**CLASS: LOWER SIXTH**

**SUBJECT: ICT**

**DURATION: 2Hr**

* 1. **Baseband and Broadband Systems**

1. **Baseband System**

A baseband system is a single-channel system that supports a single transmission at any given time. In a baseband system, data is sent as a digital signal through the media as a single channel that uses the entire bandwidth of the media. Baseband communication is bi-directional, which means that the same channel can be used to send and receive signals. In Baseband, frequency-division multiplexing is not possible.

1. **Broadband System**

A broadband system is a multichannel system that supports multiple transmissions via multiple frequency channels. In a broadband system, data is sent in the form of an analog signal where each transmission is assigned to a portion of the bandwidth. Broadband communication is unidirectional, so in order to send and receive, two pathways are needed. This can be accomplished either by assigning a frequency for sending and assigning a frequency for receiving along the same cable or by using two cables, one for sending and one for receiving.

* 1. **Transmission Modes**

This simply refers to the direction of flow of information between two communicating devices. It could be simplex, half duplex or full duplex.

1. **Simplex Mode**

In simplex mode, signals are transmitted in only one direction. The flow of information is unidirectional from transmitter to receiver always. Examples are television broadcasting, computer to the printer connection and CPU to monitor communication.

1. **Half duplex Mode**

In half duplex mode, signals can be transmitted in both directions but only one way at a time. The flow of information is bidirectional but information can only be sent if it is not being received. It is suitable for data transmission between a computer and dumb terminals. An example is the police radio (walkie-talkie).

1. **Full duplex Mode**

In full duplex mode, signals can be transmitted in both directions simultaneously. The communicating devices can transmit at the same time. The flow of information is bidirectional. It is suitable for interactive systems. An example is the telephone.

* 1. **Parallel and Serial Transmission**

1. **Parallel Transmission**

Parallel transmission is the method of transferring blocks of data (several bits) at the same time over separate channels/lines. This type of transmission requires a separate channel for each bit to be transmitted. For example, eight separate channels will be required if a block of eight bits is to be transmitted in parallel. Parallel transmission is fast but it is suited only for short distances as cabling for long distances will be expensive. It is mainly used for connections within the computer and for connecting the computer to the printer.

1. **Serial Transmission**

Serial transmission is the method of transferring data one bit at a time through the same channel. If a block of 8 bits is to be transmitted in series, the bits will be transmitted one after the other on the same channel. Serial transmission is slower than parallel transmission but it is suited for long distances. It is cheaper as only one transmission line is required. Serial transmission can be asynchronous or synchronous.

* ***Asynchronous serial transmission***: describes the process where transmitted data is encoded with start and stop bits, specifying respectively the beginning and end of each character. Data is sent character by character with each character preceded by a start bit and a stop bit is added to the end. Other control bits like the parity bit are added to the group before the stop bit and small gabs are inserted to distinguish each group.
* ***Synchronous serial transmission***: describes a continuous and consistent timed transfer of data blocks. Data is sent as one long bit stream or block of data without start or stop bits and with no gabs. Upon reception, the receiver counts the bits and reconstructs bytes. It is essential that the same timing is maintained by both sender and receiver as there are no start and stop bits and no gaps. Another channel is therefore used to transfer timing signals to keep the both parties synchronized. Accuracy is dependent on the receiver keeping an accurate count of the bits as they arrive.

Synchronous transmission is faster than asynchronous transmission because fewer bits have to be transmitted; only data bits and no extra control bits. For this reason it is the choice for network communications links.

* 1. **Switching Techniques**

The process of transferring data blocks from one node to another is called switching. Long distance transmission is done over a network of switched nodes. Data is routed by being switched from one node to another. Two switching techniques exist: packet switching and circuit switching.

1. **Packet Switching**

Packet switching is a switching method in which the message to be transmitted is broken into small data packets and sent over the network. Each packet contains a portion of data and some control information. The packets may take different routes to arrive their destination and they may arrive in any other. On arrival, they are put back into order and the message is reconstituted. Each packet is sent with a header address which tells what its destination is. The header address also describes the sequence for reassembly at the destination. One packet contains information on how many packets should be arriving. If a packet fails to arrive, the destination computer sends a message to the sender’s computer asking it to send the missing packet again. This method is suitable for transmission of data.

1. **Circuit Switching**

Circuit switching is a switching method in which a dedicated communication path in physical form between two stations within a network is established, maintained and terminated for each communication session. This channel remains open throughout the communication process and cannot be used by anyone else. It has basically three phases: circuit establishment, data transfer and circuit disconnect. The message is sent without being broken up, so it is received in the order it was sent. This method was designed for voice transmissions. Telephone networks use this type of switching method to transmit phone calls.

1. **Transmission Media**

A transmission medium is the physical pathway that connects computers and other devices on a network. Each transmission medium requires specialized network hardware that is compatible with that medium, and most networks need to use a combination of transmission media types selected based on the network's needs.There are two categories of transmission media: guided and unguided media.

Transmission Media

Media

Radio

Infrared

Fiber Optic

Twisted Pair

Coaxial

Microwaves

Guided

Unguided

Baseband

Broadband

Shielded

Unshielded

Terrestrial

Satellite

* 1. **Guided Media**

Guided media are the physical links through which signals are confined to narrow path. They are made up of an internal conductor (usually copper) bounded by jacket material. They are also called bounded or conducted media. Three common types of guided media are used for data transmission.