

Introduction to Electronic Communication

Block diagram of Electronic Communication System

Communication is the process of **exchanging information**. The basic components of a communication system are: Source, transmitter, channel, receiver and destination (user of information). Below figure depicts the general form of an electronic communication system.

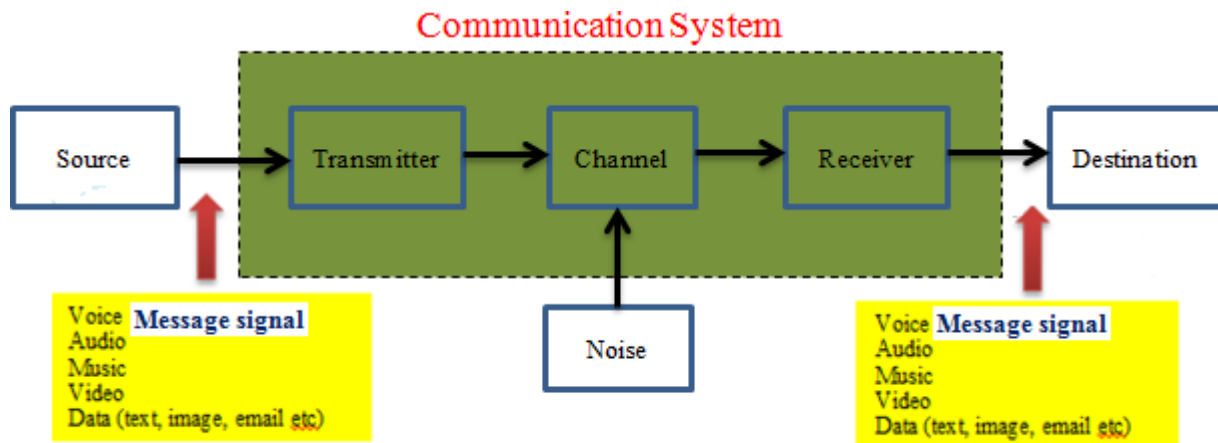


FIGURE Block diagram of a generalised communication system.

Description of a communication system is given as under:

1. **Source** (sender) who creates the message to be transmitted
2. A **medium** that carries the message
3. **Destination** (User of Information) who receives the message

INFORMATION SOURCE

A source is a device that generates messages or data to be transmitted. It may be a simple microphone, computer keyboard. The messages generated by source can be in analog or digital form. An example of analog and digital information sources is given below.

1. Analog Information Sources: Microphone, camera, TV signal
2. Digital Information Sources: Teletype, output of computer - consists of discrete symbols or letters.

TRANSMITTER

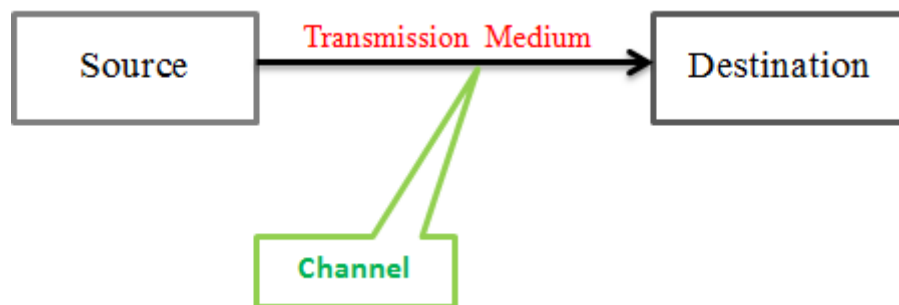
First job of transmitter is to convert input messages produced by source (ex: voice signal) into electrical form suitable for transmission. For voice messages, a transducer called microphone is used to translate sound into an electrical signal. For TV, a camera converts the light information into video signal. Transducer is the general term given to a device that converts one form of energy into another form. Note that speaker is also a transducer device, which is used to convert electrical signal back to voice signal.

Also note that modulation is the main function of the transmitter. In modulation, message signal is mathematically mixed or superimposed with high frequency carrier signal. Other functions of transmitter include, restriction of range of audio frequencies, amplification etc. Note that all these processing are done just to ease the transmission of signal from transmitter to receiver.

Advantages of modulation are: long distance transmission, high speed of transmission. Modulation also allows the reliable (practically achievable) sizes of antennas at transmitter and receiver.

CHANNEL

In a communication system, the transmitter is located at one place and the receiver is located at some other place. Channel is the physical medium that connects them electrically. Channel is the medium through which message signal is transmitted. Depending upon the type of communication system, a channel may be in the form of wires or cables. **The different channels are: Copper wires, Coaxial cable, Optical fibre, Radio links, Satellite channel or combination of any of these.** Suppose, you are calling a person in USA, the call may go through air, undersea, and space etc. So here the channel is combination of wires, radio connection, satellite and undersea cabling. The important parameters of the channel are Bandwidth and Signal to Noise Ratio (SNR). SNR is the ratio of signal power to noise power. Ideally signal power should be very high and noise power should be zero. Other important characteristics of the channel are **BANDWIDTH** and **POWER**.



NOISE

Noise is unwanted signal or energy that disturbs, interferes and affects the transmitted signal. We cannot prevent it but we can minimize it. Noise is a random signal and its behaviour can't be predicted. The measure of noise is usually expressed in terms of SNR (Signal to Noise ratio). SNR is the ratio of two quantities: Signal power and Noise power. Decibel (dB) unit is used to indicate SNR values. Note that a very high SNR is preferred for best performance.

RECEIVER

The main function of the receiver is to reconstruct the transmitted signal and delivers it to the destination called user of information. It accepts the transmitted message from the channel and converts to a form understandable by humans. Receivers contain amplifiers, oscillators, mixers, tuned circuits, filters and a demodulator (detector). Note that demodulation is the process of removing carrier from transmitted signal. Functions in receiver can be grouped as: decoding, decompressing, error detection and demodulation. The output of a receiver may be a voice signal, video signal or computer data.

TRANSCEIVER

Most electronic communications are two-way. So, both end users must have ability to send and receive messages. As a result, most communication equipment incorporates both transmitter and receiver in a single unit. All the transmitter and receiver circuits are packaged within a single circuit and referred to as transceivers. Telephones, fax machines, cellular phones and computer MODEM are examples of transceivers.

DESTINATION (User of Information):

It accepts the messages from the receiver. The destination may be a simple telephone speaker, computer screen.

Importance of Communications

Communication is the process of establishing connection or path between two end users for information exchange. It is a process of exchanging information. Note that communication involves the transmission of information from one place to another. **Earlier forms of communication include – sending fire, smoke signals, beating drums and waving flags.**

Electronic communication allows transmission of messages or information using telephones, computers, smart phones and fax machine etc. People can easily share conversation, picture, image, sound, graphics, video, maps, and software through wire, electromagnetic energy and radio systems. Electronic communications lets you combine numerous media - text, graphics sound, video, etc. - into a single message.

Communication is required for processing information. Worldwide communication facilitated the transmission of data, regardless of geographic location.

Electronic communications is interactive. With the Internet you have the ability to transmit and receive large amounts of information quickly to and from individuals and workgroups around the world.

Well-known forms of electronic communication such as **telephone, radio, TV and the Internet** increased the ability to share information. Telephone is one of the oldest media of communication. In most of the cases, it is the easiest and less expensive way of communicating distance people.

- ⊕ Electronic communication supports quick transmission
- ⊕ It provides wide coverage. World has become a global village and communication around the globe requires a second only.
- ⊕ Electronic communication saves time and money. For example Text sms is cheaper than traditional letter.
- ⊕ Electronic communication allows fast transfer of goods, money and ideas.

Since the invention of the telegraph in 1837 by Samuel Morse, electric communication has been a significant piece of our society. The importance of electronic communication in our society is incomparable to any other recent development. It has revolutionized communication in both the professional and personal way of human interaction.

Without electronic communication, we can't access and apply the available information in a timely way. In fact, we can't imagine conducting our lives or our businesses without it. Just imagine our world without the telephone, radio, television, cell phones or computer networking.

Some milestones in the history of Electronic communication

Year	Inventor	Description
1837	Samuel Morse	Invention of telegraph
1876	Alexander Bell	Invention of the telephone
1887	Hertz	Discovery of radio waves
1887	Marconi	Wireless communication by radio waves
1906	Reginald Fessenden	Invention of Amplitude Modulation (AM)
1933-39	Armstrong	Invention of super heterodyne receiver and FM
1948	Bell Laboratories	Invention of transistor
1958	Texas Instruments	Invention of IC (Integrated Circuit)
1983	United States	Cellular telephone networks