Barcode Modulation methods for data transformation between electronic devices by using Trellis code modulation

[1] Sirisha G.S.D , [2]Mr.S.RamPrasadReddy

[1]M.tech scholar, vignan womens College of Engineering, kapujaggarajupeta, jntuk University
Department of Computer Science, Visakhapatnam-12
[2]M.tech (Ph.D) Professor, Computer Department, vignan College of Engineering,
kapujaggarajupeta, jntuk University,
[1,2]Department of Computer Science, Visakhapatnam-12
[1]sirishaivaturi5@gmail.com,[2]Reddydsadi @gmail.com

Abstract— **Barcodes are used for wireless data transmission between electronic devices.They are machine readable digital data.Communication is the basic attraction of mankind as it gives knowledge of what is happening around us.Transmission of information is the communication Channel.The need is to deal with methods that allow to improve the transmission quality.Problem is quality of the transmission is ever increasing demand.The aim of the project is using the methods like QPSK-withTCM-OFDM for better data transmission.when compared with other methods.The bit-error-rate is less for TCM than other methods.**

Index terms- **BER,Communication,,Matlab,TCM system.**

I. INTRODUCTION

Now-a-days one of the most important human demand is to obtain and share information.Information can be spread by various ways.how would be this information transmitted.Transmission of information is the communication channel.The quality of the transmission is the subject to ever-increasing demands.It is important to realize that for the current demands of the transmission is also needed to improve the utilization of communication system.The need is to deal with methods that allow to improve the transmission quality.This project focus on the data transmission over a communication channel using Trellis coded modulation.(TCM).The main aim of the project is to describe the code modulation principles,evaluate the key parameters of TCM,evaluate bandwidth of TCM,and design the TCM system in MATLAB simulink.

1.1 Communication System:

Communication system enables the success of transmission of idea or any other important information among the individuals.

1.2 Communication Channel :

The communication channel consists devices and system connects the transmitter and receiver.

4 general rules for communication channel.

The modulation must not expand the required transmission bandwidth beyond the available bandwidth.

BEM based systems must be interoperable with other technologies.

The required optical snr must be met even under worth case condition.

The hardware and software implementation must be simple and inexpensive.
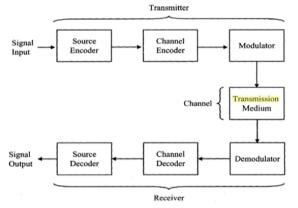
Block Diagram Of Digital Transmission

Fig 1-1

1.3 Channel Capacity:

Is concerned on the rate of information transmitted over a communication channel.

1.4 Bit Error Rate

One of the most important ways to determine the quality of digital transmission system is to measure the Bit Error Ratio.It is calculated by comparing the sequence of transmitted bits and the received bits,where the number of error's counted.The connection between received bits in

error(Nerr) and the number of total received bits(Nbits) is called the probability Pe.

Pe= Nerr/Nbits

This measured ration is affected by many factors including:noise,distortion, and jitter.In a noisey channel,BER is often expressed as a function of normalized carrier-to-noise ratio measured denoted

Eb/N0-energy per bit to noise power spectral density ratio
BER=1/2erfc(sqrt(Eb/N0))

The most common method of measuring BER is to brute force send bits through the system and calculates the Pe.

1.5 Power efficiency of modulation:

Defined as the ratio of the power of noise spectral density N0 and median of the signal energy Eb,transducing 1 bit of information at a certain bit rate=Pe.

1.6 Error- control coding.

The probability of error for a particular signaling is a function of snr at the receiver input and the information rate.The only way to reduce the error probability is the use of error-control coding.Two types:

• ARQ(Automatic Repeat Query)
• FER(Forward Error Correction)

1.7 Code Modulation:

Code Modulation has brought power bandwidth thinking to coded communication and focuses attention on bandwidth efficiency.Inter symbol interface is another issue when dealing with modulation.The data Symbol duration is the same magnitude or smaller than the delay spread of the channel.when data rate increases the amount of symbols affected also increases at the same time.

2. What is Modulation? Different Types?

This is nothing but, a carrier signal that varies in accordance with the message signal. It is used to change the signal characteristics. Basically, the modulation is of following two types:
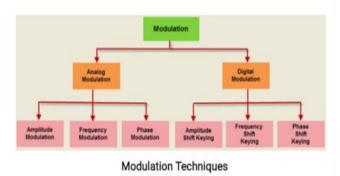

Fig 2.1

2.1 Analog Modulation

Analog signal (sinusoidal signal) is used as a carrier signal that modulates the message signal or data signal

2.2 Digital Modulation

For a better quality and efficient communication, digital modulation technique is employed. The main advantage is available bandwidth , high noise immunity and permissible power. In digital modulation, a message signal is converted from analog to digital message, and then modulated by using a carrier wave.

-Not only that, some variation of CDMA is expected to be deployed in all future 3G systems including GSM/NA-TDMA wireless networks.

-The SS modulation technique consists of spreading a narrowband signal over a very large BW, so that only a small portion of the signal is transmitted at a time. Thus only a small portion of the signal is transmitted at a time.

-Thus only a small portion of the signal is affected by the presence of interference and noise, and it also improves security by making eavesdropping virtually impossible.

-BW spreading is accomplished before the transmission through the use of a code that is independent of the transmitted data.
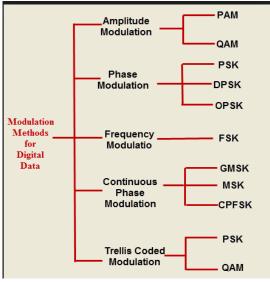

Fig 2.2

3. Proposed work

After the research work . In proposed system we are implementing different types of data modulation techniques for data transmission.Here we will be using Trellis coded modulation for high efficiency and better quality.TCM is defined as which transmits the information with high efficiency over band limited channels such as telephone.
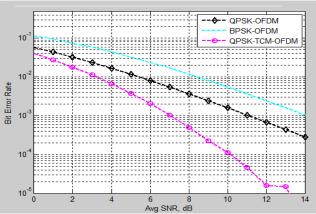
3.1 Simulation Link:

Fig 3.1

3.2 OFDM-TCM-QPSK

Method is used in encoding digital data on multiple carrier frequencies.Has developed wideband digital communication.used in applications digital television and audio broadcasting .Also in DSL internet access .used in digital multi carrier method.TCM data rate is increased without increasing the bandwidth by transmiting more information per every symbol. The information content of the symbol is increased by adding amount of possible symbol values. For example to transmitting two bits per symbol we have four possible symbol levels.If the energy per information bit is kept constant the higher number of symbol values decrease the average power per symbol increase of error probability for symbol. Quadrature amplitude modulation is both analog and a digital modulation.It conveys two analog message signals or two digital bit streams The Bit Error Rate performance of these TCM over the additive white Gaussian noise channels is analyzed. Two formulas are proposed to approximate the simulation results of Bit error rate as a function of the signal to noise ratio for all these trellis codes.

3.3 Experimental Analysis

The proposed technique has been evaluated by MATLABR2013b.We implemented methods like QPSK-with TCM-OFDM which is giving signals in parallel instead of a single high bandwidth signal.QPSK:It send 2 bits of information at a time. BPSK although this modulation technique is not possible to determine whether the received signal is equal to b(t) or –b(t) but it has a good power efficiency and has a simple system. It can also be used in low speed communication. On over all basis it can be said that BPSK modulation technique that can be used efficiently with lower data rate system.TCM The data transmission was done with high efficiency over a communication channel using Trellis coded modulation.

Conclusion and Future Work

In this project TCM combined with Orthogonal frequency division multiplexing in order to modulate data stream into visual two dimensional barcodes.We discussed about barcodes for wireless data transmission.Trying hard to find new ways and changes to bring efficiency,quality,computational process nearly 100%.In future there will be upcoming technologies so we can implement those methods and may reach 100%.

References

[1] R. Morrison, L. Cimini, and S. Wilson, "On the use of a cyclic extension in OFDM," in Proc. 54th IEEE Veh. Technol. Conf., 2001, vol. 2,pp. 664–668

Other references

[2] R. Gonzalez and R. Woods, Digital Image Processing,3rd ed. Upper Saddle River, NJ, USA: PearsonEducation, 2007

[3] Coding for Wireless Channels Ezio Biglieri ISBN: 978-1-4020-8083-8 (Print) 978-1-4020-8084-5 (Online) Get Access

[4] Introduction to Trellis-Coded Modulation With Applicationsgen.1991 | Facsimile di Ezio Biglieri

[5] Trellis Coding14 apr. 1997 di Christian Schlegel e Lance C. Perez

[6] D. J. Costello, J. Hagenauer, H. Imai, and S. B. Wicker, "Applications of error-control coding," IEEE Trans. Inform. Theory, Vol. 44, No. 6, pp. 2531–2560, October 1998

Journal Paper:
1. Detecting and Decoding Algorithm for 2D Barcode Volume 4 Issue 11
2. Barcode Modulation Method for Data Transmission in Mobile Devices. VOL. 17, NO. 1, JANUARY 2015

Books
3. Introduction to Trellis-Coded Modulation with Applications

Publication:• Book
Introduction to Trellis-Coded Modulation with Applications : 1st Prentice-Hall, Inc. Upper Saddle River, NJ, USA ©1991 ISBN:0023099658

Chapters in Books
4. Trellis-Coded Modulation Publisher: Springer Us
Coded-Modulation Techniques for Fading Channels Volume 268 of the series The Springer International Series in Engineering and Computer Science pp 155-232 S. Hamidreza Jamali, Tho Le-Ngoc

Theses:
Trellis-coded modulation on time-dispersive channels. University of Canterbury Christchurch 8140 New zealand

Proceedings Papers
5. A Novel High-Speed Trellis-Coded Modulation Encoder/Decoder ASIC Design.