International Journal of Electrical and Electronics Engineers
Volume 15, Issue No. 01, Jan-June 2023
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

"ANALYSIS OF THE PERFORMANCE OF MIMO WIRELESS OPTICAL COMMUNICATION SYSTEM"

Students: A.V.N.L.SIRISHA[1], D.NIKHIL[2], K.BHAGYALAKSHMI[3], K.DIVYA[4]
Prof: Dr. [5]K.KANTHI KUMAR
[1, 2, 3, 4,5]*Tirumala Engineering College, Narasaraopet, Andhra Pradesh, India.*

ABSTRACT

The global telecommunications network has massive expansion over the last fewyears. Optical communication provides a high data rate communication over short distances like 2km.Here we use the spatial diversity at the transmitter and receiver to decrease the fading of channel. Using the detection the receivers and QPPM modulation, we separate the symbol error probability of MIMO systems using ML detection and equal gain combining of both with and without background radiation. And for faded channels performance gains can be seen as the number of transmitters and receivers increases. The use of light for communication purposes dates back to antiquity if we interpret optical communication in a broad sense, implying any communication scheme that makes use of light. Most civilizations have used mirrors, fire beacons, or smoke signals to convey a single piece of information Therefore, the MIMO systems can be used effectively as a technique for atmospheric optical channels.

INTRODUCTION

Wireless optical communication (WOC) has been offering higher transmission rate, inherent security, unlicensed spectrum and lower power consumption and became an alternative to traditional wireless communication. Also, multiple-input multiple-output (MIMO) technology is included in WOC to improve the further transmission capacity and signal quality. Radio antennas are a key element of any radio communications broadcast or wireless system image through training an image and provided the user friendly thing by including images through cloud storage. In this digital rising technology, wireless communication plays a prominent role which is used to transmit the data in telecommunication. Generally during the transmission process the signal will be faded and noise will be added to the transmitting signal. By using this project the errors occurred in the data during transmission can be reduced and the approximated data will be received at the receiver. Optical Communication. We will design a MAT-LAB code to reduce the fading of the signal. Optical communication systems transmit the information optically through fibers. This is done by converting the initial electronic signals into light pulses employing laser or light-emitting diode light source. An optical communication system uses a transmitter, which encodes a message into an optical signal, a channel, which carries the signal to its destination, and a receiver, which reproduces the message from the received optical signal. Fading occurs when there are significant variations in received signal amplitude and phase over time or space. Fading can be frequency selective that is in, different frequency components of a signal can undergo different amounts of fading. Fading refers to the rapid fluctuations in the amplitude, phase or multipath delays of the received signal, due to the interference between multiple versions of the same transmitted signal arriving at the receiver at slightly different time. This is MIMO Wireless Optical Communication System.

EXISTING METHOD

In the existing system the free spacecommunication and antennas were used. But the effect of fading cannot be reduced completely by using these techniques, so that we developed a technique using laser technology in optical communications withthe MATLAB code. We effectively reducedthe considerable amount of fading in the transmission of signal that helps the user to receive the exact signal that is sent by the transmitter. And the MATLAB code that isdeveloped to find the amount of errors in thereceived signal. And to reduce the noise that occurred during the transmission of signal then eliminate the errors. At the same time to reduce the amount of fading that occur during the transmission of the signal between the users free spacecommunication and antennas were used. But the fading effect cannot be overcome completely by using the above techniques, So that we developed a technique by using laser technology in optical communications with the help of MAT-LAB code. We efficiently reduced considerable amount of fading in the transmission of signal thathelps the user to receive the exact signal thatsent by the transmitter.

PROPOSED METHOD

The effect of an isolator in a multiple input multiple-output (MIMO) antenna is analysed in terms of its efficiency and isolation. The use of an isolator can aggravate the bandwidth or efficiency performance even though its isolation performance is improved. MIMO antennas achieved improved isolation, but the reference antenna underwent severe bandwidth degradation and efficiency degradation. So to decrease the cost of transmission and to increase the performance we used lasers. Optical wireless communications use the transmitter and receiver in the PPM modulator and demodulator using lasers as transmitter and photo detector as receiver. This optical laser technology is helped to reduce the noise and fading of the system. Optical Communication employs a beam of modulated monochromatic light to carry information from transmitter to receiver. Optical communication systems transmit information optically through fibers. This is done by converting the initial electronic signals into light pulses employing laser or light-emitting diode light sources. An optical communication system uses a transmitter, which encodes a message into an optical signal, a channel, which carries the signal to its destination, and a receiver, which reproduces the message from the received optical signal.

WORKING

Multiple-input multiple-output (MIMO) wireless optical communication (WOC) the block diagram, of MIMO WOC system is shown above. Here the transmitter consists of M laser diodes and a telescope to determine the

International Journal of Electrical and Electronics Engineers
Volume 15, Issue No. 01, Jan-June 2023
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

direction of light and angle of beam divergence. And receiver consists of N lenses and photo detectors. Then lenses focus the receiver into photo detector (PD). The photo detector converts the received optical field to an electronic signal for the advance demodulation. Shown above. Here the transmitter consists of M laser diodes and a telescope to determine the direction oflight and angle of beam divergence. And receiver consists of N lenses and photo detectors. Then lenses focus the receiver into photo detector (PD). The photo detector converts the received optical field to an electronic signal for the advance demodulation. We used are Optical Communication, is communication that used at a distance using light to carry information. Optical communication, also known as optical telecommunication, is communication at a distance using light to carry information. MAT-LAB is a proprietary multi-paradigm programming language and numeric computing environment developed by Math Works. Although MATLAB is intended primarily for numeric computing.

RESULT

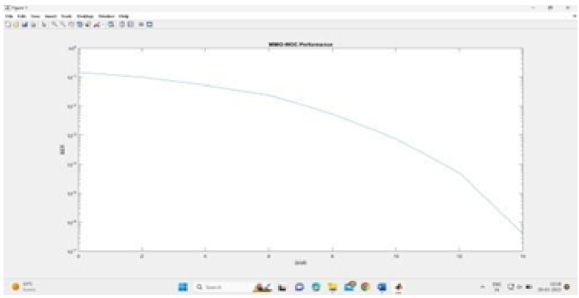

Fig: output

We observe that Bit error rate (BER) isdecreasing while signal to noise ratio isincreasing (SNR).

CONCLUSION

In our project we have analysed theperformance of MIMO wireless optical communication system which is used to reduce the channel fading. From the simulation results we have found that Bit Error Rate is decreased with increase in theSNR. So, we can say that the source that is transmitted could reach the receiver or destination with less error. The probability of error could be decreased or minimized using proposed method. The output will be efficient.

REFERENCES

[1]. X. Zhu, J.M. Kahn, Free-space optical communication through atmospheric turbulence channels, IEEE Trans. Common. 50 (8) (2002) 1293–1300, https://doi.org/10.1109/TCOMM.2002.800829.

[2].S.G. Wilson, M. Brandt-Pearce, Q. Cao, Free-space optical MIMO transmission with Q-ary PPM, IEEE Transmission Communication. 53 (8) (2005) 1402–1412, https://doi.org/10.1109/TCOMM.2005.8 52836.

[3]. Luong Duy, T. Pham Anh, Average capacity of MIMO free-space optical gamma-gamma fading channel, IEEE Int. Conf. Communication. (2014) 3354–3358, https://doi.org/10.1109/ICC.2014.68838 39

International Journal of Electrical and Electronics Engineers
Volume 15, Issue No. 01, Jan-June 2023
ISSN (O) 2321-2055
ISSN (P) 2321 -2045

[4]. Zhixiao Chen, Song Yu, Tianyi Wang, Wu Guohua, Shaoling Wang, Wanyi Gu, Channel correlation in aperture receiver diversity systems for free-space optical communication, J. Opt. 14 (12) (2012) 1–7, https://doi.org/10.1088/2040- 8978/14/12/125710.

[5]. G. Yang, M.A. Khalighi, Z.Ghassemlooy, S. Bourennane, Performance evaluation of receive diversity free-space optical communications over correlated Gamma Gamma fading channels, Appl. Opt.52 (24) (2013) 5903– 5911, ht