

# ROLE OF DIGITAL COMMUNICATION

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## ABSTRACT

Digital Communication has proliferated in a big way in the previous years. Digital Communication plays a vital role in today's electronic world. Digital Communication can be done over large distances through internet and other things. Communication technology that intimidated many of us just a few years ago is now a part of everyday life. In addition to changing our daily lives, the transformation in digital communication also raises important economic, public policy and societal questions. Digital communication is one of the most commonly used modes of communication nowadays. The objective of this paper is to understand the key modules of digital communication systems with emphasis on digital modulation techniques. The research will conduct a descriptive approach in doing so the use of journal articles, relevant newspapers and blogs will be used for gathering evidence. Access to the internet today by individuals, businesses and institutions alike has created a global market for internet service and has spurred an increase in productivity in the technological communication field.

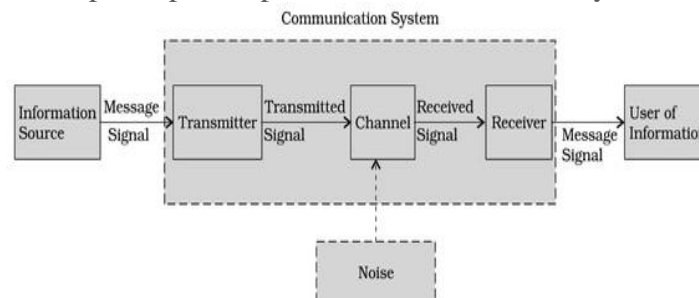
**Keywords: - Digital Communication, Communication technology, Digital modulation techniques**

## 1. INTRODUCTION

Digital communication is the physical transfer of data over Point-To-Point or Point to Multipoint communication channel. It is transfer of discrete messages. Digital communication plays a vital role in today's electronic world. In digital communication, the data transfer rate depends on its characteristics. Information source also termed as input transfer is the source of information that is to be transmitted. It may have digital (telegraphic signal information) or analog (audio, video signal) information. Communication has been one of the deepest needs of the human race throughout recorded history. It is essential to forming social unions, to educating the young and to express a myriad of emotions and needs. Good communication is central to a civilized society.

## 2. OBJECTIVES

- To understand the key modules of digital communication systems with emphasis on digital modulation techniques
- To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding
- To understand the building blocks of digital communication system
- To prepare mathematical background for communication signal and analysis
- To analyse error performance of a digital communication system in presence of noise and interferences
- To understand the concept of spread spectrum communication system



Block diagram of a typical communication system

- 1) Information Source
  - The source of data- Data could be: human voice, data storage device CD, video, etc.
  - Data Types:
    - i. Discrete: Finite set of outcomes “Digital”
    - ii. Continuous: Infinite set of outcomes “Analogue”
- 2) Transmitter
  - Converts the source data into a suitable form for transmission through signal processing.
  - Data form depends on the channel.
- 3) Channel
  - The physical medium used to send the signal.
  - The medium where the signal propagates till arriving to the receiver.
  - Physical Mediums(Channels)
    - Wired: twisted pairs, fiber optics.
    - Wireless: Air, vacuum and water.
  - Physical channels have another important limitation which is the NOISE.
- 4) Receiver
  - Extracting the message/code in the received signal.
  - Example: Once the electromagnetic waves are received properly, the receiver converts it back to a speech form.
- 5) User of the Information
  - It is the final stage where the information finally reaches the user.

### ANALOGUE V/S DIGITAL

❖ Analogue: In the past, most signals were generated, transmitted and received in an analogue form i.e. as a sine wave or as a more complex signal which could be made up from a series of sine waves. This was done because speech is an analogue signal and it was easier to implement analogue electronic circuitry than digital. However, analogue has the following disadvantages:

- i. Inflexible: To make any changes to the system, all the changes have to be made in hardware. This becomes more difficult and expensive as the system grows in size.
- ii. Prone to noise and distortion
- iii. Control and manipulation of signals is difficult.

❖ Digital: Computers deal in ‘1s’ and ‘0s’. therefore communication between computers is a matter of transferring digital sequences between machines. The next step is to convert speech into a digital format to permit a communication network. These days digital electronic circuitry is cheaper than analogue circuitry for the implementation of complex functions. Digital has the following advantages:

- i. Normally, large scale digital systems are software controlled so that it is possible to make changes to the system in software and remotely.
- ii. It is less prone to noise or distortion, a ‘1’ remains a ‘1’ and will not be mistaken for a ‘0’ unless there is an extreme level of distortion.
- iii. It is relatively easy to manipulate signals.

The mathematical treatment is not as straight forward as that for analogue.

### 3. ADVANTAGES OF DIGITAL COMMUNICATION

- It is fast and easier.
- No paper is wasted.
- The message can be stored in the device for a longer time, without being damaged, unlike paper files that easily get damaged.
- Digital communication can be done over large distances through internet and other things.
- It is comparatively cheaper and the work which requires a lot of time can be made simple by one person as folders and other facilities can be maintained.
- It provides facilities like video conferencing which saves a lot of time, money and efforts.
- Easy to mix signals and data using digital techniques.

- Internet is spread almost in every city and town. The compatibility of digital communication systems with internet has opened new areas of countries

#### 4. DISADVANTAGES OF DIGITAL COMMUNICATION

- It is unreliable as the messages cannot be recognised by signatures. Though software can be developed for this, they can be easily hacked.

- Sometimes, the quickness of digital communication is harmful as messages can be sent with the click of a mouse.

- Many people misuse the efficiency of digital communication. The sending of hoax messages, the usage by people to harm the society, etc. causes harm to the society on the whole.

- Generally, more bandwidth is required than that for analogue systems.

- Synchronization is required.

- Introduce sampling errors.

- High power consumption.

- Complex circuit, more sophisticated device making are also the drawbacks of digital system.

#### Modulations

The very basic process in any communication system is the process of modulation which is performed on the signal to be transmitted in order to enable it to acquire an acceptable form.

In the analogue domain, modulation refers to the process of changes in the parameters of the carrier signals with respect to the variations in the modulating signals. As per the variations in the parameters the modulation techniques are amplitude modulation, frequency modulation and phase modulation. Similarly, there are various digital modulation techniques as well such as amplitude shift keying, frequency shift keying & phase shift keying. Amplitude shift keying is a process of shifting the amplitude of carrier signals between two levels depending on whether 1 or 0 is to be transmitted.

Frequency shift keying is a process of shifting the frequency of process of shifting the frequency of carrier signals between two levels depending on whether 1 or 0 is to be transmitted.

Phase shift keying is a process of shifting in the phase of process of shifting the frequency of carrier signals between two levels depending on whether 1 or 0 is to be transmitted.

#### 5. FUTURE SCOPE OF DIGITAL COMMUNICATION

i. Digital Communication technology that intimidated many of us just a few years ago is now a part of everyday life. Think of the evolution of the cell phones in your pocket.

ii. Application area of digital communication is extremely wide. In addition to the well-known telecommunication networks as the GSM system, it forms the basis of common-day electrical apparatuses from wrist watches to televisions, video games and satellites.

#### 6. CONCLUSION

The evolution of information technology reached a turning point with the development of the internet. Access to the internet today by individuals, businesses and institutions alike has created a global market for internet service and has spurred an increase in productivity in the technological communication field.

#### REFERENCES

- [www.nano.org.uk/news](http://www.nano.org.uk/news)
- S. Haykin (1998) Digital Communication, John Wiley & Sons
- [www.researchgate.net](http://www.researchgate.net)
- [www.nitt.edu](http://www.nitt.edu)