BE PROJECT
LITERATURE SURVEY

DIGITAL SIGNAL TRANSMISSION OVER MIMO-OFDM SYSTEM

Purushottam Patil
Rakesh Rathod
Sunil Nagare
Guided By - Prof. Sukanya Kulkarni Madam
Department of Electronics and Telecommunications
Sardar Patel Institute of Technology , Andheri

ABSTRACT

The increased data rates and reliability required to support emerging multimedia applications require new communications technology. We present results regarding two techniques used in high data rate transmission âĂŞ orthogonal frequency division multiplexing (OFDM) the and multiple-input multiple-output (MIMO) scheme. The aim of this dissertation is to find efficient methods of providing reliable communication links using MIMO-OFDM under fast fading scenarios. Toward this end, both equalization and channel coding techniques are investigated. Despite many advantages of OFDM, OFDM signals are very susceptible to the time-varying channel, which breaks the orthogonality between sub-carriers, resulting in inter-channel interference (ICI). The ICI increases an irreducible error floor in proportion to the normalized Doppler frequency.

INTRODUCTION

As applications for wireless access look to make the transition from voice communication to multimedia data, such as internet data and video data, demand for high-speed wireless communications is increasing. Also, to meet quality of service (QoS) requirements in various situations, reliability become an important issue. Orthogonal frequency division multiplexing (OFDM) is a promising candidate for high-speed transmissions in a frequency selective fading environment. By converting a wideband signal into an array of properly-spaced narrowband signals for parallel transmission, each narrowband OFDM signal suffers from frequencyflat fading and, thus, needs only a single-tap equalizer to compensate for the corresponding multiplicative channel distortion. One disadvantage of using OFDM systems is interchannel interference (ICI) in fast fading environments. In OFDM systems, the change in the channel from symbol to symbol is more significant than for a single carrier transmission system, due to its longer symbol duration. Time variations of the channel within an OFDM symbol lead to a loss of subchannel orthogonality, resulting in interchannel interference (ICI) and leading to an irreducible error floor in conventional OFDM receivers. We study the lots of papers and journals , from that we made analysis and literature survey is made on following references.

REFERENCES

1." Principles of MIMO-OFDM Wireless Systems " Helmut B Communication Technology Laboratory Swiss Federal Institute of Technology (ETH)

2. " Multiple-Input Multiple-Output Orthogonal Frequency Division Multiplexing in Fast Fading Channels " University of California Los Angeles Doctor of Philosophy in Electrical Engineering by Sungsoo Kim.

3. " Channel Estimation for MIMO-OFDM Systems by Modal Analysis/Filtering " Marcello Cicerone, Osvaldo Simeone, Member, IEEE, and Umberto Spagnolini, Senior Member, IEEE.

4. " IMPROVING THE TRANSMISSION OF IMAGE BY USING HUFFMAN ENCODING OVER MIMO OFDM FADING CHANNEL " IJRRECS/October 2013/Volume-1/Issue-6/ 961-970 ISSN 2321-5461INTERNATIONAL JOURNAL OF REVIEWS ON RECENT ELECTRONICS AND COMPUTER SCIENCE .

5. " Comparison of ICI Cancellation Schemes for BER Performance Improvement of OFDM System " International Review of Applied Engineering Research. ISSN 2248-9967 Volume 4, Number 5 (2014), pp. 437-444 Âl' Research India Publications

6. NPTEL Video Lectures on " Advanced 3G and 4G Wireless Mobile Communications " and " Principles of Modern CDMA/ MIMO/ OFDM Wireless Communications ".

7. " Peak Power Reduction in Orthogonal Frequency Division Multiplexing Transmitters " BY Gavin Hill ,Victoria University of Technology School of Communications and Informatics March 2011

ANALYSIS OF REFERENCES

1. Principles of MIMO-OFDM Wireless Systems :-
The use of multiple antennas at both ends of a wireless link (MIMO technology) holds the potential to drastically improve the spectral effciency and link reliability in future wireless communications systems. A particularly promising candidate for next-generation xed and mobile wireless systems is the combination of MIMO technology with Orthogonal Frequency Division Multiplexing (OFDM). This Paper provides an overview of the basic principles of MIMO-OFDM.

2. Multiple-Input Multiple-Output Orthogonal Frequency Division Multiplexing in Fast Fading Channels :-
In this thesis it is assumed that the channel state information (CSI) is known to the receiver. One direction for the future work is to develop channel estimation algorithms applicable to fast fading channels. Conventional channel estimation algorithms do not fit into this work, since most algorithms assume the channel is quasi-static during an OFDM symbol period. To achieve best results from the MMSE equalizers and the channel coding, channel estimation cannot be neglected. Even though the combination of the equalizers and codes show very robust performance in fast fading channels, it is not the best solution for all fast fading scenarios. Not only the trade-off of parameters for the equalizers and codes, but also adapting the system parameters, such as the number of OFDM tones N, is important. For example, when the channel is more time-selective than frequency selective, it is good idea to use single carrier systems instead of OFDM, in order to avoid severe ICI impairments It would be interesting to see how to formally characterize the system design in a given wireless channel condition

3. Channel Estimation for MIMO-OFDM Systems by Modal Analysis/Filtering :-
In paper, they investigate the benefits of exploiting the a priori information about the structure of the multipath channel on the performance of channel estimation for multiple- input multiple-outputâĂŞorthogonal frequency-division multiplexing (MIMO-OFDM) systems. We first approach this problem from the point of view of estimation theory by computing a lower bound on the estimation error and studying its properties.

4. IMPROVING THE TRANSMISSION OF IMAGE BY USING HUFFMAN ENCODING OVER MIMO OFDM FADING CHANNEL :-
In this paper we tend to gift associate energy saving approach to transmission of separate moving ridge transformation primarily based compressed image frames over the OFDM channels. supported channel state data at the Transmitter, the descriptions so as to the method of excellent channels utilized in Huffman and SPHIT encryption. Analysis in analysis of the system in terms of chance of error is disbursed in a very subtle wireless optical channel. As per planned system shows promising results for a high speed optical wireless channel and that we demonstrate the quality of our planned theme in terms of system energy saving while not compromising the received quality in terms of peak signal-noise quantitative relation.

5. Comparison of ICI Cancellation Schemes for BER Performance Improvement of OFDM System :-
OFDM is excellent performance for promising broadband communication systems. Spectrum OFDM has high data rate transmission capability with high bandwidth efficiency which makes OFDM robust to multipath fading. But one of the major weakness of Orthogonal Frequency Division Multiplexing (OFDM) is Inter Carrier Interference (ICI). And this ICI cause BER performance degradation.To overcome this weakness Various techniques have been proposed by various authors including Time Domain Windowing, Frequency Domain Equalization, Maximum Likelihood Estimation (MLE),Extended kalman filtering (EKF) and ICI self cancellation technique, Data Conjugate ICI Self Cancellation. In this paper three ICI reduction techniques such as Extended kalman filtering (EKF) and ICI self cancellation, Data Conjugate ICI Self Cancellation has been compared on the basis of BER performance.

6. NPTEL Online Video Lectures :-
I. Advanced 3G and 4G Wireless Mobile Communications :-
In these course the principles of 3G and 4G wireless mobile communications is explained. It contains total 40 lectures from introduction of 3G and 4G standards to Cellular Traffic Modeling and Blocking Probability.
II. Principles of Modern CDMA/ MIMO/ OFDM Wireless Communications :-
In these course the principles of modern CDMA , MIMO , OFDM is explained. It contains total 35 lectures from Introduction to wireless systems to Principles of CDMA and MIMO wireless communications.

7. Peak Power Reduction in Orthogonal Frequency Division Multiplexing Transmitters :- Orthogonal Frequency Division Multiplexing (OFDM) is a digital transmission method developed to meet the increasing demand for higher data rates in communications which can be used in both wired and wireless environments. This thesis describes the issue of the Peak to Average Power Ratio (PAPR) in OFDM which is a major drawback, and presents new and variations to existing algorithms to reduce it.

OUR AIM :-

From all above reports and papers we understand that the principles of basic MIMO-OFDM , its ICI handling , image transformations . Our main focus is on to transmit digital signals over MIMO-OFDM system and to find what problem arises and how to handle it ,and resolving it by analysing it's parameters like ICI , ISI , BER , PSNR ,etc and to improve Air Interference Performance for WMAN (Wireless Metropolitan Area Networks) and used in the 4G Technology.