STUDY MATERIAL – 8
TOPIC – NETWORKING

SUBJECT: COMPUTER APPLICATION **CLASS: XII**
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LAN Protocols

- Local Area Network(*LAN*) is a group of computers connected to each other in a small geographic area such as building, office.
- A network *protocol* is an established set of rules that determine how data is transmitted between different devices in the same network. Essentially, it allows connected devices to communicate with each other, regardless of any differences in their internal processes, structure or design.
- Topics:
  - ✓ Ethernet
  - ✓ Token Ring

❖ Ethernet

Ethernet is the most popular LAN protocol and the first LAN architecture for connecting PCs in a LAN. It defines both the types of network cables to be employed and the signal levels and bandwidth used in the network. It consists of two components called CSMA/CD:

➢ Ethernet & CSMA scheme:

- ❑ Ethernet uses a media access control scheme called Carrier Sense Multiple Access or CSMA to minimise data collisions.
- ❑ It deals with how multiple nodes can access the common carrier cable.
- ❑ Before transmitting data, the node senses the carrier to see if it is busy transmitting signals.
- ❑ If so, the node waits until the channel becomes idle and then tries to transmit its data.
- ❑
- ❑ Each Ethernet NIU has a unique 48 bit physical address called MAC address.
- ❑ When a node transmits message on the network through its NIU, all stations connected to the network copy the message.
- ❑ Each station then checks the destination address of the message.
- ❑ If it matches the station's MAC address then it accepts the message.

➢ Ethernet & CD scheme:

- ❑ The CSMA scheme reduces the possibilities of a collision, but does not eliminate the occurrence.
- ❑ So when a collision is detected, the communication is stopped and the signals are again retransmitted with a time gap in between.
- ❑ This mechanism of detecting a collision is called Collision Detection or CD.
- ❑ The combined scheme of media access control and collision detection is referred to as carrier sense multiple access with collision detection or CSMA/CD
- ❑ Implementation of Ethernet protocol include Ethernet 10Base2 network.

❖ Token Ring

- ❑ In Token ring network, a 3 byte electronic message called token moves around the network from node to node in a logical ring.
- ❑ To transmit data, a node has to first capture the free token from the network. Then it changes it to a busy token and transmits the data called a frame immediately after the busy token.
- ❑ This ensures, that only one node can transmit data at any given time.
- ❑ Each node in the network receives the token and checks if the message's destination address matches its own address. If it matches, the message is accepted and the last two bits of the

data frame are changed to inform the source about the receipt of data.

- After it reaches the source node the busy token is then change to a free token and placed on the network for other nodes to transmit their data.
- The use of token guarantees the avoidance of possibility of collision.
- Implementation include IBM Token Ring network.

Switching Technique

Communication links are set up in such a way that all computers connected over long distances can communicate with each other within a reasonable cost. Depending upon the method used, digital communication can be of the following types:

- Leased circuit networks
- Switched Network Services
  - **Circuit Switched Networks**
  - **Message Switched Networks**
  - **Packet Switched Networks**

❖ Leased Circuit Networks

Leased lines are permanent point-to-point links between two or more points and are suitable for building WANs.

- ✓ **Advantage:**

- These lines are always 'ON' , thus providing a full time dedicated connection.

- ✓ **Disadvantage:**

- Leased lines are more expensive, and the cost of implementation of dedicated lines is also higher as cables need to be laid out individually.

❖ Switched Network Services

When data is transmitted from one computer network to another, it travels through intermediate nodes before being delivered to the recipient network. These intermediate nodes are called switching devices which mainly consists of switches and routers.

- ➢ **Circuit Switched Networks:**

Here a temporary circuit is setup using electro mechanical switches during the time of communication and the circuit link is maintained until the communication session is over. Usually telephone companies use such a network for continuous voice communication.

- ✓ **Advantage:**

- As a point to point physical connection is made between the source and destination nodes, delay due to network traffic is absent. Examples include modems and dial up ISDN links.

✓ **Disadvantage:**

- Only two stations can use a link at a time. A given station cannot access more than one communication link at any given time.

➢ **Message Switched Networks:**

Over here, no physical path is created in advance between the sender and the receiver. When a sender sends a data block it is stored in the router of the first switching office. There it is inspected for errors and transmitted to the router of the next switching office. The same process is repeated until the data is delivered. This type of network is also called store and forward network. The technique was mainly used for transmitting telegrams which is not used presently.

✓ **Advantage:**

- In this process there is no limit to the size of the transmitted data block.

✓ **Disadvantage:**

- Since there is no limit to the size of the transmitted data block, it can keep a particular link between two switching offices engaged, for a long time, delaying communication.

➢ **Packet Switched Networks:**

In this type, the data to be transmitted is first broken down into smaller units called packets, where each packet contains a part of the whole data and the sender and receiver addresses. Each packet is independently sent over the best possible route to the destination. At the destination, the individual packets are assembled together to form the original data.

✓ **Advantage:**

- In case there is a fault in a particular route then only the data packets through that route may get lost, which can be re-transmitted.
- More than two stations can use the same channel simultaneously by using various methods of multiplexing.

✓ **Disadvantage:**

- Since the same communication channel is shared by several stations simultaneously, network traffic can cause a delay in transmission.
- A station cannot utilise the full bandwidth of a channel as it is shared by other stations.

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