

Data Communication and Networking Note

Switching

A network consists of many switching devices. In order to connect multiple devices, one solution could be to have a point to point connection in between pair of devices. But this increases the number of connection. The other solution could be to have a central device and connect every device to each other via the central device which is generally known as Star Topology. Both these methods are wasteful and impractical for very large network. The other topology also can not be used at this stage. Hence a better solution for this situation is SWITCHING. A switched network is made up of a series of interconnected nodes called switches.

Types of Switching Techniques

There are basically three types of switching methods are made available. Out of three methods, circuit switching and packet switching are commonly used but the message switching has been opposed out in the general communication procedure but is still used in the networking application.

- 1) Circuit Switching
- 2) Packet Switching
- 3) Message Switching

Circuit Switching

Circuit Switching is generally used in the public networks. It come into existence for handling voice traffic in addition to digital data. How ever digital data handling by the use of circuit switching methods are proved to be inefficient. The network for Circuit Switching is shown in figure.

Circuit Switching Network

- Here the network connection allows the electrical current and the associated voice with it to flow in between the two respective users. The end to end communication was established during the duration of call.
- In circuit switching the routing decision is made when the path is set up across the given network. After the link has been sets in between the sender and the receiver then the information is forwarded continuously over the provided link.
- In Circuit Switching a dedicated link/path is established across the sender and the receiver which is maintained for the entire duration of conversation.

Packet Switching

In Packet Switching, messages are broken up into packets and each of which includes a header with source, destination and intermediate node address information. Individual Packets in packet switching

technique take different routes to reach their respective destination. Independent routing of packets is done in this case for following reasons:

1. Bandwidth is reduces by the splitting of data onto different routes for a busy circuit.
2. For a certain link in the network, the link goes down during transmission the the remaining packet can be sent through the another route.

Packet Switching Network

- The major advantage of Packet switching is that they they are used for performing data rate conversion.
- When traversing the network switches, routers or the other network nodes then the packets are buffered in the queue, resulting in variable delay and throughput depending on the network's capacity and the traffic load on network.
- Packet switching contrasts with another principal networking paradigm, circuit switching, a method which sets up a limited number of dedicated connections of constant bit rate and constant delay between nodes for exclusive use during the communication session.
- In cases where traffic fees are charged, for example in cellular communication, packet switching is characterized by a fee per unit of information transmitted.

Message Switching

In case of Message Switching it is not necessary to established a dedicated path in between any two communication devices. Here each message is treated as an independent unit and includes its own destination source address by its own. Each complete message is then transmitted from one device to another through internetwork.

Message Switching Data Network

- Each intermediate device receive the message and store it until the nest device is ready to receive it and then this message is forwarded to the next device. For this reason a message switching network is sometimes called as Store and Forward Switching.
- Message switches can be programmed with the information about the most efficient route as well as information regarding to the near switches that can be used for forwarding the present message to their required destination.
- The storing and Forwarding introduces the concept of delay. For this reasons this switching is not recommended for real time applications like voice and video.