A Review on Effect of Performance Parameter in OFDM System using Digital Modulation Technique

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ABSTRACT
Within digital communications, information is expressed inside in the form of bits. The term symbol refers to a collection, in a variety of sizes, of bits. At this time, Source data is taken from 8-bit grayscale bitmap image file and the preferred image data is rehabilitated into symbol size by means of D-PSK, and renovate by taking the Inverse Fast Fourier Transform (IFFT). Converted data will then be separated into multiple frames by the OFDM transmitter. Previous to the outlet of the transmitter, the modulated frames of time signal be cascaded together along with frame guards inserted in between as well as a pair of identical headers added to the beginning and end of the data stream. The receiver detects the start and end of each frame in the received signal through an envelope detector. Every detected frame of time signal is then demodulated into useful data.

The additional complex the OFDM system is, the higher IFFT size it has; thus a higher number of carriers can be used, and higher data transmission rate achieved. The preference of MPSK modulation varies the data rate and Bit Error Rate (BER). The advanced order of PSK leads to superior symbol size, thus fewer numbers of symbols desirable to be transmitted and superior data rate is accomplish.

Keywords
OFDM System, SNR, Bit error rate, IFFT, FFT, Communication Channel, Digital Modulation Technique.

1. INTRODUCTION
The aim of our manuscript is to give an idea of what is an OFDM system, its main structure and the analysis of the obtained results of the simulations testing. OFDM system, and investigate how its performance is changed by varying some of its major parameters (M-PSK , SNR, IFFT size, no. of carriers). This objective is met by developing a MATLAB program to simulate a basic OFDM system in an AWGN channel. From the process of this development, the mechanism of an OFDM system is premeditated.

Inside this technique, the Demodulated data is compared to the original baseband data to discover the total number of errors. Separating the total number of errors by total number of demodulated symbols, the bit-error-rate (BER) is originated.. This paper is intended to develop an efficient and flexible simulation model for OFDM systems using MATLAB.

2. OFDM SIMULATION
There is an assortment of OFDM Simulation. In this section we are going to converse following techniques in brief-
1. BER as a function of SNR and Multipropagation.
2. Analysis using PSK/QAM Modulation Technique.
3. Analysis using Digital Modulation Techniques.

2.1. BER as a function of SNR and Multipropagation.
One of the most important characteristics of every simulation model of OFDM is the size of the fast Fourier transformation (FFT) used to engender the signal. In the simulation it is equivalent to the number of samples for the transmission signal. The more the size of the FFT is increased the more samples there are for each signal. The supplementary samples there are the smoother and more accurate the signal is.

An additional very important variable is the number of the carriers being used in every simulation. According to the number of carriers the data is cut into pieces, which are called chunks. Each carrier transmits 2 data bits. The first is coded in the real part of the Fourier transformation of signal and the second in the imaginary.

2.1.1. BER and S/N ratio
To make the plots of the BER as a function of the S/N ratio a file was transmitted for many S/N ratios. As mention before the S/N ratio can be changed by the variable, which changes the S/N ratio according to the equation.

There are two plots. In the first the echoes have high level and in the second low levels. To be exact, in the first plot the two echoes have a level of 1/2 and 2/5 times and in the second 1/10 and 1/20 times the level of the
Signal. The results are able to see into Figure 1 and Figure 2.

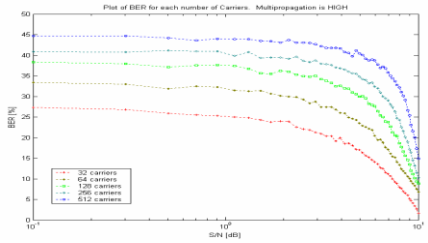


Figure 1: BER as a function of S/N ratio. Multipropagation effects are high

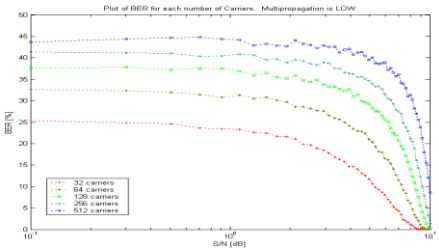


Figure 2: BER as a function of S/N ratio. Multipropagation effects are low

2.1.2. BER as a function of Multi-propagation

In these plots the behavior of the BER of OFDM can be seen as a function of the level of the signals. There are two plots. In the first the transmission takes place with a low S/N ratio - 0.1 - and in the second with a high – 10. The results of the BER as a function of multi-propagation for each set of carriers be able to seen inside the Figure 3 and Figure 4.

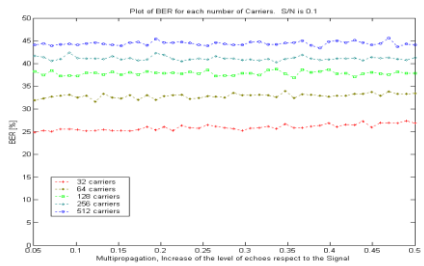
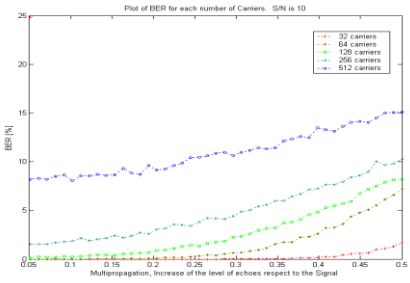


Figure 3: BER as a function of Multipropagation. S/N Ratio is 1/10

The first and obvious thing we can notice from all the Plots is that the more we increase the number of carriers for certain S/N Ratio and Multipropagation effect the more the BER increases. This is to be expected, because the more we increase the number of carriers the more we increase the symbol rate and therefore the data rate.



. Figure 4: BER as a function of Multipropagation. S/N Ratio is 10.

2.2. Analysis using PSK/QAM Modulation Technique

In this, we have evaluated the BER performance of an OFDM system with two digital modulation schemes, specifically M-ary PSK and M-ary QAM, in excess of an AWGN channel. The OFDM scheme is a authoritative modulation technique to achieve high data rate and is able to abolish ISI. It is computationally regimented due to its use of FFT techniques for implementing modulation and demodulation functions.

As at this time the psychoanalysis for PSK & QAM modulation techniques.

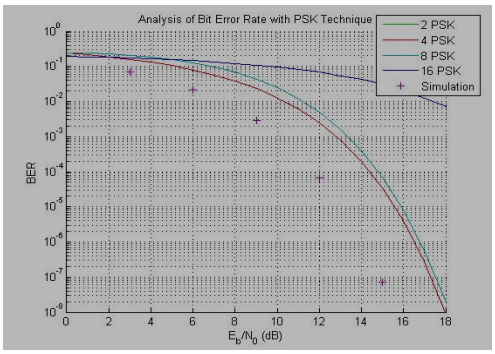


Figure 5: BER with 2-PSK, 4-PSK, 8-PSK, 16-PSK

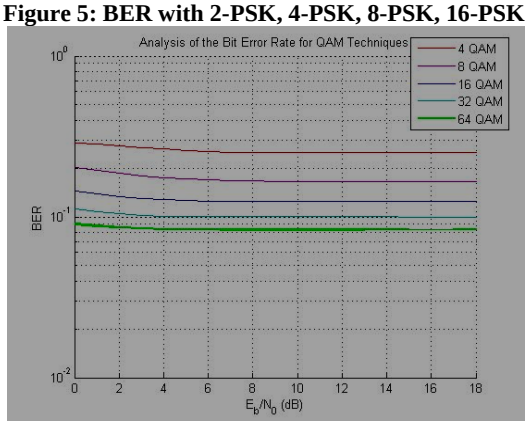


Figure 6: Bit error rate with 4QAM, 8QAM, 16QAM, 32QAM, 64QAM

It is observed from the M-ary PSK BER plots to assist, the BER is fewer during the case of 4-PSK for a low Eb/N0 than in the 8- PSK and 16-PSK cases. It shows as a superior value of M-ary PSK increases spectrum efficiency, but is easily affected by noise, the OFDM system with the higher M-PSK scheme is used for great capacity, extended distance application at the charge of insignificant increase in Eb/N0 while that with the QPSK scheme is suitable for stumpy capacity, squat distance application. The comparison of M-ary PSK and M-ary QAM schemes designate that, the BER is great in MPSK as compared to M-QAM and it is in general depending on its applications.

2.3. Analysis using Digital Modulation Techniques

At the establishment of simulation MATLAB program, some variables are entered by the user. The rest are either fixed or derived from the user-input and fixed variables. The number of carriers needs to be no more than [((IFFT size)/2) – 2], for the reason that there are like many conjugate carriers like the carriers, and individual IFFT bin is standoffish for DC signal although another IFFT bin is intended for the symmetrical point at the Nyquist frequency toward separate carriers and conjugate carriers. All the user-inputs are tartan for validity and the program will request the user to correct any incorrect fields with brief guidelines provided. Sometimes the OFDM receiver's outcome might also happen to be a data stream that is longer than the original transmitted data stream due to some imprecision processing caused by channel noise. In such cases, the received data stream is trimmed to the length of the original data stream in order to fit the dimensions of the original image. The received data would more likely have a length less than the original.

In this technique, BPSK, QPSK, 16PSK, 256PSK were used. And at this point plots for BER with different Modulation techniques are demonstrate. . Here, as shown in Figure 7, BER increased extraordinarily by raising the PSK order. SNR is inversely proportional to error rates.

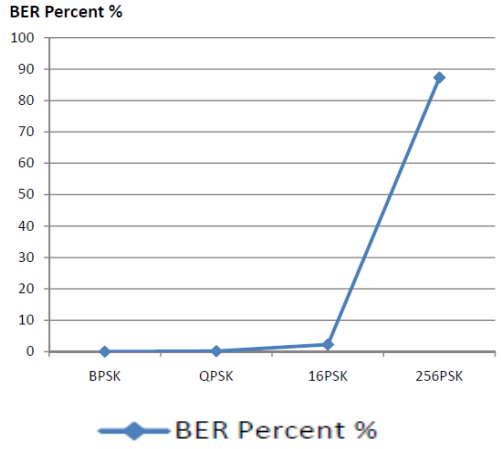


Figure 7: BER v/s MPSK

Figure 8 shows the relationship between the two for all four M-PSK methods. As expected, higher order PSK requires a larger SNR to minimize BER. Similarly, as shown in Fig. 9, 256-PSK and 16-PSK require a relatively large SNR to transmit data with an acceptable percent error.

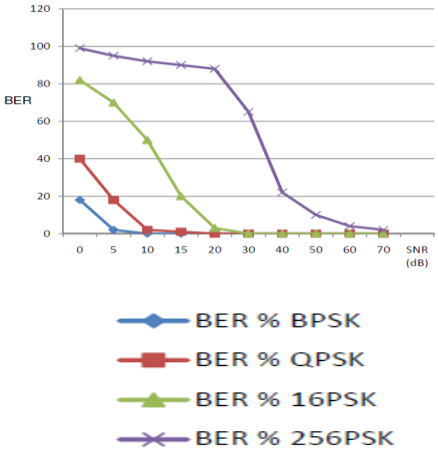
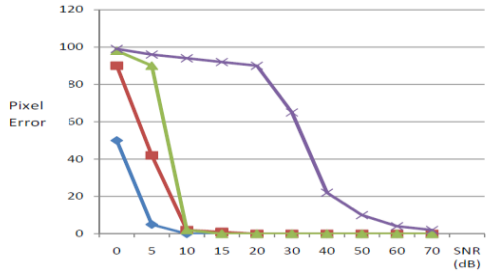


Figure 8: BER v/s SNR

The graphical summary of the above results and comparison has been developed in the following segment.



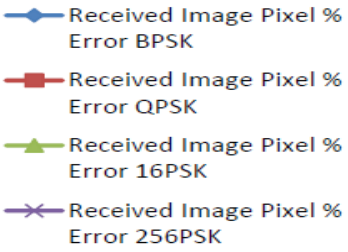


Figure 9: Pixel Error v/s SNR

3. CONCLUSION

Subsequent to considering all the methods of OFDM simulation we conclude that:

In OFDM system, when IFFT size is higher, then a higher number of carriers can be used, and higher data transmission rate achieved. The preference of MPSK modulation varies the data rate and Bit Error Rate (BER). The higher order of PSK leads to superior symbol size, thus fewer number of symbols needed to be transmitted and privileged data rate is achieve. and also for a higher value of M, such as M > 16, the PSK modulation scheme is suitable for OFDM. A set of four QPSK symbols is mapped to one 8-bit word, and when one or more of the 4 QPSK symbols in a set is decoded imperfectly, the whole 8-bit word is mistranslated; therefore, it counts as all 4 QPSK symbols are errors when taking into consideration the pixels percent error. However, in BER calculation, the concentration is the accuracy of the Transmition and receiving, thus it only counts any of the QPSK symbols that are decoded incorrectly. In all cases, I obtain good performances but of these all modulation schemes I conclude that digital modulation technique (last one) gives better result.

4. ACKNOWLEDGMENT

This work was done in the Communication / DSP lab of TIT and it was supported by all the staff working in the Lab and by the Senior Lecturer Mrs. Shruti Bhargava.

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