

QPSK Modulated Li Fi in Wireless Medium

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Abstract—In modern days wireless communication plays a vital role and Li Fi is the advance topic in which different modulation techniques are applied. The main functions of Li Fi include Illumination and high speed communication. This paper analyses QPSK and BPSK modulation with Li Fi in wireless medium and simulation shows that QPSK modulated Li Fi shows better result as compared to BPSK and other modulation techniques. QPSK modulated Li Fi shows BER of 10^{-6} in wireless medium.

Keywords—Li Fi; QPSK; BPSK

I. INTRODUCTION

Wireless communication is the technique in which two or more devices are connected wirelessly [1]. The type of wireless medium can be satellite communication, WLAN, Global Positioning System (GPS) and Mobile Telephone System etc. The advantage of wireless communication includes its installation, simplicity, flexibility, reduced cost and high mobility [2].

Prof. Harald Haas invented Li Fi technology on July 2011 at TED Global Talk. LiFi is based on Visual Light Communication (VLC) by utilizing light emitting diodes (LEDs) in wireless system. Right now WiFi is the technology to interconnect different modules to the internet. Frequently the use of internet based devices is rapidly increasing [3]. But now a day Li Fi is the demanding technique based on the number of users. LiFi technique performs more accurately than WiFi in terms of Efficiency and safety. The rate speed of LiFi is 1000 times faster than WiFi. For safety of the internet, LiFi is more secure than the WiFi based on the spread of the signal. and LiFi has more secure communication compared to WiFi [4].

Digital Modulation offers more information capacity, great quality communication, and high data security. Hence, digital modulation techniques are mostly chosen than analog modulation techniques. This paper analyses the BER

and SNR for QPSK modulated Li Fi system and the result is simulated using MatLab [5].

II. LI FI TECHNIQUE WITH DIGITAL MODULATION TECHNIQUES

A. Li Fi Technique

Li Fi uses light emitting diodes as Transmitter and two main functions of Li Fi are Radiation of light and high speed data communication. It has greater speed than WiFi and about 10000 times the frequency spectrum of radio. In Li Fi LED are used to transmit data and photo-sensitive detectors are used to receive data at the receiver end. The Light signal passed through the wireless medium and received at the receiver. The receiver section includes the modulator where the demodulated data is received and at last BER is calculated. The modulation chosen here is the QPSK which has greater efficiency [6].

III. BPSK & QPSK MODULATION

In BPSK modulation is known as Phase reversal keying since the carrier used here takes two phase reversals such 0° and 180° . The advantages of BPSK include the simplicity of BPSK receiver compare to other modulation types. and power efficiency as less power is required to transmit. In BPSK modulation, the data rate and symbol rates are equal which makes it inefficient modulation technique and QPSK is chosen. In QPSK modulation technique four phase reversals such as 0° , 90° , 180° , and 270° are taken and it can be extended up to eight or sixteen values depending upon the requirement. QPSK is maximum used in recent digital communication system since it provides bandwidth efficiency and better bit error rate [7]. The Simulink block diagram of QPSK is shown in the figure below.

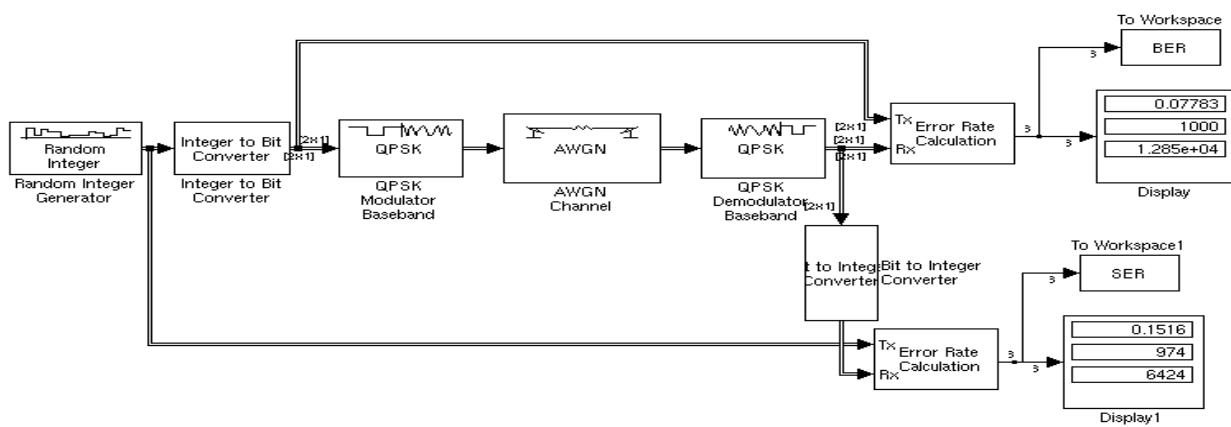


Figure 1. Simulated QPSK mode

IV. SIMULATED RESULT

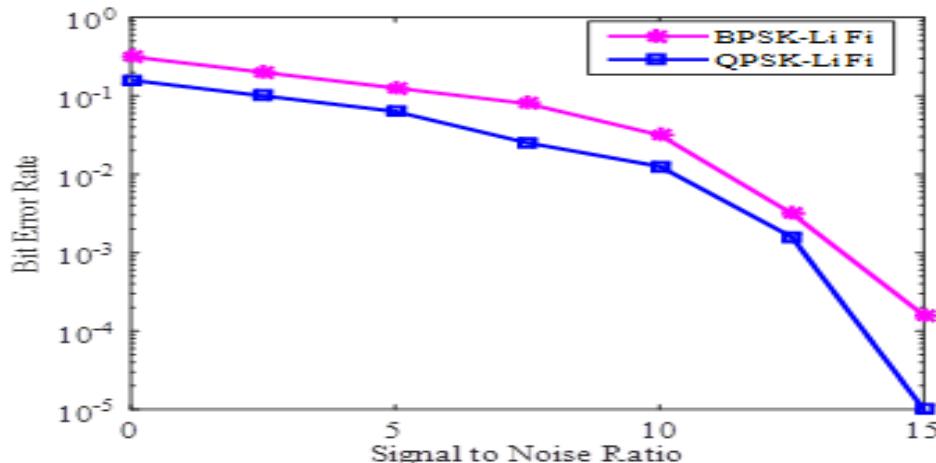


Figure 2. SNR Vs BER plot of QPSK modulated Li Fi

Figure 2. Shows the Signal to Noise Ratio versus Bit Error Rate plot for QPSK modulated Li Fi. The simulation is done by Mat Lab. It is observed that BPSK modulated Li Fi shows BER of 10^{-4} and QPSK modulated Li Fi gives BER of 10^{-5}

V. CONCLUSION

Li Fi is the demanding topic where the benefits include high speed data and light radiation. This paper investigates various modulation techniques with Li Fi and simulates BPSK, QPSK modulation with Li Fi. The simulation result shows QPSK modulated Li Fi exhibits better result as compared to BPSK modulated Li Fi. By taking other advanced modulation techniques the BER performance can be analyzed and the efficiency of the system can be investigated.

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