



# Communications System

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# Chapter !@!

Brief description of Communication

# DaTA Transmission

# EXPLAIN THE DATA TRANSMISSION CONCEPT

- Data transmission is the moving of data in the form of signals across a transmission medium.
- Example  
when you are collecting numerical statistics from another computer, sending animated pictures from a design workstation, or causing a bill to ring at a distant control center, at that movement you are facing data transmission.

# DATA RATE

- The maximum number of bits of information which can be transmitted per
- . Typically expressed as mega bits per second (mbps). 'This shows the speed at which data can be transmitted between devices. This is sometimes referred to as though put. it can also be expressed in MBps.

SHAH Sahab,  
Difference  
Between Medium  
and Channel



# BAUD RATE

- The number of signal elements transmitted per second. A signal element consists of one or more bits

# What are various communication channel modes?

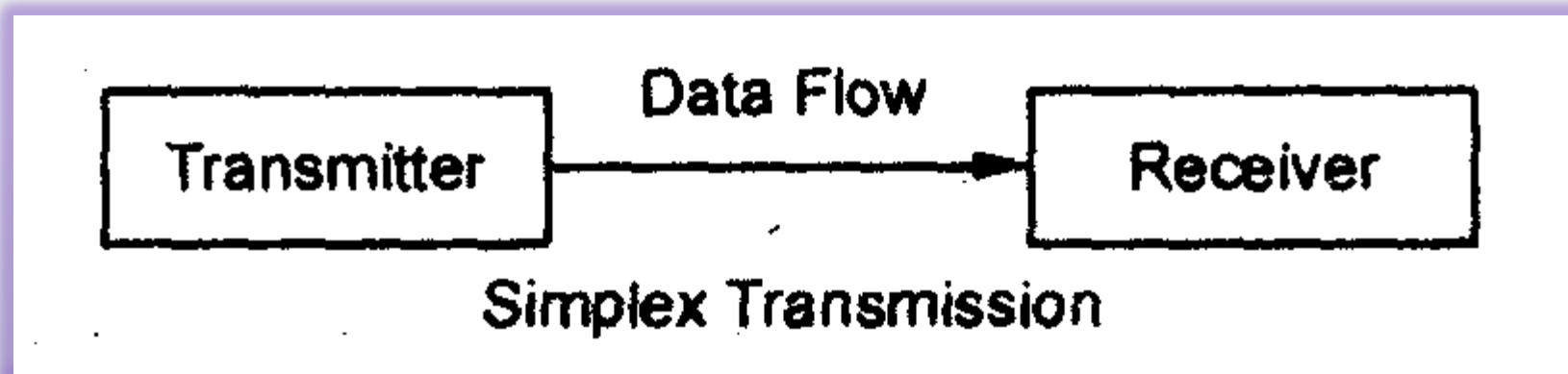
Bilal Sahab .....?





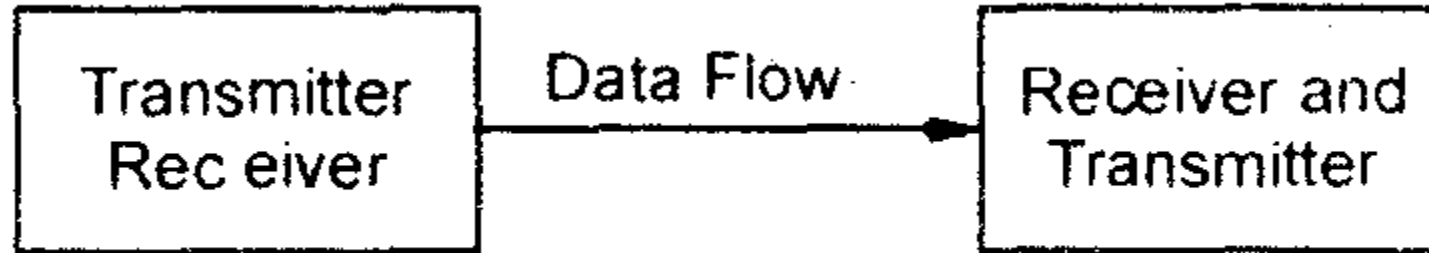
# SIMPLEX

- In this communication mode, the data flows in only one direction
- Sender always remain a sender and receiver always remains a receiver.
- In all it is done in a one way communication. So, receiver can't intimate the sender that data was being received properly or not.
- Example: Television and Radio broadcasts.



# HALF DUPLEX

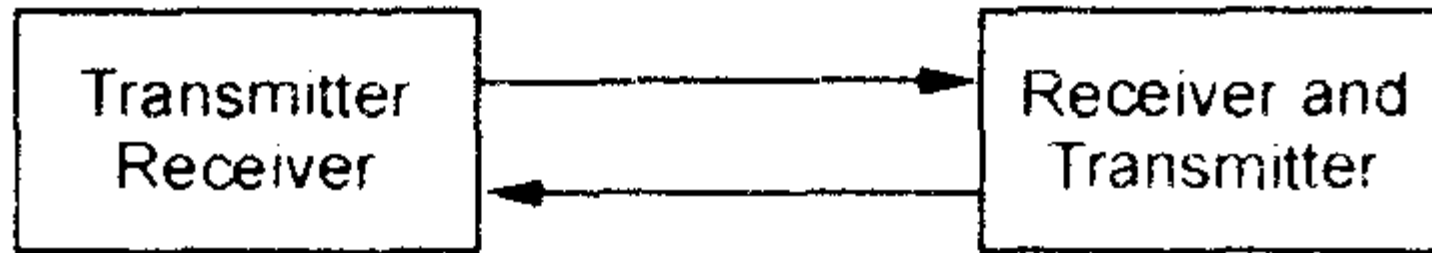
- In this mode, the data flow in both direction but not simultaneously i.e. sender can send data to receiver and receiver can send acknowledgement as well but not together as line is common. Hence it is a two way alternate communication.



Half duplex Transmission

# FULL DUPLEX

- To overcome the limitations of the half duplex i.e. to reduce the turned around time, here different paths are being allocated because of which two way simultaneous communication can take place here.



Full duplex Transmission

- What are various types of communication / Transmission

HOW DOES Rx,  
Determines start and  
Stop of Data



# SYNCHRONOUS TRANSMISSION

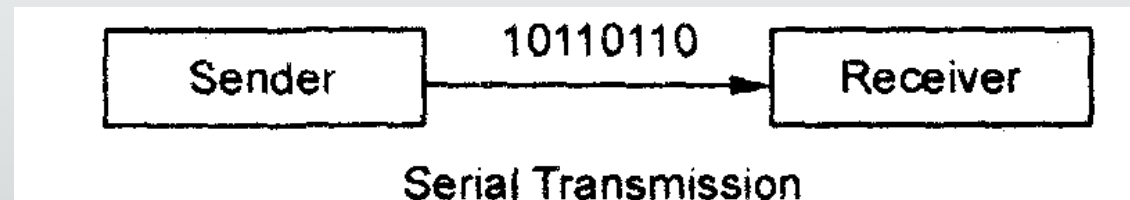
- When data is being send at periodic intervals with constant arrival rate then data is said to be synchronized.
- Here, each data block is being surrounded by control bits called flags which delimits the data block boundaries and helps the receiver in notifying the arrival of data.
- So here a separate clock or the clocking codes are being used because a drift in clock frequency can lead to loss of data.

# ASYNCHRONOUS TRANSMISSION

- When a data character is sent at any time i.e. no fixed interval this can lead to loss of synchronizations as it is then difficult to know that when next character is arriving, hence in this approach, each character is being preceded by a bit called start bit while succeeded by a stop bit. The arrival of these bits will tell the receiver about the corresponding character.
- This type of communication is generally found in machines or terminals such as teletypes or teleprinters and low speed computer terminals. It is very simple to implement.

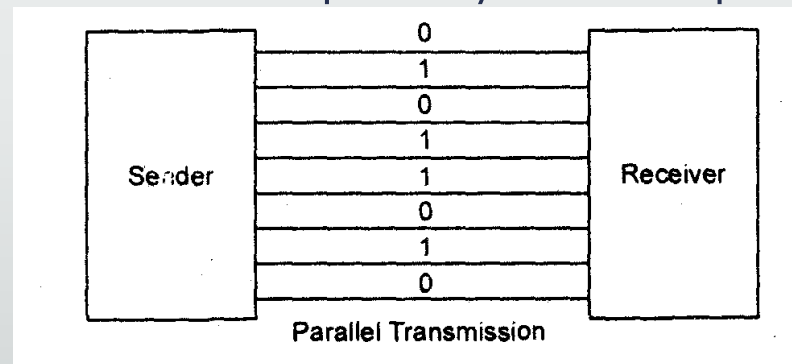
# DATA TRANSMISSION MODES

- **Serial Transmission**
- In this transmission the data is transmitted serially over the line.
- As signal wire pair can carry the signal so generally preferred for long distance communication.
- The problem of crosstalk, interference is negligible but the speed is slow. Hence due to its low cost in implementation, optimum data rate for longer distance it is considered efficient transmission e.g. keyboard to computer system.



## ■ Parallel Transmission

- Here the multiple data lines are laid out to carry multiple signals at a time. The lines are laid in **multiple of 8**. With the distance cost gets increased as more number of cables are to be drawn, hence seeing its cost factor this transmission is generally preferred for short distances communication. The multiple paths also introduced the concept of cross talking and **interference leading to the generation of errors**. But it is fast as multiple bits are transmitted simultaneously on different paths to the receiver. e.g. data transmission between computer system and printer.



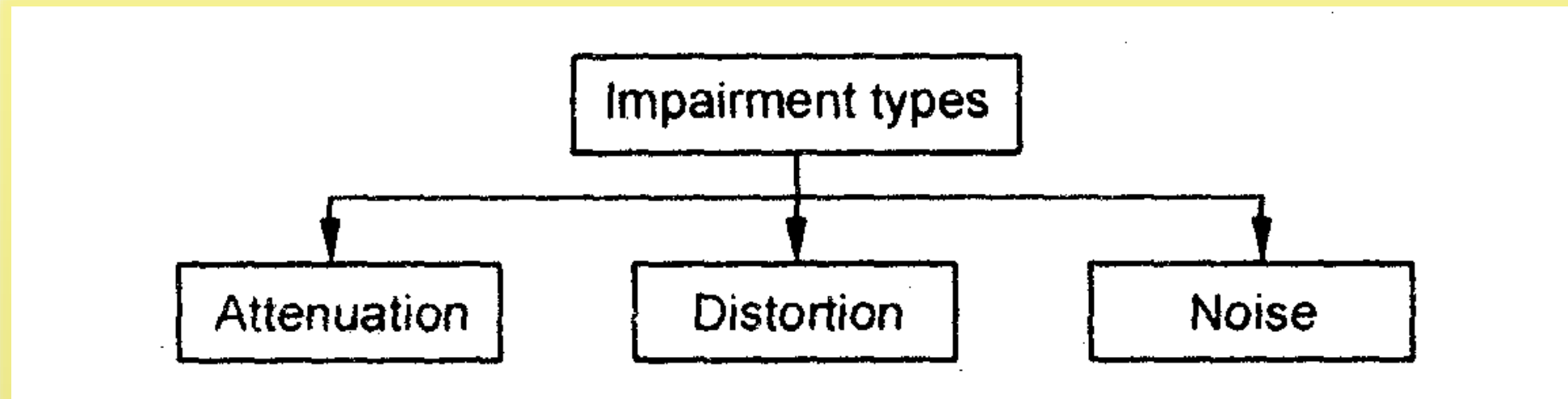


Wattu Sahab ..  
Why Digital ? ..  
Why Not Analog



Digital	Analog
<ol style="list-style-type: none"><li data-bbox="219 329 1161 444">1. Digital signal transfer is assumed to be error free.</li><li data-bbox="219 548 1161 662">2. Digital systems have cheap electronic circuits.</li><li data-bbox="219 695 1059 752">3. Easier to calibrate and adjust.</li><li data-bbox="219 848 1161 962">4. Digital communication has resistance to noise.</li><li data-bbox="219 1052 1161 1166">5. Digital transmission is the faster way of communication.</li></ol>	<ol style="list-style-type: none"><li data-bbox="1238 344 2308 529">1. While analog signals are always subject to some sort of degradation in signal quality and information loss.</li><li data-bbox="1238 558 2308 672">2. On the other hand, analog system have high budget to implement.</li><li data-bbox="1238 701 2308 815">3. It is little bit typical to calibrate and adjust.</li><li data-bbox="1238 848 2308 1033">4. It does not have resistance to noise. Noise effects more in analog communication or transmission system.</li><li data-bbox="1238 1058 2308 1172">5. Analog transmission is slower than that of digital transmission.</li></ol>

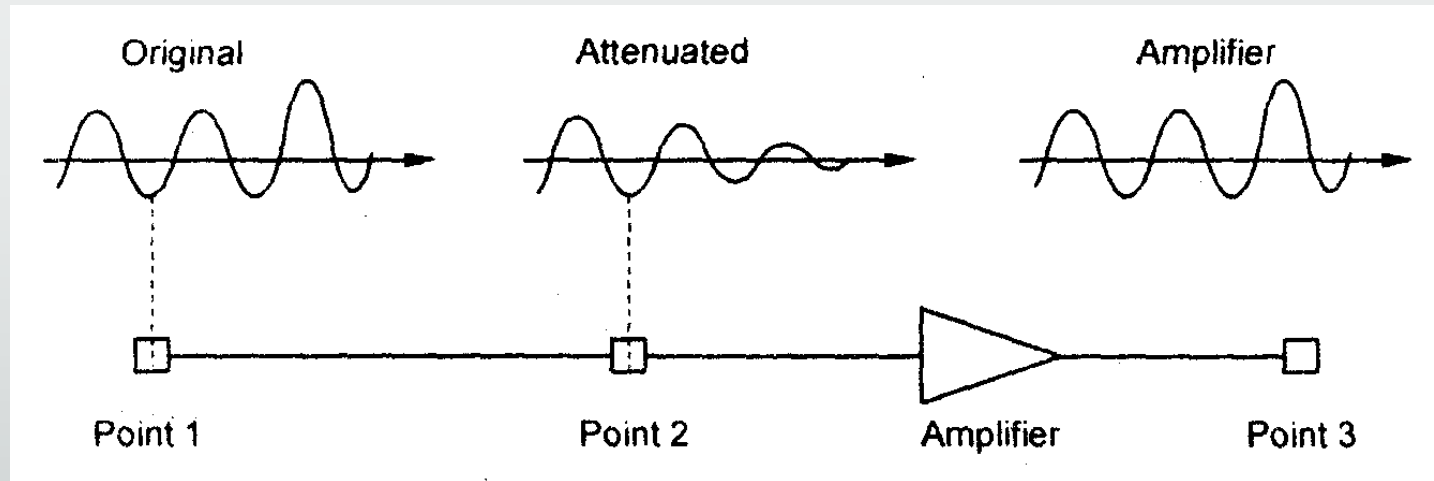
# TRANSMISSION IMPAIRMENTS



- When transmission takes place between media, which is not perfect. The imperfections cause impairment in the signal. This means that the signal at the beginning and end of the medium are not the same. There are chances for the data that we have sent and we have received.

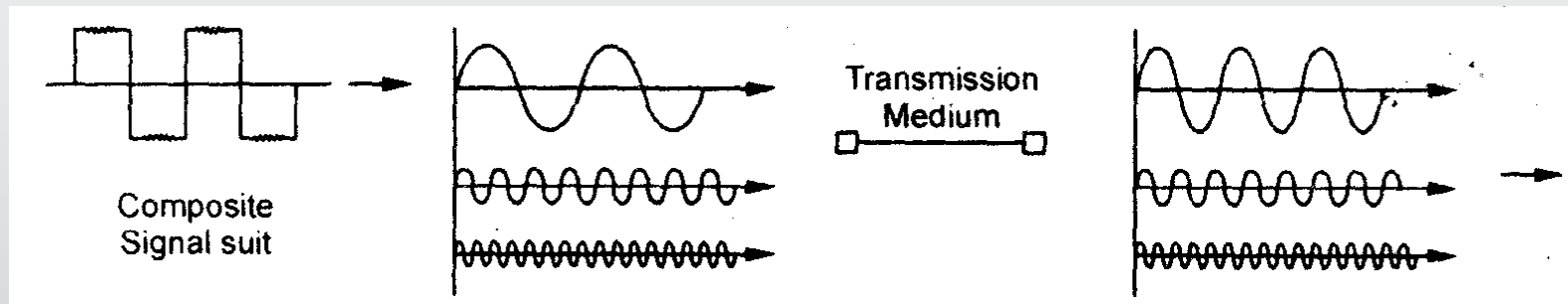
# ATTENUATION:

- Attenuation means loss of energy when a signal travels through the medium, it loses some of its energy so that it can overcome the resistance of the medium. That is why a wire carrying electrical signals gets warm to compensate for this loss, amplifiers are used to amplify the signal

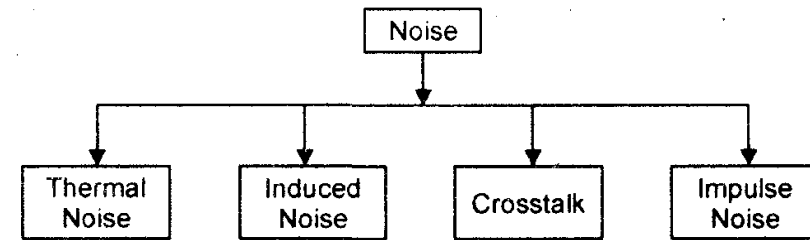


# DISTORTION:

- **Distortion:** Distortion means that the signal changes its forms or shape. Distortion occurs in a composite signal, made of different frequencies. Each signal component has its own propagation speed through medium and therefore its own delay is arriving at the final destination



# NOISE:



- Noise also causes problem in the transmission process. Several types of noise such as thermal noise, induced noise crosstalk and impulse noise may corrupt the signal.
- Thermal noise is the random motion of electrons in a wire which creates an extra signal not originally sent by the transmitter.
- Induced noise causes from sources such as motors and appliances. These devices out as a sending antenna and the transmission medium acts as the receiving antenna.
- Crosstalk is the effect of one wire on the other. One wire act as sending antenna and other as the receiving antenna.
- Impulse noise is a spike for a very short period of time that comes from power lines, lightning