NORTH AMERICAN UNIVERSITY

Computer Science Department

COMP 4351 Network Administration

Equipment Introduction & Packet Tracer

Objectives:

1- To become familiar with the network simulator Packet Tracer.

2- To use the packet tracer to simulate a simple network.

Introduction to Packet Tracer

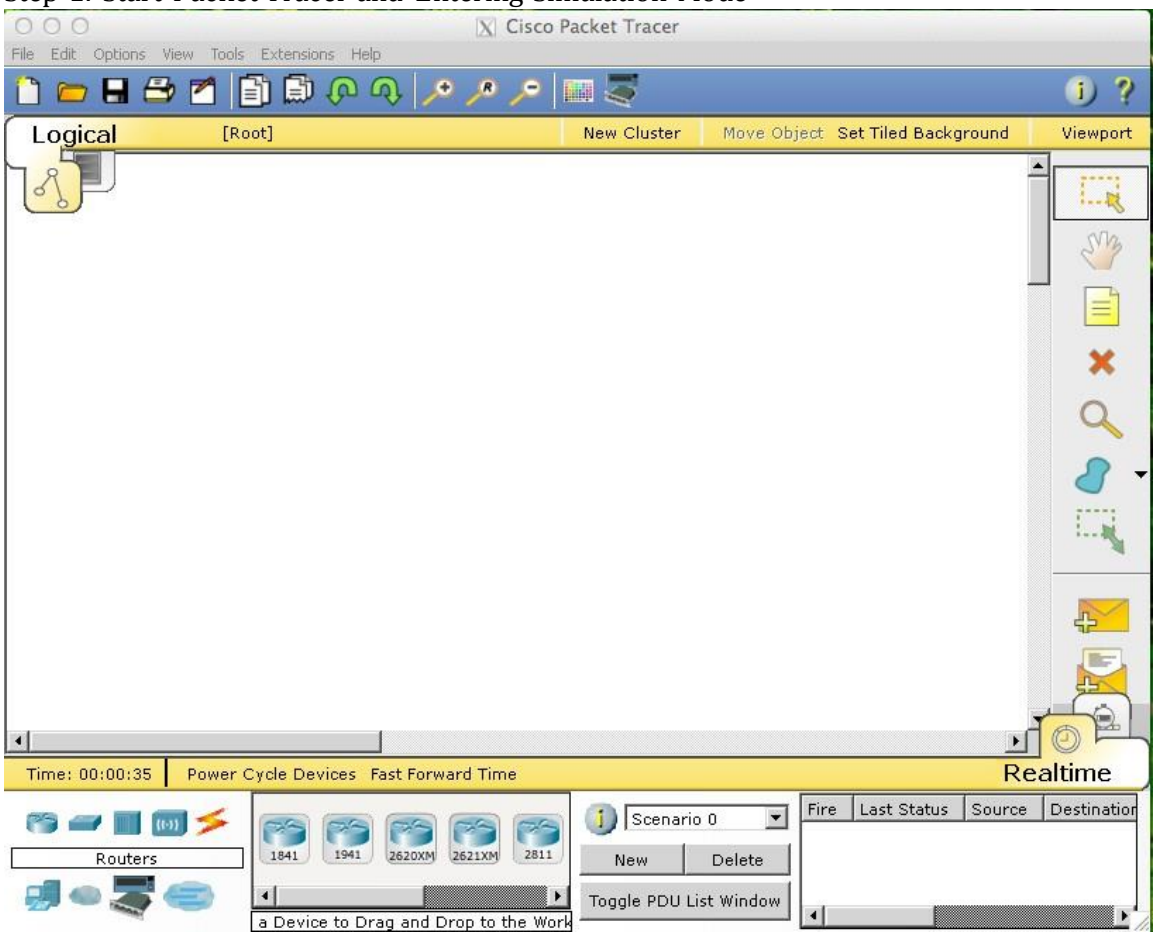
What is Packet Tracer?

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. This includes layer 2 protocols such as Ethernet and PPP, layer 3 protocols such as IP, ICMP, and ARP, and layer 4 protocols such as TCP and UDP. Routing protocols can also be traced.

Procedure:

A) Introduction to the Packet Tracer Interface using a Hub Topology

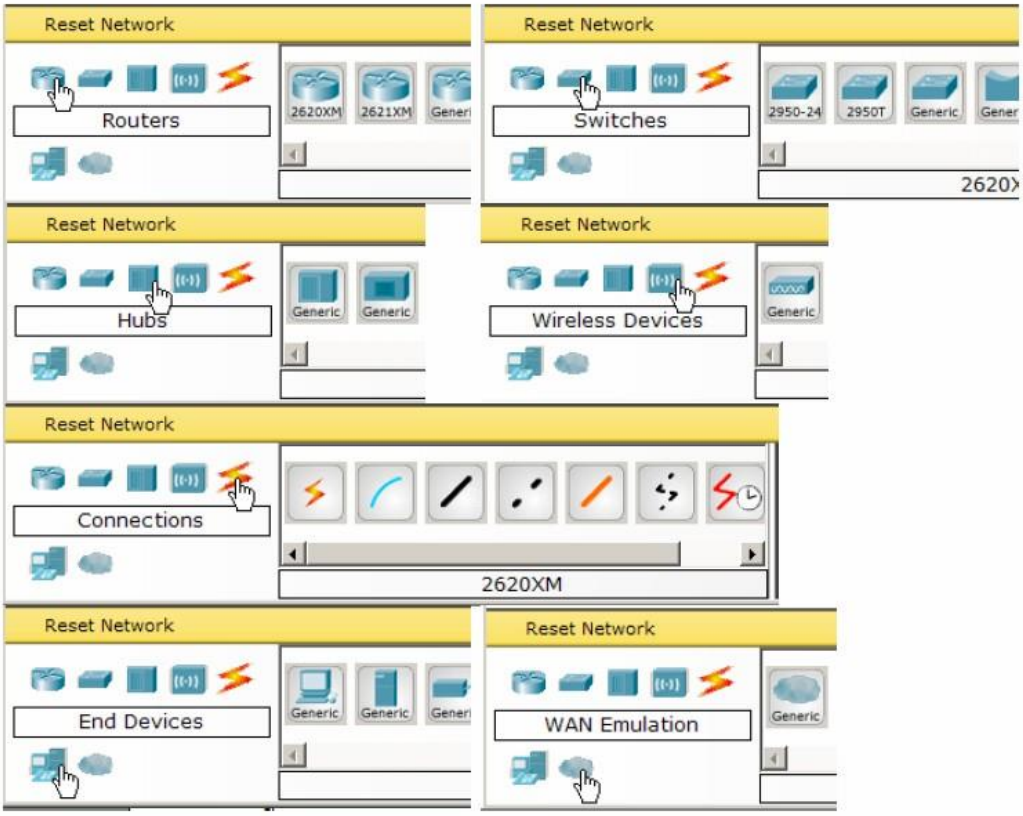
Step 1: Start Packet Tracer and Entering Simulation Mode



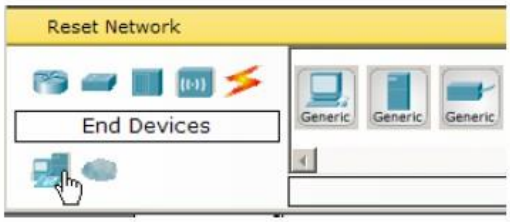
Step 2: Choosing Devices and Connections

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, Switches, Hubs, and Connections.

Single click on each group of devices and connections to display the various choices.

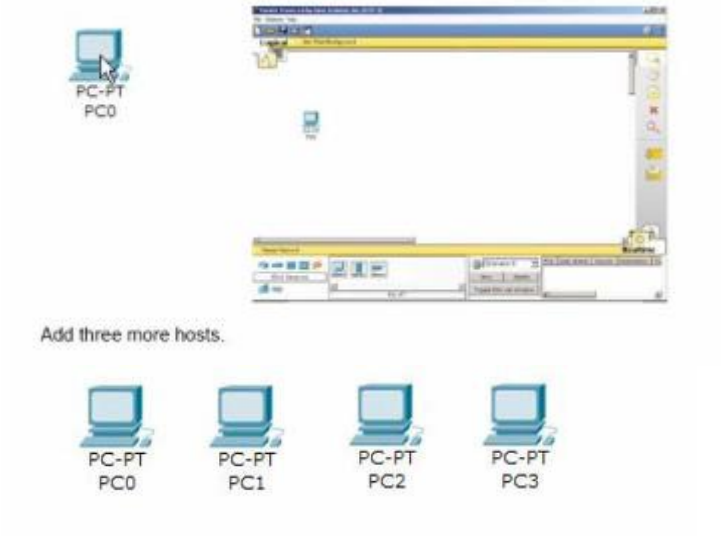


Step 3:Building the Topology – Adding Hosts Single click on the End Devices.

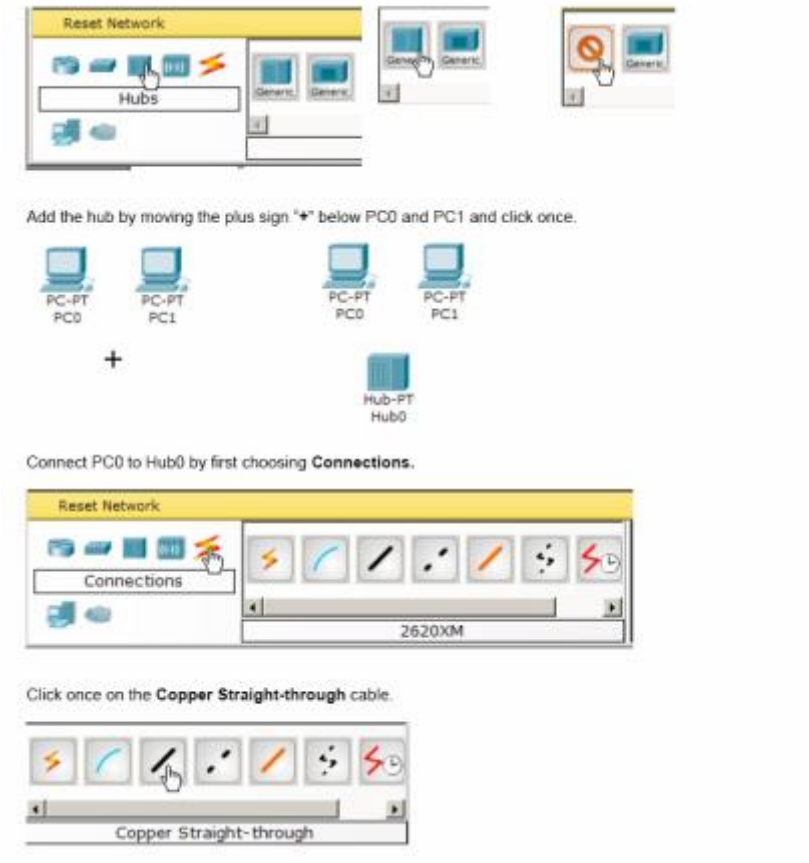


Single click on the **Generic** host.

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.

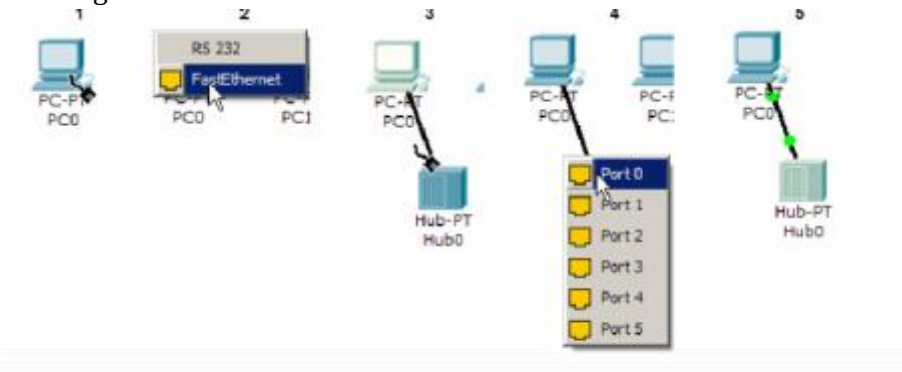


Step 4: Building the Topology – Connecting the Hosts to Hubs and Switches.
Adding a Hub
Select a hub, by clicking once on Hubs and once on a Generic hub.

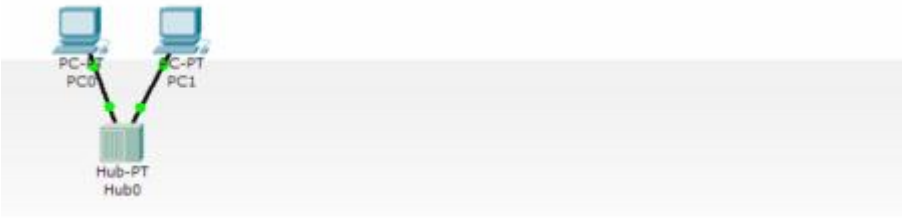


Perform the following steps to connect PC0 to Hub0:

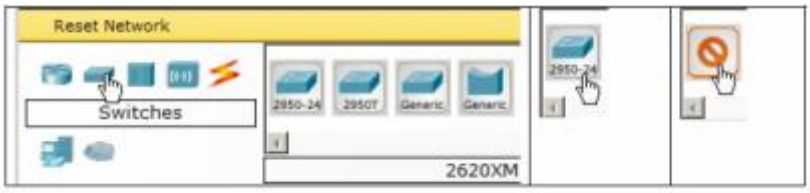
1. Click once on PC0
2. Choose FastEthernet
3. Drag the cursor to Hub0
4. Click once on Hub0 and choose Port 0
5. Notice the green link lights on both the PC0 Ethernet NIC and the Hub0 Port 0 showing that the link is active.



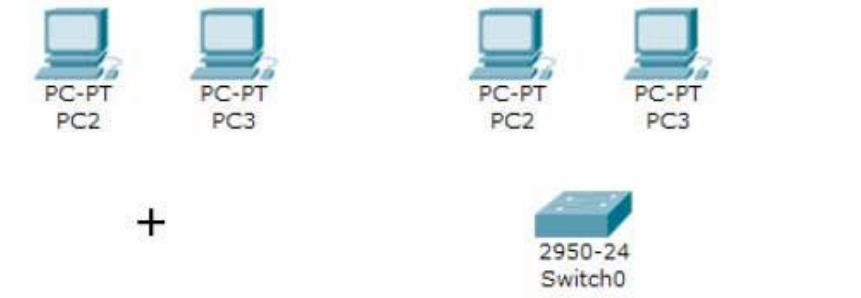
Repeat the steps above for **PC1** connecting it to **Port 1** on **Hub0**. (The actual hub port you choose does not matter.)



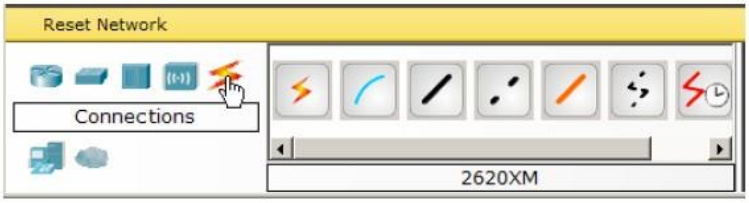
Adding a Switch Select a switch, by clicking once on **Switches** and once on a **2950---24** switch.



Add the switch by moving the plus sign "+" below PC2 and PC3 and click once.



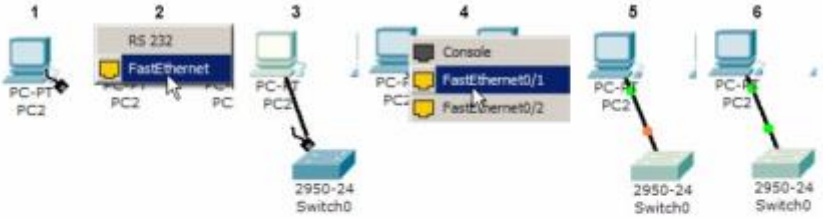
Connect PC2 to Hub0 by first choosing **Connections.**



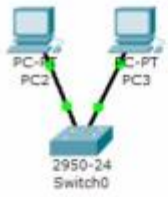
Click once on the **Copper Straight---through** cable.

Perform the following steps to connect PC2 to Switch0:

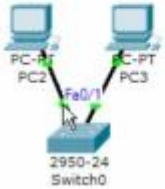
1. Click once on PC2
2. Choose FastEthernet
3. Drag the cursor to Switch0
4. Click once on Switch0 and choose FastEthernet0/1
5. Notice the green link lights on PC2 Ethernet NIC and amber light Switch0 FastEthernet0/1 port. The switch port is temporarily not forwarding frames, while it goes through the stages for the Spanning Tree Protocol (STP) process.
6. After a about 30 seconds the amber light will change to green indicating that the port has entered the forwarding stage. Frames can now forwarded out the switch port.



Repeat the steps above for **PC3** connecting it to **Port 3** on **Switch0** on port **FastEtherent0/2**. (The actual switch port you choose does not matter.)



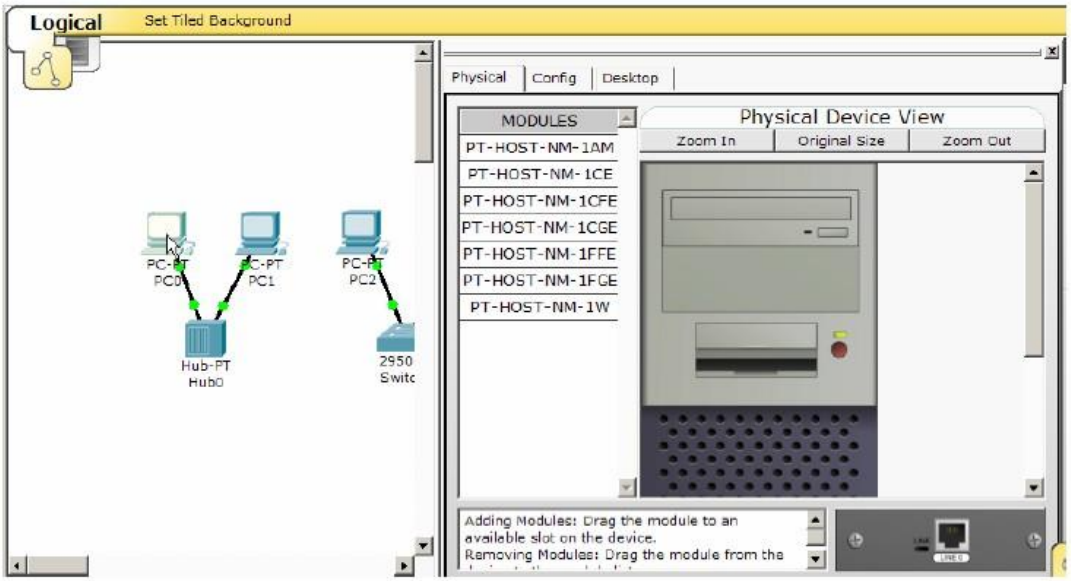
Move the cursor over the link light to view the port number. **Fa** means FastEthernet, 100 Mbps Ethernet.



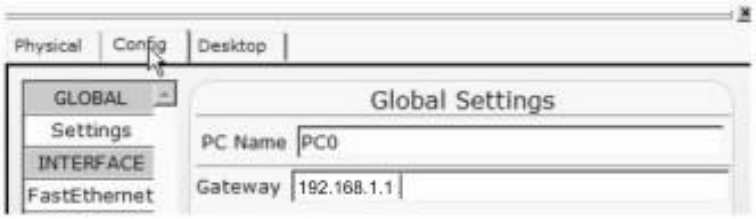
Step 5: Configuring IP Addresses and Subnet Masks on the Hosts

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

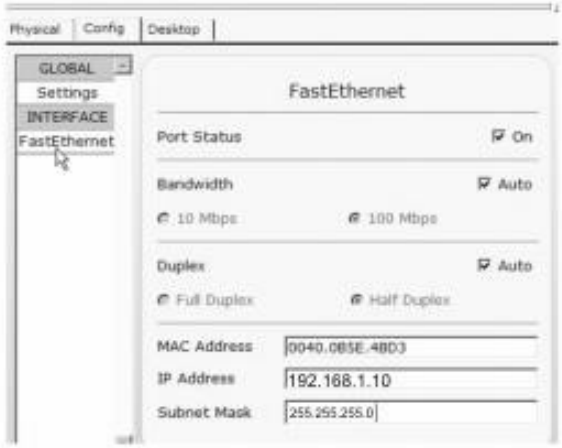
Click once on PC0.



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.



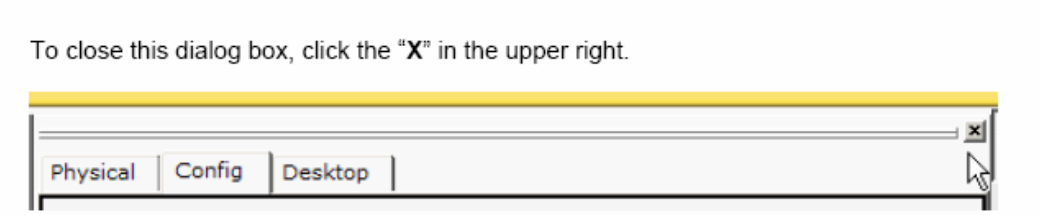
Also, notice this is where you can change the Bandwidth (speed) and Duplex of the Ethernet NIC (Network Interface Card). The default is Auto (autonegotiation), which means the NIC will negotiate with the hub or switch. The bandwidth and/or duplex can be manually set by removing the check from the Auto box and choosing the specific option.

Bandwidth --- Auto

If the host is connected to a hub or switch port which can do 100 Mbps, then the Ethernet NIC on the host will choose 100 Mbps (Fast Ethernet). Otherwise, if the hub or switch port can only do 10 Mbps, then the Ethernet NIC on the host will choose 10 Mbps (Ethernet).

Duplex --- Auto

Hub: If the host is connected to a hub, then the Ethernet NIC on the host will choose Half Duplex. Switch: If the host is connected to a switch, and the switch port is configured as Full Duplex (or Autonegotiation), then the Ethernet NIC on the host will choose Full Duplex. If the switch port is configured as Half Duplex, then the Ethernet NIC on the host will choose Half Duplex. (Full Duplex is a much more efficient option.) The information is automatically saved when entered.



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

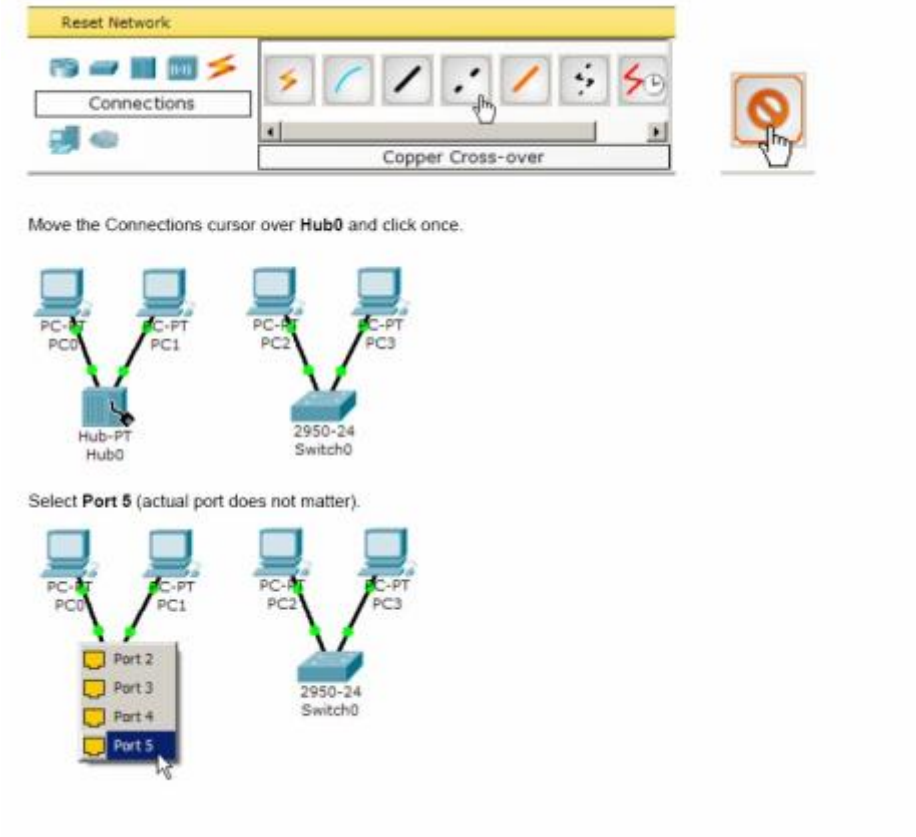
Host	IP Address	Subnet Mask
PC0	192.68.1.10	255.255.255.0
PC1	192.68.1.11	255.255.255.0
PC2	192.68.1.12	255.255.255.0
PC3	192.68.1.13	255.255.255.0

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

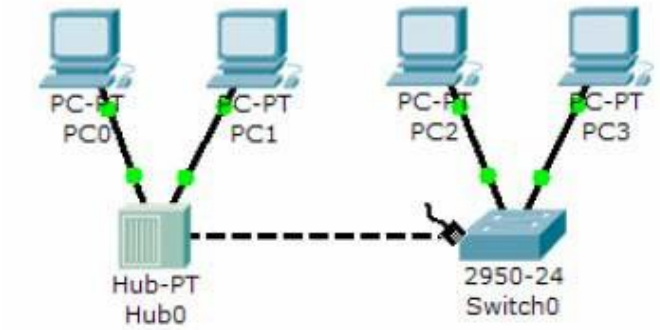
Deleting a Device or Link To delete a device or link, choose the Delete tool and click on the item you wish to delete.

Step 6: Connecting Hub0 to Switch0

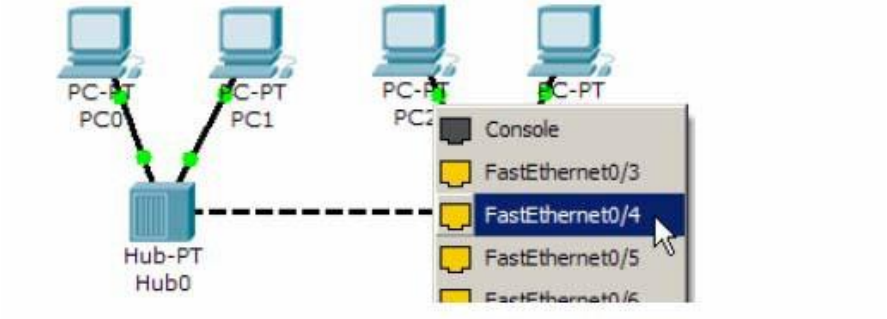
To connect like---devices, like a Hub and a Switch, we will use a Cross---over cable. Click once the Cross---over Cable from the Connections options.



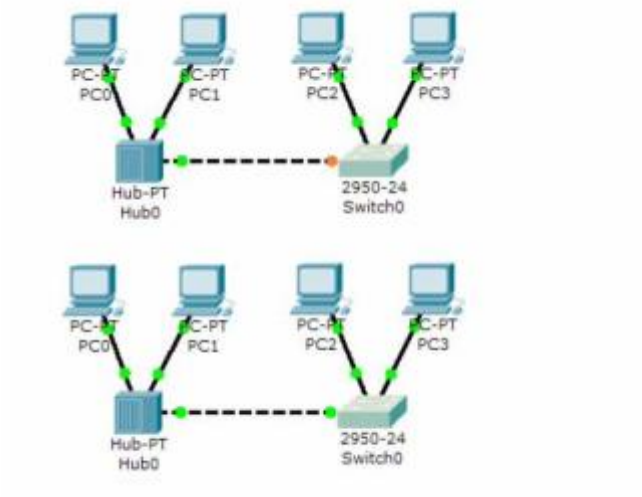
Move the Connections cursor to Switch0



Click once on Switch0 and choose FastEthernet0/4 (actual port does not matter).



The link light for switch port FastEthernet0/4 will begin as amber and eventually change to green as the Spanning Tree Protocol transitions the port to forwarding.



Network Simulation

In this part, we are going to use the simulator to simulate traffic between hosts. *For this scenario, delete the switch and host PC3, then connect host PC2 to the hub*.

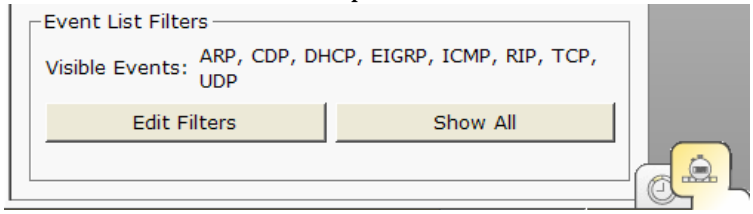
Task 1

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

a) 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.

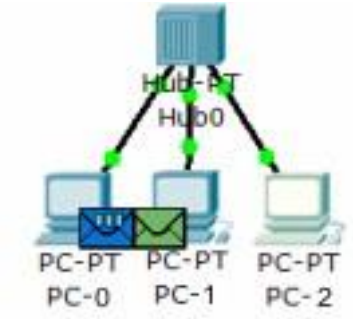
When Simulation Mode is chosen, a Simulation Panel will appear on the right side of the screen. This panel can be moved by moving the cursor at the top of the panel until it changes and then double---clicking on it. The panel can be restored to the original location by double---clicking on the Title bar. If the panel is closed, click on the Event List button.

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

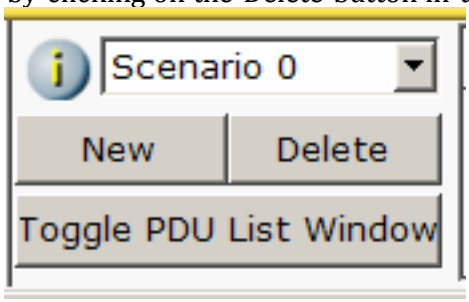


c) Select a Simple PDU by clicking the closed envelope in the Common Tools Bar on the right.

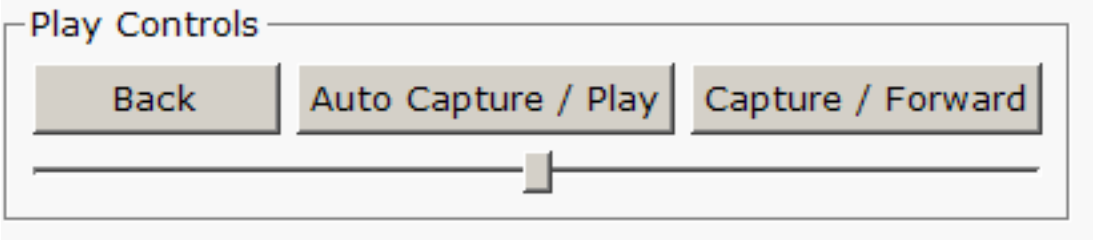
Move to PC0 and click to establish the source. Move to PC1 and click to establish the destination. Notice that two envelopes are now positioned beside PC0. This is referred to as a data traffic scenario. One envelope is an ICMP packet,. The Event List in the Simulation Panel will identify exactly which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



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

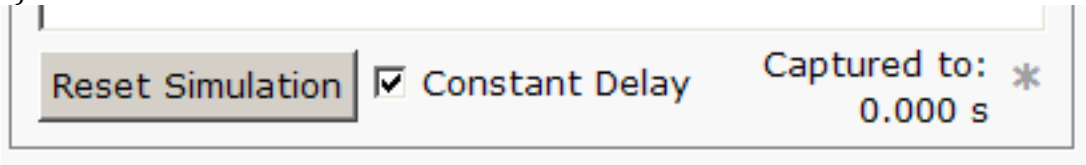


Multiple scenarios can be created by clicking on the New button in the Scenario panel. The scenarios can then be toggled between without deleting.

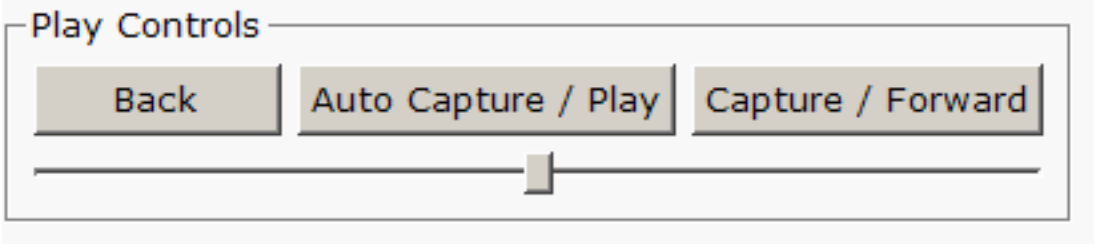


d) Select Auto Capture / Play from the Simulation Panel Play Controls. Below the Auto Capture / Play button is a horizontal bar, with a vertical button that controls the speed of the simulation. Dragging the button to the right will speed up the simulation, while dragging is to the left will slow down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

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

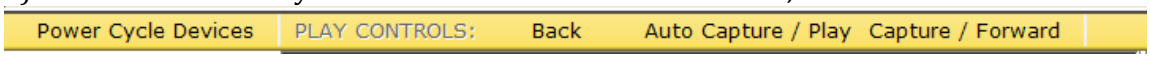


f) Choose the Capture / Forward button.

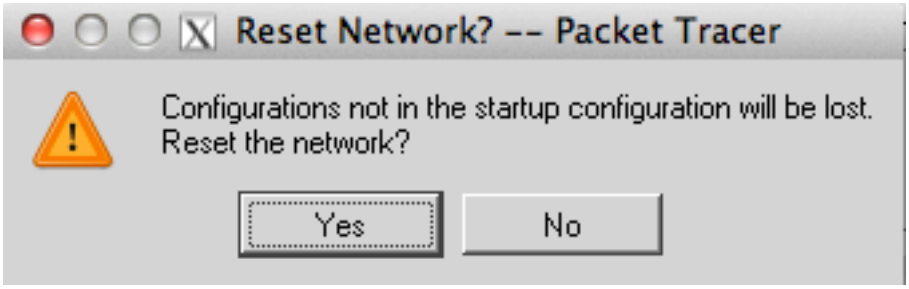


Notice that the ICMP envelope moved forward one device and stopped. The Capture / Forward button will allow you to move the simulation one step at a time.

h) Choose the Power Cycle Devices button on the bottom left, above the device icons.



i) Choose **Yes**



Notice that both the ICMP envelopes are now present. The Power Cycle Devices will clear any configuration changes not saved and clear the MAC / ARP tables.

<u>Task 2</u>

View ARP Tables on each PC.

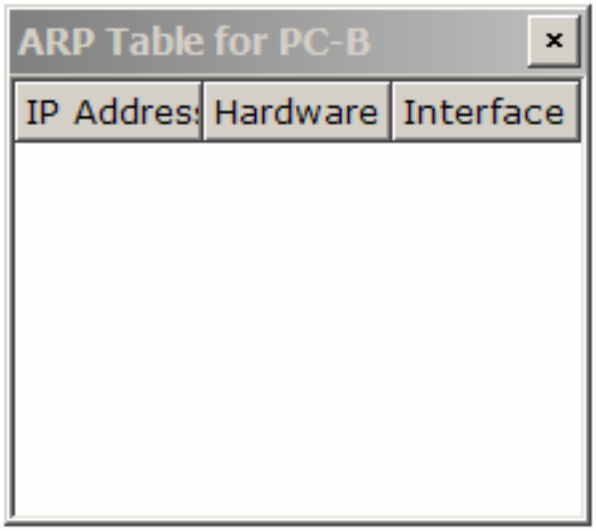
a) Choose the Auto Capture / Play button and allow the simulation to run completely. b) Click on PC---0 and select the Desktop tab.

c) Select the Command Prompt and type the command **arp ---a**.

d) 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).

e) To examine the ARP tables for PC1 and PC2in 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.

f) 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