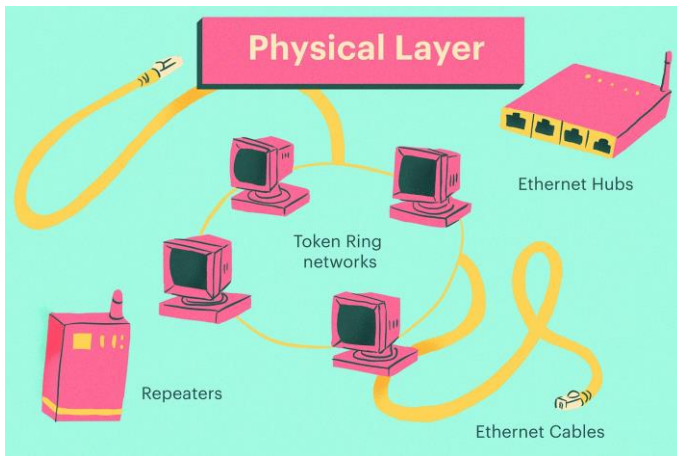


MODULE-2: PHYSICAL LAYER



Prepared by Prof. Amit K. Nerurkar



Module 2**Physical Layer**

Circuit and Packet Switching**Switching**

Switching is the most important mechanism which exchanges the information between different networks or different computer(s). Switching is the way which directs data or any digital information towards your network till the end point.

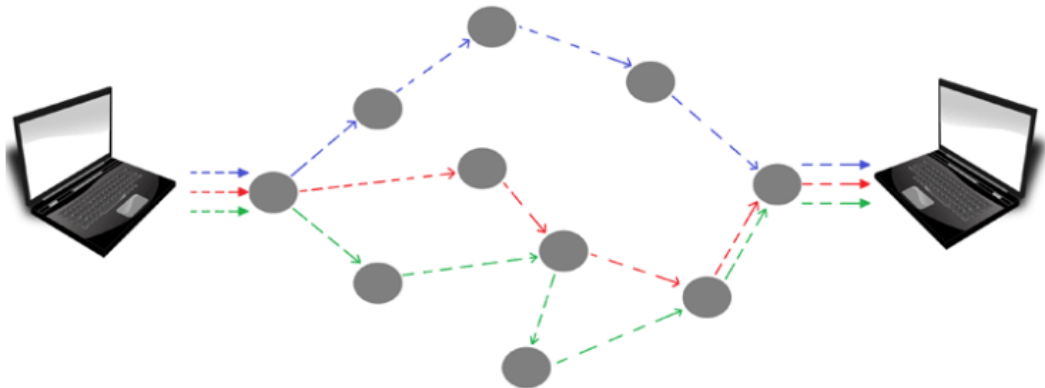


Figure: Switching

Circuit Switching

Circuit switching is a switching method where an end-to-end path is created between two stations within a network before starting the data transfer.

Circuit switching has three phases:

Circuit establishment

Transferring the data

Circuit disconnect.

Circuit switching method has a fixed data rate and both the subscribers need to operate at this fixed rate. Circuit switching is the simplest method of data communication where **dedicated physical connections are**

established between two individual senders and receiver. To create these dedicated connections, a set of switches are connected by physical links.

In the below image, three computers on the left side are connected with three desktop PCs on the right side with physical links, depending on the four circuit switchers. If the circuit switching is not used, they need to be connected with point-to-point connections, where many number of dedicated lines are required, which will not only increase the connection cost but also increase the complexity of the system.

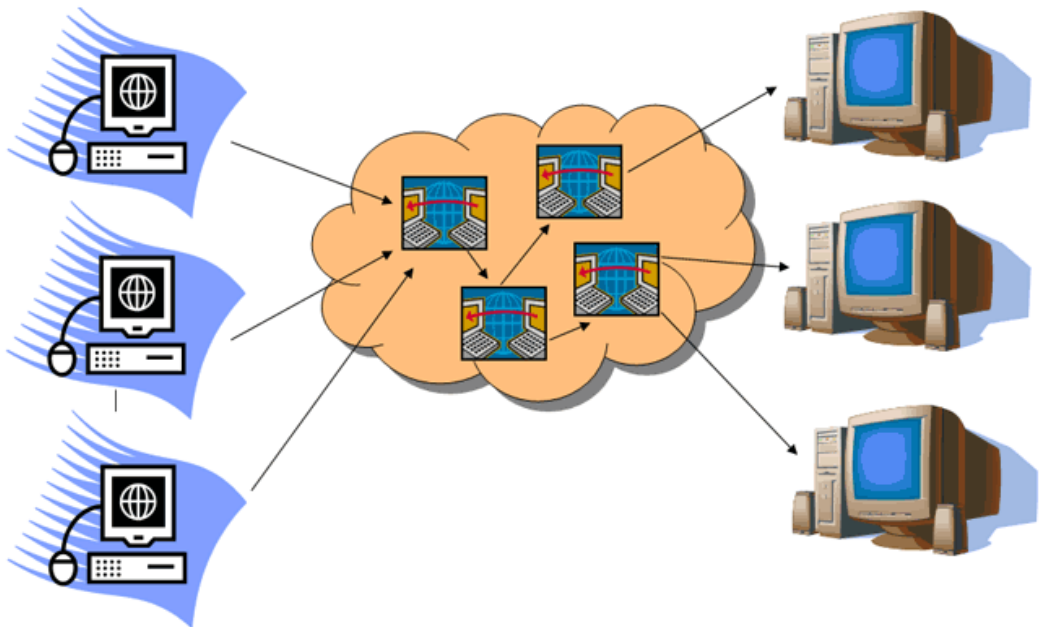


Figure: Circuit Switching

Packet Switching

Packet switching is a method of data transfer where the data is broken into small pieces of variable lengths and then transmitted to the network line. Broken pieces of data are called as **packets**. After receiving those broken data or packets, all are reassembled at the destination and thus making a complete file. Due to this method, the data gets transferred fast and in an efficient manner. In this method, no pre-setup or resource reservation is required like circuit switching method.

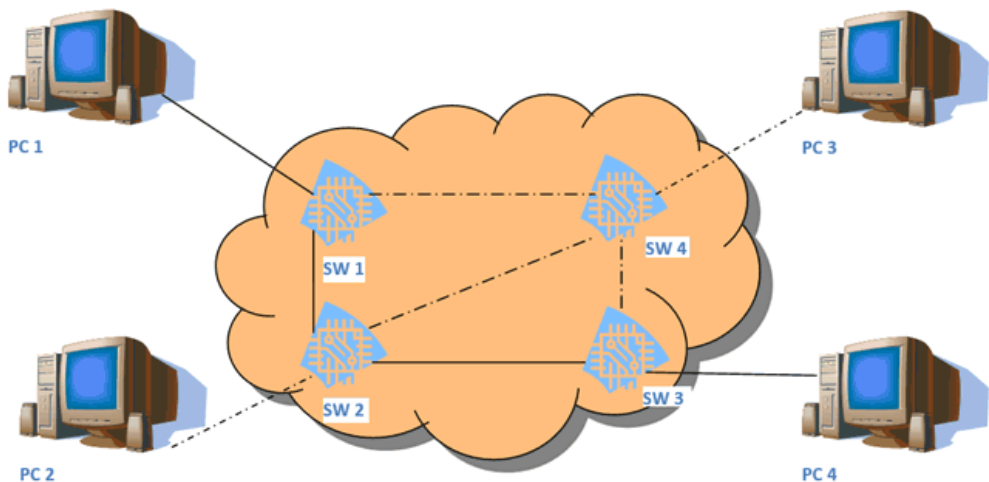
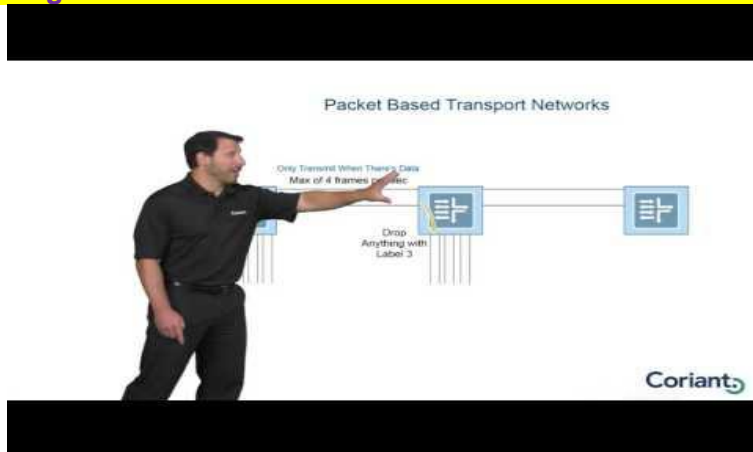


Figure: Packet Switching

In the above image, 4 PCs are connected with a 4 switch network and the **data flow will be packet switching in Virtual circuit mode**. As we can see switches are connected with each other and share the communications path with each other. Now in the virtual circuit, a predefined route needs to be established. If we want to transfer data from PC1 to the PC 4 the path will be directed from the SW1 to SW2 to SW3 and then finally at PC4. This route is predefined and All SW1, SW2, SW3 are provided with a unique ID to identify the data paths, so the data is bound by the paths and could not choose another route.

The Difference

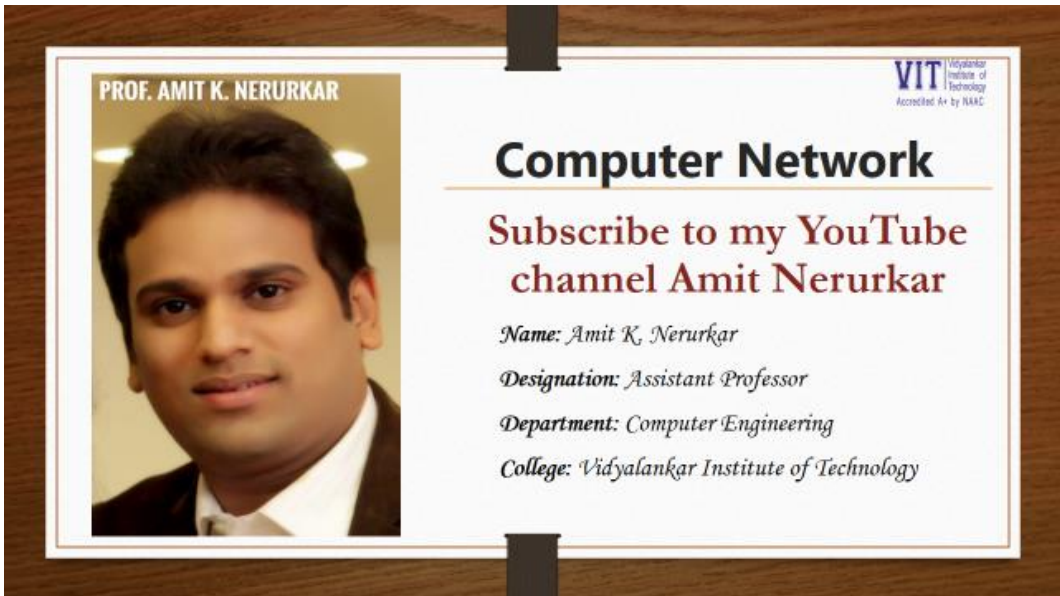
Circuit Switching	Packet Switching
A single connection which also leads to a single path for establishing a connection between 2 points.	A packet is simply data that has been divided into smaller units along with a header, for ease of transfer containing signal information.
A circuit needs to be established to make sure that data transmission takes place.	Each packet containing the information that needs to be processed goes through the dynamic route.
A uniform path is followed throughout the session.	There is no uniform path that is followed end to end through the session.
It is most ideal for voice communication, while also keeping the delay uniform.	It is used mainly for data transmission as the delay is not uniform.
Without a connection, it cannot exist, as the connection needs to be present on a physical layer.	A connection is not necessary, as it can exist without one too. It needs to be present on a network layer.

Video**Understanding Circuit Switched Networks vs Packet Switched Networks**

References

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4. <https://www.sanfoundry.com/computer-networks-questions-answers-physical-layer/>

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