

Communication System & its overview

Lab no: 1

Objective:

- To learn about the communication system & its types
- Understanding the working of communication system
- To know about the application of communication system
- Learn different terminologies used in communication system

Theory:

Communication System is a system model that describes a communication exchange between two stations, transmitter, and receiver. It consists of multiple components like input source, transducers, transmitter, channel and many more.

Communication is the act of conveying message, information from one end to another by means of suitable medium. Here the communication system is used for that efficient transfer of those data and information.

Communication System consists of multiple individual components that have their own use cases in the whole process of data transfer which are described below.

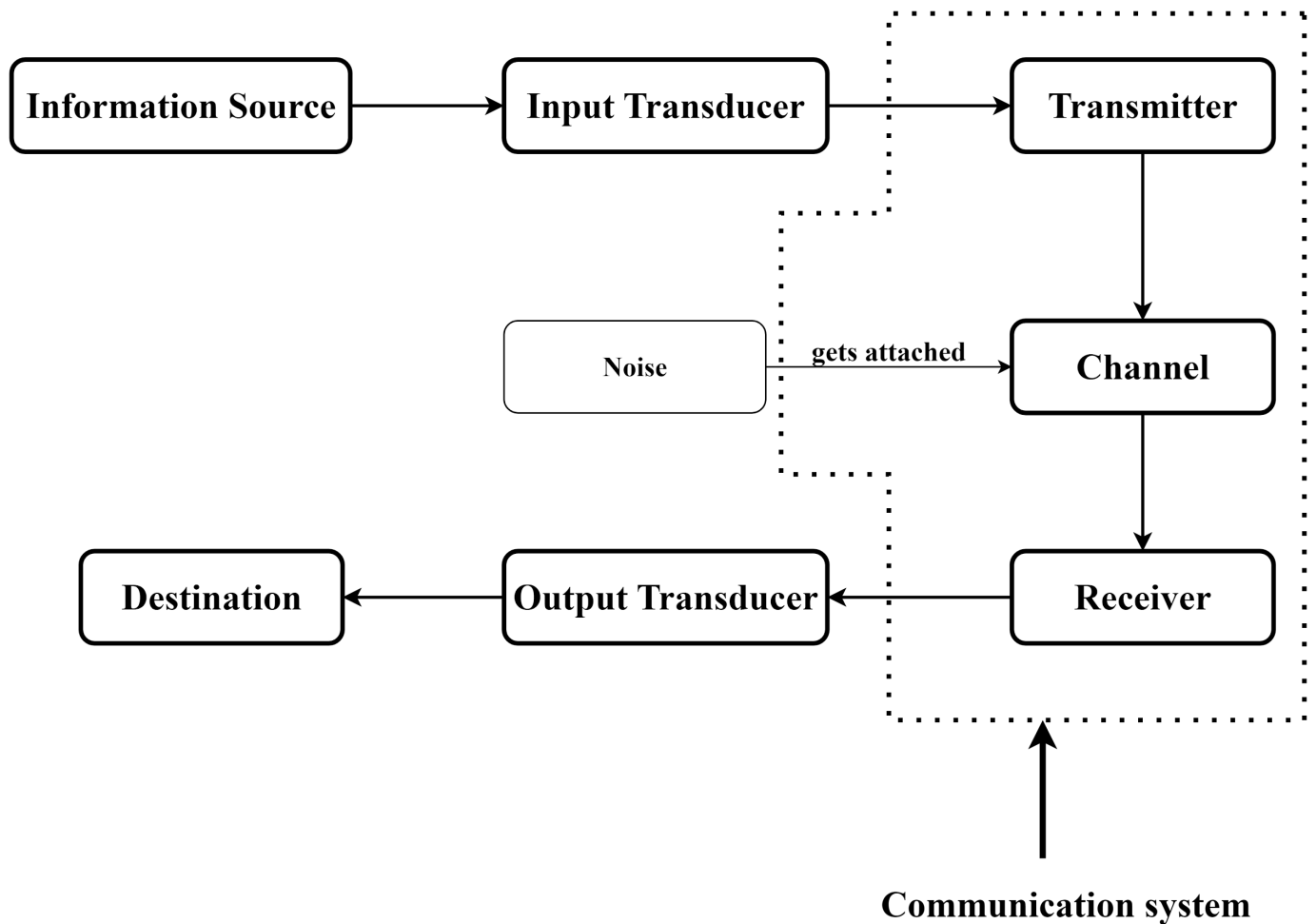


Fig: Block Diagram of Communication System

1. Information Source

They are the message or information providing source which can either provide voice, video or any other form of data. The information source can be analog or digital based on the type of system.

2. Input Transducers

Input Transducers help to convert the input into suitable transmittable format i.e electrical signal. The provided information can be in the form of audio, video or text etc which can't directly be transmitted in its original form, so here input transducers come into use.

3. Transmitter

Now the received electrical signal provided by the input transducer needs to be in suitable form for transmission over the channel. Transmitter converts the received signal into a suitable format where the things like increasing power level of the signal, frequency conversion, data rate control, signal conditioning etc is done.

4. Channel

Channel is the mediator that facilitates the transmission of information between transmitter and receiver. It can be wired or wireless. In this facilitating process using channels, there will be the addition of unwanted noise that degrades the quality of the signal. Hence it needs to be filtered out, for which there will be multiple repeaters in between channels that filters out the unwanted signal and amplifies the signal to match the level of signal.

5. Receiver

Receiver receives the information transmitted by the transmitter. Its job is to receive a signal, amplify it and then demodulate and convert into suitable format.

6. Output Transducer

It is the inverse transducer that performs reverse operation on input transducer. It helps to obtain the original form of the signal that was sent by the input source. Speaker is an example of this transducer.

Working Mechanism:

Let's consider a realistic example of a communication system involving a smartphone making a voice call. Here's a detailed explanation of how the communication system works in this scenario:

Input Source: In this case, the input source is the human voice. When you speak into the smartphone's microphone, your voice generates analog audio signals.

Input Transducer: The smartphone's microphone serves as the input transducer. It converts the analog audio signals (your voice) into electrical audio signals.

Transmitter: Inside the smartphone, the transmitter component performs several functions:

- **Signal Encoding:** The transmitter convert the analog signals into a digital format using an analog-to-digital converter (ADC).
- **Amplification:** The transmitter may amplify the digital audio signals to ensure they have sufficient power for transmission.
- **Modulation:** The digital audio signals are modulated onto a carrier signal. In the case of a voice call, this modulation may involve frequency modulation (FM) or another suitable modulation scheme.

Channel: The communication channel, in this case, is the wireless network infrastructure that connects your smartphone to the recipient's smartphone. This network can include cellular towers, base stations, and various network components.

Receiver: On the recipient's smartphone, the receiver component is responsible for receiving and processing the transmitted signal. Its functions include: signal reception, demodulation, signal conditioning and decoding of the signal.

Output Transducer: The output transducer in this case is the speaker in the recipient's smartphone. It converts the analog audio signals into sound waves, which can be heard by the person receiving the call.

Destination: The destination is the person using the recipient's smartphone to listen to your voice during the call. The person hears your voice as sound waves from the smartphone's speaker.

Discussion:

In this lab, we explored the fundamental concepts of communication systems, their components, and their working mechanisms. We began by understanding that a communication system is a model that facilitates the exchange of information between two stations, the transmitter and the receiver. It is a vital tool for conveying messages and data efficiently from one end to another, using a suitable medium. Key components of the communication system are:

- Information Source
- Input Transducers
- Transmitters
- Channel
- Receiver
- Output Transducer

Conclusion:

In this lab, we gained a comprehensive understanding of communication systems and their importance in modern communication technology. We learned that a communication system comprises multiple components, each with a specific role in facilitating the exchange of information. These components work together seamlessly to ensure that information from the source reaches the destination accurately and efficiently.

Furthermore, we discussed the practical application of communication systems in everyday scenarios, such as voice calls on smartphones, demonstrating the real-world significance of the concepts learned in this lab.

Overall, this lab provided a solid foundation for understanding the principles of communication systems, the terminology associated with them, and their role in enabling effective communication across various mediums.