

Review Paper on Wireless Communication

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Abstract— Without the use of any electrical conductor, the information can be transmitted from one place to other, is called wireless connection. Radio waves are primarily used technology to make connections with one another. WC system has emerged in our lives as it is unavoidable. Moreover, It made usage of equipment much easier. For optimizing the radio and energy resources, severe creation of the system has been generated since past few decades. Radio signals coming via air as the variation of the electromagnetic field of radio wave, just because of these fluctuations, the required amount of electrical current is induced which further flows in antenna. All these ups and downs in the radio waves are identified and translated into the data. This is considered as the working of wireless communication This paper will discuss about the history of WC along with the description of its types, positive and negative prospects and its applications.

Keywords— radio waves, wireless connection, network
Introduction

I. INTRODUCTION

Sir Jagdish Chandra Bose known for being the real inventor of wireless communication where as Hedy Lamarr (leading lady of the Hollywood Industry) is the mother of wireless communication. The very first thing which was invented by Guglielmo Marconi (an inventor from Italy) was radio. Although the concept of wireless communication(WC) was developed in the 19th century. However, the very first communication was setup via air in 20th century i.e. radio telegraphy. The whole time n between, just passed by having its indulgement in performing severe experimental procedures on the idea of WC. Generally, the whole process of making the communication done with one another based on the electromagnetic waves and signals. In the communication world, WC has been described has a medium which is totally responsible for the process of transmitting the required data from the sending end to receiving end. All this communication can be done trough the two different medias – guided and unguided. WC has been surrounded us for about a century or even more and continuously evolving.

Elements of wireless communication:-

Propagation channels:-

That allows the propagation process of the signal. It can be through water, air, or any other medium. It is a medium which is used to carry the signals and allows the travelling of signal.

Transmitter:-

- Information source:- This device carries the information or may produce the information which should be processed before having its transmission via the propagation channel.
- Source Encoder:- It receives the same information from information source and used to compress it. The process of compression has to be done for reducing the transmitted data. It allows the vanishing of redundancies from the data.

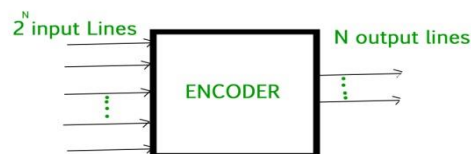


Fig no. 1 Encoder

- Channel Encoder:- It can be utilized for having an increment in the reliability of the system. The system can be trustable just by adding more parity bits to coded messages. This must be protecting from error that comes in the way of data while its transmission.
- Modulator:- This device has its use for transferring the coded message into the signal by which it will be easier to have the transmission by the channel of communication. In simple words, this transforms digital data to analog signal.
- Multiplexer:- It is used to transmit two or more signals from a single transmission line. It allows the combination of multiple signals into single signal.

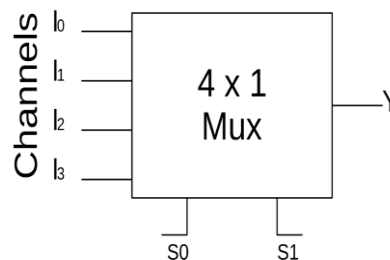


Fig no. 2 multiplexer

Receiver:-

Diversity Combiner:- This device used to combine multiple versions of same signal which are transmitted with different channels. It gathers all the

arising signals and after that generate high power signal.

Equalizer:- The distortion introduced by the propagation channel with the adjustments of received signal's phase along with its amplitude, compensates with the help of this device which is known for equalizer.

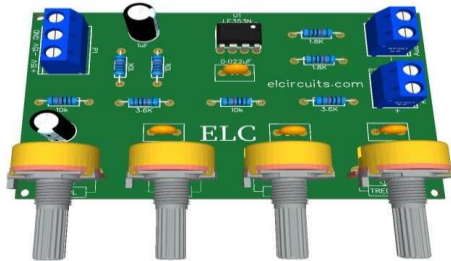


Fig no. 3 3 band equalizer

- a) **Demodulator:-** Demodulator is used to extract original coded data from the signal which are received with the propagation channel. In other words, it transforms the analog signal into form of digital data.
- b) **Channel Decoder:-** Coded messages travel by the information source may have some error raised, this device used to correct those errors. These errors may introduce through the noise or some other elements.
- c) **Source Decoder:-** This is basically opposite to the source encoder. For an instance, for retrieving the original data, source decoder used to decompress the coded data into its original format.
- d) **Information Sink:-** This device is used to achieve and process the data travels through information source.

TYPES OF WIRELESS COMMUNICATION:-

a) **Infrared Communication:-** Infrared wireless communication is known for the technology which is used to transfer of digital data. It works on the basis of infrared waves which may range from 750nm to 1 mm.

There are two type of it:-

> **Point to Point:-** There is a line of sight in between transmitter and receiver. In other words, the transmitter and receiver should be pointed to each other without any obstacle. E.g. Remote control communication.

Diffuse Point:- There is no need to have any line of sight or link between transmitter and receiver because a signal can be transmitted by reflecting or bouncing processes through.

Satellite Communication System:- This is the transfer of the information with the help of communication satellite in the orbit around the earth.

a) Telephone, radio, television, internet and military application used satellite communication. There are 2000 artificial satellites in the space or may be more. Communication satellites are also known as space mirrors which help to bound the signal. For the working of satellite there are three stages in it:-

- Uplink
- Transponders
- Downlink

a) **Mobile Communication system:-** This is the system allows folks to communicate without utilizing any physical disregarding, location, time and distance. It has two types:-

- **Infrastructured:-** In it service provider needs to layout the infrastructure to establish a network for communication hence network is depend upon infrastructure. E.g. Cellular Communication.
- **Infrastructure-less Mobile Communication:-** This has eliminated the need of infrastructure of communication. E.g. MANET, WSN.

b) **Broadcast Radio:-** The content is transmitted with the help of electromagnetic waves which can be frequency modulated or amplitude modulated. The broadcast are very sensitive with respect to atmospheric conditions. E.g. AM Radio, FM Radio and frequency modulation.

c) **Microwave Communication:-** Microwave signals are limited to line of sight. This is required for long transmission line. It uses series of repeaters to make a microwave relay network. It is commonly used in point to point communication system, satellite communication, and deep space radio communication. It may ranges from 30GHz to 300GHz. It is applicable for in terms of long distance telephone communication, cellular phones, television network, satellite, wireless LANs.

d) **Wi-Fi:-** Wi-Fi stands for wireless fidelity. This type of wireless technology works on the basis of radio signals which are drawn by the router to the device, that we want to connect. That device, after receiving the signal, change that radio signal into the form of data which we use. This all process of sharing data allow us to stay connected to the

internet but in specific coverage area.



Fig no. 4 wireless communication

e) Bluetooth:- With or without the cables, Bluetooth make the device communicate to each other. It does not require any line of sight. It was developed in 1990s and gained a remarkable popularity within a very small time span. Its band radio wave uses 2.4GHz. As of 2021, 4.7billion Bluetooth integrated circuit chips are shipped annually.

It is advantageous in the terms of – personal network, low power consumption, low interference, fully automated, very affordable and many more.

ADVANTAGES OF WIRELESS COMMUNICATION:-

- a) Speed:- Wireless Communication is blessed with a high speed to connect the devices with each other. E.g. 4G or 5G network.
- b) Cost:- WC costs lower than the wired network because it does not require any complex cabling or any labor cost.
- c) Accessibility:- All the areas that have been challenging the wired network to reach, this wireless network can help to stay in touch with others even on those areas.
- d) Helpful:- This network is helping people to stay connected from anywhere and anytime. E.g. professions can work even from remote areas.
- e) Flexibility:-As compared to wired network, the wireless communication is more adaptable because of its flexibility.
- f) Convenience:- The transfer of information is much faster to the user devices with the wireless network. It means it is very convenient to use.
- g) Constant Connectivity:- The wireless connection provides 24/7 constant connectivity.
- h) Easy to implement:- It has become so easy for workplaces to implement BYOD(Bring Your Own Devices) Policy. It is easy to implement such policies on the wireless network as compared to wired network.

DISADVANTAGES:-

- a) Limited bandwidth:- Due to having minimum bandwidth, wireless network cannot support video teleconferencing or VTC. If the network is not password protected then there is a chance for the neighbors to steal the bandwidth.

- b) Requires basic knowledge of computers:- If we are deprived from the basic knowledge of computer then it will definitely be a little difficult to install the wireless network and it can be resulted into the risk of security, so hackers can easily hack those networks.
- c) Short coverage range:- The coverage area in the case of wireless communication is generally short.
- d) Radioactive in nature:- In the comparison of wired network, wireless communication network can generate more number of radiations which can be resulted into a great harm for the human health and for birds, as well.
- e) Effected by interference:- In the situation, where the environment is surrounded by any dust storm or fog, the connectivity can be lost or get slow down.
- f) Security can be a concern:- By the general observation, it has been proved that wireless communication networks are a little secure. The main cause for this high risk of security should be considered as the communication signals that get transmitted via air so it is easy to intercept by bad actors.
- g) Unreliable data transfer speed:- Typically, the wireless network does not match the speed of wired network. So, the transfer speed could be slightly lower.

APPLICATIONS:-

- 1) Wireless communication is useful in the terms of various devices which are known as interfacing devices. For example, wireless mouse, wireless keyboard and so on.
- 2) Wireless communication networks are also helpful in the areas which are based on the working of infrared waves. It means that it is used in remote controlled systems. E.g. Television which is controlled by remote.
- 3) WC systems are also equipped with numerous projects which are required with the higher level of communication. For example, home automated systems.
- 4) The use of WC can also be seen in the field of various mobile communication systems and cellular systems, which can be used for making multiple devices, communicate to each other.
- 5) Security based systems are also required with the participation of wireless systems where there extra care is required. For example, defense based services.
- 6) Wireless communication is used for setting up the Wi-Fi connection. This makes the communication possible in between multiple

devices at the same time along with the faster speed of transferring data.

CONCLUSION:-

From the early days of radio waves to the advent of 5G, advancements in this field have revolutionized industries along with being a bridge to cover all the gaps in the way of great accessibility to the information and services with a good internet connection. With the continuous evolvement of technology, Wireless Communication will undoubtedly shape the future with having a lot of innovations and connectivity possibilities that we can only imagine.

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