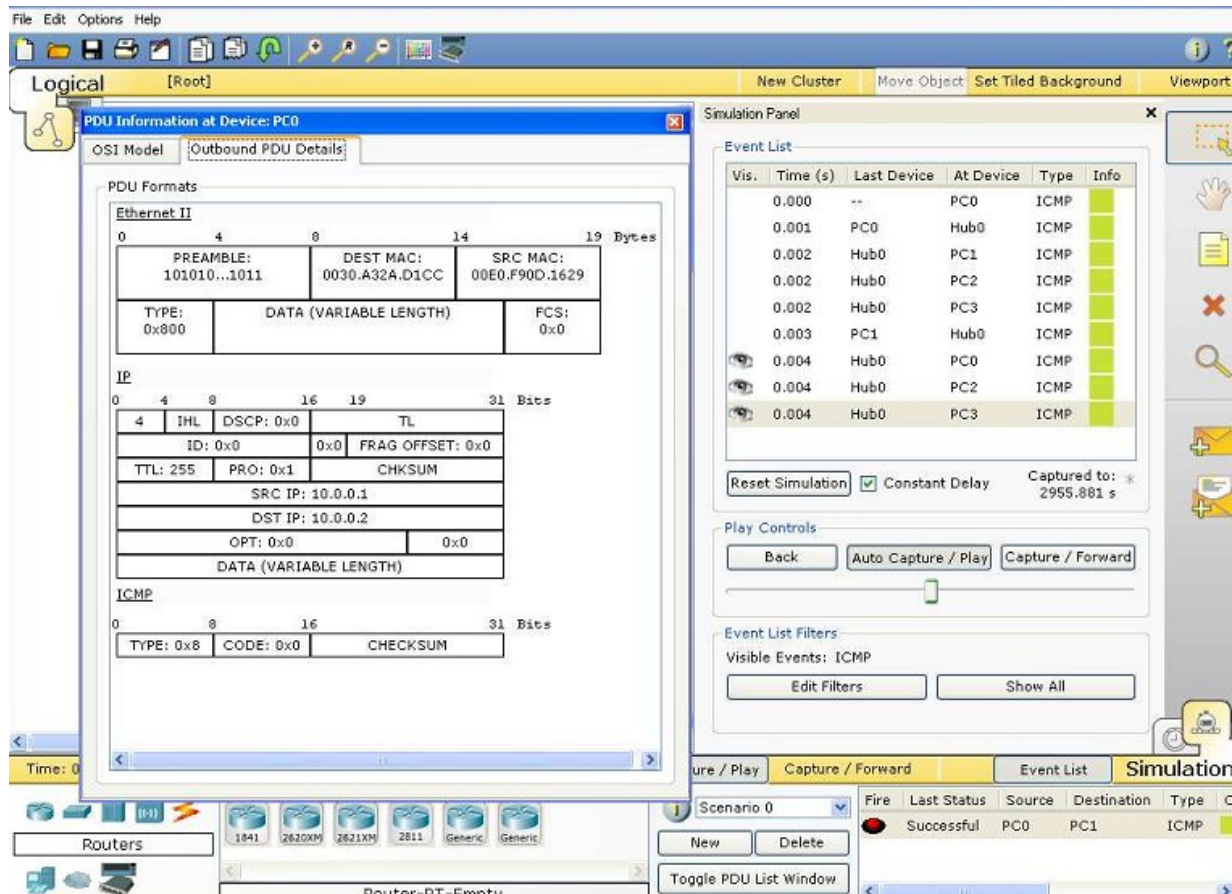
#### e. Viewing the frame (Protocol Analyzer)

To examine the actual protocols being sent, click on the colored Info box in the Event List. **The Event List shows where this Ethernet Frame is currently, "At Device", the previous devices, "Last Device", and the type of information encapsulated in the Ethernet Frame, "Info".** Single click on the second event's Info box to view the Ethernet frame with the encapsulated IP Packet and the encapsulated ICMP message "At Device" PC0

The PDU (Protocol Data Unit) is displayed in two different formats, OSI Model and Outbound PDU Details.

A screenshot of the simulation software interface. The main window is titled 'Logical [Root]' and contains several panels. On the left, the 'PDU Information at Device: PC0' panel is open, showing 'OSI Model' and 'Outbound PDU Details' tabs. The 'OSI Model' tab displays a list of layers from Layer 7 to Layer 1. The 'Outbound PDU Details' tab shows a detailed view of the packet structure, including Layer 3 (IP Header), Layer 2 (Ethernet II Header), and Layer 1 (Port(s): FastEthernet). Below the layers, a list of steps describes the ping process. On the right, the 'Simulation Panel' is open, showing an 'Event List' table. The table has columns for 'Vis.', 'Time (s)', 'Last Device', 'At Device', 'Type', and 'Info'. It lists several events, including ICMP Echo Request messages from PC0 to Hub0 and PC1. Below the event list, there are buttons for 'Reset Simulation', 'Constant Delay', and 'Captured to: 2781.696 s'. At the bottom, there is a 'Play Controls' panel with 'Back', 'Auto Capture / Play', and 'Capture / Forward' buttons. The bottom status bar shows 'Scenario 0' and a table with columns for 'Fire', 'Last Status', 'Source', 'Destination', 'Type', and 'C'. The table shows a successful ICMP Echo Request from PC0 to PC1.

The default is the OSI Model view with a brief description with what is occurring with this packet. Click on the Outbound PDU Details tab to see the protocol details including the layer 2 Ethernet frame, the layer 3 IP packet and ICMP message .



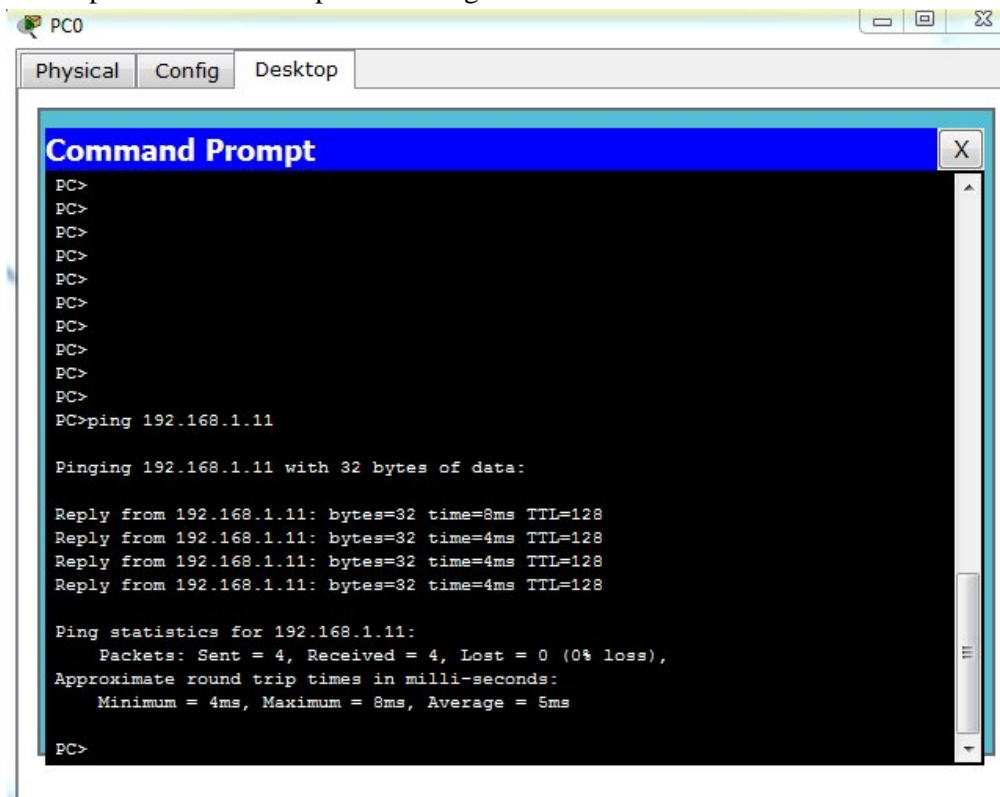
### Test ping command using "COMMAND PROMPT":

To test the ping command. Fast double click on PC0 to get the following. Under desktop click on "COMMAND PROMPT" window.



You will get the following and in the window type: **ping 192.168.1.11** < press enter >.

You will see that 4 packets are sent to PC1 and get a reply back. If you do not get a reply then something is wrong with your network. The ping utility shows if the connection between source pc and destination pc is working or not.



## Task 2

### View ARP Tables on each PC.

- Choose the Auto Capture / Play button and allow the simulation to run completely.
- Click on PC-0 and select the Desktop tab.



### Select the Command Prompt and type the command **arp -a**

- Notice that the MAC address for **PC2** is in the ARP table (to view the MAC address of PC2, click on PC2 and select the Config tab).
- To examine the ARP tables for PC1 and PC2 in another way, click on the Inspect Tool.



Then click on PC1 and the ARP table will appear in a new window.

Note that PC2 does not have an entry in the ARP table yet. Close the ARP Table window.

- Click on PC2 to view the ARP table. Then close the ARP Table window.

NOTE: To deactivate the Inspect Tool, click on the Select Tool

### Task 3

To view packet collision and jam signal ,Try to make two computers sending packets at the same time .

- In the simulation mode make PC-0 send packet to PC-1 and PC-2 send packet to PC-3 then choose Auto capture/play

