CS 361
Computer Networks Lab

Assignment 1

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Date – 29/09/2023

Questions:

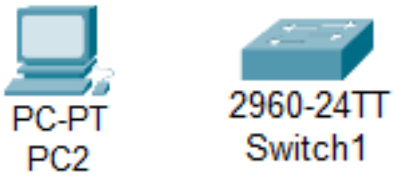
1. Write the differences between switch and hub?

Parameter	Switch	Hub (Ethernet Hub)
Device Type	A switch is a sophisticated networking device that operates at the Data Link Layer (Layer 2) of the OSI model. It intelligently forwards data frames based on MAC addresses.	A hub is a basic networking device that operates at the Physical Layer (Layer 1) of the OSI model. It amplifies and broadcasts incoming data to all connected devices.
Function	Switches are like traffic cops in a network. They examine the destination MAC address of incoming data and forward it only to the specific device it's intended for, reducing unnecessary traffic.	Hubs act like megaphones in a network. They simply take incoming data and broadcast it to all connected devices, regardless of whether the data is intended for a specific device.
Address Learning	Switches can learn and store the MAC addresses of devices connected to their ports. This information is used to make forwarding decisions efficiently. .	Hubs do not have the capability to learn MAC addresses; they treat all devices equally and broadcast data indiscriminately.
Broadcast Domain	Switches can create multiple broadcast domains by segmenting the network. This means that broadcast traffic is contained within each segment, reducing network congestion.	Hubs have a single broadcast domain. When a device broadcasts data, it's transmitted to all connected devices, leading to more broadcast traffic across the entire network.
Collision Domain	Switches create multiple collision domains, isolating collision problems to individual segments. This results in fewer collisions and improved network performance.	Hubs have a single collision domain, so collisions on one device can affect all connected devices, leading to network slowdowns in the presence of collisions.

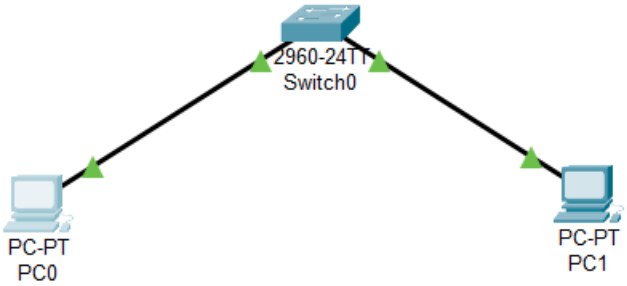
Parameter	Switch	Hub (Ethernet Hub)
Traffic Management	Switches efficiently manage network traffic by forwarding data only to its intended recipient, reducing unnecessary data transmission.	Hubs do not manage traffic; they broadcast all incoming data to all devices, leading to higher network congestion.
Efficiency	Switches are highly efficient in minimizing unnecessary traffic, which conserves network bandwidth.	Hubs are inefficient, as they broadcast all incoming data to all devices, consuming more bandwidth and causing unnecessary network traffic.
Network Segmentation	Switches allow for network segmentation into multiple LAN segments, enabling better organization and control over the network.	Hubs do not offer segmentation; all devices are part of a single, shared network segment.
Cost	Switches are generally more expensive than hubs due to their advanced features and capabilities for managing network traffic.	Hubs are relatively inexpensive but are considered outdated for most modern network applications.
Common Usage	Switches are the standard choice for modern Local Area Networks (LANs) due to their intelligence and efficiency.	Hubs are considered obsolete and are not recommended for use in modern networks due to their inefficiency and lack of advanced features.
Performance Impact	Switches provide low latency and high performance by intelligently forwarding data.	Hubs introduce higher latency and lower overall network performance due to broadcasting all incoming data.

2. **Create a small network using a switch and show that the message transferred from one end device to other is successful.**

Components: End devices (PC), Switch (2960)



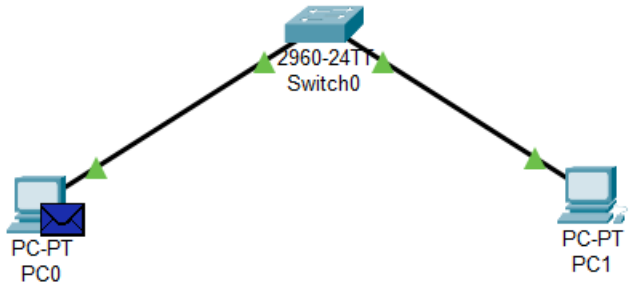
1. The PCs were given IP Addresses (IPV4): 10.10.10.1 and 10.10.10.2
2. Connections made between PCs and Switches

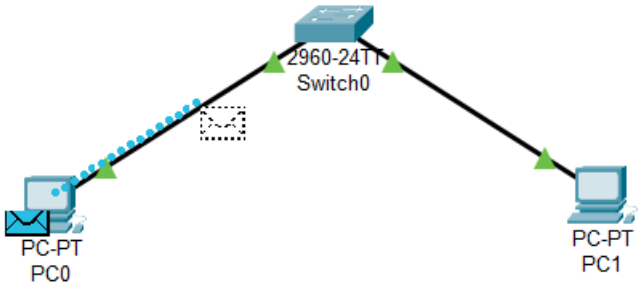


3. Checking if the PCs can connect to each other.

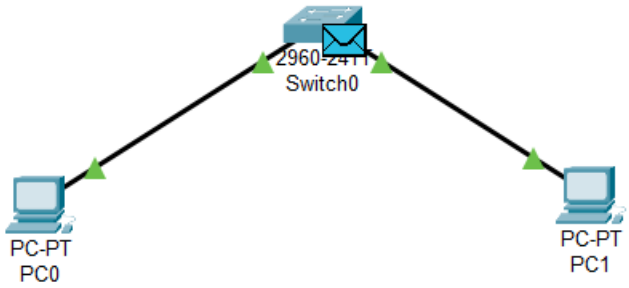
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.10.10.2

Pinging 10.10.10.2 with 32 bytes of data:

Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

4. Sending simple packet data units (PDU) from one PC to another.

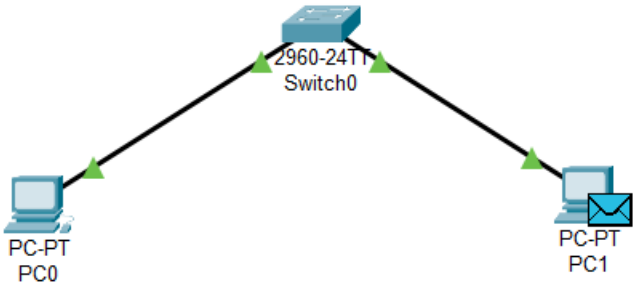




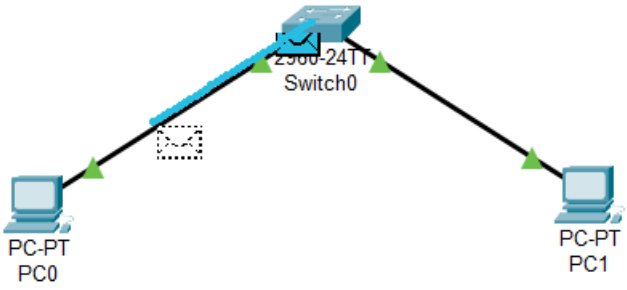
Packets reaching the router.



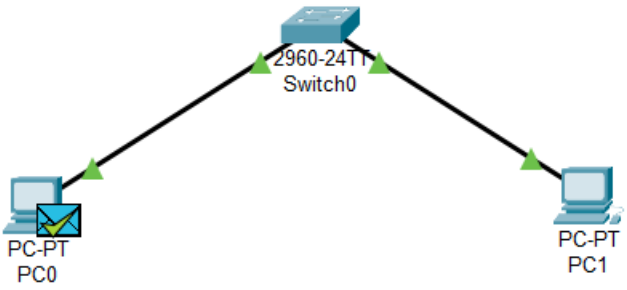
Packet reached router.



Packet reached PC2.



Confirmation being sent to PC1 via the switch.

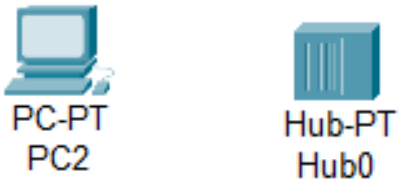


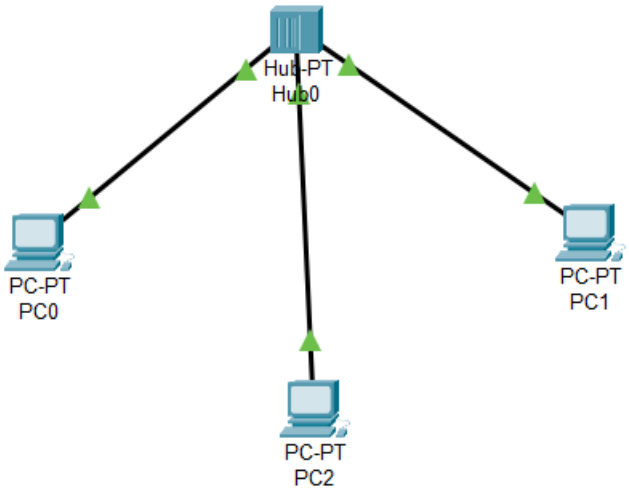
Packet delivered confirmation received by PC1.
Tick mark attained.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC1	ICMP		0.000	N	0	(edit)	

3. **Create a small network using a hub and show that the message transferred from one end device to other is successful.**

Components: End devices (PC), Switch (2960)





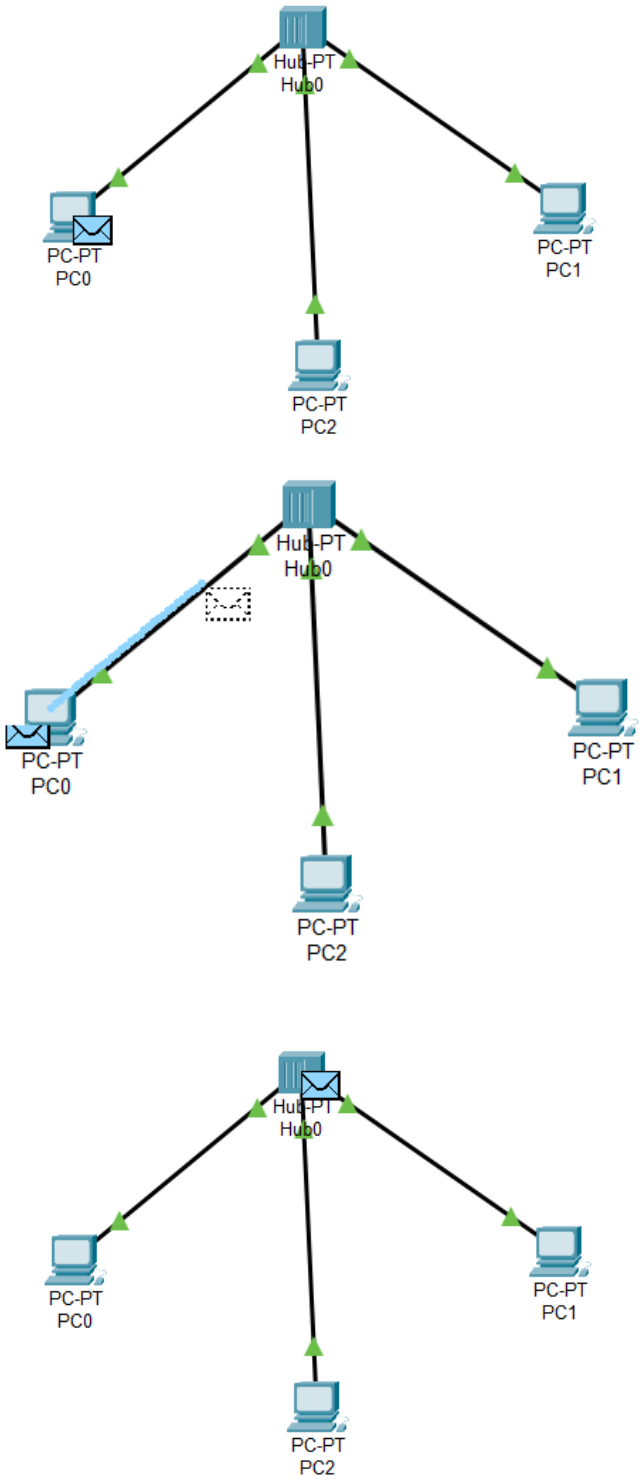
Network of Hub (PT-Hub) and three End devices (PCs)

1. The PCs were given IP Addresses (IPV4): 10.10.10.1, 10.10.10.2 and 10.10.10.3
2. Connections made between PCs and Hubs

3. Checking if the PCs can connect to each other.

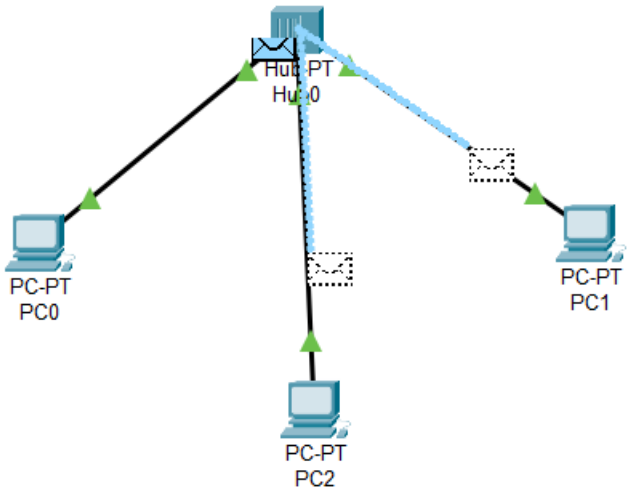
```
Pinging 10.10.10.2 with 32 bytes of data:

Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.10.10.3

Pinging 10.10.10.3 with 32 bytes of data:
```

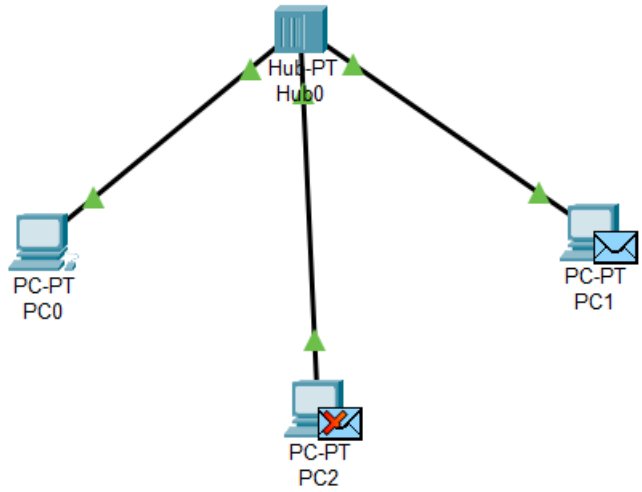
4. Sending simple packet data units (PDU) from one PC to another (PC1 to PC3).



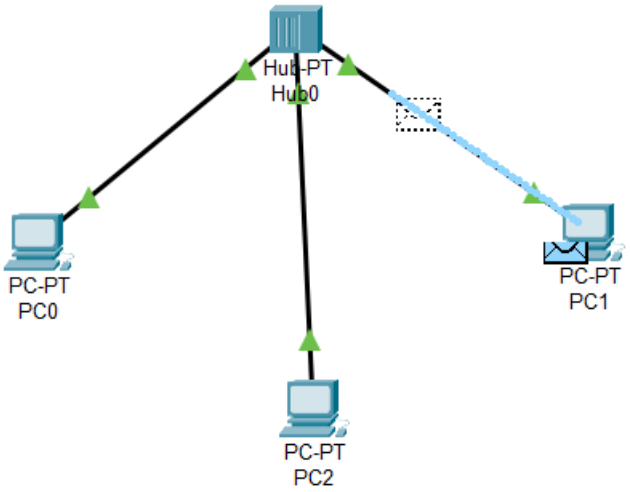
Packets reached the Hub.

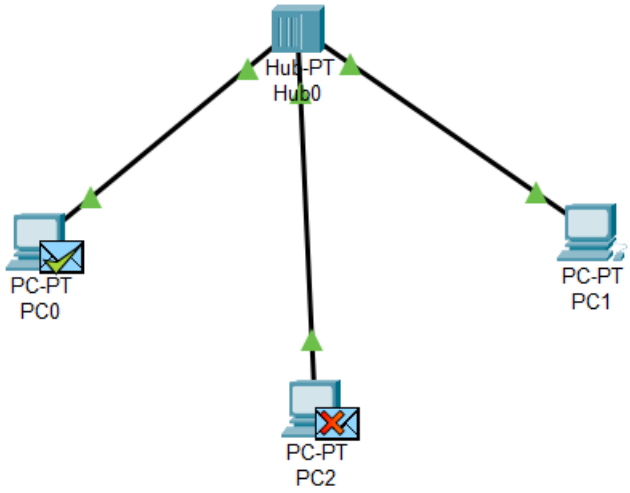
5. From the Hub, packets go towards all the end devices in accordance with the properties of the Hub. It doesn't send packets to the target location only, rather all the end devices.





Since the packet was destined for PC3, PC2 denies it. PC3 accepts it and in the next steps it sends a confirmation message pack to PC1.





By properties of Hub, again the confirmation message is transmitted to all the end devices. PC2 denies it correctly and PC1 accepts it, as it was meant for it. The transfer of packet was successful.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC1	ICMP		0.000	N	0	(edit)	(delete)