Department of Computer Science and Engineering

Islamic University of Technology (IUT)

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Laboratory Report

CSE 4412: Data Communication and Networking Lab

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Section : **1**

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Lab No : **3**

Title: Create a simple basic LAN (Local Area Network)

Objective:

1. Create a simple LAN by connecting multiple end devices.
2. Significance of IP address
3. Difference between Switch and Hub.
4. Configure the given topology (see .pkt file in the attachment) to create LAN.

Devices/ Software Used:

- Cisco Packet Tracer
- Virtual Hub, Switch, PC

LAN

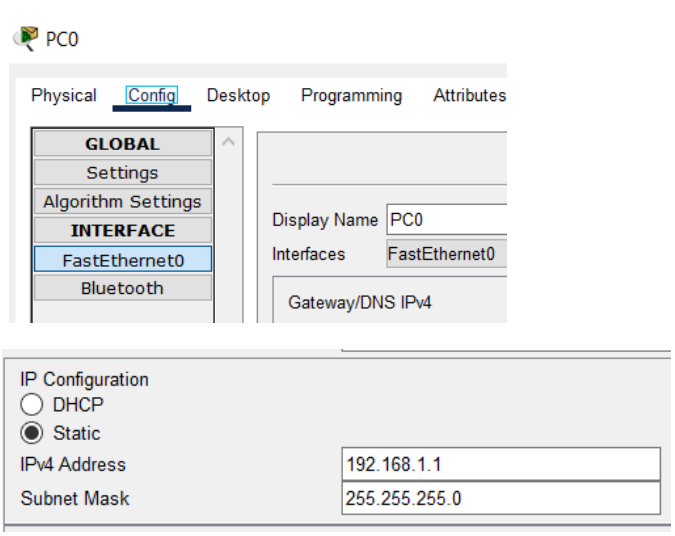
A local area network (LAN) is a collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.
Regardless of size, a LAN's single defining characteristic is that it connects devices that are in a single, limited area. In contrast, a wide area network (WAN) or metropolitan area network (MAN) covers larger geographic areas. Some WANs and MANs connect many LANs together.

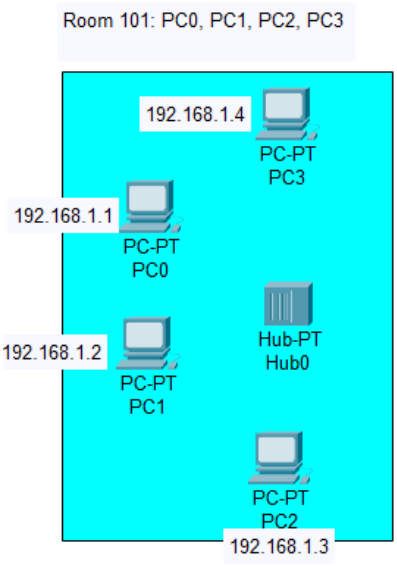
IP addresses

An IP address is a unique address that identifies a device on the internet or a local network. An Internet Protocol address (IP address) is a numerical label such as 192.168.1.1 that is connected to a computer network that uses the Internet Protocol for communication. An IP address serves two main functions: network interface identification and location addressing.
In essence, IP addresses are the identifier that allows information to be sent between devices on a network: they contain location information and make devices accessible for communication.

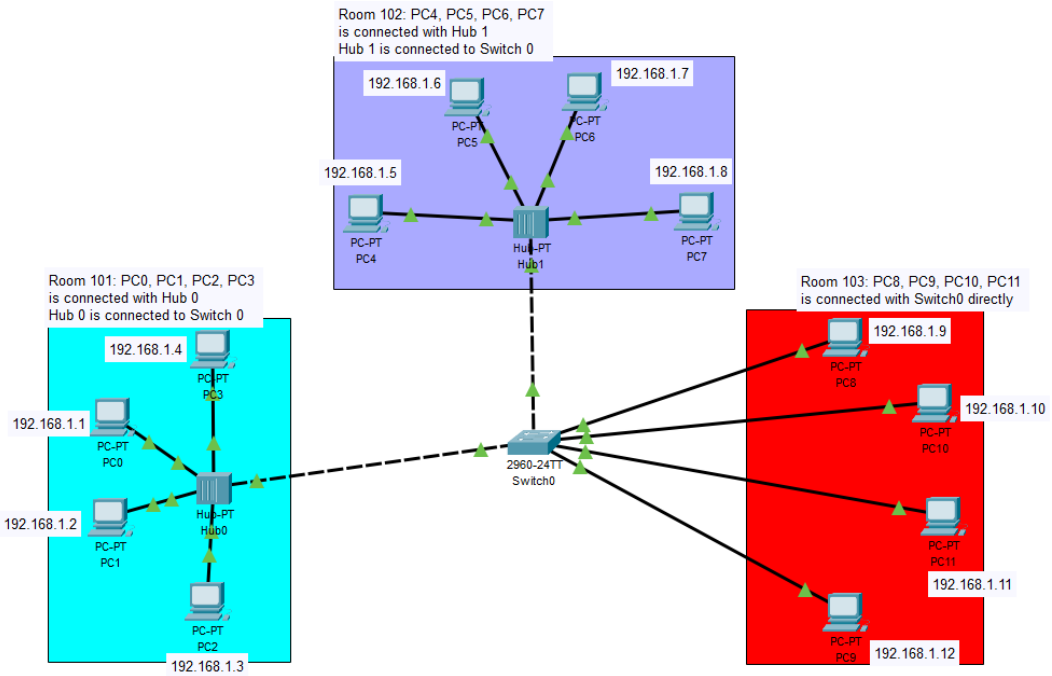
Working Procedure:

- To establish a connection between end devices we first need to configure IP addresses for them. We can do that just clicking on them then going to the "Config" tab then click "FastEthernet0". After that we need to put in a IPv4 address. These addresses will be different for every device in the network since IP addresses are unique. If we put in the IP address then it will automatically set the Subnet Mask. To make it easier for us to see the IP addresses, we can put a label beside them.

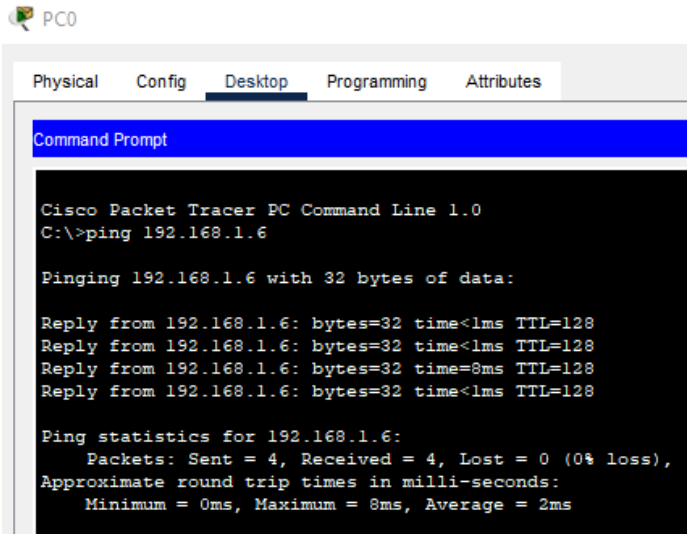


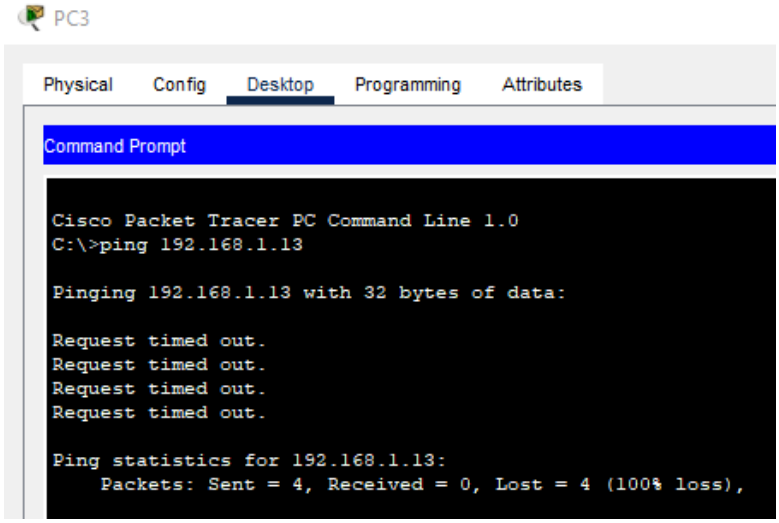


- Then connection with the Hub is done with copper straight through cables. But the connection between the Switch and the Hubs were done with copper cross-over cables. After setting up all the connections the whole LAN will look like this:



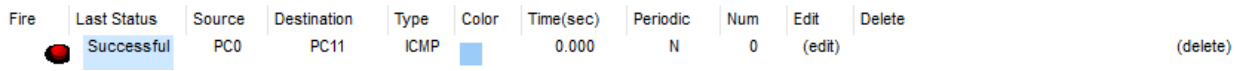
- To check is if the connection's been properly established or not, we can send ping requests from one end device to another. To do that, we need to click one of the end devices and go to the Desktop tab and then click Command Prompt. Then we have to write "ping (IP address)".
  We have to bear in mind that the IP address that we write has to be valid (a device with that IP address has to be present in that connection). If the IP address is valid then we'll get replies from that device.





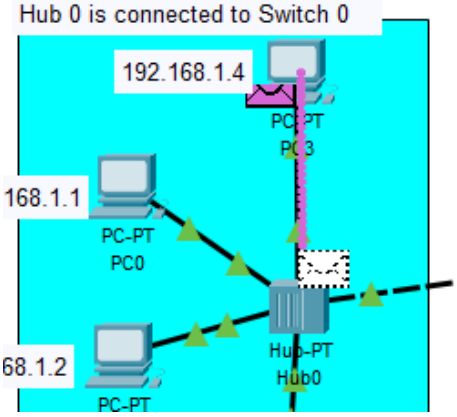
  If the IP address is not valid then there won't be any replies and the requests will get timed out.

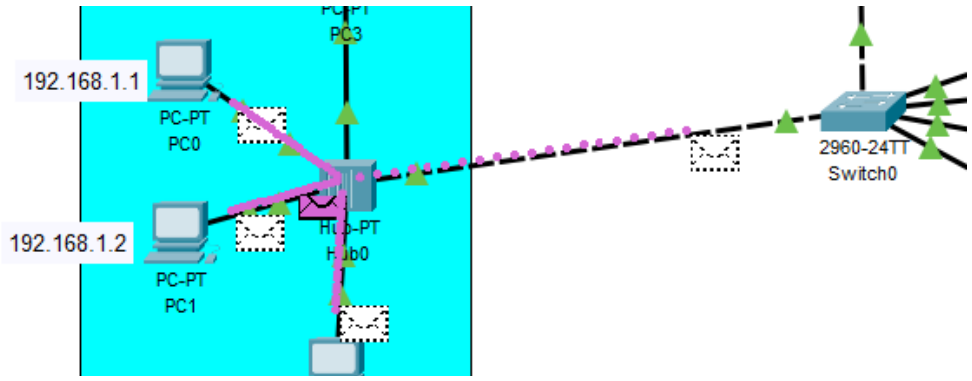
- Now, for the last step of validation we need to send a packet from one PC to another. For that, we need to click at the closed envelop icon (add simple PDU) from the actions bar then click on the two PCs in which we want to set up a transmission.
  After doing that, on the bottom right side of the screen, a log will show the status of the connection.

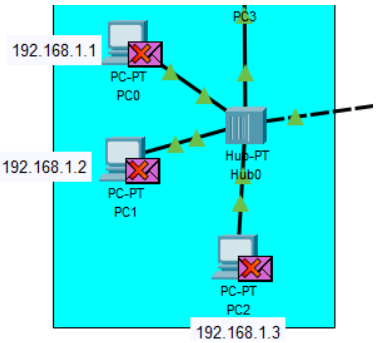


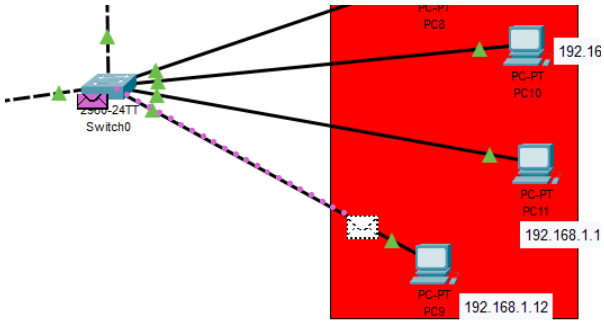
- Since the connection is successful, a transmission can be made between the two nodes. Now we have to go to the simulation panel to observe the transmission of the packet.
  Clicking the "play" button will allow us simulate the whole transmission process.

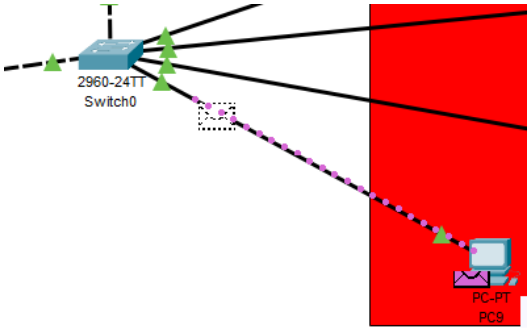
Room 101: PC0, PC1, PC2, PC3
is connected with Hub 0
Hub 0 is connected to Switch 0

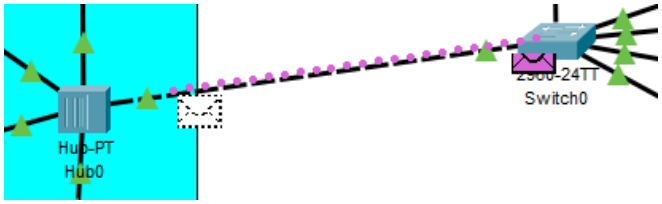












Room 101: PC0, PC1, PC2, PC3
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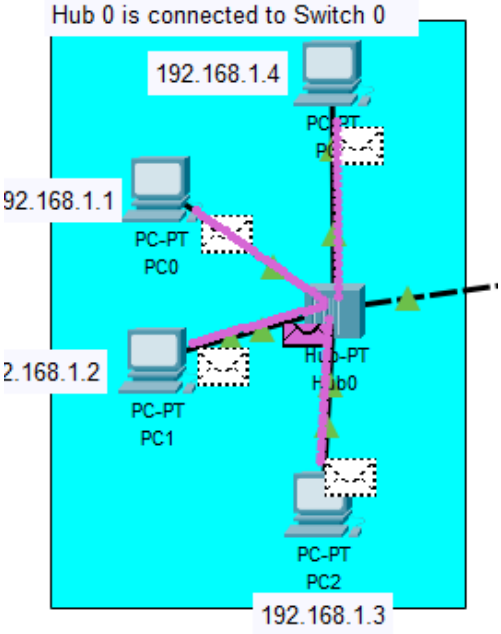
Hub 0 is connected to Switch 0



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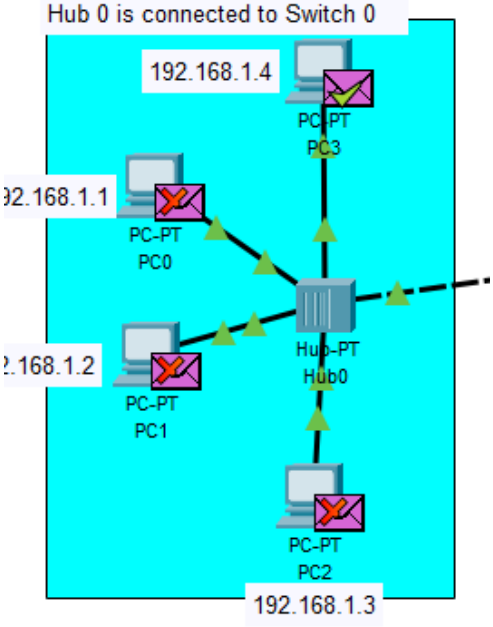


- These pictures show the whole simulation process and the simulation panel looks like this:

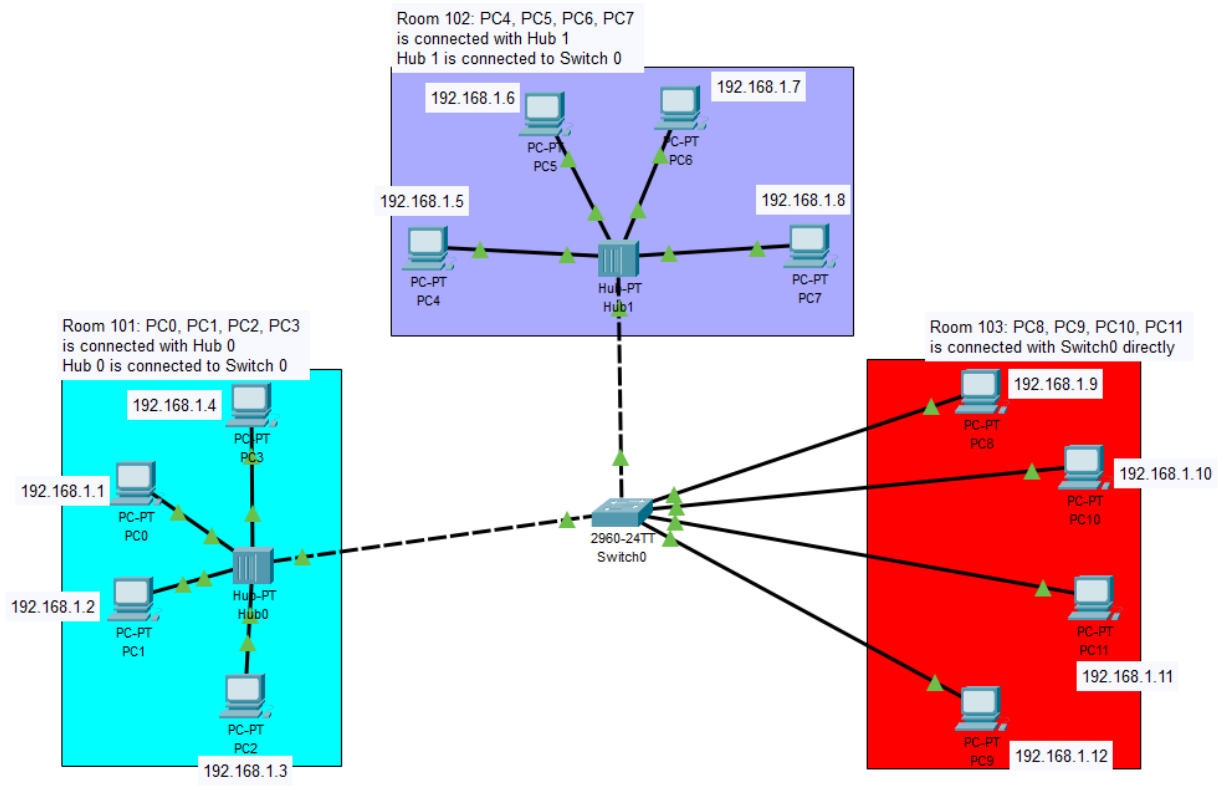
Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC3	ICMP
	0.001	PC3	Hub0	ICMP
	0.002	Hub0	PC0	ICMP
	0.002	Hub0	PC1	ICMP
	0.002	Hub0	PC2	ICMP
	0.002	Hub0	Switch0	ICMP
	0.003	Switch0	PC9	ICMP
	0.004	PC9	Switch0	ICMP
	0.005	Switch0	Hub0	ICMP
	0.006	Hub0	PC0	ICMP
	0.006	Hub0	PC1	ICMP
	0.006	Hub0	PC2	ICMP
	0.006	Hub0	PC3	ICMP

Diagram of the experiment:

The whole LAN looks like this:



Observation:

- **Significance of IP address configuration to different end devices**

  The IP address uniquely identifies every device on the internet. Without one, there's no way to contact them. IP addresses allow computing devices (such as PCs and tablets) to communicate with destinations like websites and streaming services, and they let websites know who is connecting.

- **Difference between Switch and Hub**

- Hub functions at the physical layer and transmits the signal to the port. Switch on the other hand functions at the data link layer and route the information and send it over the network.
- Hub only follows broadcast transmission. Switch follows three i.e., multicast, unicast, and broadcast type transmission.
- Hub utilizes duplex transmission technique but Switch utilizes full duplex transmission technique.
- Hub doesn't allow packet filtering but Switch allows it.
- Hub has much less ports than a Switch.

Challenges:

- Took me a bit of time to set up the whole connection properly.
- Familiarity issues.