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RESEARCH ARTICLE

PROPOSED ALGORITHM: A NOVEL APPROACH TO MINIMIZE THE EFFECT OF FADING USING ADAPTIVE CHANNEL CODING &MULTI CARRIER MODULATION TECHNIQUES- A SURVEY

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ABSTRACT

Fundamental obstacle in wireless communication system design is fading. Though different techniques have been used to minimize the effect of fading, adaptive channel coding with multi carrier modulation technique is less likely used by the researchers. Adaptive channel coding minimizes the reception of erroneous data by assigning different channel coding techniques depending on the quality of the channel .To achieve high data rate transmission and to minimize fading, multi-carrier modulation systems are preferred over single carrier modulation systems. The proposed research work is a novel approach to improve the Bit Error Rate (BER) using adaptive channel coding and multi - carrier modulation techniques to minimize fading effect using MAT Lab.

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INTRODUCTION

The research in the past decade has led to a much richer set of perspectives on how to communicate over wireless channels. Fading and interference are the major challenging problem in wireless communication. These aspects are by and large not as significant in wire- line communication. Fading (Theodore S. Rappaport, 1996) is one major problem as it changes over time at a faster rate. All the communication systems are often designed to adapt to such impairments. In such cases, the probability of experiencing a fade on the channel becomes the limiting factor. In the present communication system the fading effect is minimized by using different techniques like Diversity, Equalization and channel coding. In the proposed algorithm, the flow of the proposed paper is as follows

- Introduction
- Methodology
- Adaptive Channel Coder
- Interleaver
- Multi-Carrier modulator
- Expected outcome

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Literature survey

Andrea J. Goldsmith (1998) developed coset codes designed for AWGN channels can be superimposed on adaptive modulation for fading channels. M-ary QAM used on different state trellis code to achieve higher gains. They also compared the performance of Adaptive MQAM and non-adaptive trellis codes designed for Rayleigh fading channels and shown that for moderate complexity codes at low BER.

Atif Sharif (2010) discussed in his paper about the problem of adaptive modulation scheme selection through an OFDM based system over parallel frequency selective fading channels. They implemented channel coding techniques using generalized concatenated codes and adaptive modulation scheme selection based on the channel condition such as BPSK, QPSK, 8QAM, 16QAM, 64QAM on each sub-channel and water filling algorithm used on carrier to interference ratio. Donekeo Lakanchanh (2010) has implemented adaptive modulation techniques to each sub-carrier to keep required BER and PER performance among different modulation such as BPSK, QPSK, 16QAM, 64QAM.

Convolution coding is used as an error correcting code and soft decision Viterbi decoding used at the receiver over signal bandwidth 80MHz. Jayashree S. Nandaniya (2014) expressed comparative BER analysis on different channel coding techniques such as RS coding, BCH coding, Hamming coding, CRC coding and convolution coding on M-PSK modulation and demodulation. Deergha Rao (2010) mentioned a comparative theoretical BER computation of DS-CDMA,FH-CDMA and MC-CDMA in Rayleigh fading channel. He observed that the BER performance decreases with increases number of users in all the cases and the performance of MC-CDMA is better than the other two.

Lily Mishra, (2014) clearly reviewed in their paper about the various adaptive modulation and coding techniques. In wireless network they focused two different power techniques like channel inversion and water filling then concluded water-filling is the optimal way of adaptation by varying the different data rates by varying the symbol rate or the type of modulation.

S.M. Shahrear Tanzil (2010) evaluated BER performance with & without Turbo-encoding-decoding on BPSK modulation as well as different types of M-ary PSK modulation .They identified TF-domain spreading on MC-DS-CDMA gives two advantages over DS-CDMA & MC-CDMA. i.e., large bit rate is possible and no. of available user range increased. They expressed analytically SINR of MC-DS-CDMA communication system with TF-domain spreading is presented in presence of Nakagami-m fading and Doppler frequency shift.

frequency hopping technique and then transmitted through the channel.

Adaptive Channel coder

A channel coding techniques are designed to improve performance by enabling the transmitted signals to with-stand the effects of various channel impairments, such as noise, interference and fading. It is mainly used to minimize the effect of noise by two basic operations, error detection and error correction. Forward Error Correction (Shu Lin and Daniel .J. Costello, 2004) in a receiver may be applied to digital bit stream or in the demodulation of a digitally modulated carrier. FEC is an integral part of the initial analog-to-digital conversion in the receiver.

Many FEC coders can also generate a bit-error rate (BER) signal which can be used as feedback to fine –tune the analog receiving electronics. Based on the design of the FEC code, maximum fractions of errors can be corrected. Hence, different forward error correcting codes are suitable for different conditions. A common problem with channel coding schemes is their degraded performance at low values of the received signal-to-noise ratio (SNR) and the unnecessary overhead when designed for high SNR values. To overcome this problem, adaptive channel coding schemes have been proposed to take advantage of knowledge of the channel status and/or the information being transmitted. Depending upon the quality of the channel different channel coding techniques like Linear, Convolutional and Turbo coding will be used to improve the bit error rate.

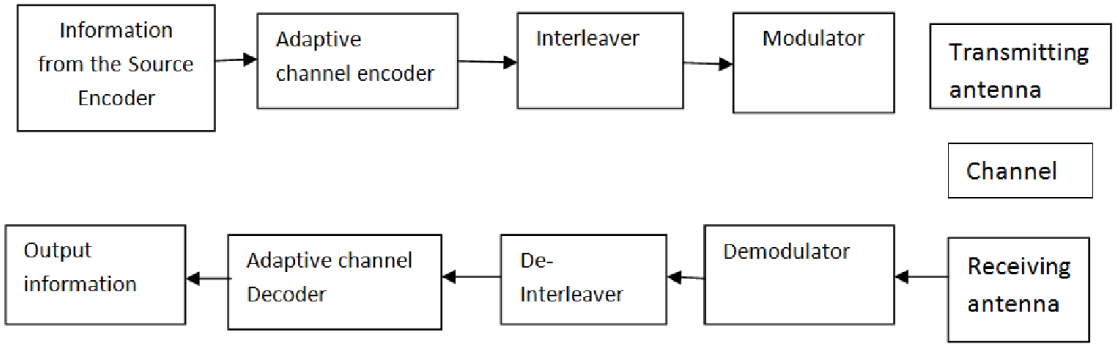

Fig. 1. The main block diagram for the proposed paper is as shown in the

MATERIALS AND METHODS

- In proposed methodology from Fig1 we use an adaptive channel coding techniques depending on the quality of the channel. The quality of the channel will be checked by transferring the handshake packet between transmitter and receiver.
- If the noise in the channel is less we use simple linear channel coding technique.
- If the noise is moderate then, we use convolution coding and if the noise in the channel is maximum we use turbo coding technique.
- The adaptive channel coded data is further given to an interleaving block to overcome the burst errors present in the channel. The obtained data is modulated using

Interleaver

All the wireless communication channels are memory type and errors typically occur in bursts rather than independently. If the number of errors within a codeword exceeds the error correcting capability of the code, it fails to recover the original codeword. Interleaving ameliorates this problem by shuffling source symbols across several code words, thereby creating a more uniform distribution of errors. Therefore, interleaving is widely used for burst error-correction.

Interleavers and De-interleavers are designed and used in the context of characteristics of the errors that might occur when the message bits are transmitted through a noisy channel. Burst error and random error are the two types of error concern over communication system.

One of the most popular ways to correct burst error is by using interleaving technique. The interleaver spreads out the errors so that they appear random to the decoder.

Block interleavers and convolutional interleavers are the two commonly used interleavers. In the block interleaver bits are load row by row with 'L'codewords, each of length 'n'bits. These L code words are then transmitted column by column until the interleaver is emptied. At the receiver, the code words are de-interleaved before they are decoded. A burst of length L bits or less will cause no more than 1 bit error in any one code word. The random error decoder is much more likely to correct this single error than the entire burst. Convolutional interleavers eliminate the problem except for the delay associated with the initial fill. It also reduces memory requirements over block interleavers by about one half. The analysis of modern iterated codes, like turbo codes and LDPC codes, typically assumes an independent distribution of errors. Systems using LDPC codes therefore typically employ additional interleaving across the symbols within a codeword. For turbo codes, an interleaver is an integral component and its proper design is crucial for good performance.

Multi carrier modulator

Multi-Carrier Modulation (MCM) is the principle of transmitting data by dividing the stream into several bit streams, each of which has a much lower bit rate, and by using these sub streams to modulate several carriers. The demand for wireless data communications, experiments and product tests rapidly revealed that the mobile fading channel needed specific solutions, for modulation scheme, bit rates and the packet length. Among the many proposals, Multi- Carrier Modulation appeared one of the most elegant solutions for wireless digital transmission at high symbol rate. The signal waveform used for Multi- Carrier transmission has intriguing properties.

Multicarrier modulation techniques are particularly beneficial because when the data rates increase, so wider bandwidths are needed. When this happens, different frequencies within the bandwidth are subject to different path lengths and different fading conditions. This can distort the transmission making it difficult to copy. MCM provides a way of increasing the bandwidth whilst still being able to tolerate the varying fading conditions present. A further advantage of multicarrier system is that they are less susceptible to interference than single carrier system as interference may only affect a small number of the carriers.

Expected Outcome

- To Design Novel adaptive channel coding technique to improve the BER over fading Channel.
- To Implement Multi-Carrier modulation technique to minimize fading effect.
- To Develop Novel outcomes to minimize the effect of fading in terms of BER and SNR using MAT-Lab.

Parameters used for the Outcomes

- The parameters which used in this novel approach to minimize fading are,
- Bit Error Rate(BER)
- Signal-to-Noise Ratio (SNR- bit energy and Noise Power spectral density).
- Handshaking threshold fixed as 3dB.
- The channel coding techniques will be selected depending on BER over channel.
- Analytical and simulation results for BER and spectral efficiency for the channel will be obtained.
- Depending on signal to noise ratio the proposed algorithm is designed to adaptively select the channel coding techniques.

Conclusion

This Proposed research paper presents a novel approach to improve the bit error rate by using adaptive channel coding techniques, based on quality of the channel and multi-carrier modulation techniques to minimize the fading effect.

REFERENCES

Andrea J. Goldsmith, and Soon-Ghee Chua, "Adaptive Coded Modulation for Fading Channels", *IEEE transactions on communications,* Vol. 46, no. 5, May 1998 595.

Atif Sharif and Vidyasagar M. Potdar, 2010. "Adaptive Channel Coding and Modulation Scheme Selection for Achieving High Throughput in Wireless Networks", 2010 *IEEE 24th International Conference on Advanced Information Networking and Applications Workshops*.

Deergha Rao, K. 2010. " A Comparative Theoretical BER Performance Analysis of Wireless Communication Techniques in Rayleigh Fading Channel", ICSP 2010proceedings, *IEEE Transaction,*

Donekeo Lakanchanh, Suthichai Noppanakeepong1, Shingo Yoshizawa and Yoshikazu Miyanaga, 2010. "Adaptive OFDM Modulation Techniques Over Fading Channel for Wireless Communication Systems with an 80 MHz Bandwidth", *IEEE Transaction.*

FatihÇakr, Emin Tucu, Ali Ozen, and Ismail Kaya, Novel Cascaded Turbo-Permutation Coding for Frequency Selective Rayleigh Fading Channels, IEEE Transaction 2012

Ferkan Yilmaz, Member, 2012. *IEEE* and Mohamed-Slim Alouini, Fellow, *IEEE,* A Novel Unified Expression for the Capacity and Bit Error Probability of Wireless Communication Systems over Generalized Fading Channels, IEEE transactions on communications, vol. 60, no. 7, July 2012.

Gary J. Mullett, "Introduction to Wireless Telecommunications Systems and Networks".

Jayshree S. Nandaniya, Nilesh B. Kalani, Dr. G.R. Kulkarni, Comparative Analysis of Different Channel Coding Techniques, IRACST – International Journal of Computer Networks and Wireless Communications (IJCNWC), Vol.4, No2, April 2014.

Lily Mishra and M.H Patwardhan**, "**Review of Various Adaptive Modulation and Coding Techniques in Wireless Network", IJRET**:** *International Journal of Research in Engineering and Technology, Volume: 03 Issue: 03 Mar-2014.*

Pongsatorn Sedtheetorn, 2013. The Exact Performance Evaluation for Modern Wireless Communications in Nakagami Fading, 2013 13th International Symposium on Communications and Information Technologies (ISCIT).

S.M. Shahrear Tanzil, Md. Zoheb Hassan, Tanveer Ahmed Bhuiyan, S.P. Majumder, **"**Analytical Performance Evaluation of Turbo Coded SIMO TF-Domain Spreaded MC-DS-CDMA Wireless Communication System Over Nakagami Fading Channel", *IEEE Transaction,* 2010.

SamShanmugam, K. "Digital and Analog communication systems".

Shu Lin and Daniel, J. Costello, 2004. "Error Control Coding Fundamentals and Applications", 2nd Edition, Prentice - Hall, New Jersey

Theodore S. Rappaport, 1996. "Wireless Communication" 2nd edition, Prentice-Hall, New Jersey.

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