National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

Department of Electrical Engineering

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Semester: 6 **Section:** D

EE-357 Computer and Communication Networks

Experiment - 1

Introduction to Hub, Switch and Router

		PLO5/ CLO3		PLO5/ CLO3	PLO5/ CLO3	PLO5/ CLO3
Name	**Reg. No**	**Viva / Quiz / Lab Performance 5 Marks**	**Analysis of data in Lab Report 5 Marks**	**Modern Tool Usage 5 Marks**	**Ethics and Safety 5 Marks**	**Individual and Team Work 5 Marks**
Noor-ul-Ain Ansar	284825					
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EXPERIMENT NO 1

PART - 1

Introduction to Hub, Switch and Router

1. Objective

This lab exercise is designed to understand the difference between Hub, Switch and Router.

2. Resources Required

- Computer
- Packet Tracer (version 5 or higher)

3. Introduction

Hubs, switches, and routers are all devices which let you connect one or more computers to other computers, networked devices, or to other networks. Each has two or more connectors called ports into which you plug in the cables to make the connection. Varying degrees of magic happen inside the device, and there within lies the difference. These terms are often misused so let's clarify what each one really means.

3.1 Hub

A hub is typically the least expensive, least intelligent, and least complicated of the three. Its job is very simple: anything that comes in one port is sent out to the others. That's it. Every computer connected to the hub "sees" everything that every other computer on the hub sees. The hub itself is blissfully ignorant of the data being transmitted. For years, simple hubs have been quick and easy ways to connect computers in small networks.

3.2 Switch

A switch does essentially what a hub does but more efficiently. By paying attention to the traffic that comes across it, it can "learn" where particular addresses are. For example, if it sees traffic from machine ‘A’ coming in on port 2, it now knows that machine A is connected to that port and that traffic to machine A needs to only be sent to that port and not any of the others. The net result of using a switch over a hub is that most of the network traffic only

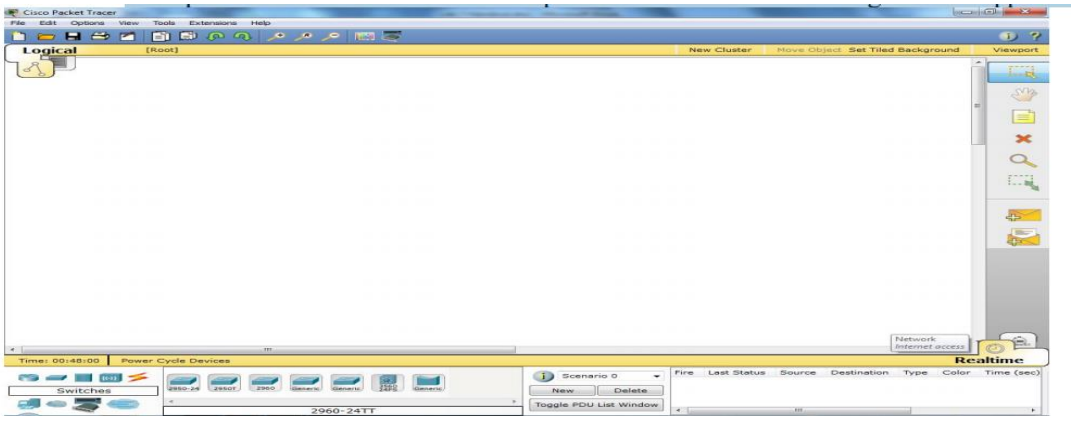
goes where it needs to rather than to every port. On busy networks this can make the network significantly faster.

3.3 Router

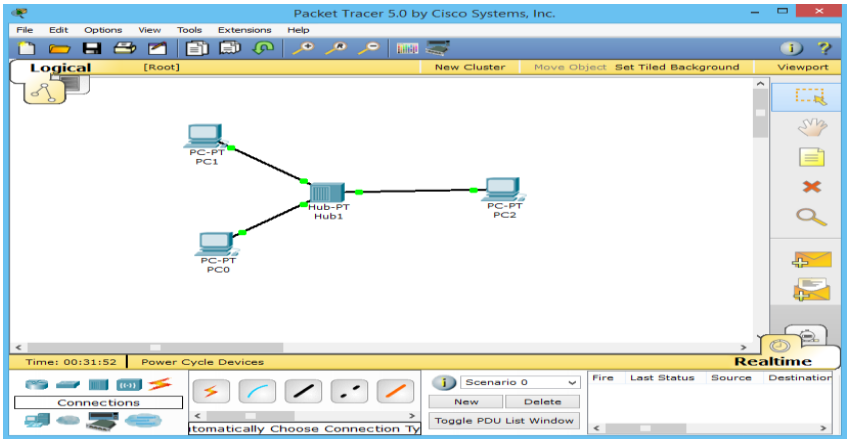
A router is the smartest and most complicated of the bunch. Routers come in all shapes and sizes from the small four-port broadband routers that are very popular right now to the large industrial strength devices that drive the internet itself. A simple way to think of a router is as a computer that can be programmed to understand, possibly manipulate, and route the data it's being asked to handle. For example, broadband routers include the ability to "hide" computers behind a type of firewall which involves slightly modifying the packets of network traffic as they traverse the device. All routers include some kind of user interface for configuring how the router will treat traffic. The really large routers include the equivalent of a full-blown programming language to describe how they should operate as well as the ability to communicate with other routers to describe or determine the best way to get network traffic from point A to point B.

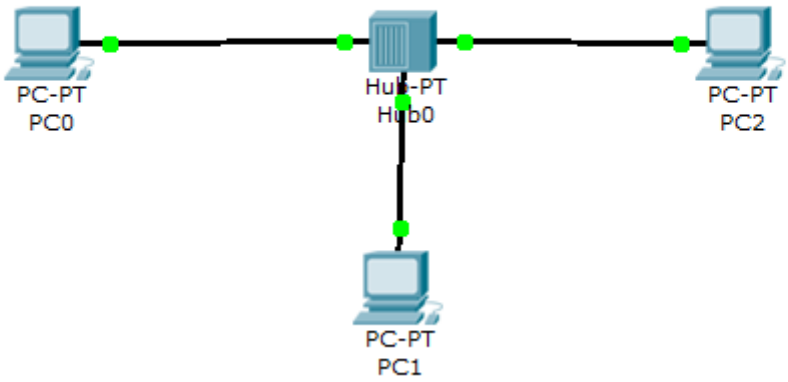
4. Procedure

1. Open Packet Tracer 5 from Desktop or Start Menu. The following window appears.



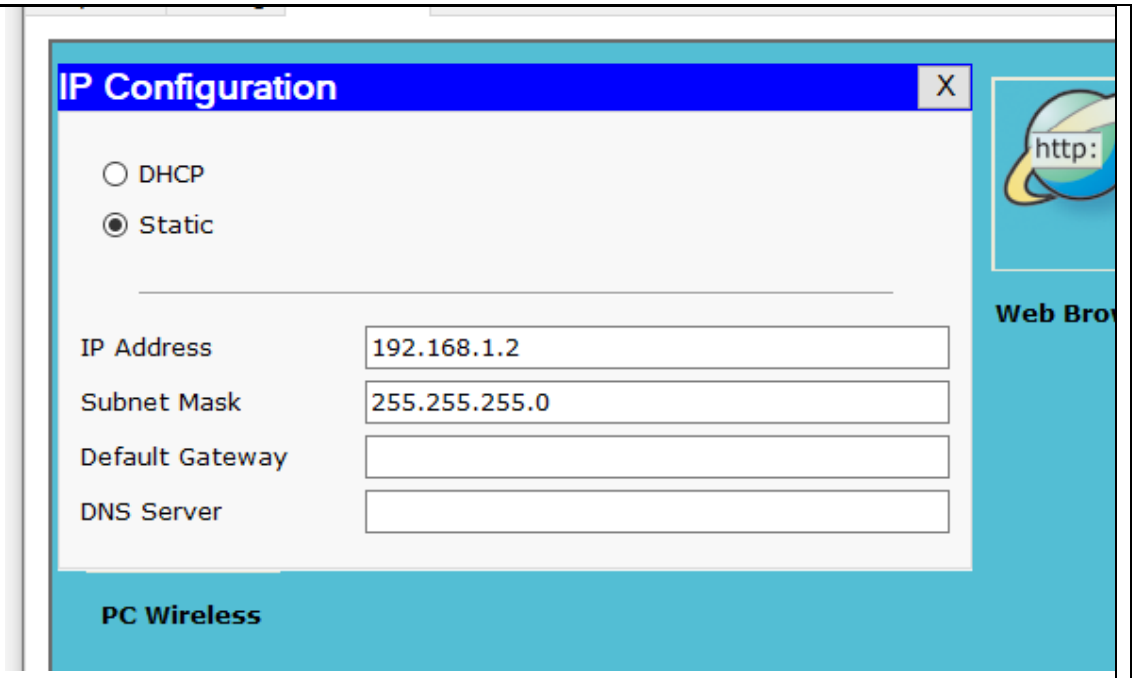
2. Click on **Hubs** in lower left part, click on **Hub-PT** and then again click in the main window. The Hub will appear in the main window.
3. Place Three PCs **Generic (in End Devices)** in the main window.
4. Find suitable connections in **Connections** to have the following topology.



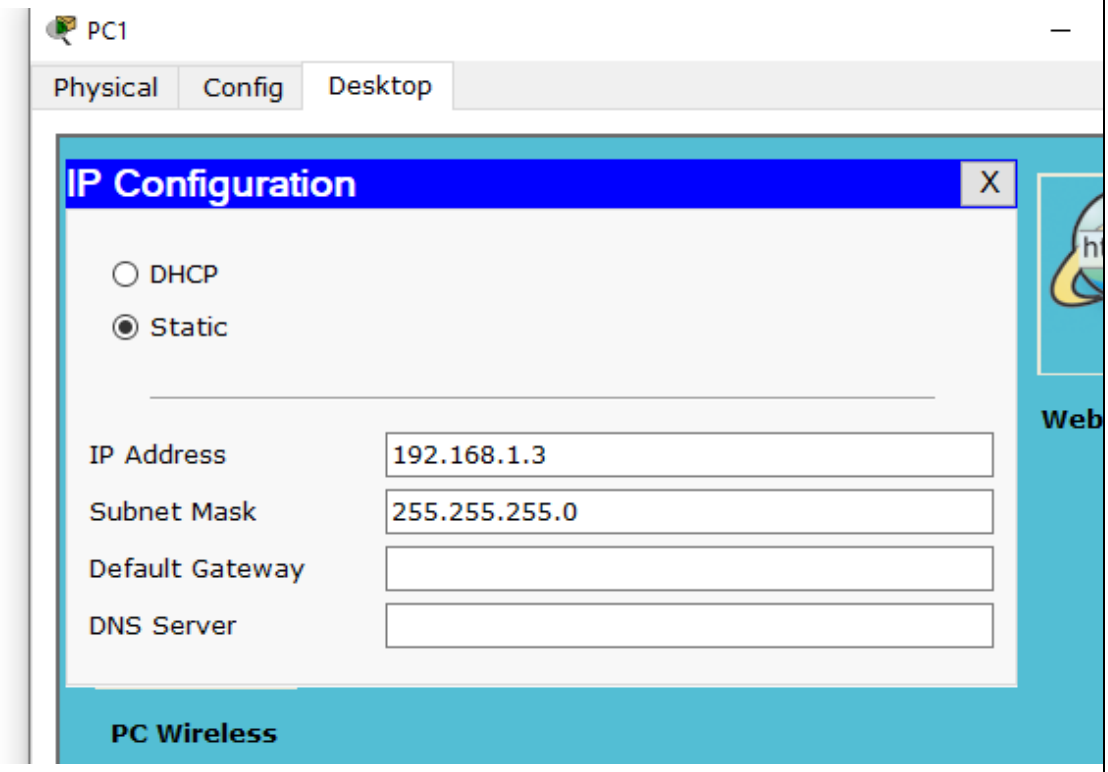


5. Double-click on PC0 and go to **Desktop** tab. Click on **IP Configuration** and enter **192.168.1.2** as the IP address and **255.255.255.0** as subnet mask. **192.168.1.3** for PC1. Enter any IP address for PC3 and PC4 (in same network).

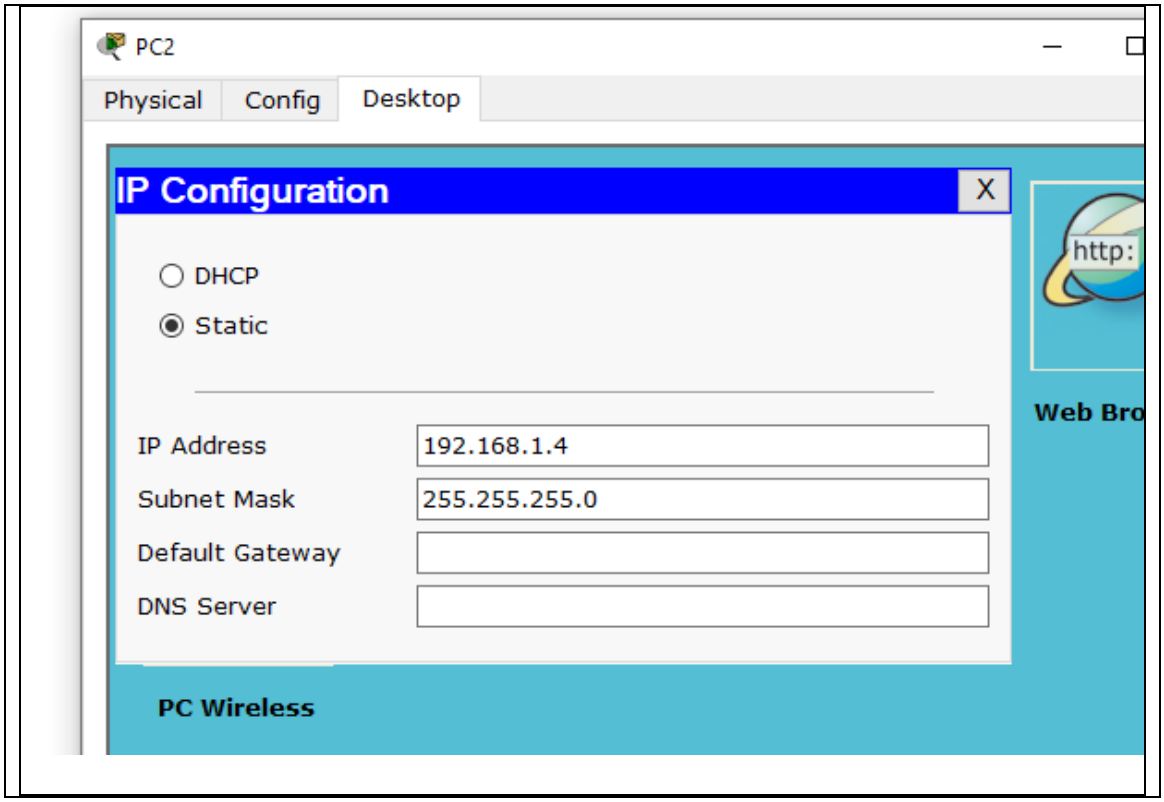
PC0


IP Configuration
X
DHCP
Static
IP Address
192.168.1.2
Subnet Mask
255.255.255.0
Default Gateway
DNS Server
PC Wireless
http:
Web Bro

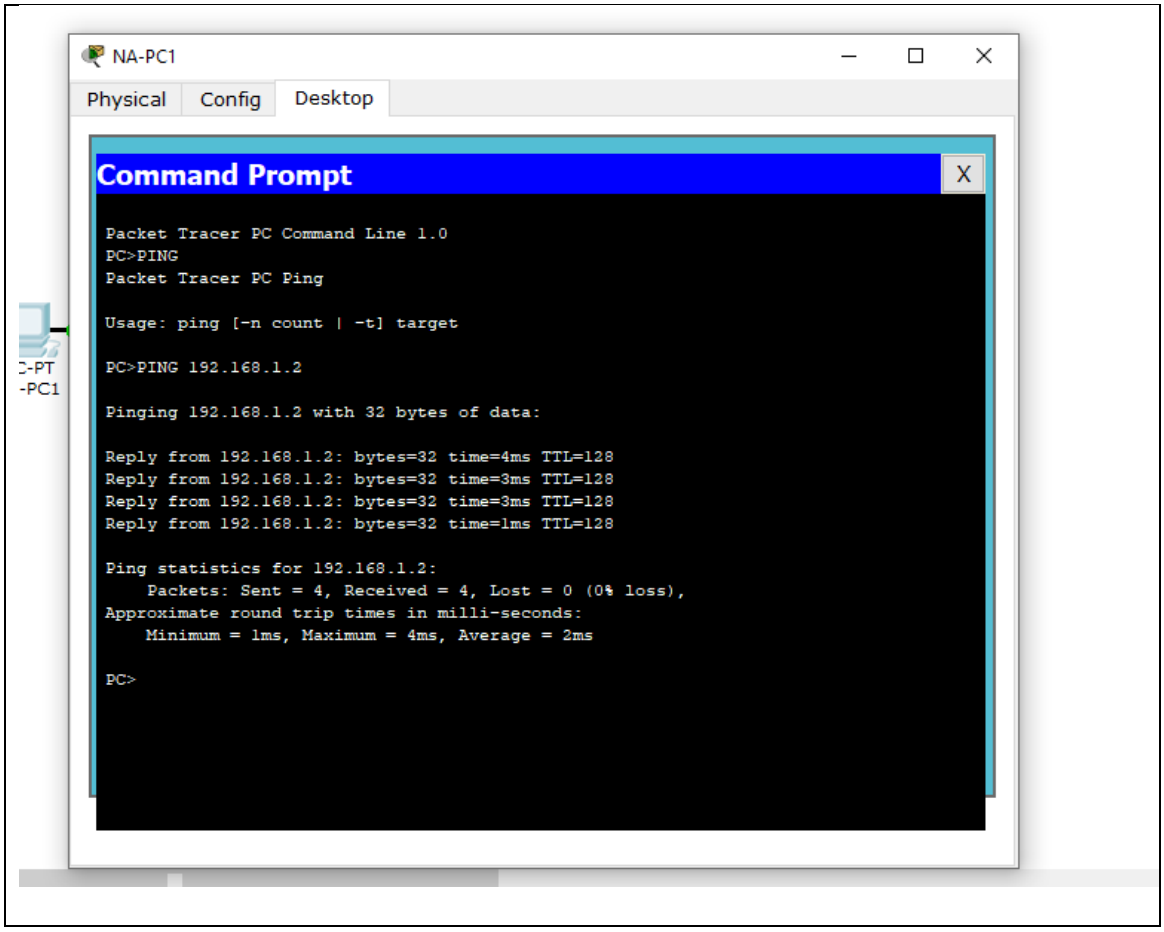
PC1


PC1
Physical
Config
Desktop
IP Configuration
X
DHCP
Static
IP Address
192.168.1.3
Subnet Mask
255.255.255.0
Default Gateway
DNS Server
PC Wireless
Web

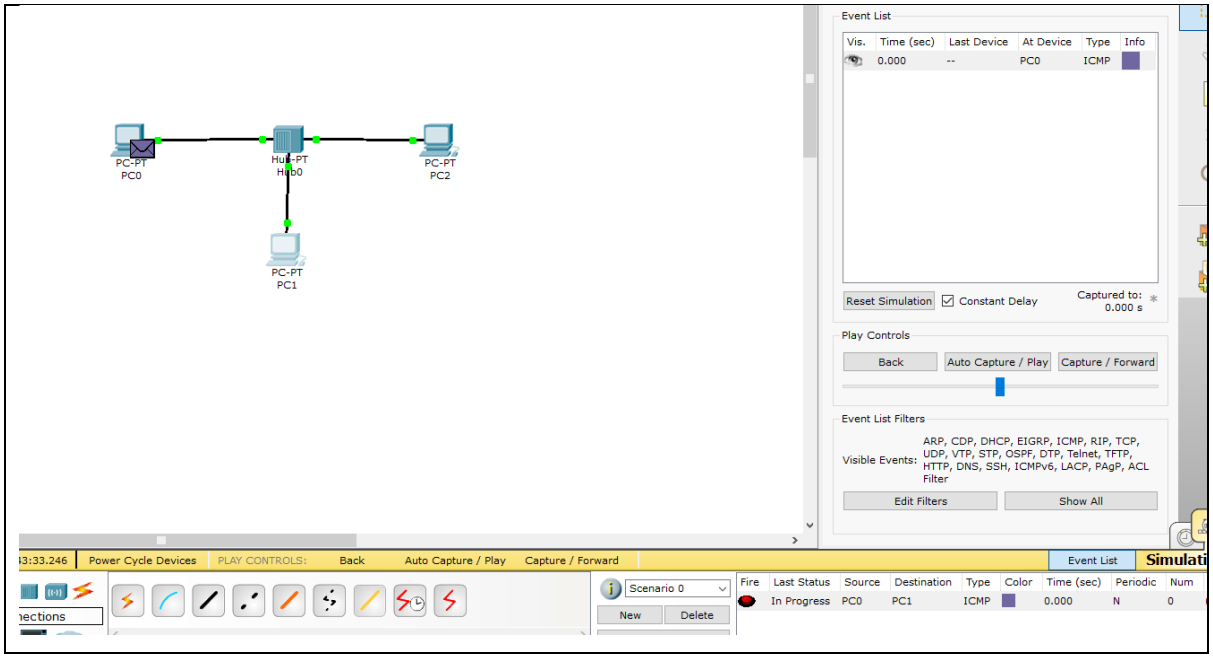
PC2

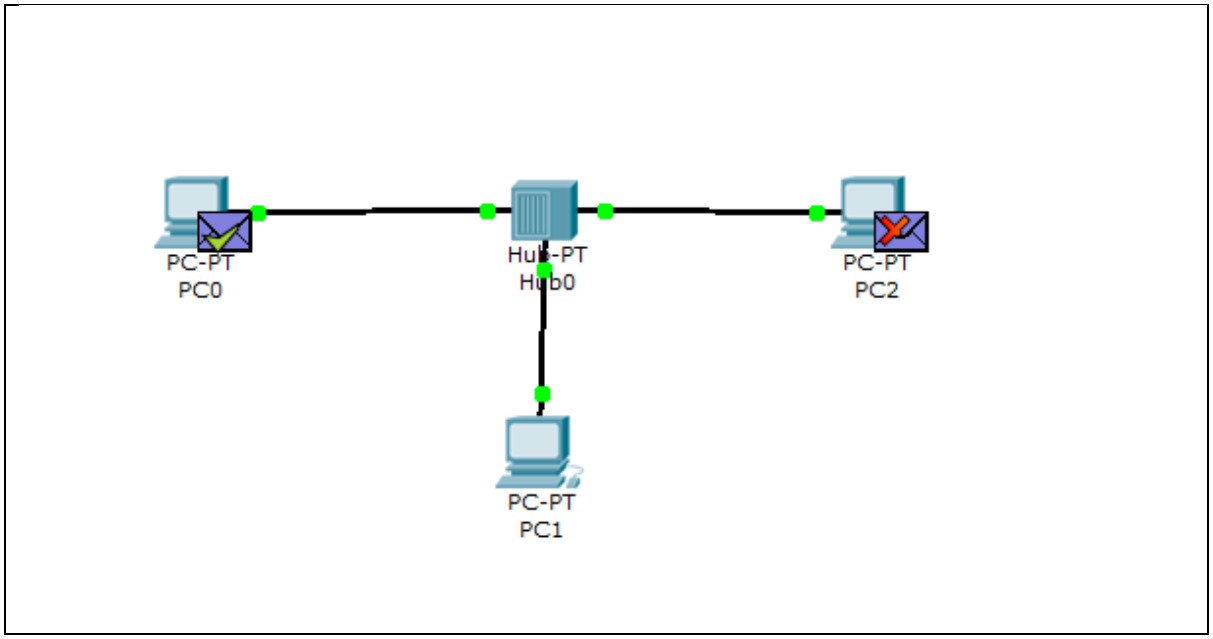


6. To check communication, go to **Desktop** tab of any PC, click on the **Command Prompt** and use any networking command (ping, tracert etc.).

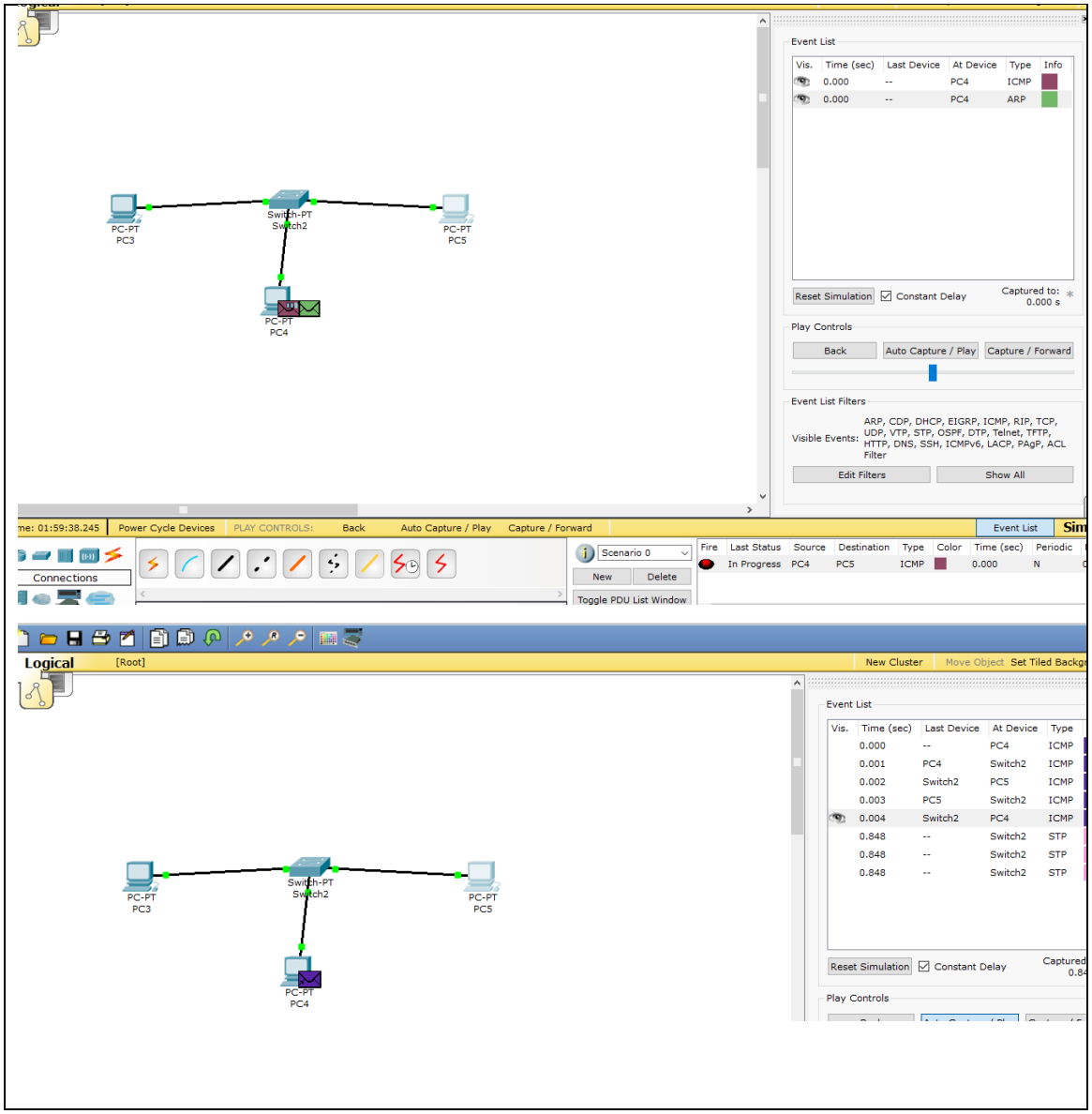


7. You can also use the closed envelope with a plus sign (**Add Simple PDU**) in the right menu of the Packet Tracer window. Click on it, then the two nodes to be checked. **This a much better way to check, go to Simulation mode using Shift +S or by clicking in** the lower right corner of window.

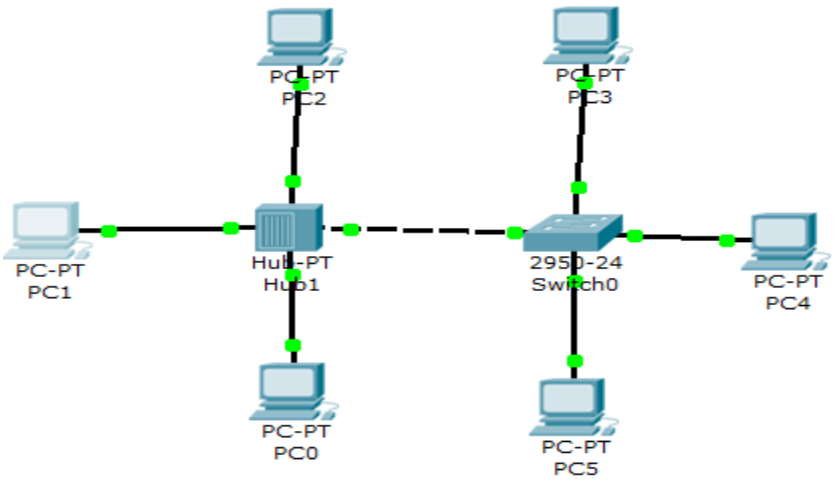


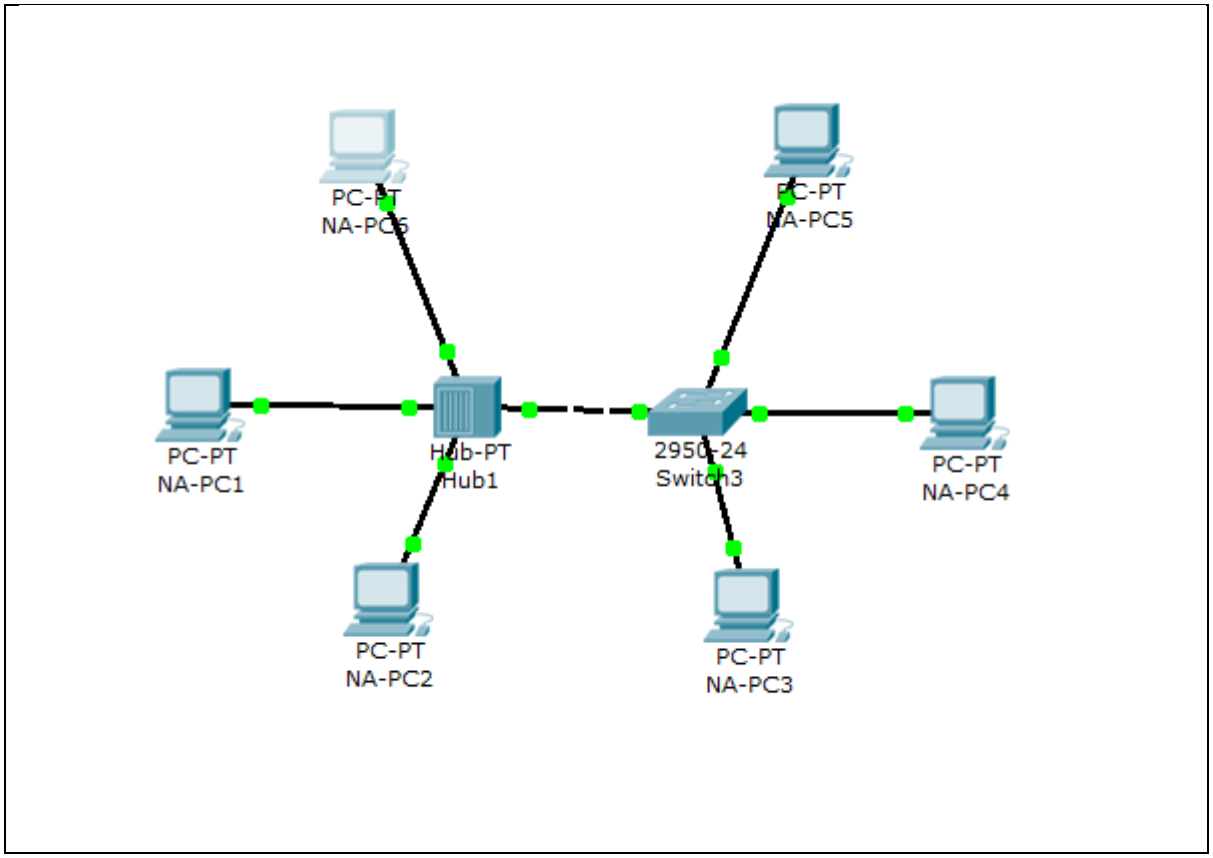


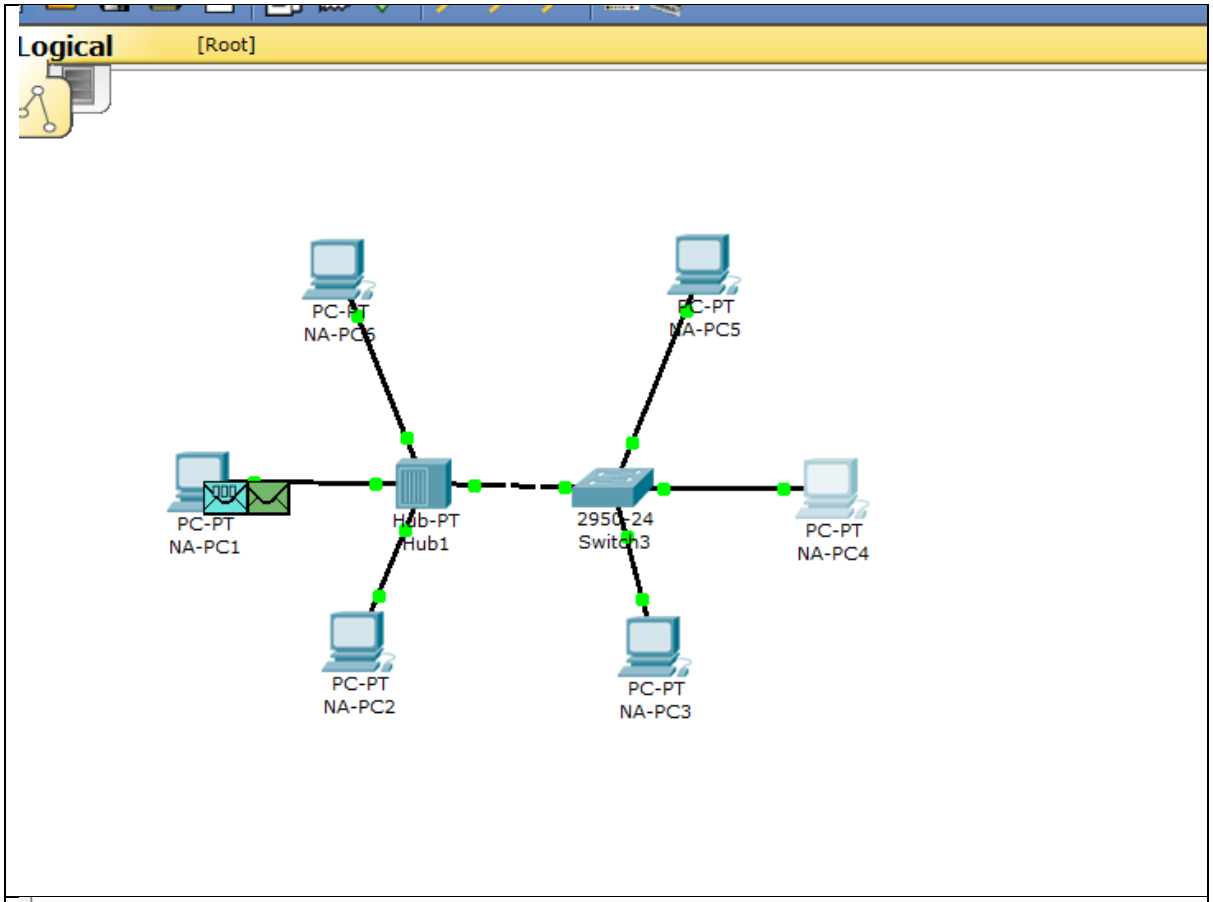
8. Repeat the step 1-7 using Switch instead of Hub.

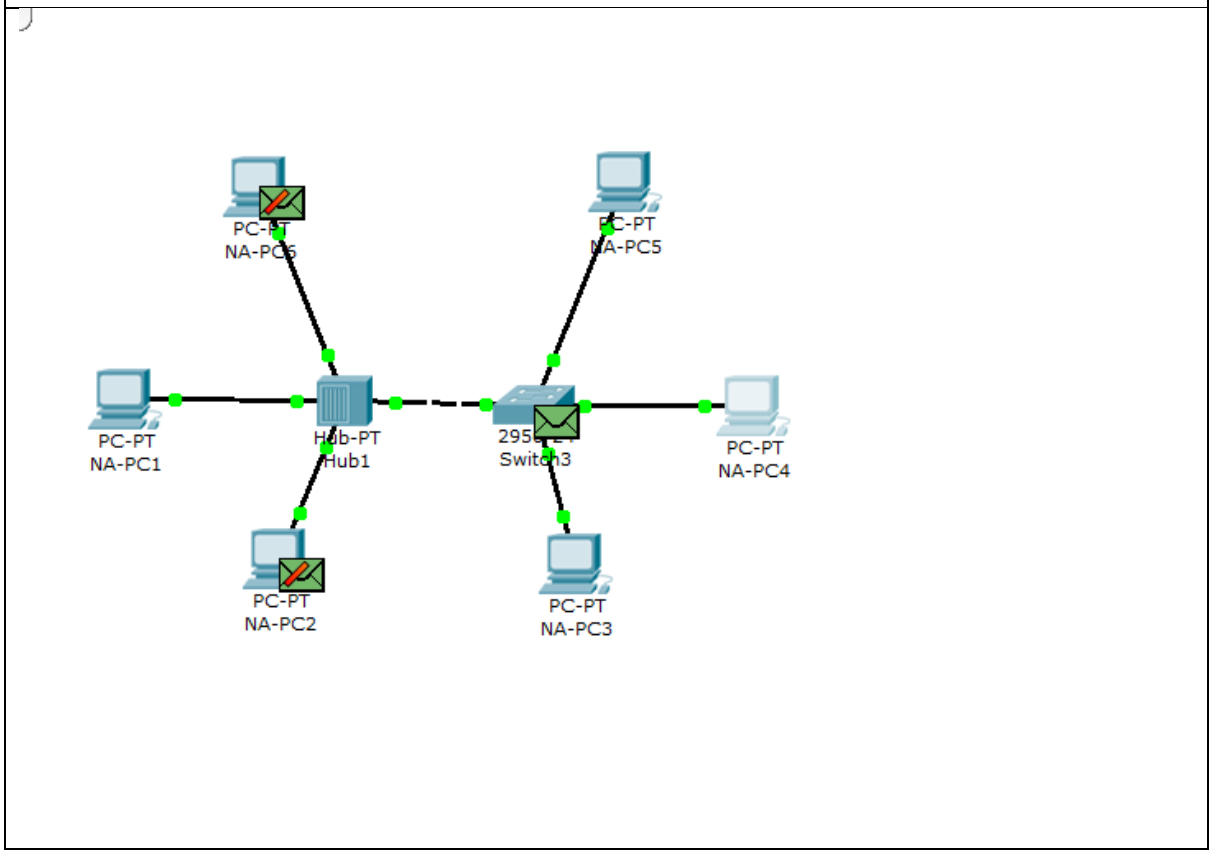


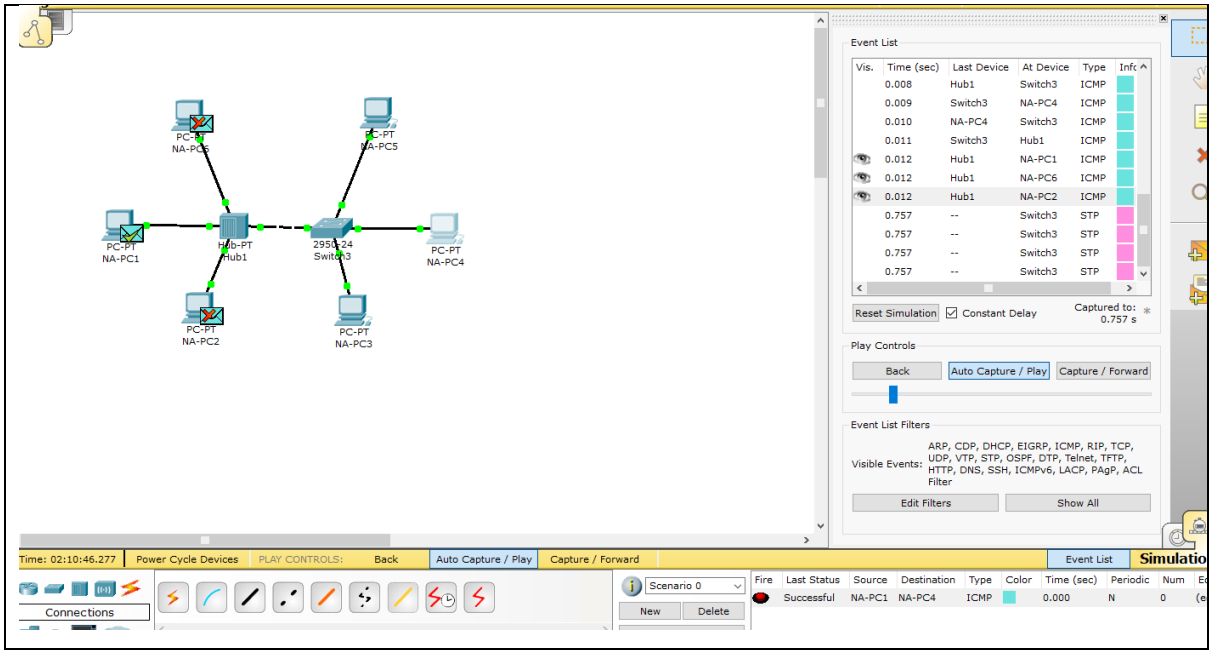
9. Connect the switch and Hub as shown below and write discussion about Hub and Switch Function.


PC-PT
PC2
PC-PT
PC3
PC-PT
PC1
Hub-PT
Hub1
2950-24
Switch0
PC-PT
PC4
PC-PT
PC0
PC-PT
PC5


PC-PT
NA-PC6
PC-PT
NA-PC5
PC-PT
NA-PC1
Hub-PT
Hub1
2950-24
Switch3
PC-PT
NA-PC4
PC-PT
NA-PC2
PC-PT
NA-PC3


Logical
[Root]
PC-PT
NA-PC6
PC-PT
NA-PC5
PC-PT
NA-PC1
Hub-PT
Hub1
2950-24
Switch3
PC-PT
NA-PC4
PC-PT
NA-PC2
PC-PT
NA-PC3


PC-PT
NA-PC6
PC-PT
NA-PC5
PC-PT
NA-PC1
Hub-PT
Hub1
Switch3
PC-PT
NA-PC4
PC-PT
NA-PC2
PC-PT
NA-PC3



10. Repeat task 8 on ENSP Software.

Conclusion:

In this lab we were introduced to the Cisco Packet tracer on which we learned how to interface hub and switches with PCs. We also went to learn about the functionalities of hubs and switches; how they transmit packet from one pc to another, what protocol they follow, what is their broadcast and collision domain and etcetera.