10/11/22

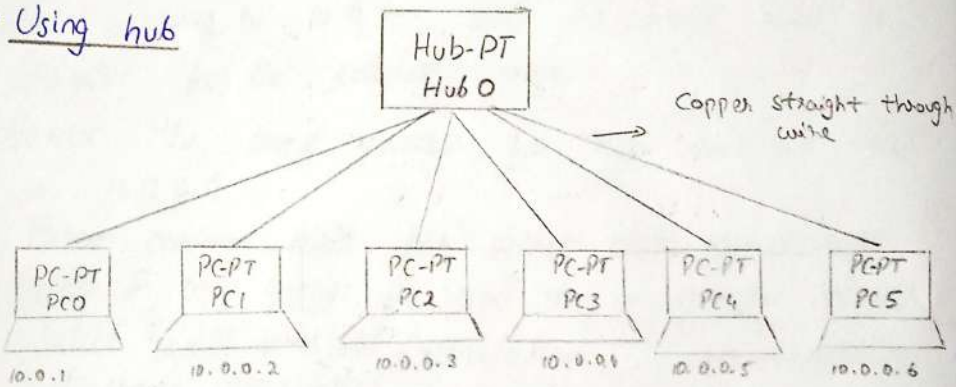
# Lab 1

## Hubs and Switches

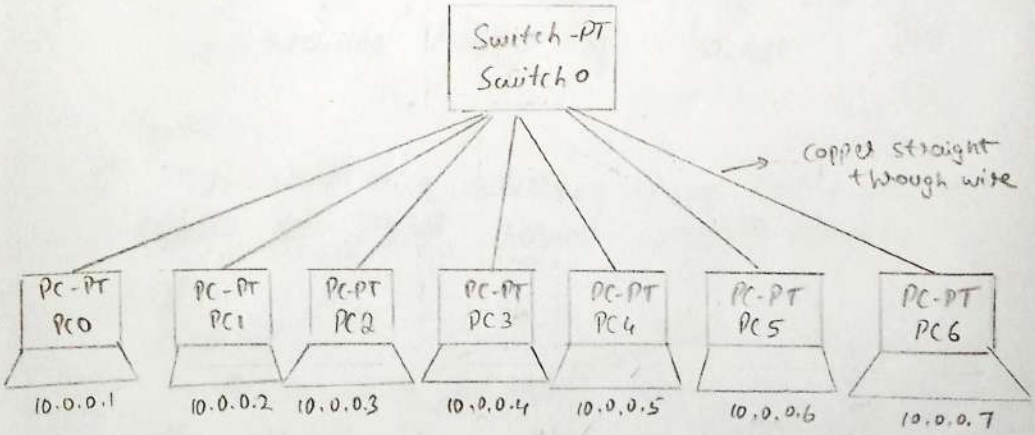
**Aim**: Creating a topology and simulate sending a simple PDU from source to destination using simple hub and switch as connecting devices.

**Topology:**

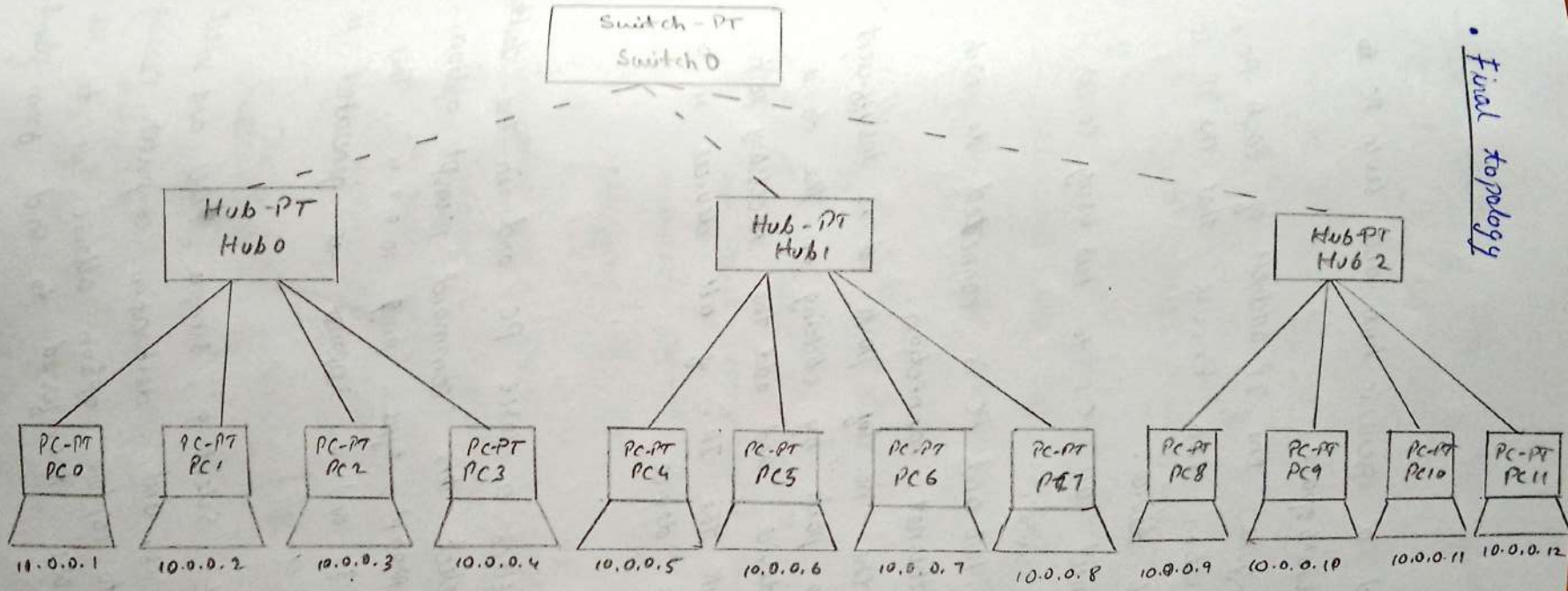
- **Using hub**




- **Using switch**



• Final topology



Procedure:

→ Using hub: • Add a generic hub and seven PC to the workspace.

• Configure the IP address of each PC's in the configuration tab. Ensure that the IP is different for each device.

• Connect all PC's to hub using copper straight through wire.

• The hub and PC is connected to each other's fast ethernet connection.

• If the no. of ports is insufficient then add extra ports by clicking on the device. Turn off the device and add the necessary ports.

• Write the IP's of all devices in a note below the device

Real time: Select a sorce PC and in the desktop tab select the command prompt option. In command prompt type "ping 10.0.0.4". This pings the PC 3 and a response is generated in PC 0.

Simulation time: Select a simple PDU and select a source and destination computer. Clicking on auto capture option allows us to see how packets are transferred to and from device.

→ Using Switch: • Add a generic switch and seven PC's to workspace.

• Configure the IP address of each PC's in the configuration tab. Ensure that IP is different for each device.

• Connect all PC's to the switch using copper straight through.

• If no. of ports are insufficient then add extra ports by clicking on device. Turn off the device and add the necessary ports.

• Write the IP's of all devices in a note below the device.

Real time: Select a source PC and in the desktop tab select command prompt option. In command prompt ping the destination PC by specifying its IP

Simulation time: Select a simple PDU and select a source and destination computer. Clicking on auto capture option allows us to see how packets are transferred.

→ Final structure (Hybrid mode)

• Add a switch, ~~and~~ 3 hubs and 12 PC's to workspace.

• Connect the three hubs to the switch and 4 PC's to each of the hubs using copper cross over and copper straight through respectively.

· Configure the IP of each of the PC in configure and add a note below each PC entering IP addr

Real time mode: Select the PC you want to send the packet from and open its command prompt, specify the destination PC by specifying its IP address. A response is sent by the destination PC to source PC.

Simulation mode: Add a simple PDU by selecting the pair of PC and click on auto capture from right panel.

Observation

HUB:

Learning outcome:

When a source sends a packet in the network the hub receives the packet and sends broadcast over the network, i.e, it sends data to all the end devices in the network and the node whose ip matches with the specified address accepts the packet and acknowledges it, remaining nodes discards / ignores the message.

The communication between hub and end devices is established through copper straight through wire as they belong to different layers.

## Result

PC> ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3 : byte = 32 time = 2ms

Reply from 10.0.0.3 : byte = 32 time = 0ms

Reply from 10.0.0.3 : byte = 32 time = 0 ms

Reply from 10.0.0.3 : byte = 32 time : 0ms

Ping statistic for 10.0.0.3

Packets sent = 4, recieved = 4, loss = 0

## Switch

### Learning outcome

When a source device sends a message sends a message to the switch once the connection is established, which takes some time called as learning time, the switch recieves the packet. It initially broadcasts the packet to all connected devices to locate the destination. Once the destination is located the message is sent only to that device.

The connection between the switch and end device is established using copper straight through as the belong to different network layer.

## Result:

PC> ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data

Reply from 10.0.0.2: bytes = 32 time = 1ms

Reply from 10.0.0.2: bytes = 32 time = 3ms

Reply from 10.0.0.2: bytes = 32 time = 0ms

Reply from 10.0.0.2: bytes = 32 time = 0ms

Ping statistics for 10.0.0.2

packets sent = 4, Received = 4, lost = 0 (0% loss)

## Final Structure (Hybrid model)

### Learning outcome:

The switch and hub are connected through copper cross over as they belong to the same network layer but PC and hubs are connected through copper straight through as the belong to different network layer.

The message from the source PC to destination is sent through the hub which then sends to all its connected PC's and the switch. The switch then sends the message to the respective hub and the hub sends the message to all its connected PC. The destination PC acknowledges that it has received the message by sending a acknowledgement back to the source PC.

Results:

PC > ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data

Reply from 10.0.0.5: bytes = 32 time = 1ms TTL = 128

Reply from 10.0.0.5: bytes = 32 time = 1ms TTL = 128

Reply from 10.0.0.5 bytes = 32 time = 1ms TTL = 128

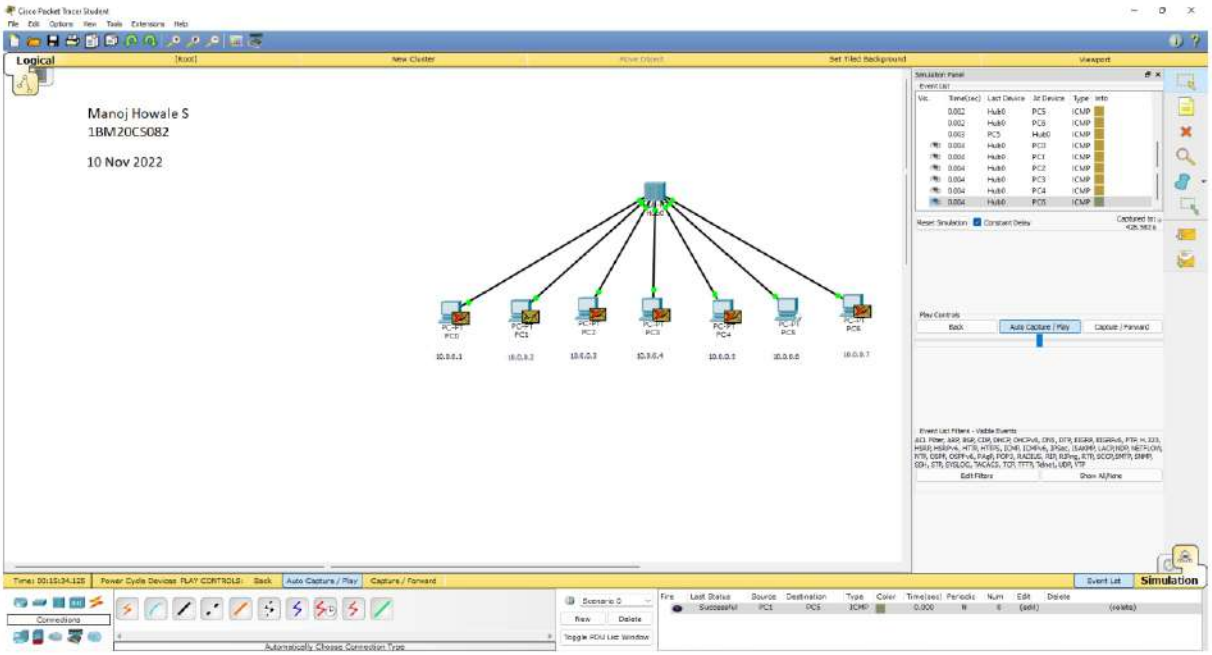
Reply from 10.0.0.5 bytes = 32 time = 1ms TTL = 128

Ping statistics for 10.0.0.7:

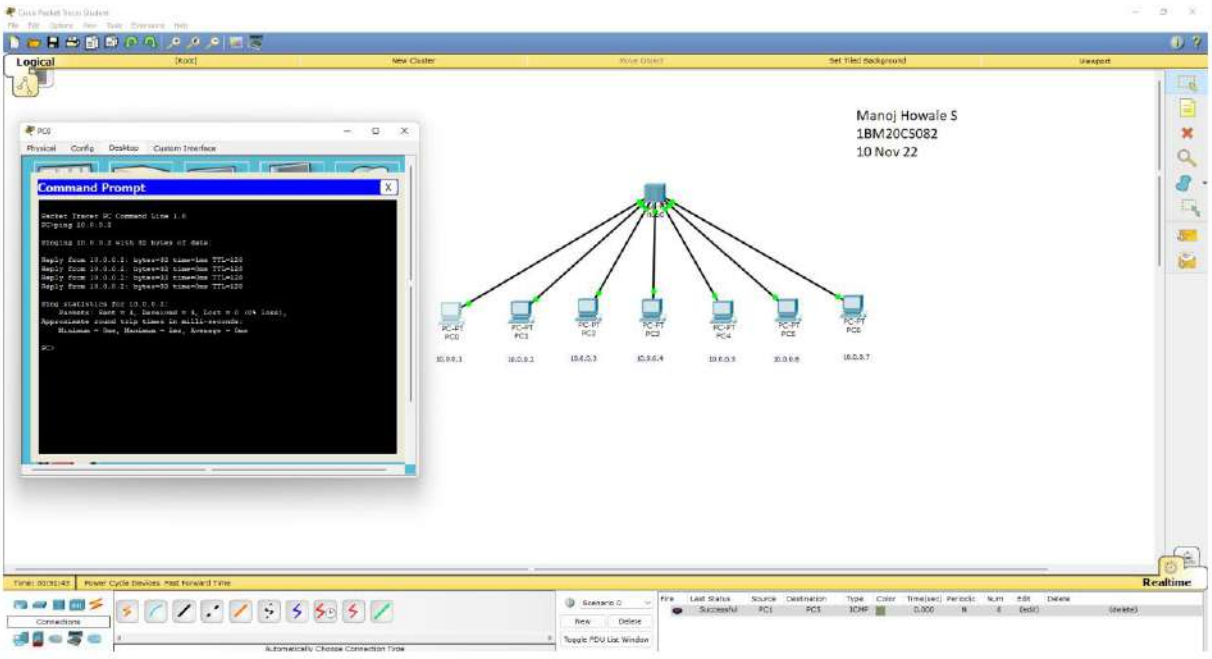
Packet: sent = 4 received = 4, lost = 0 (0% loss)

minimum = 0ms, maximum = 1ms, Average = 0ms

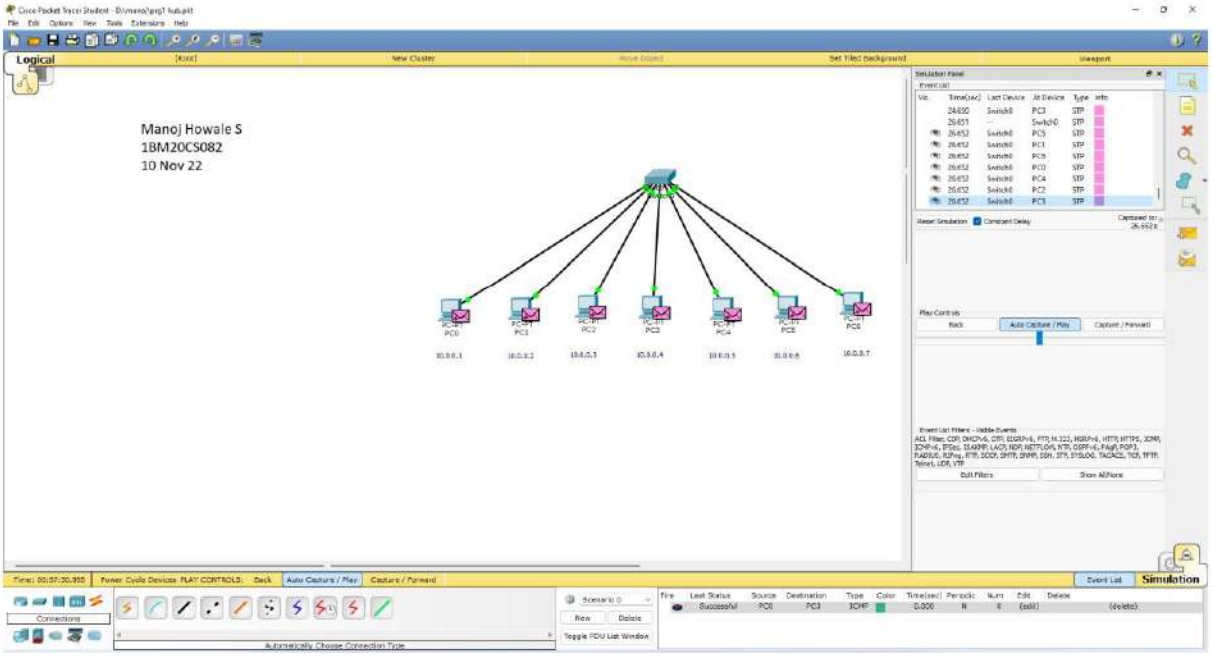
## HUBS----SIMULATION



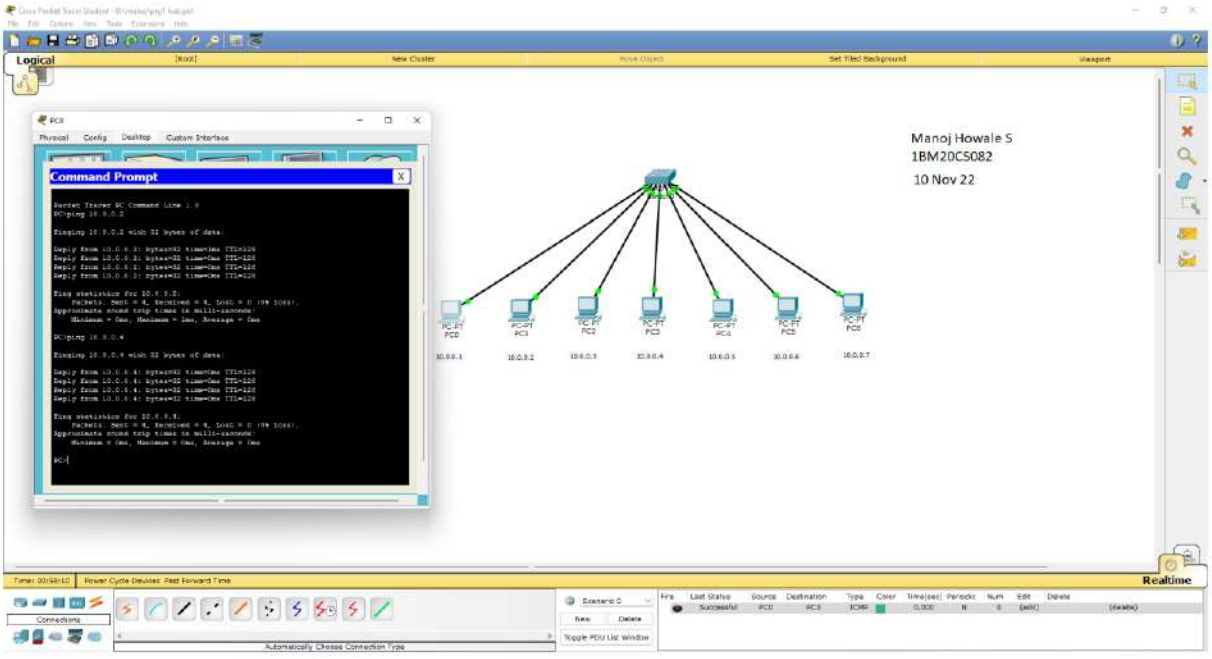

## HUBS----REAL TIME



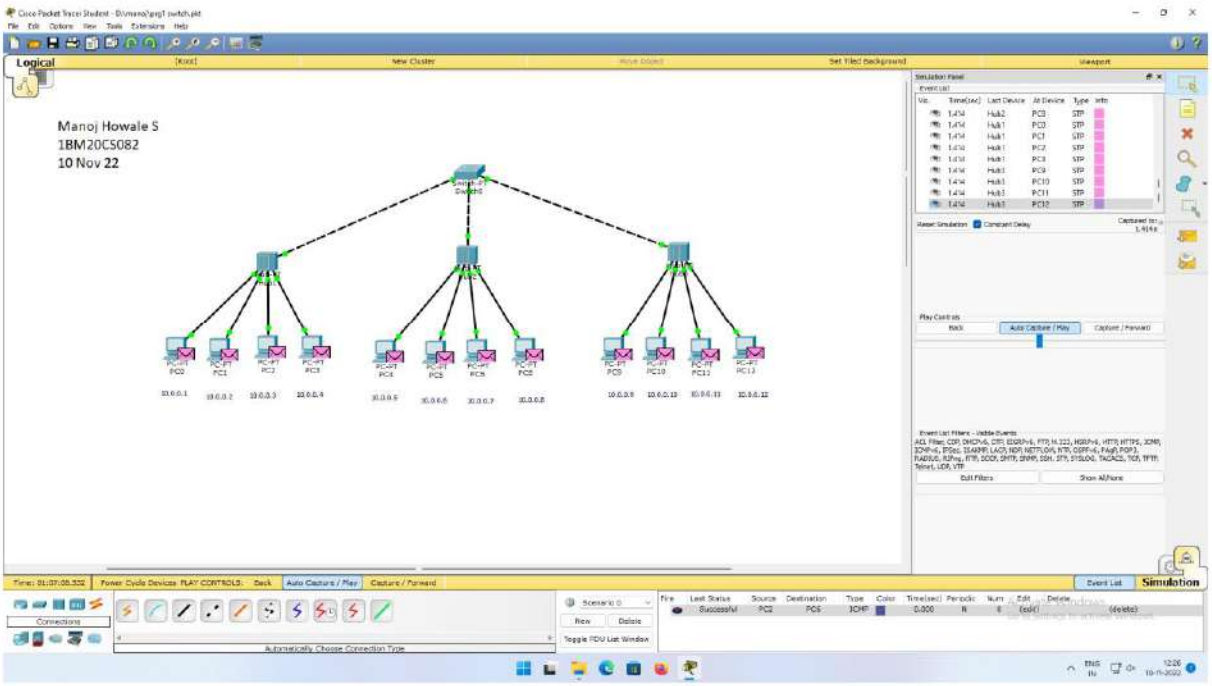
SWITCHES-----SIMULATION




SWITCHES----REAL TIME



FINAL NETWORK-----SIMULATION




FINAL NETWORK----REAL TIME