Bit Error Rate Analysis in Simulation of Digital Communication Systems with Different Modulation Schemes

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Abstract

With the increasing demand in communication, it has become necessary to give better and efficient service to users by using better technique. This paper analyse the bit error rate, for different modulation schemes such as Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK. By Choosing a reliable modulation scheme and better coding technique the enhancement of the performance can be obtained in transmitter and receiver of the system. Simulated result is shown to analyse and compare the performance of these systems by using additive white Gaussian noise channel (AWGN). Finally the different modulation schemes are compared on the basis of BER and best modulation scheme is determined. From analysis of two modulation techniques, the system could use more appropriate modulation technique to suit the channel quality, thus we can deliver the optimum and efficient system parameters. LabVIEW has been used for simulation.

Keywords: LabVIEW, BER, AWGN

1. Introduction

The history of communication gives us insight into the way it influenced the development of civilization and still exerts an influence on modern societies. Communication can be defined simply as 'sending and receiving messages', or 'the transmission of messages from one person to another'. Effective communication occurs only when the receiver understands the exact message sent by the transmitter. [17]

A communication system is made up of devices that employ one of two communication methods (wireless or wired), different types of equipment (portable radios, mobile radios, base/fixed station radios, and repeaters), and various accessories (examples include speaker microphones, battery eliminators, and carrying cases) and/or enhancements (encryption, digital communications, security measures, and interoperability/networking) to meet the user needs.

In the series of communication methods, one of them is Wireless communications. It has become one of the fastest growing areas in our modern life and creates enormous impact on nearly every feature of our daily life. A tremendous technological transformation during the last two decades has provided a potential growth in the area of digital communication.

Living in the era of communication everything may be video, audio or any information in the form of electrical signal is termed as data and there is an enormous requirement of data transfer between two or more point through the world wide web, every moment of the clock, which is a big threaten to the existing communication systems because of the problems like spectral congestion, severe adjacent & co-channel interference problems and noise corrupted data reception etc. This has resulted in serious need for the research work all around the world for the development of the communication systems which can handle the above said problems, where each aspect of the communication systems is dealt with the development of new encoding techniques, modulation techniques, possibilities for newer transmission channels and off course the demodulation and decoding techniques. [7]

The next generation of wireless communication systems faces the demand for increased data rates, higher mobility, larger carrier frequencies, and more link reliability. Wireless channels are characterized by fading, multipath, limited bandwidth, and frequency and time selectivity which make system design a challenge. It is therefore crucial to have an understanding of the behavior of wireless channels in order to know their performance limits and to be able to design efficient communication systems for them. This dissertation considers the analysis of the performance of digital communication systems with different coding and modulation schemes.

Although digital communication is much better than the analog communication, still it has certain issues that need to be addressed. Especially when it comes to wireless communication, one of the major research considerations becomes the effect of multipath propagation. A thorough analysis is necessary for strategic planning of any system design by doing comparative study of different modulation techniques via different multipath communication channels. To study and draw the graph in terms BER versus Eb/No in multipath communication channels for modulation schemes. Therefore, understand the system could go for more suitable modulation technique to suit the channel quality and can suggest better modulation schemes. [3]

2. Modulation and Channel Schemes

The purpose of any digital communication system is to transmit data from an information source to an information sink. At a minimum, a baseband waveform must be constructed from the symbols making up the information. Some media, such as coaxial cable, can propagate baseband waveforms with

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