UID	2019230064
Name	Afaan Ansari
Batch	A [TE Comps]
Subject	DCCN

Experiment : 3

AIM: Study of different types of physical layer wired/wireless connections

Theory:

- **Step 1: Create a logical network diagram with two PCs and a hub**

The bottom left-hand corner of the Packet Tracer screen displays eight icons that represent device categories or groups, such as Routers, Switches, or End Devices.

Moving the cursor over the device categories will show the name of the category in the box. To select a device, first select the device category. Once the device category is selected, the options within that category appear in the box next to the category listings. Select the device option that is required.

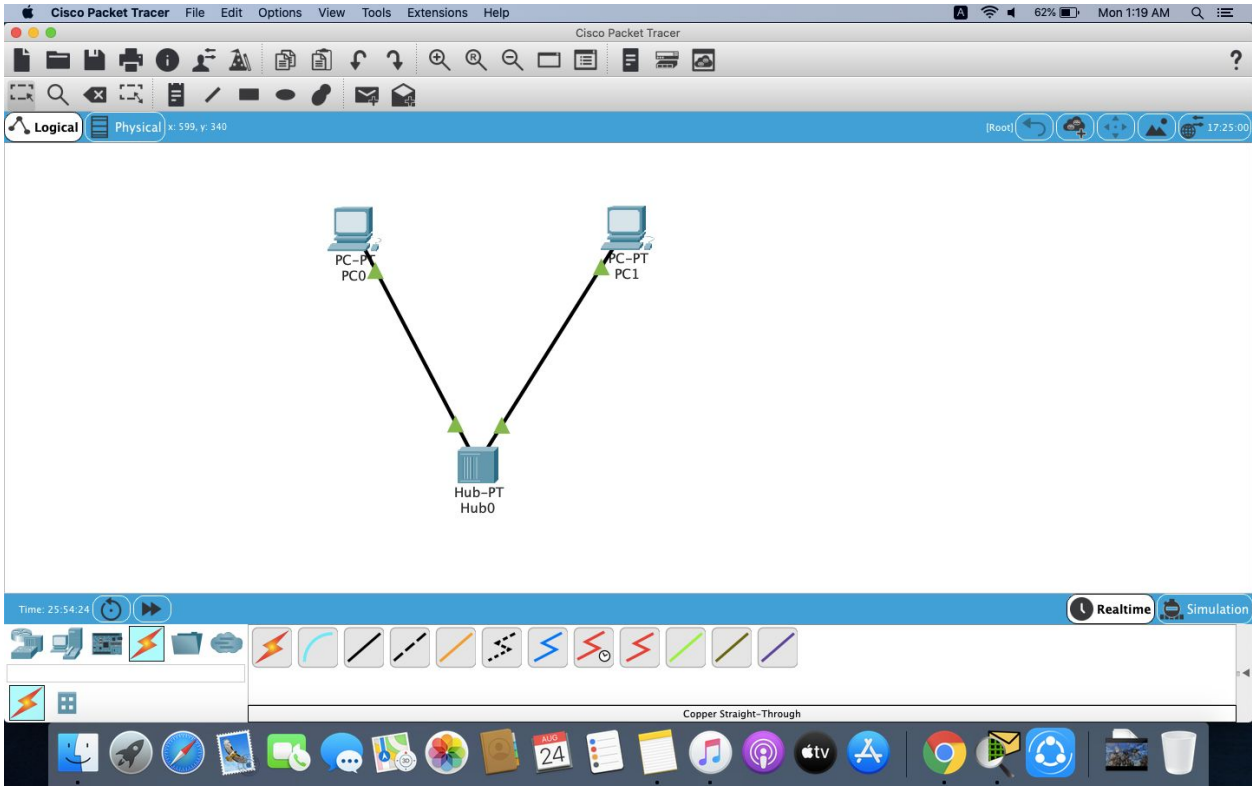
a) Select End Devices from the options in the bottom left-hand corner. Drag and drop two generic PCs onto your design area.

b) Select Hubs from the options in the bottom left-hand corner. Add a hub to the prototype network by dragging and dropping a generic hub onto the design area.

c) Select Connections from the bottom left-hand corner. Choose a Copper Straight-through cable type. Click the first host, PC0, and assign the cable to the FastEthernet connector. Click the hub, Hub0, and select a connection port, Port 0, to connect to PC0.

d) Repeat Step c for the second PC, PC1, to connect the PC to Port 1 on the hub.

*There should be green dots at both ends of each cable connection. If not, check the cable type selected.



This image shows the network of two generic personal computers and a generic hub which is created and the computers are connected to the hub by the Copper straight-through cable.

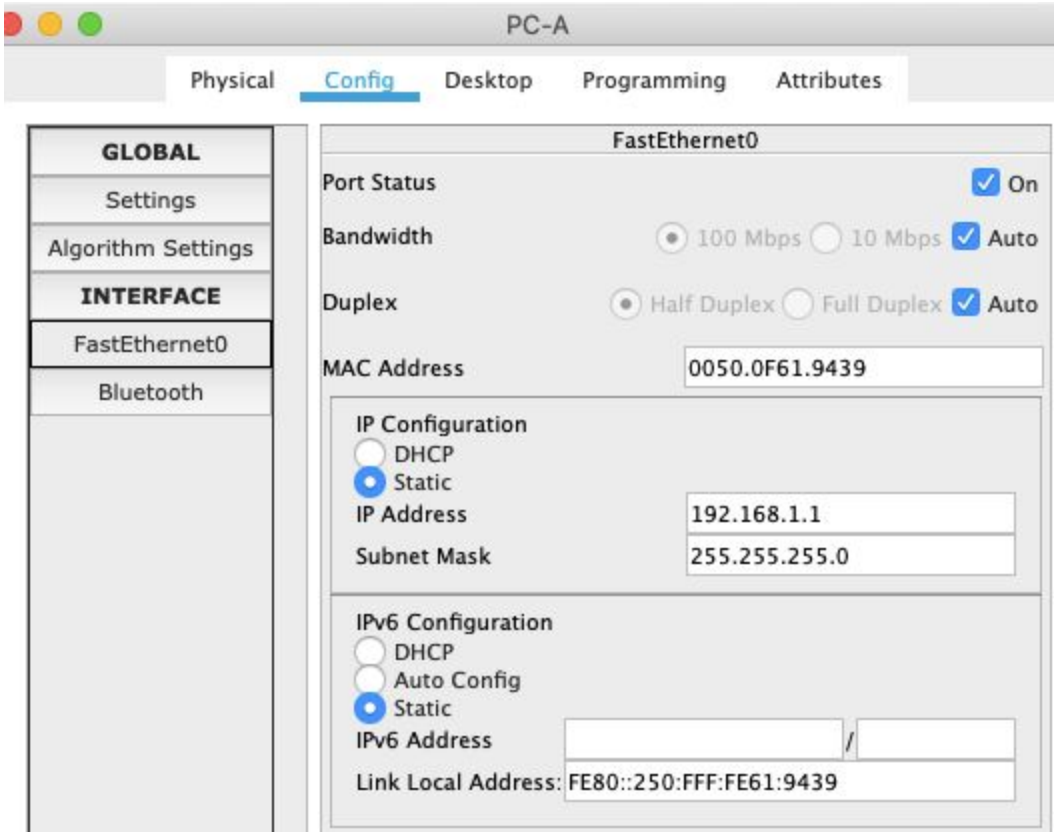
- **Step 2: Configure host names and IP addresses on the PCs**

a) Click PC0. A PC0 window will appear.

b) From the PC0 window, select the Config tab. Change the PC Display Name to PC-A. (An error message window will appear warning that changing the device name may affect scoring of the activity. Ignore this error message.) Select the FastEthernet tab on the left and add the IP address of 192.168.1.1 and subnet mask of 255.255.255.0. Close the PC-A configuration window by selecting the x in the upper righthand corner.

c) Click PC1.

d) Select the Config tab. Change the PC Display Name to PC-B. Select the FastEthernet tab on the left and add the IP address of 192.168.1.2 and subnet mask of 255.255.255.0. Close the PC-B configuration window.


PC-A
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
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IP Configuration
DHCP
Static
IP Address
192.168.1.1
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IPv6 Configuration
DHCP
Auto Config
Static
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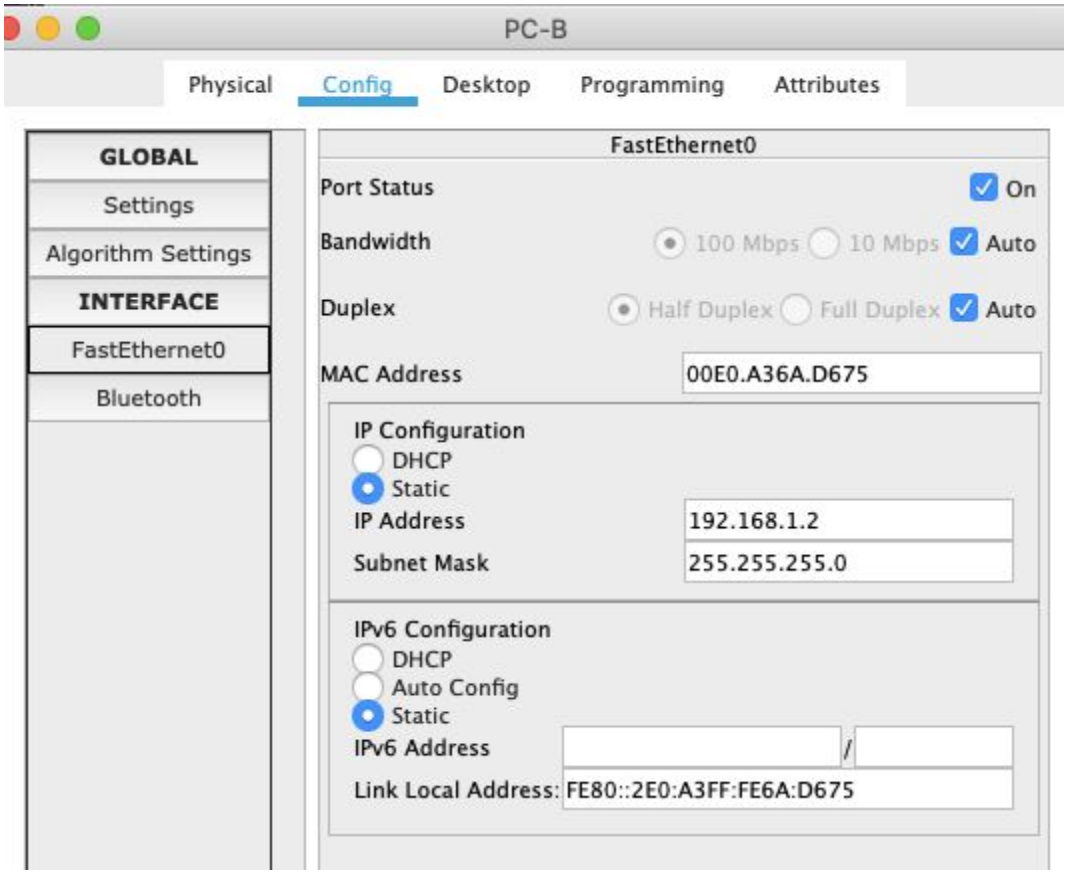
Link Local Address:
FE80::250:FFF:FE61:9439


PC-B
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Algorithm Settings
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FastEthernet0
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FastEthernet0
Port Status
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10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.A36A.D675
IP Configuration
DHCP
Static
IP Address
192.168.1.2
Subnet Mask
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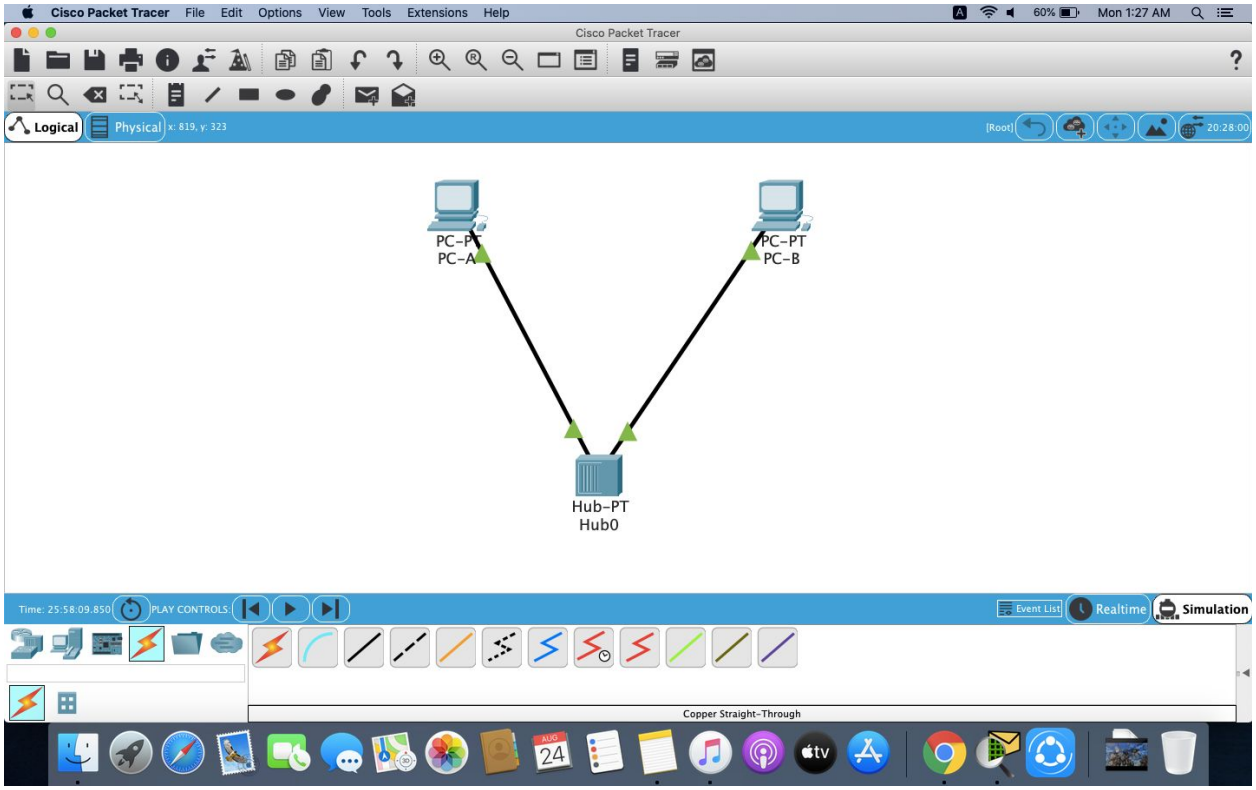
Link Local Address:
FE80::2E0:A3FF:FE6A:D675



This images show the configuration of personal computers (PC-A and PC-B) and connected to a hub in the Ethernet network. The IP addresses and subnet masks assigned are shown.

Step 3: Observe the flow of data from PC-A to PC-B by creating network traffic

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

b) Click the Edit Filters button in the Edit List Filters area. Clicking the Edit Filters button will create a pop-up window. In the pop-up window, click the Show All/None box to deselect every filter. Select just the ARP and ICMP filters.

c) Select a Simple PDU by clicking the closed envelope on the right vertical toolbar. Move your cursor to the display area of your screen. Click PC-A to establish the source. Move your cursor to PC-B and click to establish the destination.

**Notice that two envelopes are now positioned beside PC-A. One envelope is ICMP, while the other is ARP. The Event List in the Simulation Panel will identify exactly which envelope represents ICMP and which represents ARP.

d) Select Auto Capture / Play from the Play Controls area of the Simulation Panel. 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.

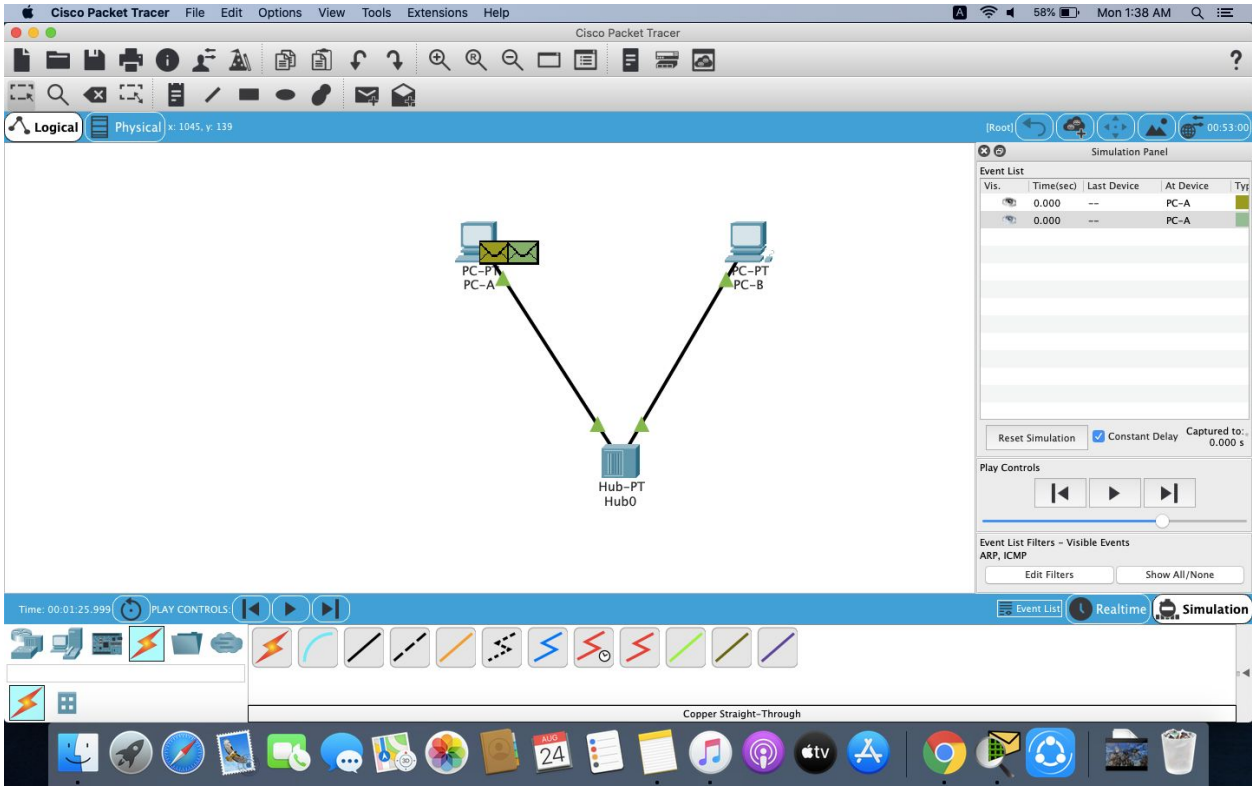
e) The animation will run until the message window No More Events appears. All requested events have been completed. Select OK to close the message box.

f) Choose the Reset Simulation button in the Simulation Panel. Notice that the ARP envelope is no longer present. This has reset the simulation but has not cleared any configuration changes or dynamic table entries, such as ARP table entries. The ARP request is not necessary to complete the ping command because PC-A already has the MAC address in the ARP table.

g) Choose the Capture / Forward button. The ICMP envelope will move from the source to the hub and stop. The Capture / Forward button allows you to run the simulation one step at a time. Continue selecting the Capture / Forward button until you complete the event.

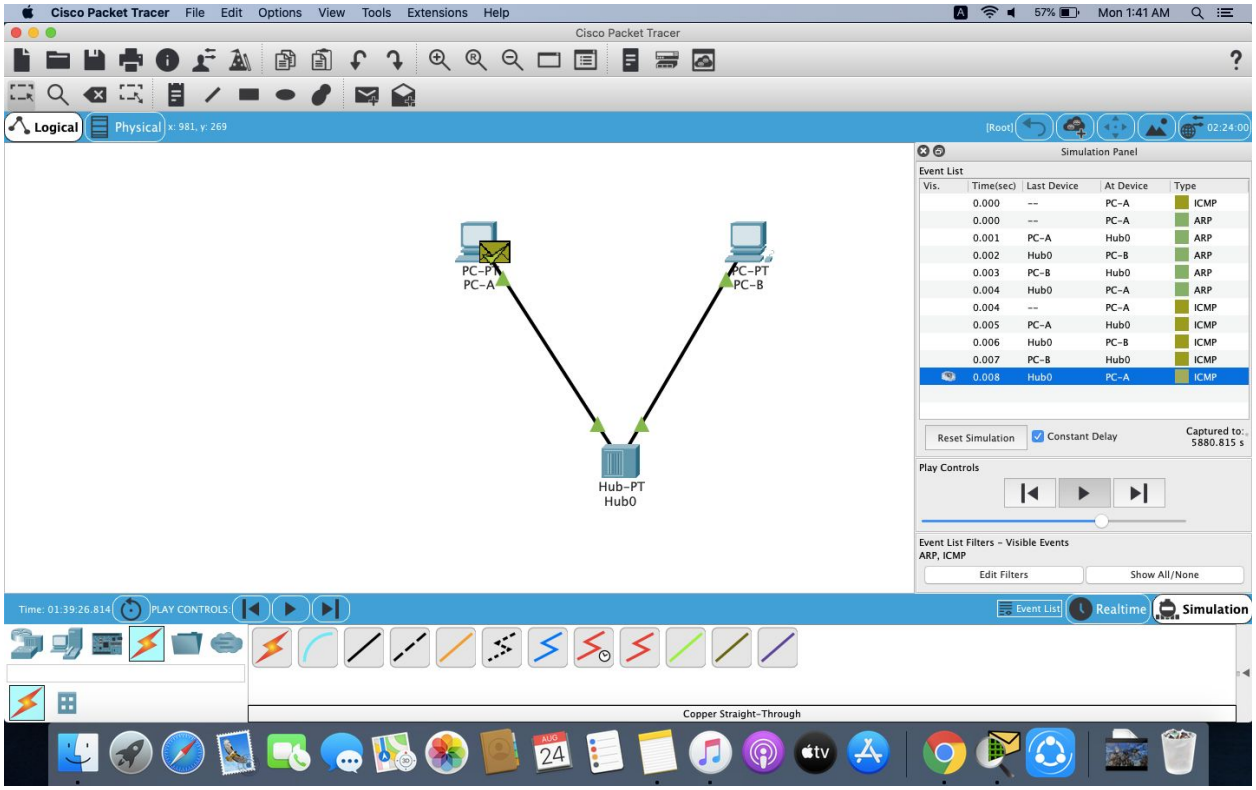
h) Choose the Power Cycle Devices button on the bottom left, above the device icons.

i) An error message will appear asking you to confirm reset. Choose Yes. Now both the ICMP and ARP envelops are present again. The Reset Network button will clear any configuration changes not saved and will clear all dynamic table entries, such as the ARP and MAC table entries.

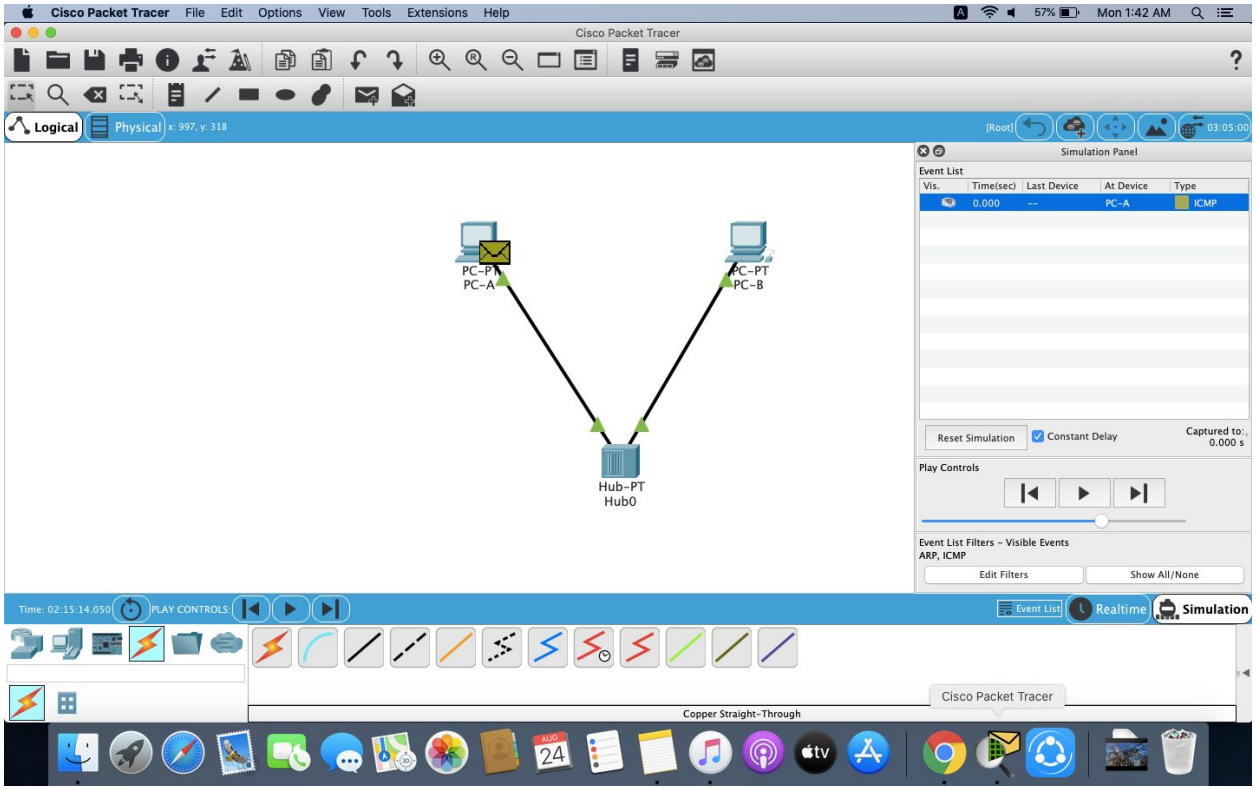


simulation panel shows all the event list filters that are available and also provides editing filters and resetting the simulation and to play the simulation

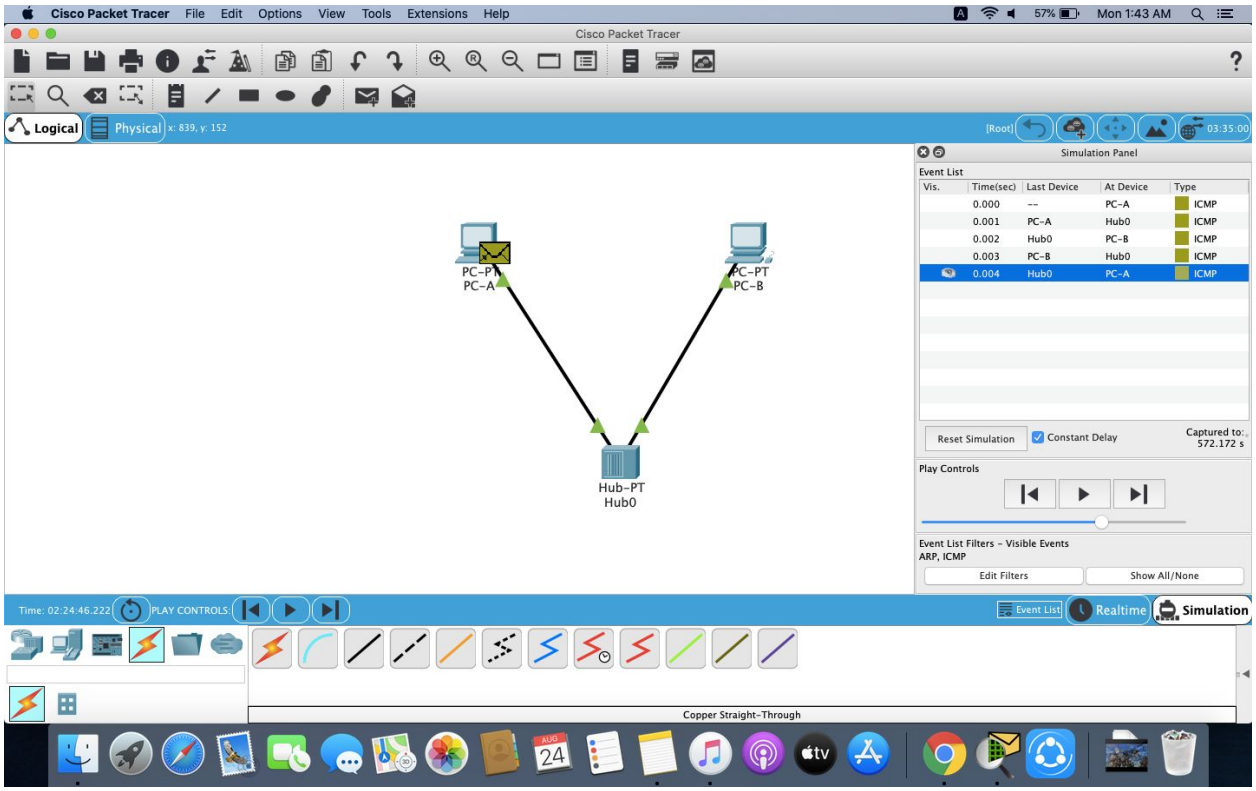
The image shows the ICMP and ARP (Address Resolution Protocol) which are used for the simulation and packets are shown for PC-A. A PDU (Protocol Data Unit) is established with PC-A as the source and PC-B as the destination.



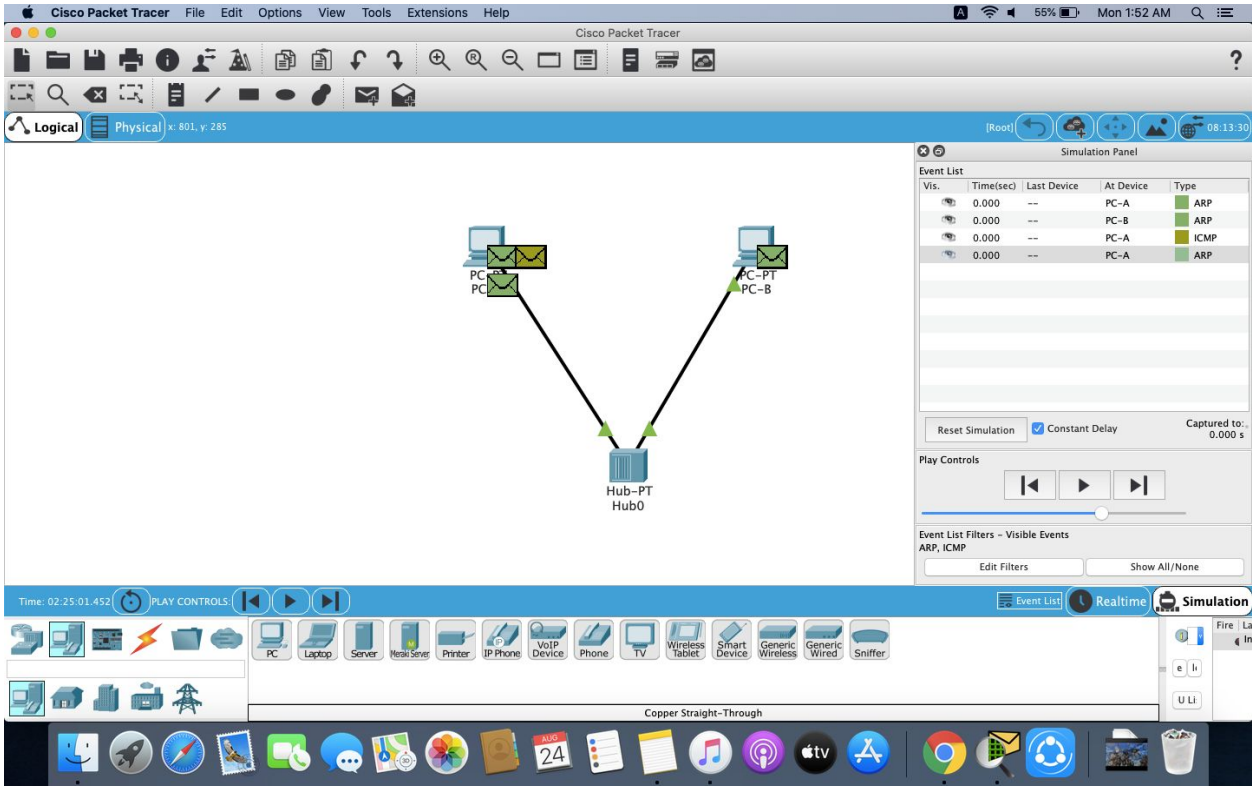
This image shows the steps of simulation and also how the ICMP and ARP data packets are sent between the hub and the personal computers.



This image shows the scenario of resetting the simulation. The ARP filter is set to visible but the ARP packet is not visible since both the PCs have their MAC addresses stored in the ARP tables.



This image shows the simulation of transfer of the ICMP packets. Both the ARP and the ICMP packets flow from PC-A to PC-B via the hub and then back to PC-A from PC-B via the hub to complete the communication.



clicking on the **Power Cycle Devices** button, all the dynamic cached entries are cleared and the ARP packets are visible again

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- **Step 4: View ARP Tables on each PC**

a) Choose the Auto Capture / Play button to repopulate the ARP table on the PCs. Click OK when the No More Events message appears.

b) Select the magnifying glass on the right vertical tool bar.

c) Click PC-A. The ARP table for PC-A will appear. Notice that PC-A does have an ARP entry for PC-C. View the ARP tables for PC-B and PC-C as well. Close all ARP table windows.

d) Click the Select Tool on the right vertical tool bar. (This is the first icon present in the toolbar.)

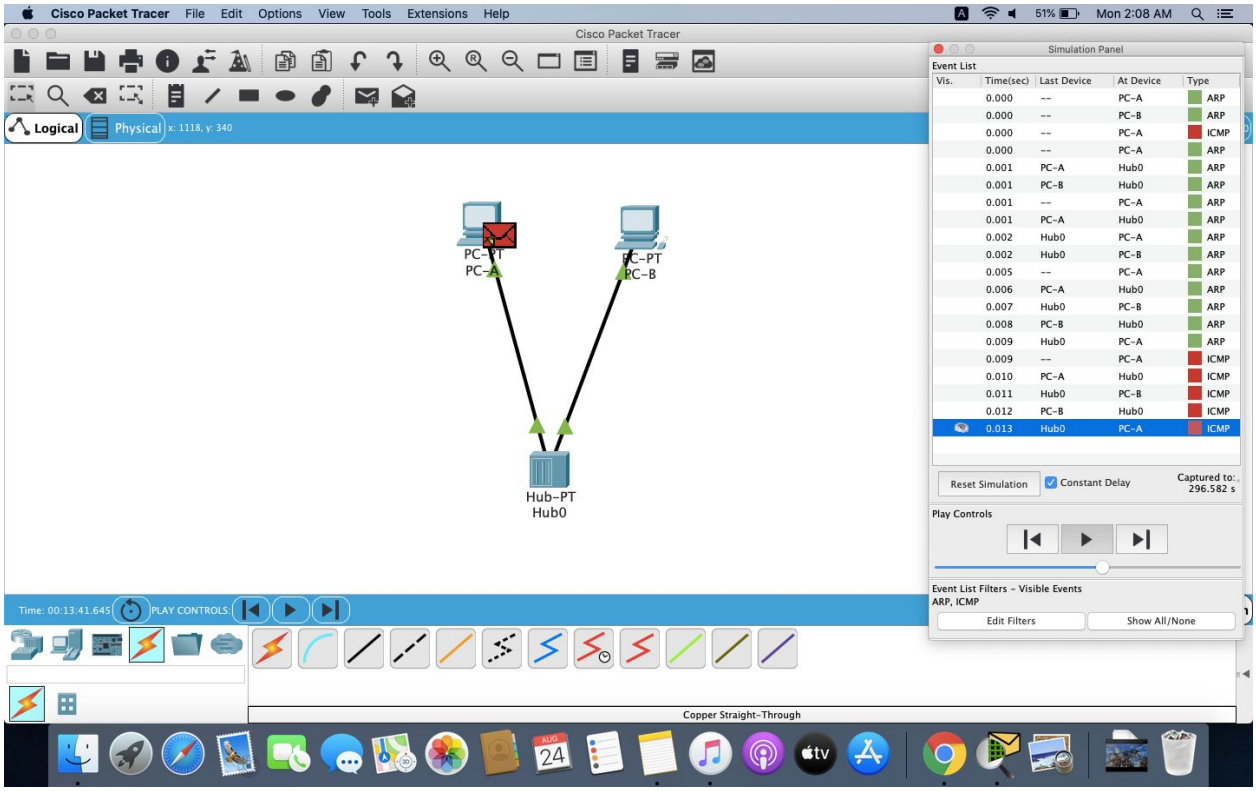
e) Click PC-A and select the Desktop tab.

f) Select the Command Prompt and type the command arp -a and press enter to view the ARP table from the desktop view. Close the PC-A configuration window.

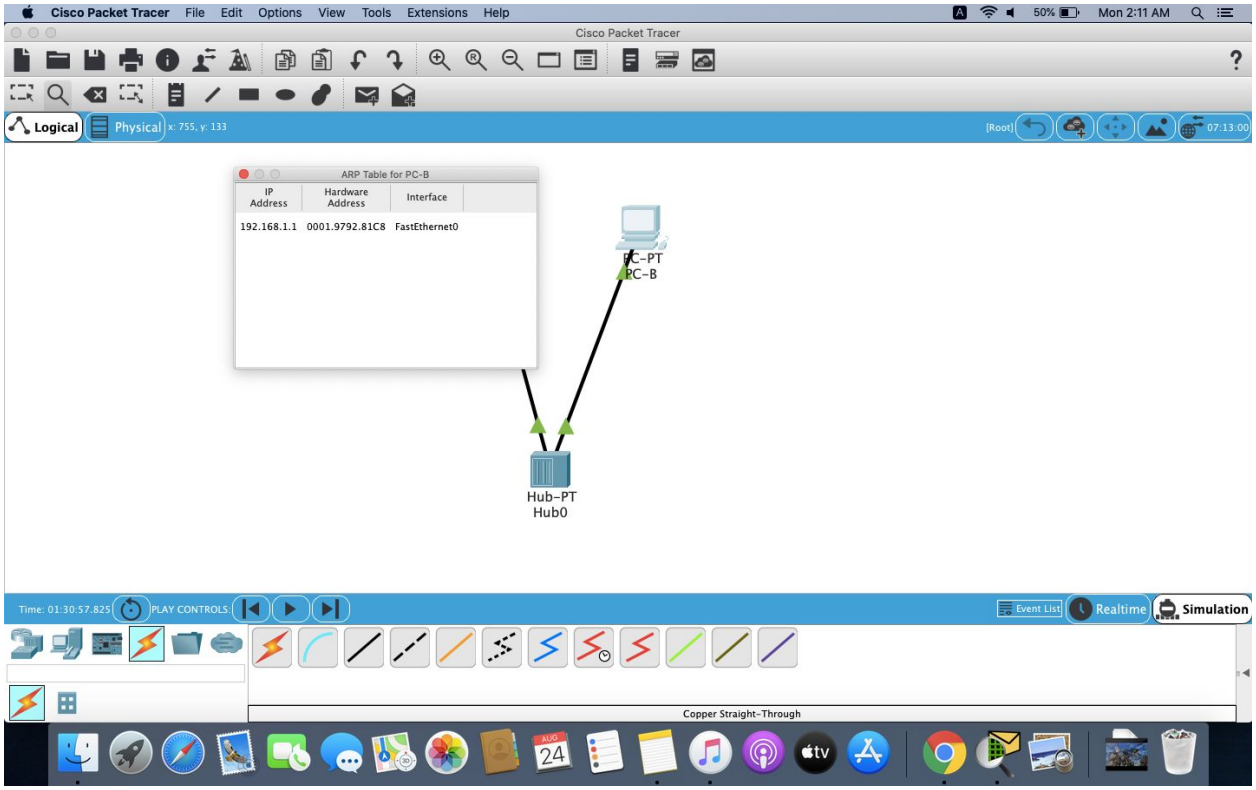
g) Examine the ARP table for PC-B.

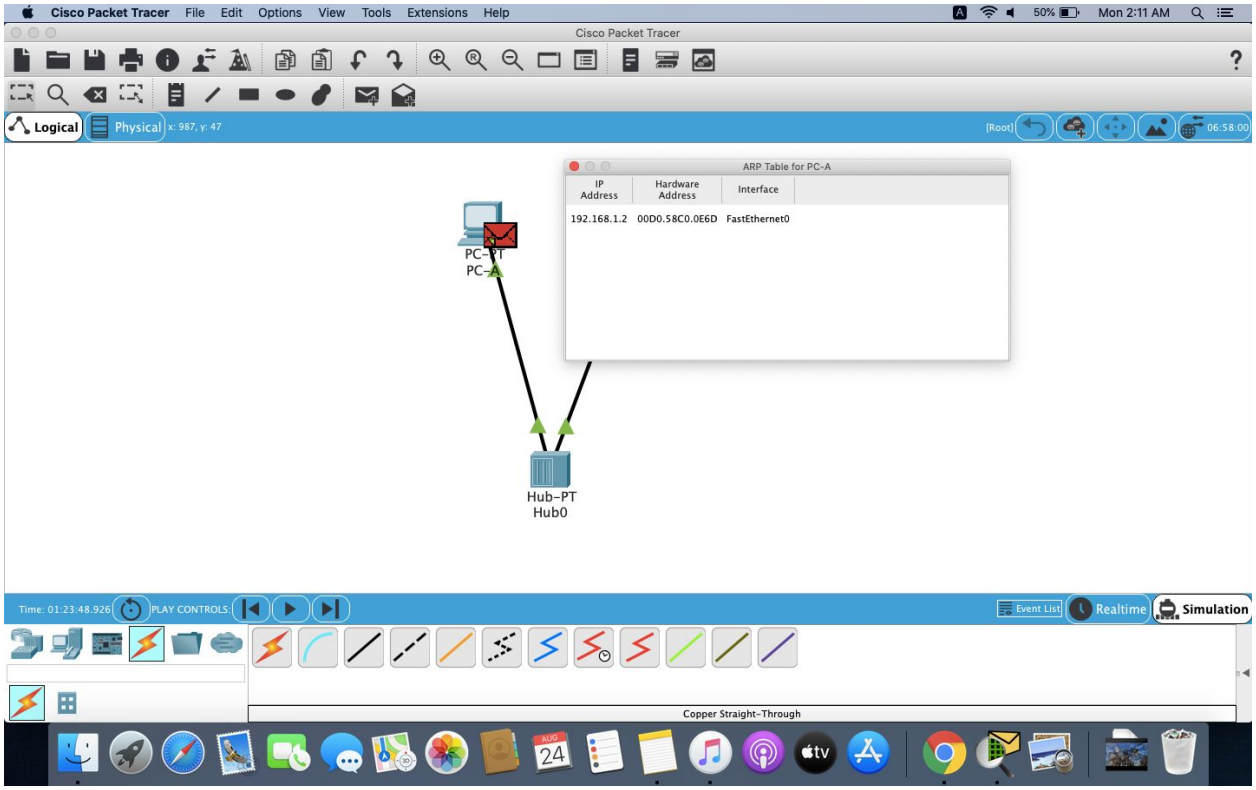
h) Close the PC-B configuration window.

i) Click the Check Results button at the bottom of the instruction window to verify that the topology is correct.

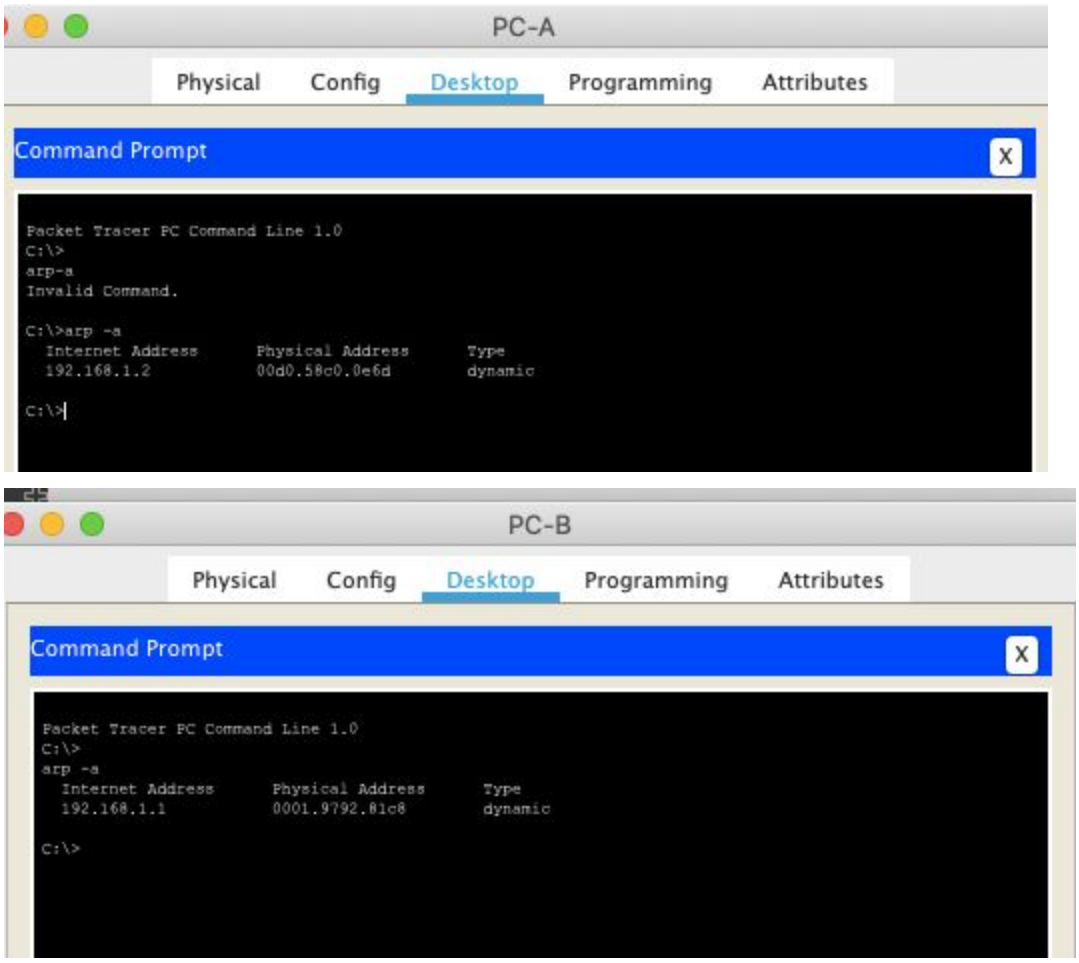


This image shows the simulation that repopulates the ARP table entries. It transfers the 2 ARP events and 1 ICMP event from PC-A and PC-B via the hub. The PDU contains 1 ICMP frame and 2 ARP frames at PC-A and 1 ARP frame at PC-B at the simulation. PC-A and PC-B sends an ARP frame to the hub but due to the collision frames are dropped. Then PC-A sends another ARP frame from the buffer and this frame reaches PC-B via the hub and then back to PC-A via the hub completing the ARP frame transfer. Now, the ICMP frame is sent by PC-A from the buffer same as the previous ARP frame and the simulation is completed.





This images show the cached arp table entries for PC-A and PC-B.



This image shows the Command Line Interface of the dynamic cached storage of PC-A . It has IP and MAC addresses of PC-B and that of PC-B which has the IP and MAC addresses of PC-A in its ARP table.