Experiment.

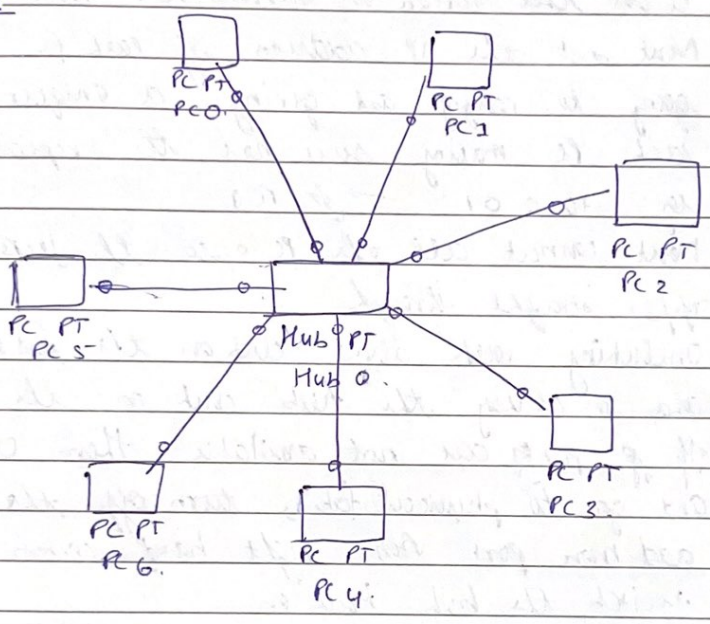
Title : Experiment on hubs and switches.

1/4/22

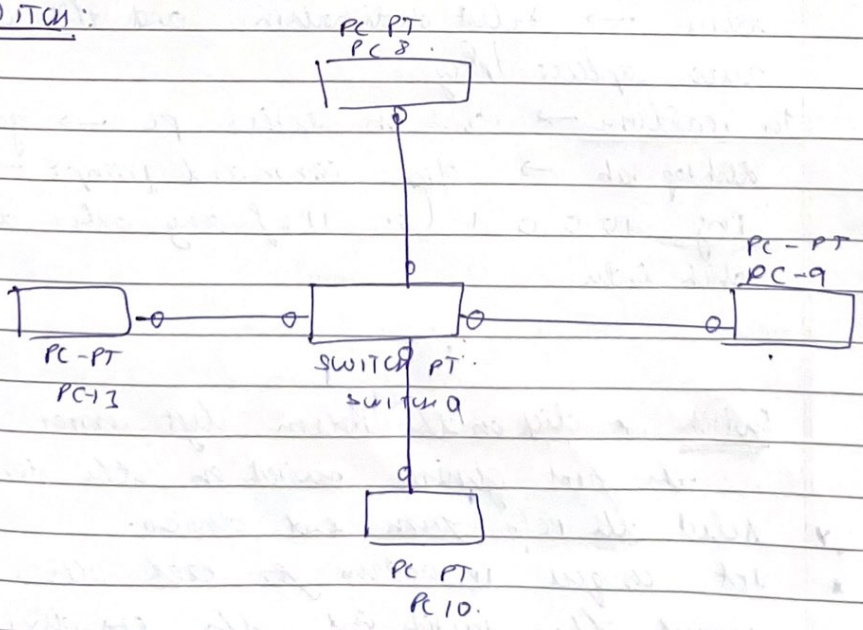
Aim : To create a topology and simulate sending a simple PDU from source to destination using hub and switch ~~using~~ as connecting devices.

Topology

HUB:



SWITCH:



[switch & hub are in the same layer
∴ cross over]. (layer 2).

procedure :-

Hubs:

* In cisco packet tracer click on the left bottom corner and place the hub on the screen.
* From the left bottom corner select end devices and click on the generic PC's and place minimum of 4 on the screen around the HUB.
* Next set the IP address of each pc by clicking on it going to config and giving a unique IP addrss to each PC making sure not to repeat. (select fast ethernet).
eg: 10.0.0.1 → for PC1.
* Next connect all the PC's to the HUB using a copper straight through.
* On clicking each device click on the fast ethernet option and on clicking the hub click on the available port.
* If the ports are not available then click on hub and go to physical tab, turn off the switch and add new port from right hand corner and then switch the hub back on.

For simulation → click → add simple PDU → select source → select destination. and then click auto capture/play.

For realtime → click on either PC → go to desktop tab → open command prompt → type → Ping 10.0.0.1 (or IP of any other device) click enter.

Switch : * click on the bottom left corner and place the first generic switch on the screen.
* select the PC's from end devices.
* set unique IP address for each device.
* connect the switch and the end devices using copper straight through.

* For simulation - click → add simple PDU → select source → select destination → click on auto capture / play.

* For realtime → click on either pc → go to desktop → open command prompt → type → Ping 10.0.0.2 (or ip address of any other device) click enter.

Result : For HUB :-

PC> Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.1 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.1 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.1 : bytes = 32 time = 0ms TTL = 128
packets : sent = 4, Recieved = 4, lost = 0

For switch :
PC> Ping 10.0.0.9
pinging 10.0.0.9 with 32 bytes of data :

Reply from 10.0.0.9 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.9 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.9 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.9 : bytes = 32 time = 0ms TTL = 128
packets : sent = 4, Recieved = 4, lost = 0

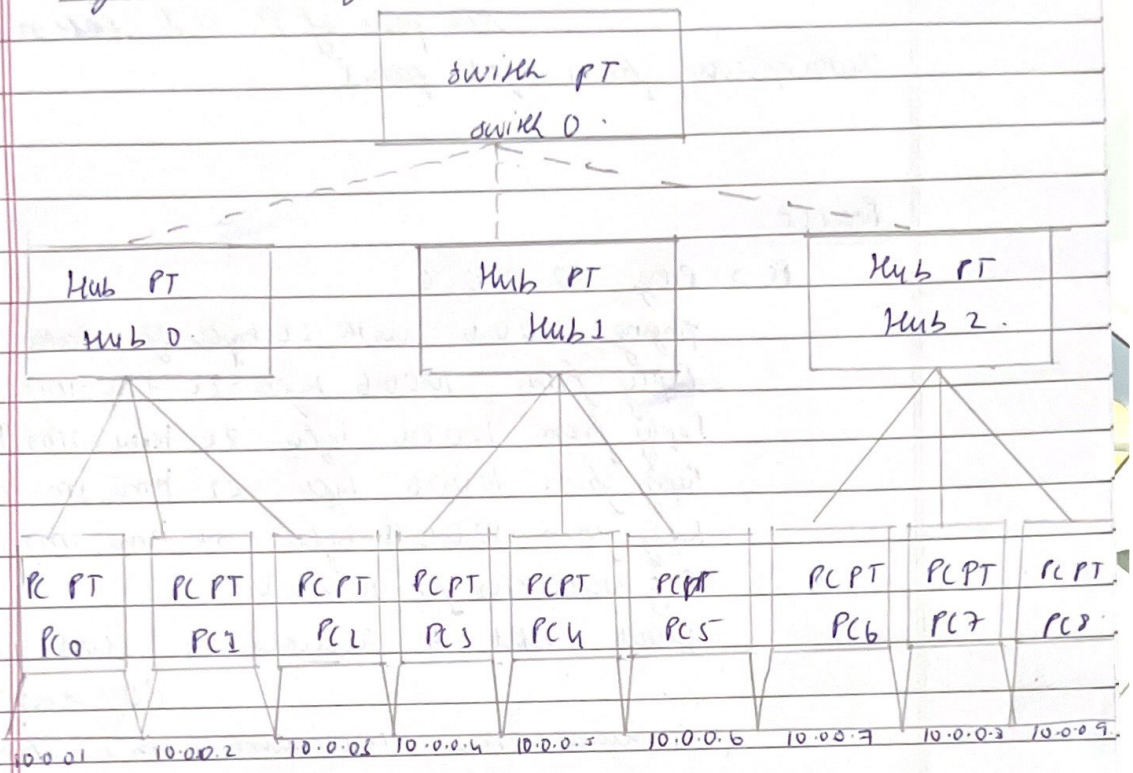
Observation: Hub: It is not an intelligent device. It will broadcast to all devices. if we want to add more devices make sure to check for more ports, if not available - switch off add more ports from right hand corner & turn the switch back on.

Switch: Initially when the connection is made we see amber color which means the device is not ready for communication. Later it will turn green.
The communication between the switch and the end devices is established using offer straight through as they belong to different network layers.

Learning: Hub: when a source needs to send a packet in the network. the hub receives the packet and broadcasts it over the network.
i.e. It will send the data to all the end devices in the network and the node whose IP matches with the specified address accepts the packet and acknowledge it. remaining nodes discard / ignore the message.

Switch: when a source device sends a message to the switch once the connection is made, it takes some time called the learning time. the switch receives the packet. it initially broadcasts the packet to all the connected devices to locate the destination. Once the destination is located the message is sent only to that device.

Hybrid topology.



procedure:-
- Add a switch and 3 hubs and 9 PC's to workspace.
- Connect these three hubs to the switch using copper cross over since hub and switches are in the same layer.
- Connect the hubs to the PCs using a copper straight through.
- Configure the IP of each of the PC in the figure.

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

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

Result:

PC> Ping 10.0.0.6

Pinging 10.0.0.6 with 32 bytes of data

Reply from 10.0.0.6 bytes=32 time=1ms TTL=12

Reply from 10.0.0.6 bytes=32 time=1ms TTL=12

Reply from 10.0.0.6 bytes=32 time=1ms TTL=12

Reply from 10.0.0.6 bytes=32 time=1ms TTL=12

Ping statistics for 10.0.0.6

packet: sent = 4 received = 4 lost = 0

(0% loss)

minimum = 0ms maximum = 1ms Average=0

Learnings: The switch and hub are connected through copper crossover as they belong to the same network layer but PC and hubs are connected through copper straight through as they belong to different network layers.

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 hubs and the hubs sends the message to all its connected PC's. The destination PC acknowledges that it has received the message by sending an acknowledgment back to the source PC.