The Modern Communication Systems – Radio, Tape Recorder, Television, Movies, Walkie-Talkie, Smart Phones, Computer & Internet etc.,

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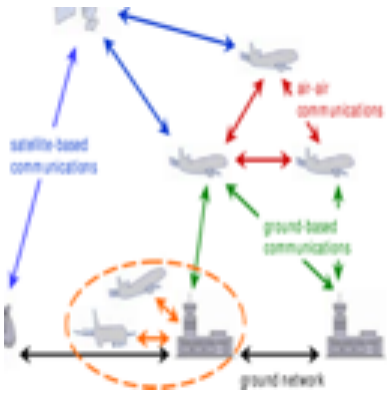
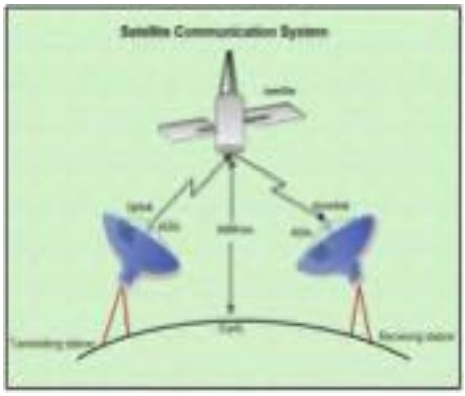
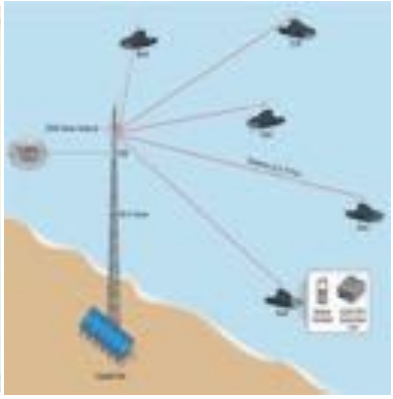
***Abstract* - There are actually five types of communication: verbal, non-verbal, written, listening, and visual. A communications system is a collection of communications equipment that is integrated into a coherent system. These allow different people to stay in touch over a geographical system. One major application is in disaster response. With a communications system, firefighters, police and paramedics can coordinate their efforts with other government officials. A communications system is an integrated system of communications hardware. This can include transmissions equipment, relay stations, tributary stations and other data terminal equipment. A communications system can even include other communications systems. A good example would be a regional emergency response communications system that connects several different cities and allows them to respond to a disaster by integrating systems they have installed for their own police and firefighters. The communication system enables the successful transmission of idea or any other important information among individuals. The person from whom the thought originates carefully encodes his ideas into a sensible content which is now ready to be shared with everyone. He is commonly referred to as the sender and the other party who receives the information from him is called the receiver or the recipient. The free flow of information between the sender and the receiver takes place because of the communication system. The different communication systems discussed include Radio, Tape Recorder, Television, Movies, Walkie-Talkie, Smart Phones, Computer & Internet etc.,**

***keywords* - Radio, Tape Recorder, Television, Movies, Walkie-Talkie, Smart Phones, Computer & Internet**







1. Introduction to Communication Systems

Communications systems can include optical communications networks such as fiber-optic cables, radio and even power line communications. A sophisticated system might mix and match these different types of media. Another distinction in types of communication is duplex communications. Duplex communications allow both parties to communicate to each other at the same time.

Examples of communications systems in action include tactical networks that allow armed forces to stay in touch with central command securely. Another major application is emergency communications systems that allow officials and first responders to send messages to each other and to the public, such as through the U.S. Emergency Alert System (EAS) and outdoor warning sirens.

Yet another communication system type is an automatic call distributor, which queues calls from outside an organization for routing to certain people. These are typically seen in call centers.

Different Types of Communication Systems

1. Optical Communication System. The word "Optical" stands for light. ...
2. Radio Communication System. In the radio communication system the information flows with the help of a radio. ...
3. Duplex communications system. ...
4. Half Duplex Communication System. ...
5. **Tactical Communication System**.

A thought kept in the brain is of no use unless and until it is shared with other individuals and rest of the world. The idea, no matter however brilliant it is, must come out for its successful implementation for it to benefit one and all. It is the prime responsibility of the individual to share his thoughts and ideas with others.

How is it possible? How can one share his ideas and thoughts?
The flow of information can be between two individuals. The information can flow from the individual to a machine, from the machine to the individual and even between two machines. Machines coupled together through networks also provide signals for the individuals to respond, thus a type of communication system. In the above cases all the machines must work on similar lines and patterns, must be technically compatible and has to provide the same information, so that the individuals can decode the information well.

Let us study the various types of communication system for the smooth flow of information between two parties.

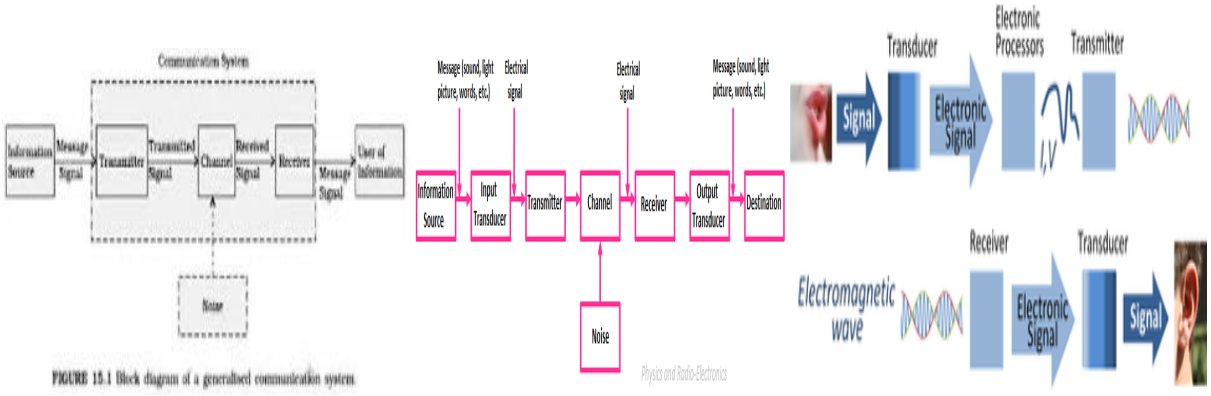
1. Optical Communication System
The word "Optical" stands for light. As the name itself suggests, optical communication system depends on light as the medium for communication. In an optical communication system the transmitter converts the information into an optical signal (signal in the form of light) and finally the signal then reaches the recipient. The recipient then decodes the signal and responds accordingly. In optical communication system, light helps in the transmission of information. The safe landing of helicopters and aeroplanes work on the above principle. The pilots receive light signals from the base and decide their next movements. On the roads, red light communicates the individual to immediately stop while the individual moves on seeing the green light.
In this mode of communication light travels through the optical fibre.

2. Radio Communication System
In the radio communication system the information flows with the help of a radio. Radio communication system works with the aid of a transmitter and a receiver both equipped with an antenna.
The transmitter with the help of an antenna produces signals which are carried through radio carrier wave. The receiver also with the help of an antenna receives the signal. Some information is unwanted and must be discarded and hence the electronic filters help in the separation of radio signals from other unwanted signals which are further amplified to an optimum level Finally the signals are decoded in an information which can be easily understood by the individuals for them to respond accordingly.

3. Duplex communications system
In Duplex communications system two equipments can communicate with each other in both the directions simultaneously and hence the name Duplex. When you interact with your friend over the telephone, both of you can listen to each other at the same time. The sender sends the signals to the receiver who receives it then and there and also give his valuable feedback to the speaker for him to respond. Hence the communication actually takes place between the speaker and the receiver simultaneously. In the Duplex communication system, two devices can communicate with each other at the same time.
A type of communication system involves the sender and the receiver where the sender is in charge of sending signals and the recipients only listen to it and respond accordingly. Such communication is also called Simplex communication system.

4. Half Duplex Communication System
In half Duplex communication system, both the two parties can't communicate simultaneously. The sender has to stop sending the signals to the recipient and then only the recipient can respond.
A walkie talkie works on the half duplex communication system. The military personnel while interacting has to say "Over" for the other person to respond. He needs to speak the security code correctly for the other person to speak. The other party will never communicate unless and until the code is correct and complete.

5. Tactical Communication System
Another mode of communication is the tactical mode of communication. In this mode of communication, communication varies according to the changes in the environmental conditions and other situations.
All the above modes of communication work for a common objective ie to transfer the information from one party to the other party. The various models of communication system help us to understand the route of flow of information from the sender to the recipients through some medium.



What is a Communication System and Its Basic Elements

A "hello how are you" from one person, from one location, needs to be conveyed effectively and, clearly without noise to another person in another location. A picture sent to someone far away should be received without any distortion. A file transferred from one location to another location should be received without errors. Communication engineering is a process by which, connection (link) is established between two points, for information exchange maximizing customer delight. The main examples of the communication system include telephone, telegraph, mobile, Edison telegraph, computer and TV cable. The sources of this system can be divided into electric otherwise non-electric. These are the sources of an input or message signal. The sources include audio files like mp3, mp4, MKV, and GIFs (graphic image files), human voice, e-mail messages, TV picture, and electromagnetic radiation.

What is a Telecommunication System?

Telecommunication implies communication between two points, separated by a distance. "Tele" means "at a distance". It takes into account that something may be and will be lost in the process; hence the term 'telecommunication' includes all kinds of distances and all kinds of techniques such as radio, telegraphy, television, telephony, data communication, and computer networking.

Telecommunication System

We can define telecommunication as, communicating information such as data, text, pictures, voice, audio, video, feelings, thoughts over a long distance. The medium for such signal transmission can be thro electrical wire or cable (also known as "copper"), optical fiber or ether etc. If the communication is through the free-space by means of electromagnetic waves, then it is called wireless.

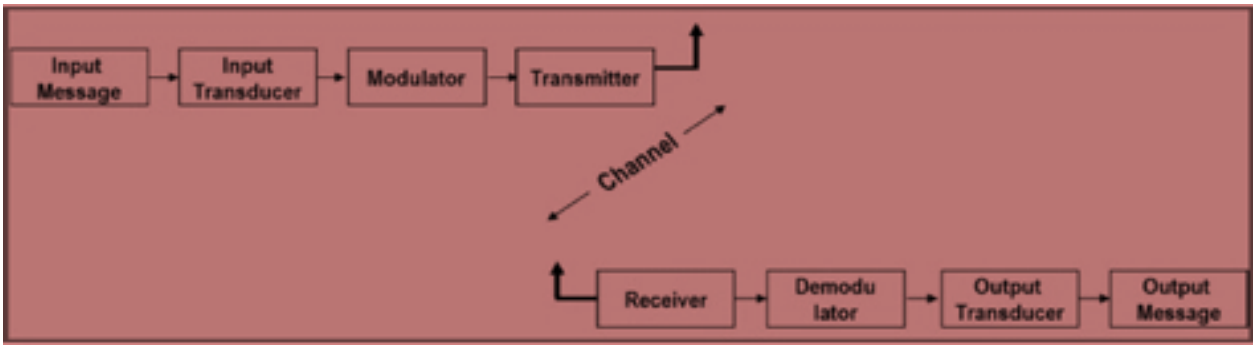
The Internet is the largest example of a typical data communication network. Few other forms of Telecom networks can be Corporate and academic wide-area networks (WANs). Different technologies have evolved, to bring out newer applications. Broadband and mobile Communications have instantly become popular. Some of the technologies in vogue are

1. Digital Telephone networks
2. WiMAX, WIFI, BLUETOOTH
3. Police wireless (Walkie talkie)
4. GSM / CDMA / UMTS / LTE / Wireless LAN
5. Facebook, Twitter, Linked In, WhatsApp

Distance does not matter anymore. Communication has to happen anytime, anywhere, at any place, through any medium, at any speed, through any device.

Basic Elements of Communication System

The basic elements of a communication system are shown in the elementary block diagram.



2. Basic Elements of Communication System

1. **Objectives:** The objectives of a communication system include Minimum bandwidth, Maximum quality (Signal to Ratio), Minimum Bit Error Rate (BER), Maximum speed, Economy, Reliability, Mobility.
2. **Messages:** The message can be voice, music, Data, Video, Temperature, Light, Pressure etc
3. **Input Transducer:** The input can be in any energy form (temperature, pressure, light) but for transmission purposes, this needs to be converted to electrical energy. Transducer does this.
4. **Modulator:** Translates the input signal to a higher frequency spectrum and also modulates (camouflages) the signal to combat noise (Amplitude Modulation, Freq Modulation, Phase Modulation, PCM, Delta Modulation, ASK, FSK, PSK, QPSK, QAM, GMSK, etc). The output can be analog or digital (thro A/D converters).
5. **Transmitter:** It converts information into a signal that is suitable for transmission over a medium. Transmitter increases the power of the signal thro power amplifiers and also provides interfaces to match the transmission medium, such as an antenna interface, fiber interface and so on.
6. **Antenna:** If it is wireless communication, antenna propagates (radiates) the signal through the air (atmosphere)
7. **Channel:** A channel in a communication system just refers to the medium through which an electrical signal travels. These media are classified into two types such as guided as well as unguided. Guided media can be directed from a source in the direction of the receiver by using connecting cables. In OFC-optical fiber communication, an optical fiber is a medium. Additional guided media may comprise telephone wire, coaxial cable, and twisted pairs, etc.

The second type of media namely unguided media that refers to a communication channel which forms space among the source as well as the receiver. In RF communication, the medium is space which is called air. It is the only thing among the source & receiver whereas in further cases such as sonar, the medium is generally water since sound waves tour powerfully through assured liquid media. The two types of Medias are measured unguided for the reason that there are no connecting wires between the source as well as the receiver.

8. **Noise:** Noise is the challenge for communication engineers. It is random and unpredictable in nature. Noise is the undesirable electric energy that enters the communication system and interferes with the desired signal.
   1. Noise is produced at the transmitter, channel and also at the receiver. Everywhere.
   2. It can be man-made and natural.
   3. Natural noise: Lightning, Solar radiation, Thermal
   4. Man-made: Welding, Sparking, Motors, Car ignition, Tube lights, Electronic fan regulators etc
9. **Receiver**
   1. Receives the signal (desired) with noise (undesired).
   2. Recovers the original signal in spite of the noise.
   3. Consists of amplifiers, filters, mixers, oscillators, demodulators, transducers.
   4. The receiver consists of a similar sequence of block diagrams.
   5. Whatever was done in the transmitter will be undone in the receiver.
   6. For example, modulation in TX will be matched by Demodulation in RX, A to D in TX will be undone by D to A in the receiver and so on.

Application Areas of Communication System

There are several types of communications which are used in different fields. The application areas of communication system mainly include the following.

A strategic communications system is applicable for straight support of strategic forces. It is designed to meet up the necessities of changing strategic conditions as well as environmental conditions. It gives protectable communications like data, voice, video, between the mobile users to make possible. Generally, requires very short fitting times, typically on the hours of order, in order to gather the necessities of common replacement.

An Emergency communication system is normally based on the computer that is mainly used for the two-way communication of urgent situation of sending messages between two persons & groups of persons. The main intention of these systems to combine the cross-communication of messages among is different communication technologies.

An ACD or Automatic call distributor is one kind of communication system that routinely assigns, queues, as well as unites callers in the direction of handlers. Main applications of this system involved in customer service, placing an order by telephone, otherwise management services.

A VCCS or Voice Communication Control System is basically an automatic call distributor with characteristics that make to utilize in dangerous situations.

Thus, this is all about the basic elements of the communication system, and the key components of this system mainly include sources, input transducers, transmitter, communication channel receiver, and the output transducer.

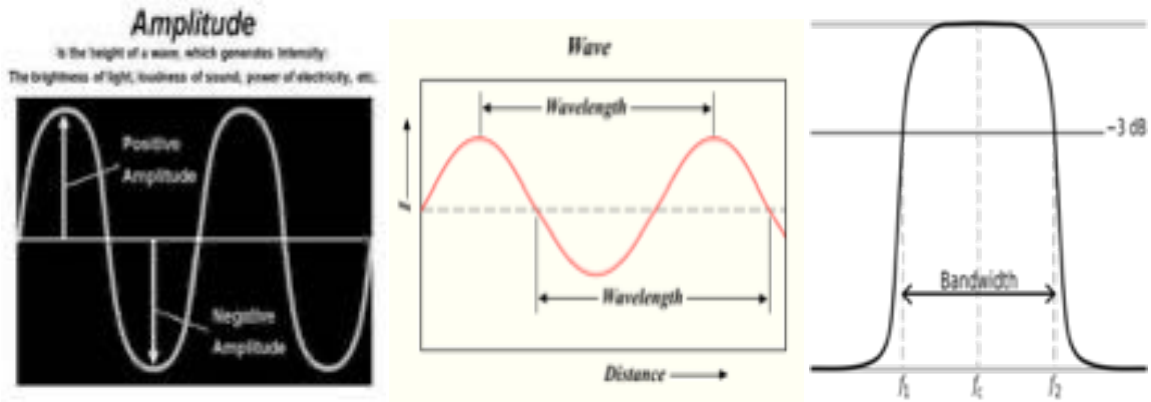
Basic Terminology Used in Communication Systems

In this discussion, we will come across various terms used in Communication System like their meanings and applications of the same. These terms and definitions both are very important and play a key part in modern Communication System in this age of electronics. Let us have a look at some of these.

Communication System Terminology

1. **Signal:** Any audio or video or audio-visual generated for example cannot be directly transmitted. It first needs to be converted into an electronic form. This electronic form is a 'Signal'. Since electronics operate in the binary system i.e. a combination of 1s and 0s only (generally 1 denotes 'on' or 'high' and 0 denotes 'off' or 'low'), the entire audio-visual is converted into a binary form. This binary form in the electrical medium is a 'Signal'.

2. **Amplitude:** Consider a sinusoidal wave transmitting energy in space with the wave passing through a series of particles which oscillate about a mean position and transmit the energy. The maximum displacement of a particle from its mean position is an 'Amplitude' of the sinusoidal wave.

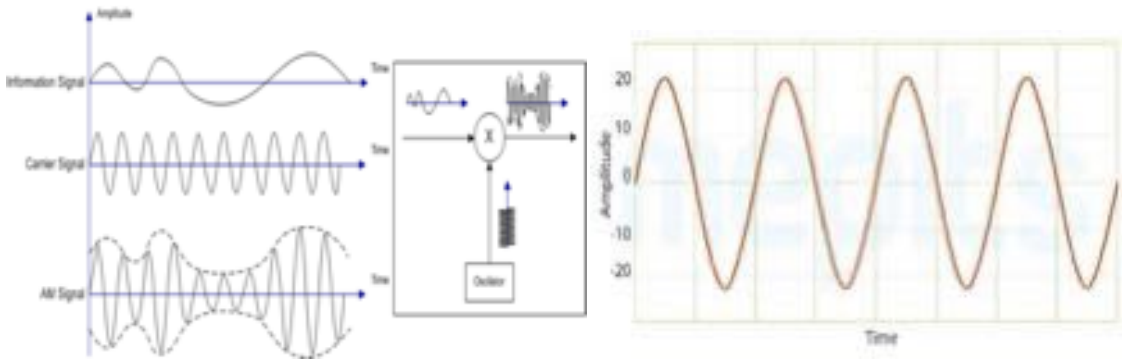


3. **Wavelength:** The wavelength of a sinusoidal wave is the distance between two particles having the same amount of displacement and both are in phase with each other.

4. **Frequency:** The frequency of a wave is the number of waves passing a point in space per unit time. It is basically the reciprocal of the time period required by a wave to cover a unit distance.

5. **Bandwidth:** The bandwidth of a signal is the difference between the highest and the lowest frequencies carried by the signal.

6. **Modulation:** Any signal to be transmitted consists of a number of varying frequencies and cannot be directly transmitted by the transmitter and is therefore superimposed with a carrier signal before being transmitted. This is the 'Modulation' of the signal. Modulation of the signal is in 2 ways, Amplitude Modulation, Frequency Modulation



7. **Demodulation:** The modulated signal sent by the transmitter is received by the receiver and needs to be converted to its original format before it can be studied. This process is Demodulation. It is basically the reverse of Modulation.

8. **Attenuation:** When a signal is transmitted through the electronic medium over long distances it loses its quality and strength due to dissipation and wastage of energy naturally. This is the 'attenuation' of the signal. Continuous efforts and various methods prevent this or minimize the deterioration of the signal.

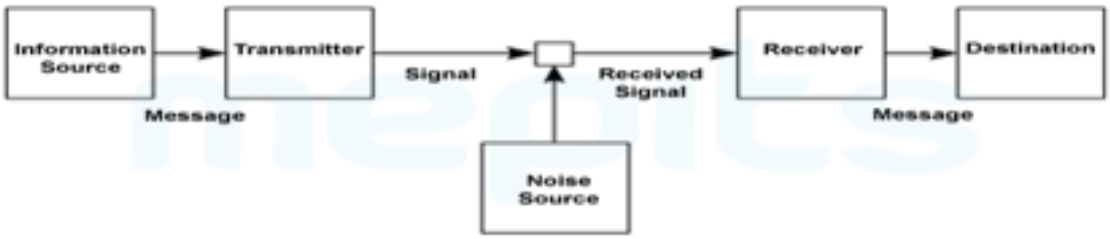
9. **Transducer:** A transducer is any device that converts any physical variable like force, movement etc to an electronic signal and thus gives a suitable output for the same. For example, whenever you use your smartphone and select a value on its screen the processor of the phone converts the pressure on the screen due to your touch into a signal. This is an example of a 'Transducer'.

10. **Amplification:** The process of increasing the amplitude of a signal is "amplification". For example, whenever you speak on a mic, your voice is both amplified and audible at a farther distance. In this process, only the amplitude of the signal increases. There is no fundamental change to the original content of the signal.

11. **Repeater:** Any electronic signal transmitting over a long distance is liable to lose its quality and strength. To overcome this problem we use a "repeater" to facilitate transmission of the signal over very long distances. A 'repeater' is basically a combination of a transmitter and receiver and plays the role of both of them by receiving the signal and transmitting it again. Cell phone towers placed over long distances are a good example of a 'repeater'.

3. Communication Systems

Communication is the process of transfer of information from sender to receiver. Figure shows a basic structure of a communication system. The *transmitter* converts the information into **signals** suitable for the *communication channel*. While the signals propagate through the channel, noise signals arise. These signals along with noise will reach the receiver end, where message signal is filtered from the transmitted signal along with noise. To some extent, the noise signals can be filtered out and the message signal can be reproduced.



Basically there are three elements in a communication system- transmitter, communication channel, and receiver.

1. Transmitter Unit

The information cannot be transmitted in its raw format through the *communication channel*. Transmitter unit is used to convert raw information into the format that is understandable by the communication channel. Different methods like *modulation* and coding may be used depending on the requirement. Mobile phones and AM radio transmitters are some of the most familiar transmitters. Modulation is employed to superimpose a low frequency message signal on to a high frequency carrier to protect the signal from getting dispersed.

2. Communication channel

Communication channel is defined as the medium through which the signal is send from transmitter to receiver. When signal is propagated through the channel, it gets affected by noise. And also channel attenuation degrades the signal strength, so signal power decreases with distance. In *radio communication* systems, air is the medium and in *satellite communication* systems, both air and vacuum are the medium.

3. Receiver

Signals sent through the communication channel reaches the receiver, where it is decoded or demodulated to extract the message. Since channel attenuation degrades the signal power, *amplifier* is used at the receiver to compensate for the transmission losses. Both **selectivity** and *sensitivity* of a receiver should be high only then the message signal can be extracted from the received signal.

Selectivity

Selectivity is defined as the ability of a receiver to select the exact **message** signal while rejecting other noise signals. Selectivity is measured in terms of ratio in decibels (dBs) by comparing the signal strength received to that of similar signal strength on another frequency.

Sensitivity

Sensitivity is the ability of a receiver to pick up weak signals which get affected by channel attenuation. It is defined as the minimum magnitude of input signal required to produce a specified output signal. That is, minimum input signal required to produce a specified **signal-to-noise S/N ratio** at the output port of the receiver.

4. **Noise**

Noise is any *unwanted signals* that interfere with the information, which includes atmospheric changes, lighting and thunderstorms, other communication systems etc. that can cause noises in the transmitted signal. Different techniques can be used to minimize the noise in the signal but it cannot be completely removed.

Communication Protocol

Communication protocol is defined as the set of rules that the devices agree for **communication**. When messages are exchanged between two systems, parameters like rate of transmission, synchronous or asynchronous, *half-duplex* or *full-duplex* mode should be agreed to before transmission. Detecting and correction of transmission errors and encoding and decoding data will also come under communication protocol. It is implemented in both hardware and software.

Elements in Communication Protocol

1. **Syntax**

Syntax in communication protocol defines the structure of **data**, that is, how each data is arranged in the transmitted data. For example, transmitted data may contain 12 bits in which first four bits represent sender's address, next four bits shows the receiver's address and the final four bits are for data. Syntax defines this structure only after which the receiver can understand and be able to fetch the corresponding data.

2. **Semantic**

Transmitted data contains *digital representation* of any real time variable. Semantic defines the meaning of a particular data and how it is to be interpreted. For example, in the receiver's address part, if data is coded as 0010 it means that data has to be moved to third module.

3. **Timing**

'When to send' and 'at what rate' comes under timing protocol. If the sender produces data at one rate and receiver process at a lower rate, then there is a possibility of data loss causing incorrect interpretation or system failure.

In this method, signal is directly transmitted from the transmitter to the receiver. Most common example of baseband **communication** is direct conversation between two people. In this method, the signal amplitude gets distorted with the distance. If the second person is standing 200 meters away from the first person, he cannot hear what the other person is saying.

4. **Transmission Techniques in Communication**

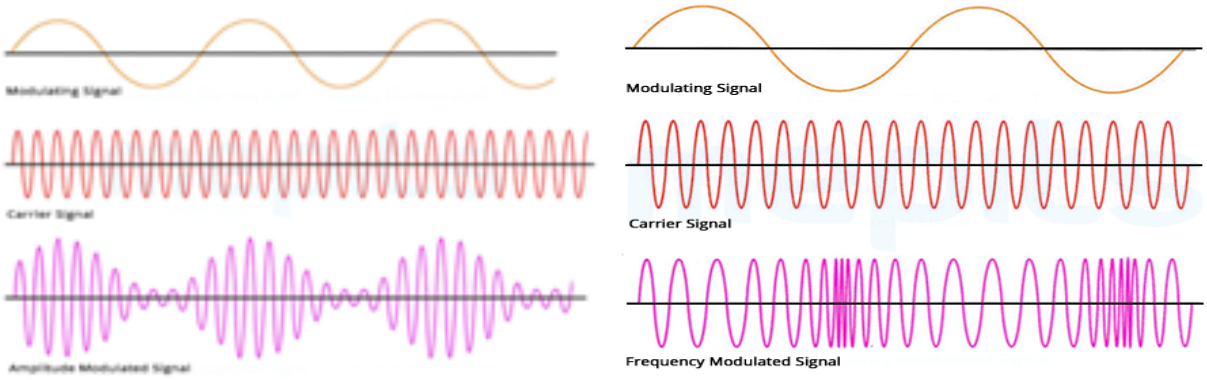
Broadband Signal Communication

Baseband signal communication is not commonly used for distance communication. Low frequency base band signals, having low energy, if transmitted directly will get distorted. So baseband signal must be modulated with high frequency signal to increase the range of transmission. **Modulation** is defined as the superimposition of low frequency baseband signal over high frequency carrier signal by varying different parameters of the carrier signals. Based on the types of parameters that are varied in proportion to the baseband signal, modulation are of different types.

Amplitude Modulation

In this method, amplitude of the carrier signal is varied with respect to the message signal. *Carrier frequency* used for amplitude modulation will be at least ten times more than baseband frequency. Instantaneous amplitude of the carrier signal is varied in proportion to the message signal. Since, frequency of the carrier signal is very high, the energy of the message signal improves and the information can be transmitted to a longer distance without distortion.

Figure shows the waveforms of carrier signal, modulating signal or message signal and amplitude modulated signal. We can see that the amplitude of the modulated waveform changes in proportion to the message signal without varying any other parameters. This technology is applied in amplitude modulation.

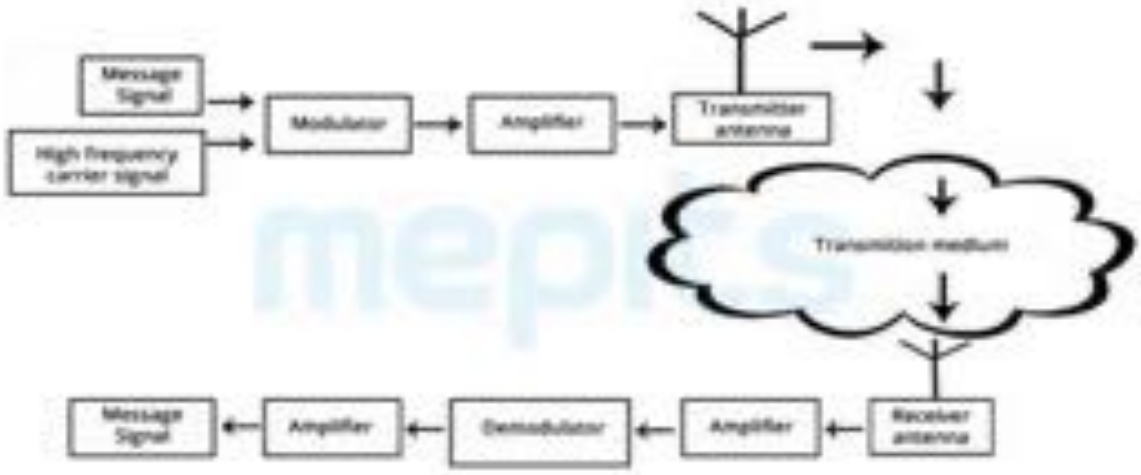


Frequency Modulation

Frequency modulation method is also used to improve the range. In this method, *instantaneous frequency* of the carrier wave is varied in proportion to the amplitude of the message signal. One important advantage of frequency modulation over amplitude modulation is that, it can be used for both analog and digital signals. But amplitude modulation can only be used in analog signals.

Radio Communication System

Radio communication system implies **wireless** transmission of *electromagnetic* signals through space. Radio signals have a frequency range from 30 kHz to 300 GHz which is less than the frequency of visible light. Various modulation methods like Amplitude, frequency, phase or pulse width modulations are used to transmit information using radio wave communication.



Radio Communication System

Elements of Radio Wave Communication System

Transmitter and Modulation

At the transmitter end, message signal is modulated with radio frequency carrier signal. Depending on the application and communication requirements, suitable type of *modulation* technique is used. Modulated high frequency signal is amplified and fed to the antenna for transmission.

Antenna

In radio wave communication system, antennas are used at both transmitter and receiver end. At the transmitter end, output from the transmitter is fed into the antenna which launches the radio waves into space. At the receiver end, antenna picks up as much of the transmitter's power as possible. Size and construction of antenna depends on the *frequency* that it deals with. An antenna consists of an arrangement of *metallic conductors*. High frequency electric current fed to these cause free electrons to vibrate at very high frequency resulting in the electromagnetic radiation.

Propagation

The behavior of radio waves when they are transmitted from one point to the other is defined by propagation. Phenomenon such as reflection, refraction, diffraction, absorption, polarization and scattering affect the propagation of radio waves along with, presence of water vapor in the troposphere and ionization of the upper atmosphere. Frequency of transmitted signal also influences the propagation of the radio wave. Signals at different frequencies behave differently when transmitted.

Receiver and Demodulation

Received signal contains modulated wave along with high frequency noise content. Since the received signal is very feeble the signals are amplified. Receiver contains *resonant circuit* to select a particular frequency and discarding others. Modulated wave thus received is fed to demodulator to obtain the message signal. The message signal is then amplified to the required level.

Fiber optic communication is now the most preferred **communication** method in telecommunication systems. Because of its advantages in many areas, it has already replaced wired communication. A few main advantages are listed below.

1. Less expensive
2. Higher data handling capacity: optical fiber is thinner than copper wires therefore more data can be transmitted within a given diameter.
3. Less signal degradation: The Signal transmitted through the optical fiber is not much degraded. So only less transmission power is required.
4. No interference: light does not interfere with the neighboring signals and so the cables can be closely packed.
5. Lightweight
6. Multiple data can be transmitted through a single fiber at the same time
7. Speed of communication: optical communication is the fastest mode of communication.
8. Flexible

In this method, electric signal is first converted into optical signal and passed through the optical fiber. The light signal reaches the receiver where it is converted back to electrical signals. Light signal is send through a long, thin strand of very pure glass about the diameter of a human hair. Many such strands are arranged in bundles and covered with a jacket for protection.

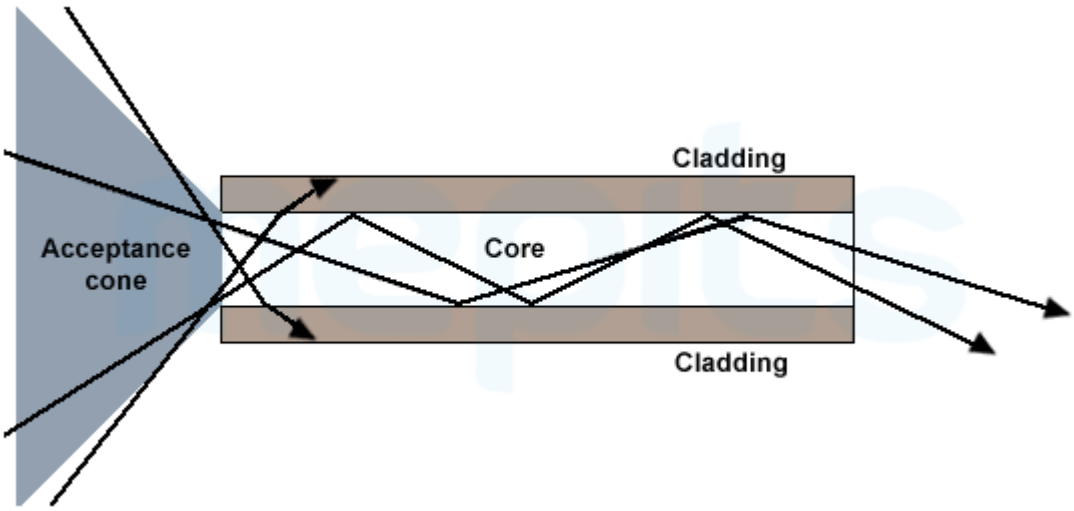
Total Internal Reflection

Total internal reflection is the basic principle used in optical fibers. From the source, light enters the core of the optical fiber. When the light passes from a medium with high *refractive index* (core) to another medium with a lower refractive index (cladding), it bends or refracts away from the normal. As the angle of the beam through the core becomes greater than a particular angle (*critical angle*) the incident light will get reflected. This process happens throughout the optical cable therefore, light signal is transmitted through it by multiple reflections.

Optical Fiber Communication

a. Construction of Fiber Optic Cable

An optical fiber essentially consists of three layers *Core*, *Cladding* and *Buffer* coating. The rest of the layers are provided in order to increase the flexibility, strength and protection from external stresses.



b. Core

Core is a thin glass/silica at the center of the optical fiber through which light travels. A Glass material with high refractive index is used for this purpose.

c. Cladding

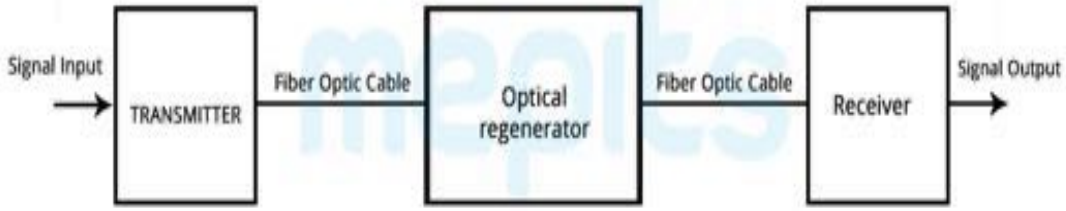
Core is surrounded by a medium, with lesser *refractive index*. Ray of light incident on the core-cladding interface is reflected back into the core. Cladding ensures that no light signal escapes from the optical fiber.

d. Buffer Coating

The entire structure is protected by a *plastic coating*. It is composed of multiple layers and materials in order to protect from external shocks, moisture, surrounding materials etc. The sheath ensures safe operating conditions to the fiber by providing the necessary strength and flexibility.

Fiber-Optic System

Fiber optic communication system consists of transmitter, optical fiber, optical regenerator and finally a receiver.



a. Transmitter

Transmitter is the first stage of the optical fiber communication system. It consists of a light source which converts electric signals into light signals and a focusing lens is used to focus the light beam into the optical fiber. Both *Lasers* and **LEDs** can be used as a light source. Lasers have more power than LEDs, but its characteristics vary with changes in temperature.

b. Optical Fiber

Light signal from the transmitter is given into the optical fiber. Signal is propagated through it by multiple *internal reflections*.

c. Optical Regenerator

When light passes through the optical fiber, the signal may get distorted due to the presence of impurities in the core. Distance to which the light signal can propagate through the fiber depends on the purity of the glass and the wavelength of the transmitted light. Therefore, to improve the transmission distance, Optical regenerators must be used at regular intervals. One or more optical regenerators are used to boost the degraded light signals in the optical communication system. In certain systems, the feeble optical signals are converted back into electrical signals and the optical data is reconstructed as in the case of a transmitter.

Optical regenerators are also called *laser amplifiers*. They are optical fibers with a special coating (doping). When degraded signal comes into the doped coating, the energy from the laser allows the doped molecules to become lasers themselves. Thus degraded light signal will get amplified and propagate further.

d. Optical Receiver

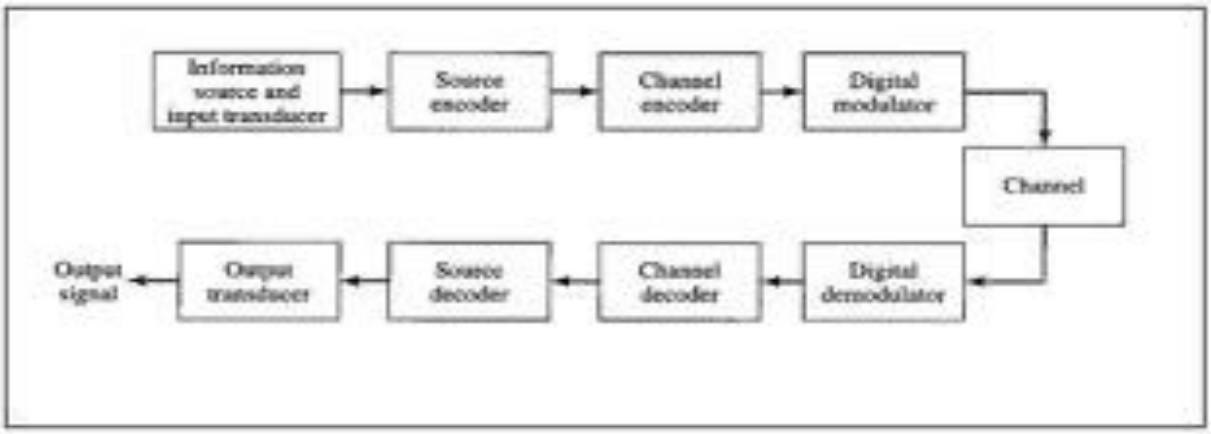
Optical receiver receives light signals which it converts back to electrical signals. Receiver uses a *photocell* or photodiode to detect the light and convert it to proportional electric signals.

Analog Communication

Advantages of analog communication over digital communication

1. **Noise immunity**:-The channel contains different types of noises. It is difficult to eliminate the noise completely. These noises interfere with the original signal which causes distortion. In digital communication, the noises are easily removed and reconstructed the original signal. But it is difficult to remove the noise from the signal in analog communication.
2. **Security**: - Digital communication provides better security than analog communication. There are several coding techniques digital communication.
3. **Bandwidth**: - The bandwidth is efficiently utilized than analog communication.
4. **Signal fidelity**: - It is better controlled through digital communication than analog communication.
5. **Long distance transmission**:-It allows the regeneration of digital signal. In analog communication, the noise is also amplified along with the signal in long distance transmission.
6. **Cheaper**: - Digital communication systems are more cheaper to implement.
7. **Multiplexing**: - Several digital signals are multiplexed efficiently. It is easier to multiplex speech, video and other digital data in digital communication system.

Block diagram of digital communication system



Digital Source
The source may analog or digital. The analog information will be converted into digital using sampling and quantization process.

Source Encoder/ Source Decoder
It converts the digital signal generated at the source output into another signal in digital form. The symbol sequence is converted into binary sequence using the source encoder. It removes the redundancy in transmitting information. It will reduce the bandwidth requirement for transmitting information.Source decoder performs inverse mapping. It reproduces the original digital source output. It converts the binary output of channel decoder into symbol sequence.

Channel Encoder/ Channel Decoder
It map the incoming digital signal into channel input to reduce the effect of channel noise. It provides reliable communication over noisy channel. In source encoding, the redundancy is removed and in channel encoding, the redundancy is introduced in a controlled manner. Error control is the main aim of channel coding. It adds some extra bits to the output of source encoder. These bits do not convey any information. It helps the receiver to detect and correct the errors occurred in the information. The channel decoder performs error detection and correction.
Modulator/ Demodulator
For the transmission through communication channel, the modulator converts input bit stream into electrical waveform. It minimizes the effect of channel noise, to match the frequency spectrum of transmitted signal and channel characteristics.
The information bearing waveform produced by modulation is converted into bit stream using detector or demodulator.

Channel
It provides the connection between source and destination. There are different channels like coaxial cable, optical fiber, radio channel etc.

1. Attenuation: - To overcome the resistance of medium the signal losses some energy.
2. Noise: - The unwanted signal which is interfered with the original signal.

Pulse Code Modulation
It is a digital pulse modulation system. The analog signal is converted into digital signal. It converts any analog signal into digital signal. This is mainly used in telecommunication applications for the transmission of digital speech. The sampled analog signal can represented digitally using pulse code modulation. The amplitude of the analog signal is sampled at uniform levels. Each sample is quantized to the nearest value. It is a digital scheme used for transmitting analog data. The signals in PCM has two states such as logic 1(high) and logic 0(low). All forms of analog data such as videos, music etc. can be digitalizing using PCM. It is the simplest form of wave coding.
The PCM encoder has three forms. They are

1. Sampling
2. Quantizing
3. Encoding

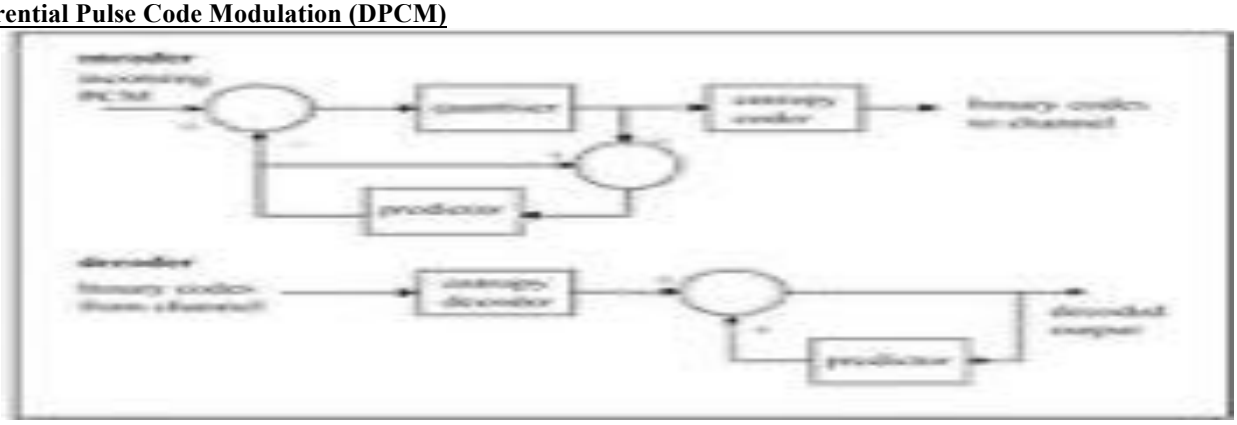
Sampling
The analog signal amplitude is sampled at regular time intervals. The sampling rate is greater than maximum frequency of the analog signal in cycle per second (Hertz). The sampling frequency should be twice the highest frequency of the analog signal. The signal will be restored at the destination using a low pass filter.

Quantization
It is the process of assigning discrete values to all samples. The number of possible value depends on number of bits used to represent samples. The instantaneous amplitude of analog signal is rounded off to up or down to the nearest level. It is called quantization.

Encoding

The sampled value is represented into binary numbers. The range is in between 0 to n. The value of n is chosen as power of 2 depending upon the accuracy required. The value of n increases will reduces the step size between adjacent quantization level and it will reduced the quantization noise.

Differential Pulse Code Modulation (DPCM)



In this difference between adjacent samples is encoded. The difference is taken between original and predicted signal. It reduces the number of bits per sample used for PCM.
At first, it iworks like PCM. At constant sampling frequency, the input is sampled and modulated using a modulation technique such as PAM. The sampled signal is stored in a predictor and it sends this signal to the differentiator. Predictor helps to compare the current sampled signal with previous sampled signal. This signal difference is given to the quantizing and coding phase of PCM. After that it is transmitted.
At the receiver, the difference signal is dequantized. The sample signal stored in predictor is added with the dequantized signal. It is then pass through a low pass filter which reconstructs the original signal.

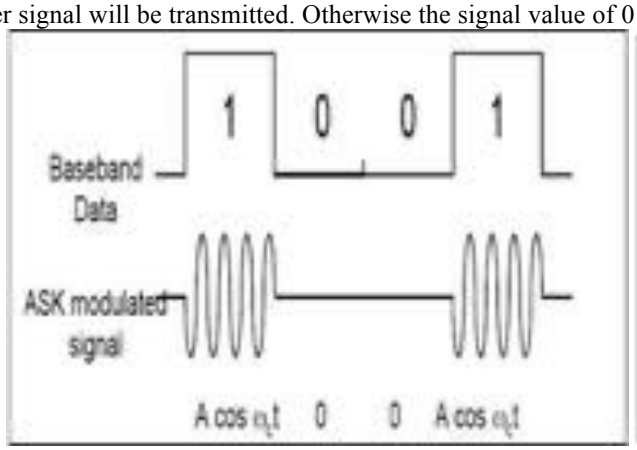
Modulation Techniques

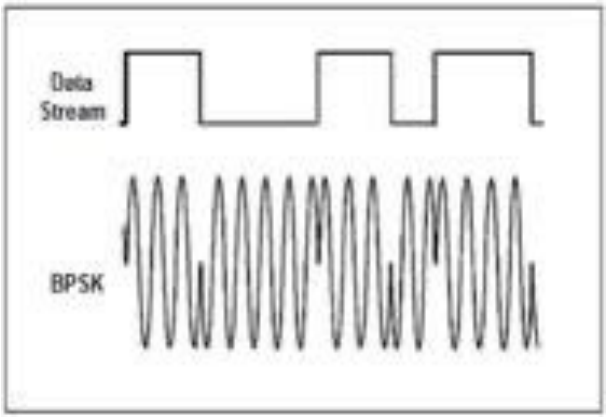
Modulation is the process of varying the characteristics of carrier signal with the modulating signal. In digital modulation, the message signal is converted from analog into digital. In digital modulation techniques, the analog carrier signal is modulated by discrete signal. The carrier wave is switched on and off to create pulses such that signal is modulated. The most important digital modulation techniques are

1. Amplitude Shift Keying'
2. Phase Shift Keying
3. Frequency Shift Keying

Amplitude Shift Keying

It is the form of AM (amplitude modulation). In this modulation the carrier wave amplitude is varied according to the message signal which is in digital format.It is used for low band requirements. It is sensitive to noise. Binary symbol 1 is represented by transmitting a fixed amplitude carrier wave and fixed frequency for a bit duration of T seconds. If the signal value is 1 then the carrier signal will be transmitted. Otherwise the signal value of 0 will be transmitted.



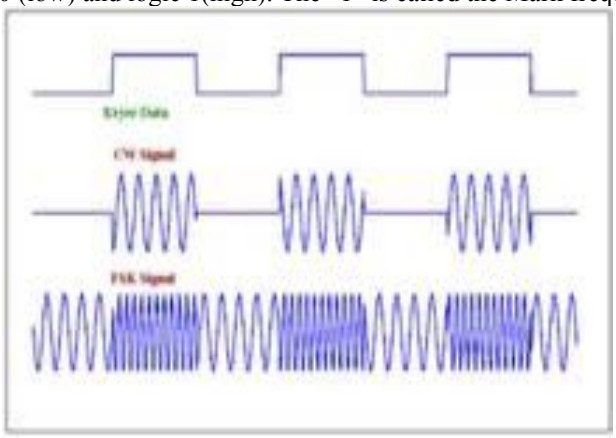


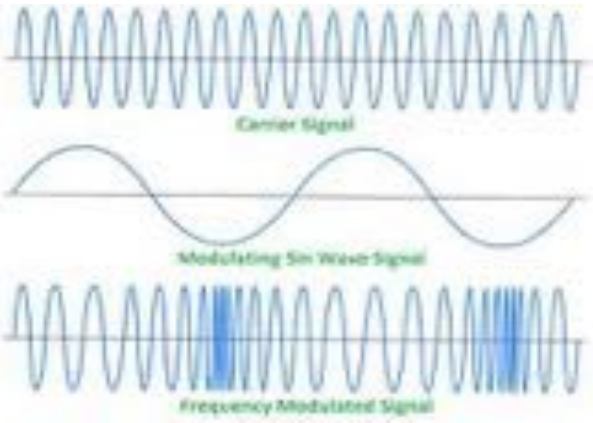
Phase Shift Keying

In this, the phase of the carrier signal is varied according to the message signal. It is also called Binary Phase Shift Keying (BPSK). BPSK uses two opposite phase signals. One is 0 degree and the other signal is 180 degree. Determination of the state of each bit is based to the state of the preceding bit. When the phase of the wave does not change then the state of the signal will remain same. If the phase of the wave reverses, that is when phase changes by 180 degree, then signal state changes from 1 to 0 or 0 to 1.

Frequency Shift Keying (FSK)

The frequency of the carrier signal is varied according to the message signal. It used a pair of discrete frequencies such as logic 0 (low) and logic 1(high). The "1" is called the Mark frequency and "0" is called the space frequency.





Digital Communication System

In **analog communication**, the information signal is a continuous signal in both amplitude and time. But in digital communication, the information signal is converted into discrete messages.Any signal can be converted into analog signal. The physical variables such as sound, light etc can be converted into analog signal using a transducer.

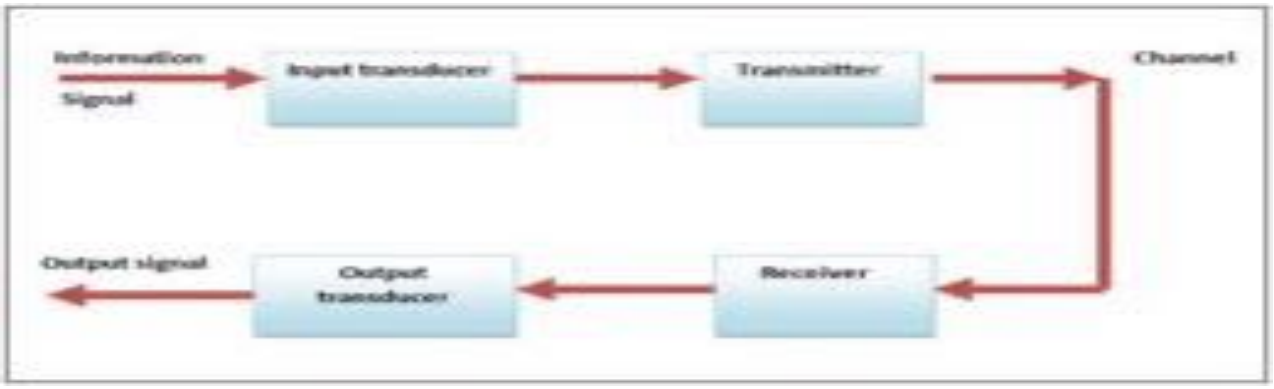
Advantages

1. Low cost.
2. It does not require complex multiplexing and timing equipments.
3. It uses less bandwidth.
4. All real world signals are analog signals. So it is easy to generate.
5. The communication is easier.
6. It is reliable because it is easy to fix the failure of individual components.

Disadvantages

1. The noise interfere with the signal causes signal loss and distortion.
2. For particular transmission, it requires hardware transmitters and receivers. For a new system, to change the analog signal, the transmitter and receiver has to be changed.
3. The devices are expensive.
4. Transmission and reception is not easier.

Block Diagram of Communication System



1. **Information Signal:** The information signal is transmitted from sender to receiver. The information signal is converted into electrical signal using input transducer.

2. **Input** Transducer**:** Transducer is a device used to convert one form of energy into another. The information signal such as voice signal is converted into electrical form using transducer. eg:- **microphone** converts sound signal into electrical form.

3. **Transmitter:** The information signal is modulated using a carrier signal and transmitted. Modulation is the process of superimposing carrier signal with information signal.

4. **Channel:** Channel connects between the sender and receiver. Copper wires, fiber optic cable free space are commonly used as channels. There are different types of noise present in the channel. This noise will interfered with the transmitted signal which causes distortion.

5. **Receiver:** The noise is first removed and demodulated to produce the original signal. Demodulation is the process of extracting the original signal from the modulated signal.

6. **Output Transducer:** The output transducer converts the electrical signal back to the information signal. Loudspeaker can convert the electrical signal into sound signal.
7. **Modulation:** Modulation is the process of changing characteristics of carrier signal according to the modulating signal.

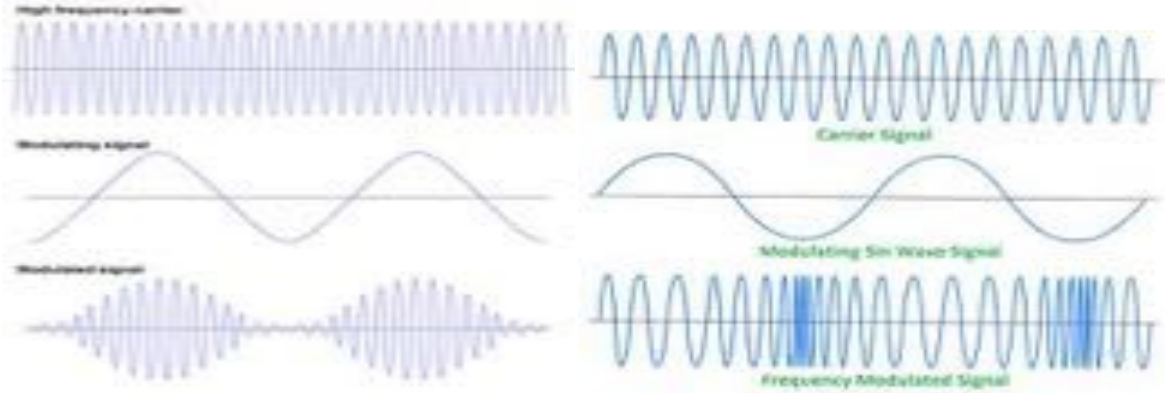
Need for Modulation

To Reduce the Antenna Height: The message signal has low frequency. As frequency decreases, the wavelength increases.
Height = $\lambda/4$
So as wavelength increases, **antenna** height need to be increased. But it is practically impossible. To reduce the antenna height, the low frequency message signal is converted into high frequency signal using any modulation technique. The information (message) cannot be transmitted through communication channel. So the low frequency message signal is modulated using high frequency carrier signal.

1. **To Multiplex the Various Signals:** In one channel, several signals can be transmitted using multiplexing. Using modulation various signals can be allotted to different frequencies. It avoids the interference of signals.
2. **To Reduce Noise and Interference:** At some frequencies, the effect of noise will be high and low at some other frequencies. If some frequency has high noise, then by using modulation technique the spectrum is shifted to another frequency where noise is less.
3. **Narrow Banding of Signals**: Modulation converts wideband signal into narrowband signal.

Modulation Techniques

If the carrier signal is continuous, then the modulation is known as continuous wave modulation.
Amplitude modulation (AM)
It is a modulation technique used for transmitting information using carrier wave. In this modulation technique, the amplitude of the carrier wave is varied according to the information signal.



Frequency Modulation: In this modulation technique, the frequency of the carrier signal is varied according to the information signal.

Phase Modulation: In this modulation technique, the phase of the carrier wave is varied according to the information signal.

5. Radio

A radio wave is an electromagnetic wave propagated by an antenna. Radio waves have different frequencies. The listener can tune the radio receiver to a specific frequency to catch a specific radio signal. For example, all FM radio stations transmit in a band of frequencies between 88 megahertz (millions of cycles per second) and 108 megahertz, and any listener who tunes his radio receiver to a frequency falling in this range would have access to that specific FM radio station's programs. Common radio frequency bands include

1. FM – 88 MHz to 108 MHz
2. AM – 535 KHz to 1.7 MHz
3. Citizen Band (CB) Radio – 26.96 MHz to 27.41 MHz
4. Short Wave Radio – 5.9 MHz to 26.1 MHz.

Every radio setup consists of two parts, the Transmitter and the Receiver. The transmitter receives the message, encodes it onto a sine wave (a continuously varying electromagnetic wave) and transmits it with radio waves. The receiver receives the radio waves and decodes the message from the sine wave it received. The transmitter and the receiver use antennas to radiate and capture radio signals. The function of the antenna in a radio transmitter is to send radio waves into space, and in a radio receiver, it is to capture the transmitter's power to the maximum extent and route it to the tuner. The size of the antenna depends on the

frequency of the signal to be transmitted or received.

A radio station transmits the sine waves, with information (programs) encoded on them, into space with help of an antenna. These sine waves are captured by antenna at the receiving station (radio set). The sine waves themselves do not contain any information and are modulated so as to hold information. Normally, sine waves are modulated in three ways:

1. **Pulse Modulation (PM):** In PM, the sine wave is turned on and off at specific intervals. This is an easy way of sending coded messages. Usage of PM is comparatively less.
2. **Amplitude Modulation (AM):** In AM, the amplitude of the sine waves (its peak to peak voltage) differs. AM is the most commonly used mode across the world.
3. **Frequency Modulation:** In FM, the transmitter's sine wave frequency changes very slightly, based on the information signal. FM is largely immune to static (not useful or empty transmissions), which enhances the effectiveness of transmissions.

The sine waves with encoded messages are captured by antenna and sent to the tuner in the receiving station. The tuner's function is to separate one from the other, the thousands of sine waves received by the antenna. Tuners use the resonance principle, i.e. they resonate and amplify at one sine wave frequency, ignoring all other sine wave frequencies. They thus enable radio to receive only one sine wave frequency. The decoding of the information on sine waves in that particular frequency is done with the help of a demodulator or detector in the radio (detector defers from one radio type to the another). The radio amplifies this decoded information and sends it to the speakers (or headphone), from where the listener listens to the information (program).




Electromagnetic waves are generated by alternating current (AC), which is the electrical power used to run pretty much every appliance and/or technology in our homes and lives – from washing machines to televisions to our mobile devices. In the United States, alternating current operates at 120 volts at 60 Hz. This means that the current alternates (changes direction) in the wire 60 times per second. Other countries use 50 Hz as the standard. Although both 50 and 60 Hz are considered relatively low frequencies, the alternating currents still generate a basic level of electromagnetic radiation (EMR). This means that some of the electric energy escapes the wire and is transmitted into the air. The higher the frequency of the electricity, the more energy that manages to escape the wire out into open space. Thus, electromagnetic radiation can be loosely described as 'electricity in the air' via radio waves, which are part of a broad range of electromagnetic waves that include: gamma rays, x-rays, ultraviolet rays, visible light, infrared, and microwave. Electromagnetic waves are all around us everywhere in different frequencies. Radio waves exhibit similar properties to that of light waves (e.g. reflection, polarization, diffraction, refraction), but exist at a frequency that our eyes are not sensitive to.

1. Electricity flowing into the transmitter antenna makes electrons vibrate up and down it, producing **radio** waves.
2. The **radio** waves travel through the air at the speed of light. 3) When the waves arrive at the receiver antenna, they make electrons vibrate inside it.

6. Tape Recorder/Cassette Player

We have been learning about the working principle of commonly used household devices such as the

1. Electric Door Bell
2. Tubelights
3. Geysers

We will continue the discussion by learning about another device which is a major source of entertainment in most households, namely a tape recorder. Agreed that with the advent of the computer age and the continuous downslide of the memory prices, we are mostly switching over to digital storage media such as hard drives, flash drives and so forth. But still there are a large number of people who use the magnetic tape recorders to play back and listen to audio and video content. But have you ever thought how your voice is stored on a thin strip made of some magnetic material and how is it replayed from there? This article explains how does a magnetic tape recorder work and what is the technology behind it.

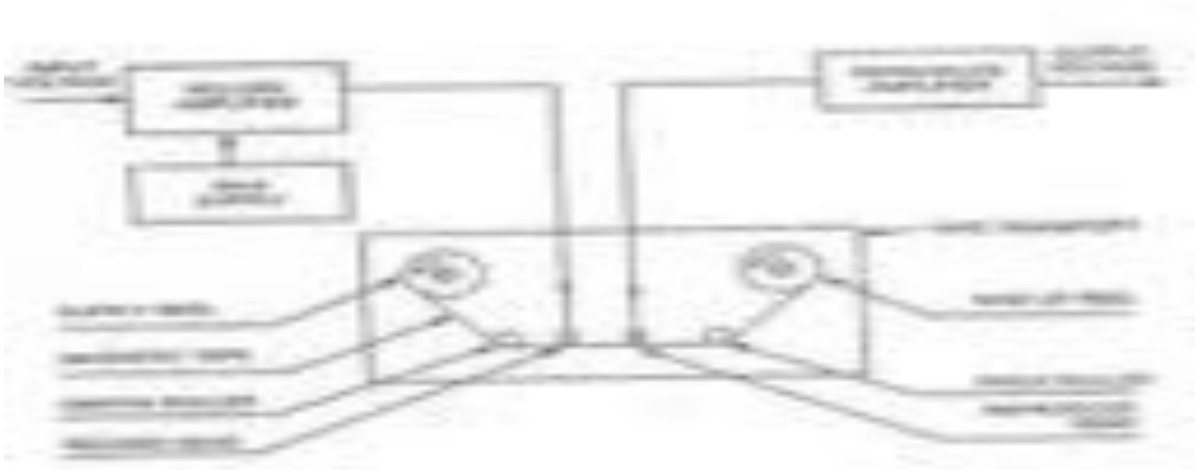
The Magnetic Tape

Before actually going into the details of the magnetic tape recorder, I would like to talk a bit about the tape which is used for this purpose. Actually the tape is made out of a special type of plastic material which is stable and can withstand continuous rubbing against the head. Normally this material is either PVC or Mylar which are quite resistant to wear and stretching which is necessary for the tape to remain useful for a long period of time. On top of this plastic base, there is a thin layer of magnetic material, usually Iron Oxide. The particles of this magnetic material are shaped in the form of tiny needles and occupy the top portion of the plastic base. The typical thickness of the tape is of the order of 25 micro-meters.

The Basic Arrangement

The basic circuit of a magnetic recording and playback system is quite simple and can be understood by seeing the sketch below which shows the entire arrangement. Of course this is a highly simplified sketch without the inside nuts and bolts, yet it is useful to take a broad view of the system.

As you can see, the entire system consists ts of two portions – a mechanical arrangement to make the magnetic tape move across two points, and an electrical system which does the real job. The mechanical movement is achieved with the help of motor drive and a combination of rollers and belts. The electrical part is taken care of by appropriate circuits which do the work of recording, playback and amplification of sound. There are two heads which are used for recording and playback of the signals respectively.



Recording and Playback

The basic principle of operation is quite simple. As the tape rubs against the recording head, it applies a magnetic field which is proportional to the input signal. This signal orients the magnetic particles in a specific format which acts as indicators to the pattern of signal stored. When the playback head rubs against the tape, the signal is reproduced since now the particles induce similar magnetic patterns in the head. If you want to read more technical details about this process you can refer to the next article on this topic (coming soon and will be linked here).

Its Not Over

If you have concluded that with the advent of the digital age, the era of magnetic tapes is over, let me tell you that it is far from the truth. Magnetic tapes are still popular in several areas such as

1. medical research
2. patient monitoring
3. surveillance
4. spying
5. production control
6. industrial research

and so on. Certainly there might be certain advantages of using magnetic tapes which make them so popular till date. We will learn about them in a later article.

7. Television

From the moment first inventors came to conclusion that electrons can transfer data and audio, they quickly started forming ideas about system that would be able to record, transmit, receive and reproduce video images over large distances. For that purposes, many inventors of late 19th and early 20th century invested significant efforts, finally managing to create early prototypes of modern analogue television systems. With steady advances in technology and polarization of many types of television devices, television standards soon managed to put firm control over television space, enabling cheap and reliable sets to find their way into the homes of families in Europe and North America.

In its basic concept, analogue television represents transmission of analog broadcast data that holds in itself encoded audio and video signal that can be reproduced on a television set, with all appropriate brightness and color points of the image and sound waves of the original signal (or simply put, transferring electromagnetic waves into sound and light energy).

This type of concept was first introduced in mechanical television system that was held back by significant deficiencies in their picture quality. Pioneered by the German technician and inventor Paul Gottlieb Nipkow, mechanical television managed to remain in the center of television invention between 1880s and 1920s after it was replaced by fully electrical systems. This system used spinning disc with series of holes in spiral pattern that scanned the environment in front of it and recorded photons using photoelectric cell. On the reproduction end, picture was created with similar spinning disc that projected the scanlines that were created by modulated light source, usually neon tube. Mechanical television systems received steady stream of upgrades during the decades after initial introduction by Nipkow, most notably by Charles Francis Jenkins in 1920s and early 1930s in United States and John Logie Baird in England.


However, even with all the advances of mechanical television it still remained held back by slow refresh rates (which caused very noticeable flickering) and low resolution. The solution to those problems came with fully electrical television systems that used cathode-ray tube (CRT) to convert received data into precisely steered electrons that "wrote" image in vertical lines across surface coated with phosphor. Because this effect can be very fast and accurate, and phosphorus is an element that retains much of it light even after electron beam is no longer hitting it, television systems that used CRT could produce stable and consistent image with scan lines that are closely packed together, enabling creation of high resolution images.

Because of this clearly superior technology, CRT television systems became instantly popular all across the world, especially because they were relative clear to make and significantly easier to maintain than mechanical televisions. After more than 70 years, analogue television signals finally started being replaced with digital transmissions and newer display technologies (LCD, Plasma, OLED) in early years of 21st century, with the plans for majority of the world to adopt this advanced transmission and reproduction method before 2020.

The basic idea of television is "radio with pictures". In other words, where radiotransmits a sound **signal** (the information being broadcast) through the air, television sends a picture signal as well. You probably know that these signals are carried by radio waves, invisible patterns of electricity and magnetism that race through the air at the speed of light (300,000 km or 186,000 miles per second). Think of the radio waves carrying information like the waves on the sea carryingsurfers: the waves themselves aren't the information: the information surfs on top of the waves.

A list on the top TV brands in India will feature both local and international companies. 2011 was not a good year for the Indian industry for conventional television sets as the market faced a slump that year for the first time ever. In 2011, 12 million units were sold compared to 18 million during 2010 signaling a decline of 33 percent.

This decrease is in accordance with trends all over the world whereby the people are going for LCD technology. The situation would have been different if ELCOT would have been successful in completing its tender of 1 million sets.

8. List of Top 10 TV brands in India

Following are some of the leading television brands operating in India:

1. Videocon

Videocon is a prominent industrial conglomerate with global operations and head offices in India. It has 17 manufacturing locations in India as well as plants in China, Italy, Poland, and Mexico. It is also the third biggest maker of picture tubes on a global basis. The group is presently worth 4 billion US dollars. Apart from color television sets, Videocon offers the following

products in India:

1. Washing machines
2. Refrigerators
3. Air conditioners
4. Microwave
5. Other home appliances

It also has the biggest network for service and sales in India. It offers the following types of television sets:

1. DDB LEDs
2. Ultra slim TVs
3. LED TVs
4. Flat TVs
5. LCD TVs
6. Conventional TVs

2. Sony

Sony Corporation operates as the electronic business unit of the Sony Group. Its major television product is the Bravia HD TV that comes in four variants like X Series (4K), 3D TV, and Internet TV. Apart from televisions and projectors it offers products in the following categories:

1. Compact digital cameras
2. Home audio systems
3. Tablets
4. Video cameras
5. In car entertainment systems
6. Games
7. Home video systems
8. Home theater systems
9. Interchangeable lens cameras
10. Computers and peripherals
11. Portable audio systems
12. Mobile phones
13. Storage media and batteries

3. LG Electronics

LG Electronics is a leading electronics organization based in Yeouido, Seoul. It operates globally and is the second biggest maker of TV sets and the third largest manufacturer of cell phones. It is also LG Group's premier company. At present it has 75 subordinate entities around the world that make and design televisions, telecom devices, and home appliances. It offers the following types of television sets:

1. LED LCD TVs
2. Plasma TVs
3. 3D TVs
4. Color TVs
5. LCD TVs

4. Samsung

The head offices of Samsung Group are at Samsung Town in Seoul and it operates as an international conglomerate. Samsung Electronics is the world's biggest electronics company in terms of sales. It offers a wide range of television products such as the following:

1. LED TVs
2. Ultra SlimFit TVs
3. LCD TVs
4. Flat TVs
5. Plasma TVs
6. TV Accessories

5. Philips

Philips is actually referred to as Koninklijke Philips Electronics NV and is primarily based in the Netherlands but operates around the world. It is one of the biggest electronics organizations on a global scale. It has approximately 119 thousand employees in at least 60 countries.

Following are its major ranges in India:

1. Cinema 21:9
2. 5000 Series
3. 8000 Series
4. 4000 Series
5. 7000 Series
6. 3000 Series

7. 6000 Series
8. CRT

6. Hitachi

Hitachi Limited is a multinational organization based at Chiyoda in Tokyo, Japan. It specializes in high end services and technology. Hitachi is one of the leading technology based companies with regards to revenues. In addition to TVs it offers camcorders, recording equipment, and projectors. It primarily offers LCD TVs. `

7. Toshiba

Toshiba Corporation is a Tokyo based multinational conglomerate. It is one of the leading global manufacturers of semiconductors and personal computers. It also operates in the following verticals:

1. Electrical products
2. Power systems
3. Information and communication systems and equipments
4. Social and industrial infrastructure systems
5. Internet bases services and solutions
6. Household appliances
7. Electronic materials and components
8. In the television segment it basically offers LCD TVs.

8. Haier

Haier Group's head offices are at Qingdao in Shandong, China and it operates as a global entity. Its primary business areas are home appliances and consumer electronics. It is one of the leading companies of the world when it comes to white goods. Its major products are air conditioners, washing machines, cell phones, refrigerators, and computers apart from television sets. It offers 3D LED, LCD, and LED TVs.

9. BPL

BPL or British Physical Laboratories Group is an electronics organization based in India. It operates in different portals such as consumer appliances, health care products, and home entertainment systems. It deals in LCD and CRT TVs.

10. Onida Electronics

Vijay Mansukhani and GL Mirchandani started Onida during 1981 with its head offices in Mumbai. The company presently has almost 33 branch offices, 41 depots, and 208 customer relation centers across the country. It primarily offers LED, color, and LCD TVs.

Other television brands available in India:

1. Mitashi
2. Micromax
3. Sansui

TV Industry in India– Present Scenario

Brands like LG, Samsung, Videocon, and Onida, inclusive of Igo, have been able to confirm their presence and during 2011 their combined market presence was 77.5 percent compared to 58.3 percent in 2010. However, their absolute numbers have reduced.

Sales of some other brands such as the following in the 0.1 to 0.2 million category:

1. Haier
2. TCL
3. Weston
4. Oscar
5. Salora
6. T Series
7. Philips
8. Beltek
9. Videocon

The segment for mid-sized sets is doing the best with a market share of 84 percent. Along with the 15 inch and 14 inch sets, this part of the television industry has a market share of 99 percent. The customers are now looking for LCD TVs instead of the larger ones.

In the last couple of years the television industry in India has been undergoing a transition with the popularity of CRT TVs being eaten into by the flat panel sets.

Indian Market for flat panel and CRT TVs

The major challenge for the conventional TVs is that the flat panel TVs are becoming economically viable and they are improving technologically as well. Increasing levels of awareness among consumers is also posing some problems for the CRT

television sets.

However, CRT TVs still account for 40 percent of the global market. It is likely that most of the demand for the color TVs will be coming from tier III and II cities in India as well as the rural locations that are experiencing a significant growth rate. Ultra slim and slim TVs are highly preferred nowadays but it is expected that the CRT segment will get some support from newer markets and consumers.
The market for flat panel TVs has sold almost 4.5 million sets and has grown by 50 percent in 2011 compared to 2010.

This category includes the LCD, plasma, and LED TVs
Samsung, Sony, and LG are the major players in the segment with a market share of 61 percent during 2011. In 2010, these companies held a combined market share of 81 percent. Other companies like Videocon, Toshiba, and Panasonic are quickly gaining ground in this segment.

Some other major companies in this segment are:

1. Haier
2. TCL
3. Weston
4. Oscar
5. Salora
6. T Series
7. Philips
8. Beltek

The market for flat panel TVs in India has sold approximately 4.5 million sets during 2011. This category includes the LCD, plasma, and LED TVs and has grown by 50 percent in 2011.

Samsung, Sony, and LG are the major companies in this segment – in 2011 their total share was 61 percent compared to 81 percent during 2010. Other companies like Videocon, Toshiba, and Panasonic are quickly gaining ground in this segment as well. Other major companies in this segment are:

1. Onida
2. Mitashi
3. Haier
4. JVC
5. Philips
6. Sharp
7. Sansui
8. Akai
9. Daenyx
10. T Series
11. Hitachi
12. Intex

Indian market for LED and LCD TVs

LED and LCD TVs have made some major contributions to the present total size of television sets. The LED TVs are the newest in terms of technology and have got a lot of positive feedback from the customers for factors like design, lesser usage of energy, and better definition. They comprise 15 percent of the Indian market for flat panel TVs.
The LCD TVs owned 85 percent of the market for the flat panel television sets during 2011. However, their share has decreased by 7 percent compared to 2010. 2011 also saw the introduction of high end TVs like the smart and 3D TVs.

9. Movies

General Procedure in Movie Making

First of all I will tell you the sequence according to my knowledge.Since I am not the expert in film making some steps may be missed here but generally it takes following steps:

1. First director of the film, according to whom each and every scene in the picture is filmed, finds the good story.
2. Then he approaches to the producer, the man who will finance the movie first and then collects the profits accordingly
3. Sometimes director may himself produce the film.
4. Then director and producer will decide on cast of the film.
5. Cast of the film means the people who are working in film.
6. Then they will approach to the appropriate actor and actress and discuss the story with them
7. If actor/actress finds it interesting then they will sign the film against previously decided amount and give the shooting dates to director.
8. After that they will decide on music composer, lyrist and song writer so that all this work should be ready as early as possible.
9. Them shooting of the film starts.

10. Choreographer, director, song writer and lyrist sit and decide on the place of song in the film and its shooting locations and dance moves.
11. Choreographer is responsible for the dance moves in the songs.
12. After completing all the shooting the work of editing ,sound mixing etc, which is called post production work starts.
13. Though it is post production work it is very important for the success of the film.
14. Editing is the art of cutting unnecessary scenes in the film which will not affect the track of story and makes movie fast and interesting.So this work is also very important.
15. Once the post-production work is complete, the film will go through certification from censor board authorizing for the movie to be released in theatres for public viewing
16. The release date of the movie will be set
17. The publicity of the movie starts
18. Distribution of the movie
19. Releasing the movie on the release date
20. Selling the movie rights to television channels



The Stages of Film Production

Now we've looked at the money involved in filmmaking, its time to take a more detailed look at the stages a film goes through. Below are the seven key stages in getting a film from an initial idea through to watching it on the big screen.

1. **Development:** The start of a project varies, but generally will begin with development of a script, be that an existing script, a book, a brief story outline. Development may also start with a Director and/or Writer pitching an idea to a Producer.
2. **Pre-Production:** This is the phase where you would narrow down the options of the production. It is where all the planning takes place before the camera rolls and sets the overall vision of the project. Pre-production also includes working out the shoot location and casting. The Producer will now hire a Line Manager or Production Manager to create the schedule and budget for the film.
3. **Production:** During this phase it is key to keep planning ahead of the daily shoot. The primary aim is to stick to the budget and schedule, this requires constant vigilance. Communication is key between location, set, office, production company, distributors - in short, all parties involved
4. **Principal Photography:** This is when the camera rolls. It is nearly always the most expensive phase of film production, due to actor, director, and set crew salaries, as well as the costs of certain shots, props, and on-set special effects. Everything that has happened up to this point is to make principal photography go as smoothly and efficiently as possible. Communication between all parties is crucial during the shoot and the production must maintain a full set of records and strive to remain on time and on budget.
5. **Wrap-Up:** The period immediately after shooting ends. It is when we strike (dismantle) the set and clear the location. Everything must be returned in good order to suppliers and there must be a full set of records of the shoot.
6. **Post-Production:** This stage starts when principal photography ends, but they may overlap. The bulk of post-production consists of reviewing the footage and assembling the movie - editing. There will be contributions as required from Visual Effects (VFX), Music and Sound Design. The picture will now be locked and delivery elements will be created. Further information on Post Production can be found later on in Week 1 of the course.
7. **Distribution:** Once the film is completed, it must be distributed. This is how producers make their money back and a considerable amount of time and energy will be invested to secure the right distribution deals for their projects. The film will go into the cinema and/or be distributed via various platforms such as Amazon Prime, Netflix, and HBO etc.
8. **Censor Board Certification**

9. **Releasing** the movie on the release date

10. **Selling** the movie rights to Television Channels

The Different Departments of Movie Making are Listed Below

1. **Producer (**Includes office, production coordinator, staff, copying, etc.)
2. **Writer** (Includes Property, Option, Treatment, 1st Draft & Final Draft, Typing, Coverage, etc. Also, if union shoot include WGA costs)

3. **Director** (Includes "Anything he/she wants to put in if he/she is bankable. Also, if union shoot include all the extras the DGA demands)
4. **Cast** (Includes Star(s), 1-Day Performers, Extras, Atmosphere, Backdrop, Paperwork, Payroll, etc. Also, if union shoot include all the extras like travel allowance, meal allowance, overtime, etc. as SAG demands) *(Below-The-Line think Crew, Equipment, Vendors, Insurance in that order)*
5. **Camera** (Film, Electronic, 4K, Red… Monitors…)
6. **Lights** (Truck, Key, Back, Fill… Generator, Cables…)
7. **Grip** (Truck, Stands, Dolly, Tracks, Tools…)
8. **Sound** (Recorder, Mixer, Mikes, Boom, Pole, Assistant…)
9. **Expendables** (Filters, Gels, Gaffing Tape…)
10. **Permits** (Cops, Fireman, Licenses, Fess…)
11. **Insurance** (Liability, Equipment, E&O, Workers Comp…)
12. **Cinematographer** (1-2 weeks Prep, 2-3 weeks Shoot, Post…)
13. **Production Manager** (3 weeks Prep, 2-3 weeks Shoot, 2-Days Wrap…)
14. **Production Designer** (4-weeks Prep, 2-3 weeks Shoot, 1-week Wrap…)
15. **Crew** (Camera Operator, Assistant Directors, Script Supervisor, Craft Service…)
16. **Sets** (Rentals, Purchases, Paint, Crew…)
17. **Stages** (Rentals, Insurance, Lights, Construction, Crew…)
18. **Locations** (Rentals, Insurance, Parking, Utility, Bonds…)
19. **"Shot-In-The-Can"** (further costs from Food to Props to Wardrobe incurred to get your film shot) *(For Post think Picture, Sound, Music, ADR, Foley, Mix in that order)*
20. **Picture Edit** (Editor, Assistant, Edit Bay, Food…)
21. **Sound Edit** (Editor, Assistant, Effects, Edit Bay, Food…)
22. **ADR** (Automatic Dialogue Replacement, Lip Syncing, Looping…)
23. **Foley** (Footsteps, Paper Noise, Clothes Rustling…)
24. **Music, Score** (Pre-Recorded, Licensed, Original…)
25. **Re-Recording** (Mix, 30-50 tracks down to 3 tracks)
26. **M&E Track** (Music & Effects but no Voice…)
27. **Laboratory** (Color Correcting, Timing)
28. **Laboratory** (Digitizing, Output, Prints, Coding…DCP & Negative)
29. **Legal** (License, Company Papers, Contracts, Agreements…)
30. **Accounting** (Payroll, Bookkeeping, Taxes…)
31. **Miscellaneous** (Who the heck knows what they are… that's why they're called "miscellaneous")
32. **Contingency, Overages** (Now, take the whole thing and add another 10%… You'll see)

10. Walkie-Talkie

1. Antenna: Sends and receives radio waves.
2. LCD display: Shows channel number, remaining battery life, and so on.
3. Monitor: Switches the walkie-talkie to monitoring mode so it can be used as a listening device or baby monitor.
4. Menu select buttons (marked with plus and minus symbols).
5. Menu button: Used for changing functions and settings. Can also be used to lock the keypad to prevent the channel or other settings from changing accidentally while the radio is in your pocket.
6. Loudspeaker.
7. Push-to-talk (PTT) button.
8. On/off switch and volume control.
9. LED indicator light shows when channels are busy.
10. Microphone: Unlike some models, this walkie-talkie has a separate loudspeaker and microphone.
11. Transmit call tone: This sends a tone signal to other radios on the same channel alerting them that you want to talk.

What is a Walkie Talkie?

Walkie talkies are handheld portable radios that use radio waves to communicate wirelessly on a single frequency band. They were first developed in the 1930s by a Canadian inventor named Donald Higgs and, quite independently, by an American named Alfred Gross. They were originally called two-way radios or pack sets, but as the thing that made them really stand out from telephones was the fact that you could both walk and talk at the same time, they became known as walkie talkies.

Each battery-powered handset contains a transmitter (which doubles as a receiver), an antenna for sending and receiving radio waves, a loudspeaker that also often functions as a microphone, and a 'push-to-talk' button that, unsurprisingly, you push to talk.

The loudspeaker-cum-microphone works like an intercom system. Because speakers and microphones contain what are essentially the same components – a magnet, a coil of wire, and a cone made of paper or plastic to receive or generate sound – they can be combined into a single device and the direction of the electrical current determines which function is given precedence. These features are separate in more sophisticated models.

So how do they work?

People communicating by walkie talkie must first of all ensure that they are sharing the same channel, or frequency band. Their handsets are all set to receive, so the microphone-cum-loudspeaker is set to loudspeaker. When no one is talking, the device will probably be broadcasting the sound of static, like a detuned radio. When someone wishes to talk, they simply depress the push-to-talk button, forcing their loudspeaker to switch to microphone function, eliminating in the process the sound of static.

As they speak, their words are converted into radio waves and broadcast across a pre-arranged channel. Radio waves fall within the electromagnetic spectrum and therefore travel at the speed of light (186,000 miles per second) and are picked up what feels like instantaneously by the other handsets, where they are converted back into vibrations or fluctuating electric currents and the speaker's voice is broadcast by the loudspeaker.

When the speaker has finished speaking, they say 'over' to let the listener know they have finished speaking, and they let go of the push-to-talk button and their handset returns to listening mode.

A walkie talkie is a two-way radio, which means that unlike a normal radio, it can both send and receive information. As the same channel is used for both functions, this means only one person can talk at a time.

In order to avoid the possibility of interference from other two-way radio users, most modern systems allow use on multiple channels. In order to do this, the radio transmitter must be able to generate waves in different frequencies.

Who uses walkie talkies?

Walkie talkies are still widely used in various organisations and industries where instantaneous and group communication is required. These include the emergency services, security services, the military and transportation industries. They are also used in construction, hospitality, manufacturing and in many other sectors.

The fact that they are hard-wearing and easy to use also makes them very popular with families. Kids love using them when out and about and they're great for parents to keep in touch with their kids when they're on a camping holiday, for example.

How Walkie Talkies Work/Two Way Radio

Walkie talkies don't play music, text, access social media or take photographs but still have the upper hand when you need to communicate in areas without a mobile or GPS signal. That's because they work off single frequency wireless signals which means that all is not lost if you find yourself off the beaten track. These hand-held radios are compact but include a speaker and microphone and are very simple to use.

How do they Work?

Walkie talkies are powered by battery, are made for transmitting and receiving messages and are manufactured to work to specific radio frequencies. Radio waves are part of the electromagnetic spectrum and are transmitted at the speed of light, or 186,000 miles per second. Whilst a user is not speaking the unit will be issuing static as it is in receiving mode, and you will hear a hissing noise just like you would with a radio that isn't tuned into a station. When you want to talk you have to press a button and in order to hear the reply you then have to release the button.

Provided all parties are sharing the same frequency band, or channel, it is possible to communicate over several miles depending on the terrain. There is no limit to how many walkie talkie users can communicate at the same time however because all will be sharing the same frequency band only one person can speak at any one time. Once you have finished relaying your message you will say 'over', release the button to allow your handset to revert to listening mode and let the other person speak. Because of the 'group talk' facility and usability in areas of poor mobile signal quality two-way radios are often preferred by small businesses, rescue groups and the military.

The Components of a Walkie Talkie

All modern walkie talkies are made up of the same components. There will be a microphone/speaker, antenna, LCD display, function buttons, battery and circuitry all working together to convert your voice into radio signals. Typical workings will consist of a coil of wire, a magnet and a paper or plastic cone to utilise the sound waves. Whilst most basic models come with a combined speaker and microphone the more sophisticated models can have separate components.

Common Problems and How to Fix Them

1. Losing coverage – this is often the result of allowing the battery to run down. Keep them properly charged at all times. Batteries should be replaced every 12/18 months to guarantee performance. Poorly-charged batteries can cause other problems like constant radio beeping or poor performance.

2. Too much background noise meaning you can't hear a conversation properly – consider using a walkie talkie with noise-cancelling abilities.
3. No privacy. Two-way radios are not the most discreet forms of communication and others can hear your conversations – consider using an ear-piece for privacy.
4. Excess static during transmission – could be caused by a dirty antenna so clean the antenna contacts using a pencil eraser.

They communicate wirelessly (using radio waves) on a single, shared frequency band.

Each battery-powered unit contains

1. Transmitter/receiver
2. Antenna (for sending and receiving radio waves),
3. A loudspeaker.

A speaker and a microphone contain the same components which are a coil of wire, a magnet, and a paper or plastic cone to pick up or generate sounds. Actually you can use a single device to do both jobs essentially by switching the electrical circuit into which it's connected and reversing the current.

Walkie-talkies are battery-powered transceivers, meaning they can both send and receive radio messages. They have a half-duplex channel, which indicates that only one **walkie-talkie** on a channel can transmit a signal at one time, although many radios can receive that same signal.

11. Smart Mobile Phones

Each cell has an antenna that receives cell **phone** signals. The antenna transmits signals just like a radio station, and your **phone** picks up those signals just as a radio does. **Smartphones** use cell **phone** network technology to send and receive data (think **phone** calls, Web browsing, file transfers).

A **smartphone** is a cellular telephone with an integrated computer and other features not originally associated with telephones such as an operating system, web browsing, and the ability to run software applications.

How does the smartphone work?

At their core, **smartphones**, and all cell phones for that matter, are mini radios, sending and receiving radio signals. ... Each cell has an antenna that receives cell phone signals. The antenna transmits signals just like a radio station, and your phone picks up those signals just as a radio **does**.

A smartphone comprises up of three main parts:

1. The sensor (which detects light)
2. The lens (the component in which light comes through)
3. The image processor.

Mobile technology is the **technology used** for **cellular** communication. **Mobile** code-division multiple access (CDMA) **technology** has evolved rapidly over the past few years.

8 Advantages of Having Smartphones

1. Instant Communication. Smartphones evolved from the earliest communication devices. ...
2. Web Surfing. The smartphones also make it convenient for people to surf the web. ...
3. Camera. In this "selfie" generation, the camera is so important. ...
4. Entertainment. ...
5. Education. ...
6. Productivity Apps. ...
7. GPS. ...
8. Privacy.

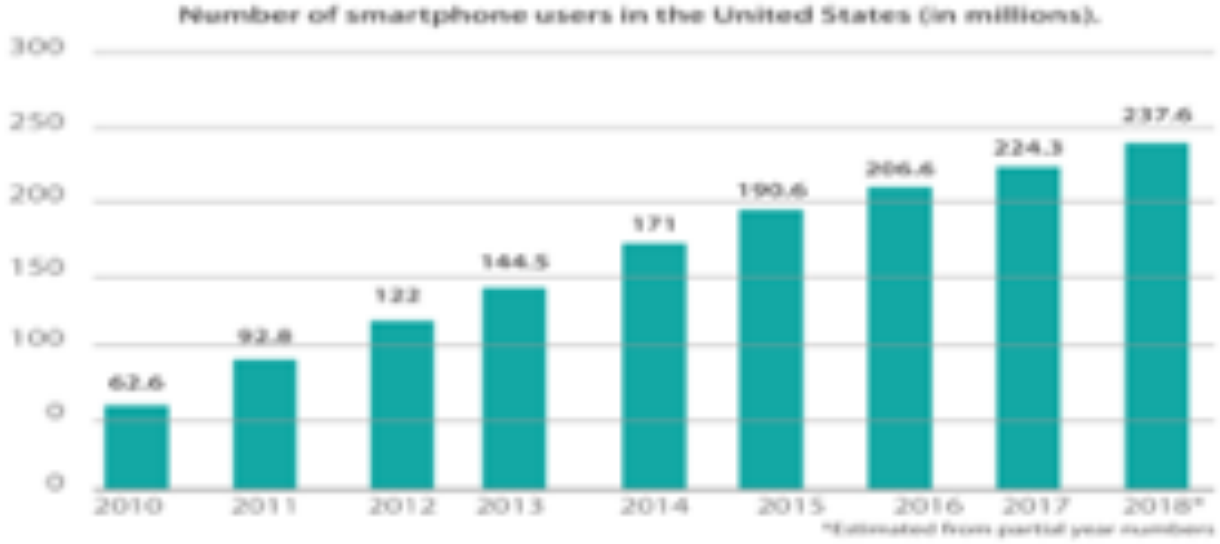
The wireless technology, commonly used in mobile phones is **WiFi**
WiFi uses radio waves (RF) to allow two **devices** to communicate **with** one another. The **technology is most commonly used** to connect Internet routers to **devices** like computers, tablets and **phones**; however, it can be **used** to connect together any two hardware components.
There are basically **three different types of wireless networks** – WAN, LAN and PAN: ... **Wireless** Local Area **Network** (WLAN): WLAN are **wireless networks** that use radio waves. The backbone **network** usually uses cables, with one or more **wireless** access points **connecting** the **wireless** users to the wired **network**.

WiFi Technology use 2.4 GHz radio spectrum for data transfer **WiFi Technology** reinstate customary wired networks among two or several computers, it facilitated file transferring wires, hubs, networking cards, and other imperative networking connected hardware. WLAN cards and wireless routers make possible broadcasting.
Smartphones and Learning Theories

List of Mobile Phones Available in India

1. Samsung Mobiles	2. Comio Mobiles	3. iball Mobiles	4. Elephone Mobiles	5. Kult Mobiles
6. APPLE Iphones	7. Blackberry Mobiles	8. Celkon Mobiles	9. Hyve Mobiles	10. Flipkart Mobiles
11. Nokia Mobiles	12. Karbonn Mobiles	13. Videocon Mobiles	14. ZOPO Mobiles	15. Yota Mobiles
16. Xiaomi Mobiles-Redmi	17. Intex Mobiles	18. Gionee Mobiles	19. TCL Mobiles	20. OKWU Mobiles
21. Micromax Mobiles	22. Panasonic Mobiles	23. Meizu Mobiles	24. itel Mobiles	25. RELIANCE Mobiles
26. OnePlus Mobiles	27. LYF Mobiles	28. Infinix Mobiles	29. SHARP Mobiles	30. Fly Mobiles
31. Honor Mobiles	32. Google Mobiles	33. Zen Mobiles	34. Unihertz Mobiles	35. JOSH Mobiles
36. OPPO Mobiles	37. Huawei Mobiles	38. Centric Mobiles	39. MTS Mobiles	40. Nextbit Mobiles
41. Motorola Mobiles	42. Coolpad Mobiles	43. iVooMi Mobiles	44. SANSUI Mobiles	45. Kodak Mobiles
46. LG Mobiles	47. Infocus Mobiles	48. SWIPE Mobiles	49. Ringing Bells Mobiles	50. Mobiistar Mobiles
51. Lenovo Mobiles	52. XOLO Mobiles	53. LeEco Mobiles	54. Philips Mobiles	55. UMI Mobiles
56. Vivo Mobiles	57. YU Mobiles	58. Ulefone Mobiles	59. Smartron Mobiles	60. HTC Mobiles
61. Realme Mobiles	62. Ziox Mobiles	63. Salora Mobiles	64. Lava Mobiles	65. Spice Mobiles
66. 10.or Mobiles	67. Micromax Mobiles	68. Asus Mobiles	69. Alcatel Mobiles	70. Detel Mobiles
71. Vodafone Mobiles	72. Nubia Mobiles	73. Tecno Mobiles	74. Acer Mobiles	75. Reach Mobiles
76. Sony Mobiles	77. ZTE Mobiles	78. Microsoft Mobiles	79. Datawind Mobiles	80. GeoTel Mobiles
81. X-TIGI Mobiles	82. AT&T Mobiles	83. Ericsson Mobiles	84. HP Mobiles	85. Sharp Mobiles

A **datacard** is any removable computer component, approximately the size of a credit card, that contains data, or that contains nonvolatile memory to which data can be written and from which data can be recovered. The term is a synonym for smart card. A data card is a removable computer component that contains data or is used for data operations, such as data input, data output, data transformation and data transfer. Data card memory is nonvolatile (held in an unpowered state) and built with dedicated information security logic.



In 2018 the number of smartphone users in the United States is estimated at 224 million. With a U.S. population of about 325 million (2017), this means that unless you're under 5 years old, chances are you own a smartphone!

Mobile devices are everywhere – in schools, restaurants, corporations – we carry them everywhere we go and use them for pretty much everything we do.

1. We cook with them,
2. Exercise with them,
3. Write with them,
4. Get our news through them,
5. Get directions from them,
6. Play games on them,
7. Read books on them,
8. Shop with them,
9. Communicate with them in any number of ways (sometimes even as a telephone
10. And we *learn* with them.

The pedagogical benefits of smartphones as a tool for learning should at least be considered whenever solving for a learning solution. This is because mobile learning can be supported as an effective learning platform by the most popular learning paradigms around: behaviorism, cognitivism, and constructivism. Just think about some of the situations below!

12. The Fundamentals Behind Cellular Communication Technology and How it Operates

When Alexander Graham Bell developed the first telephone in the latter part of the 19th century, the industrial revolution suddenly changed as more and more people became interconnected to one another thus fueling business transactions. The same era also gave birth to the radio which was initially presented by the Italian Guglielmo Marconi out of the initial works of Nikolai Tesla. It seems to be the perfect combination of discoveries and invention, but the two devices were not actually combined into a single more powerful device up to the early 1950's when the development of a cellular or mobile phone started.

Today, cellular phones are simply the most common telecom device around the world. Basically, it provides both the basic features of the telephone and a radio in providing the best communication service yet. Let us talk about how this device works.

13. Cellular Mobile Phones

My Phone is a Radio

Basically, the mobile phone is a radio. It relies on a radio signal in order to transmit and receive voice and data information. Previously, the radio device can only receive a signal from a commercial station making it a one way communication apparatus. However, by integrating the principles behind Bell's telephone, the simple radio became a communication device which can also serve as a small transmitter thus giving it the capability to become a mobile phone.

Mobile phones are small radios imbedded with mini transmitters. This means that it actually transmits radio signals when powered on. This is a very important component because it readily gives up your electronic radio location so that calls can be diverted to you or make them.

So how am I able to talk with my friend using a cell phone

One crucial part in the mobile phone communication is the establishment of relay centers called "base stations". These stations are actually smaller versions of transmitter towers that you will see around the neighborhood in almost any places. The base station serves as the electronic bridge between two mobile phones.
The principle is basically simple, because your mobile phone transmits a certain amount of radio signal, whatever base station nearest to you will capture its presence. Therefore, this gives you an "always online" mode ready to receive calls and texts. When another mobile phone user wants to contact you, his mobile phone will transmit a signal to the nearest base station in his location. This base station will then transmit to a series of telecom relay equipments such as channel towers or satellites until it reaches your local base station wherever you are. The same procedure goes when you are the one to call out to another number.

How do mobile phones work?

Imagine calling a friend on the other side of town. As you chat away, your phone converts your voice into an electrical signal, which is then transmitted as radio waves and converted back into sound by your friend's phone. A basic mobile phone is therefore little more than a combined radio transmitter and a radio receiver, quite similar to a walkie-talkie or CB radio.

In order to remain portable, mobile phones need to have relatively compact antennas and use a small amount of power. This means that mobile phones can send a signal over only a very short range, just like a walkie-talkie.

The cellular network, however, enables you to spread the latest gossip regardless of how far away your friends are. This is done by dividing up land into a patchwork of 'cells' – hexagonal areas of land each equipped with their own phone mast (also called a base station).

These huge phone masts pick up the weak signal from your phone and relay it onwards to another phone mast nearer to your friend. And if you're on the move while you talk, your phone switches masts as you go without interrupting your call.

Staying in touch

Cells also solve another conundrum – there are a limited number of radio frequencies available to mobile phone networks (typically about 800). Furthermore, a mobile phone conversation requires one frequency for speaking (transmitting) and one for listening (receiving). As a consequence, just 400 conversations could use up all the available bandwidth.

But using cells means that the same frequencies can be re-used by each cell. In busy areas such as city centres, a denser network of phone masts and smaller cells ensure there are enough frequencies for everyone. It's therefore rare for available frequencies to run out, except at really hectic times like midnight on New Year's Eve.

Some of the things Smartphones Include

1. Calendar/Notes
2. Host Applications and Games
3. Cash Checks
4. Scan Receipts
5. Create a WiFi Network for other devices
6. Sync Data with applications such as Microsoft Word and Outlook

14. Computer & Internet

When you first press the power button, the computer sends a signal to the computer power supply, which converts the AC (alternating current) to DC (direct current). This supplies the computer and its components with the proper amount of voltage and electricity.

Once the computer and its components have ample power and the power supply reports no errors, it sends a signal (using transistors) to the motherboard and the computer processor (CPU). While this is happening, the processor will clear any leftover data in the memory registers and give the CPU program counter a **F000** hexadecimal number. This number is the location of the first instruction and tells the CPU that it's ready to process the instructions contained in the basic input/output system (BIOS).

BIOS and the POST

When the computer first looks at the BIOS, it begins the power-on self-test (POST) sequence to make sure the components in the computer are present and functioning properly. If the computer does not pass any of these tests, it will encounter an irregular POST. An irregular POST is a beep code that is different from the standard one or two beeps. For example, an irregular POST could generate no beeps at all or a combination of different beeps to indicate the cause of the failure.

If the computer passes POST, it looks at the first 64-bytes of memory located in the CMOS chip, which is kept alive by the CMOS battery even when the computer is turned off. This chip contains information such as the system time and date and information about all the hardware installed in your computer.

After loading the CMOS information, the POST will begin inspecting and comparing the system settings with what is installed in the computer. If no errors are found it will then load the basic device drivers and interrupt handlers for hardware such as the hard drive, keyboard, mouse, and a floppy drive. These basic drivers allow the CPU to communicate with these hardware devices and allow the computer to continue its boot process.

Next, the POST will check the real-time clock (RTC) or system timer and the computer system bus to make sure both of these are properly working on the computer. Finally, you'll get a picture on your display after the POST has loaded the memory contained on the display adapter and has made it part of the overall system BIOS.

Next, the BIOS checks to see if it's performing a cold boot or warm boot (reboot) by looking at the memory address 0000:0472. If it sees 1234h, the BIOS knows that this is a reboot, and skips the remainder of the POST steps.If 1234h is not seen, the BIOS knows that this is a cold boot and will continue running additional POST steps. Next, it tests the computer memory (RAM) installed in the computer by writing to each chip. With early computers, you can see it performing the step as it counts the total installed memory as it's booting.

Finally, the POST will send signals to the computer floppy, optical, and hard drive to test these drives. If all drives pass the test, the POST is complete and instruct the computer to start the process of loading the operating system.

15. Booting the Operating System

After the computer has passed the POST, the computer will start the boot process. This process is responsible for loading the operating system, and all its associated system files. Because Microsoft Windows is the most commonly used operating system, this section will cover the process of loading Microsoft Windows.

The BIOS first hands control over to the bootstrap loader, which looks at the boot sector of the hard drive. If your boot sequence in CMOS setup is not set up to look at the hard drive first, it may look at the boot sector on any inserted floppy disk drive or optical disc first before doing this.

In this example, the Microsoft Windows XP NTLDR (NT loader) is found on the boot sector and tells the computer where to find the remaining code on the hard drive. Next, Windows loads the ntdetect.com file, which displays the Windows splash screen and loads the Windows registry. After loading the registry, Windows begins to load dozens of low-level programs that make up the operating system into memory. Many of the initially loaded programs are what allow Windows to communicate with the essential hardware and other programs running on the computer.

After the registry has loaded the initial basic hardware devices, it begins to load plug and play devices, PCI, and ISA devices. After loading all these devices, Windows loads full support of the hard drive, partitions, and any other disk drives and then moves to all other drivers that have been installed.

Finally, after successfully completing the above steps any additional required services are loaded and Windows starts.

16. Hardware Devices Communicating with the Computer

After the computer has loaded the operating system, hardware attached to the computer must be able to communicate with the CPU. Hardware communication is done by using an interrupt request (IRQ). Each time hardware needs the attention of the computer the interrupt controller sends the request (INTR) to the CPU to stop what it is doing to process the request. Anything that was being currently done by the CPU is put on hold and stored as a memory address in the memory stack and is returned to after the interrupt request is processed.

A computer is a machine composed of hardware and software components. A computer receives data through an input unit based on the instructions it is given and after it processes the data, it sends it back through an output device.

How does this come together to make the computer work?

The input devices of a computer can depend on the type of computer we are dealing with but most typically we will find a mouse, keyboard, scanner or even applications (software) installed on the computer. Once the data has been received, the central

processing unit (CPU) along with the help of other components, takes over and processes the information it was given. Once the data is ready, it will be sent back through an output device which can be a monitor, speaker, printer, ports, etc.

To better imagine how a computer works, knowing what's inside will make it easier. Here are the main components of a computer:

1. **CPU** – or Central Processing Unit is considered the most important component in a computer and for good reason. It handles most operations that make it function, by processing instructions and giving signals out to other components. The CPU is the main bridge between all the computer's major parts.
2. **RAM** – Random Access Memory, or RAM for short, is a computer component where data used by the operating system and software applications store data so that the CPU can process them quickly. Everything stored on RAM is lost if the computer is shut off. Depending on the applications you use, there is typically a maximum limit of RAM you will need for the computer to function properly.
3. **HDD** – Also known as Hard Disk Drive, it is the component where photos, apps, documents and such are kept. Although they are still being used, we have much faster types of storage devices such as solid state drives (SSD) that are also more reliable.
4. **Motherboard** – There is no acronym for this component but without it, there can't be a computer. The Motherboard acts as the home for all other components, allows them to communicate with each other and gives them power in order to function. There are components that don't require a physical connection to the Motherboard in order to work, such as Bluetooth or Wi-Fi but, if there is no connection or signal what so ever, the computer won't know it's there.
5. **Video and Sound Cards** – Two components which help the user interact with the computer. Although one can use a computer with a missing sound card, it's not really possible to use it without a video card. The sound card is used mainly to play sound through a speaker. However, a video card is used to send images on the screen. Without it, it would be like looking at an empty monitor.
6. **Network adapter** – Even though it is not actually required to operate the computer, the Network adapter improves the user's experience as it provides access to the internet. Modern computers with operating systems such as Windows 10 will not offer the user all of its features without an Internet connection.
7. If you are having trouble with any of your computer's internal or external components, please do not hesitate to contact Geeks on Site. Our experienced techs are ready to help you with any computer issues and are often able to do so remotely by walking you through a few steps to give them access to your computer.

17. Internet

How it Works

The Internet works because open standards allow every network to connect to every other network. This is what makes it possible for anyone to create content, offer services, and sell products without requiring permission from a central authority. It levels the playing field for everyone and it's the reason why we have a rich diversity of applications and services that many of us enjoy today.

Who's in charge of the Internet?

No one is, but everyone is. Unlike the telephone network, which for years in most countries, was run by a single company, the global Internet consists of tens of thousands of interconnected networks run by service providers, individual companies, universities, governments, and others.

What's the infrastructure of the Internet like?

The Internet is that it's a network of networks that needs to operate around the world as if it were one.
Like policy, the technical coordination of the Internet has common characteristics:

1. Open,
2. Independent,
3. Run by non-profit membership organizations that work together to meet the needs everyone.

This self-regulation has been the key to the successful growth of the Internet and is flexible enough to adapt to changing future needs.

What can you do to help make sure the Internet is open, and accessible platform?

At a time when many of the existing processes behind the development and administration of the Internet are being questioned, it is more important than ever that you're involved in its future. Internet Society provides education and information of the benefits of open, consensus-based processes and structures. We also reach out to non-governmental organizations, regulatory and governmental bodies. No matter if you're a corporate body, non-governmental organization, policy or decision maker, or an every day person – we need your help.

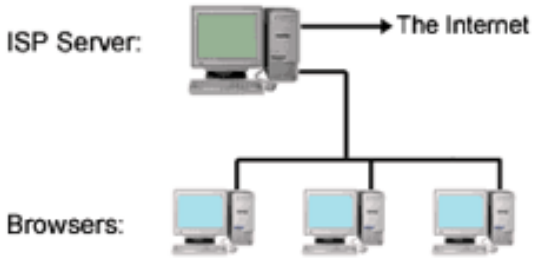
How the Internet Works

The internet is a world-wide network of computers linked together by telephone wires, satellite links and other means. For simplicity's sake we will say that all computers on the internet can be divided into two categories: *server*s and *browser*s.

Servers are where most of the information on the internet "lives". These are specialised computers which store information, share information with other servers, and make this information available to the general public.

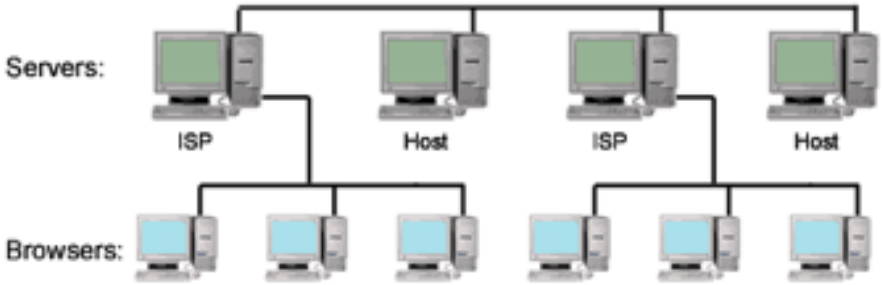
Browsers are what people use to access the World Wide Web from any standard computer. Chances are, the browser you're using to view this page is either *Netscape Navigator/Communicator* or *Microsoft Internet Explorer*. These are by far the most popular browsers, but there are also a number of others in common use.

When you connect your computer to the internet, you are connecting to a special type of server which is provided and operated by your Internet Service Provider (ISP). The job of this "ISP Server" is to provide the link between your browser and the rest of the internet. A single ISP server handles the internet connections of many individual browsers - there may be thousands of other people connected to the same server that you are connected to right now.
The following picture shows a small "slice" of the internet with several home computers connected to a server:



ISP servers receive requests from browsers to view webpages, check email, etc. Of course each server can't hold all the information from the entire internet, so in order to provide browsers with the pages and files they ask for, ISP servers must connect to other internet servers. This brings us to the next common type of server: the "Host Server".
Host servers are where websites "live". Every website in the world is located on a host server somewhere (for example, MediaCollege.Com is hosted on a server in Parsippany, New Jersy USA). The host server's job is to store information and make it available to other servers.

The picture below show a slightly larger slice of the internet:



To view a web page from your browser, the following sequence happens:
1. You either type an address (URL) into your "Address Bar" or click on a hyperlink.
2. Your browser sends a request to your ISP server asking for the page.
3. Your ISP server looks in a huge database of internet addresses and finds the exact host server which houses the website in question, then sends that host server a request for the page.
4. The host server sends the requested page to your ISP server.
5. Your ISP sends the page to your browser and you see it displayed on your screen.

18. Advantages Of Communication Technology In An Organization

1. Speeds the sending of information
2. Improves organizational communication
3. Speeds decision making in an organization
4. Increases participation in organizational processes
5. Influences the way people interact in organizations
6. Structures organizational life
7. Supports open discussions
8. Eliminates stereotypical classifications
9. Provides a voice to those who normally would not speak up in groups
10. Instantaneous and Efficient
11. Easy Archiving and Retrieval
12. Cuts Costs
13. Encourages Strategic Thinking
14. Protects Information
15. Mass Communication
16. Social Relief
17. Speed and time
18. Globalization
19. Job creation
20. Eliminates the cultural gap

19. Disadvantages Of Communication Technology In An Organization

1. Poor substitute for face-to-face (ftf) communication
2. Difficulty Training Employees

3. Expensive
4. Not Safe
5. Privacy

20. Conclusions & Recommendations

1. A large gap remains between public expectations for mobile communications ("anytime, anywhere") and the available technology.
2. Over the next 10 years or so, market forces will fill this gap by developing new technologies for commercial wireless communications.
3. The commercial sector has its own incentives to produce advanced communications devices, components, and subsystems as well as complete systems.
4. To use commercial technologies effectively, we will have to take special measures to promote the development and acquisition of products that can be integrated into systems that meet specialized requirements.
5. Standards Development in Communication Technology
6. Demonstration, Testing and Development of Communication Technology
7. Modeling And Simulation in Communication Technology
8. Network Architecture in Communication Technology
9. Network Security in Communication Technology
10. High-Density Communications Platforms
11. The performance of an antenna changes when it is used near another antenna or metallic structure, and it no longer provides the expected beam shape.
12. Electronic equipment emits low levels of RF radiation from internal local oscillators and data buses
13. Electronic signals represent interference to other radio receivers.
14. Radio receivers transmit a small amount of the local oscillator frequency used to tune the radio, causing interference that is particularly problematic if the local oscillator is dithered, hopped, or modulated.
15. Radios transmit signals not only on the intended carrier frequency and modulation but also (in an attenuated fashion) on carrier harmonics, intermodulation distortion products, intermediate frequencies, up-conversion local oscillator frequencies, and the broadband noise of each power amplifier stage.

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