Q-FACTOR IMPROVEMENT IN 32 APSK FOR LONG HAUL OPTICAL COMMUNICATION

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ABSTRACT

In this, we proposed 32 APSK modulated coherent optical orthogonal frequency division multiplexing (the constellation consists of 4,12,16). Although 4+12 APSK has best transmission than QAM, the 32 APSK will increase the bit rate. The CO-OFDM has the increased tolerance towards fiber nonlinearities over optical fiber. With 32APSK the Q-factor can be increased than 4+12 APSK is evaluated by designing constellation points.

INTRODUCTION

Recently CO-OFDM plays an important role in fiber optic communication due to its high spectral efficiency, CO-OFDM means that coherent detection and OFDM. since OFDM has large PAPR value towards its fiber non-linearities, hence approaches such as pre-processing at the transmitter or DFT-S have been carried out to reduce PAPR value. In 32 APSK the constellation design consist of 3 rings and 5 bit rate per symbol. In this paper 32 APSK modulation format is introduced into CO-OFDM for the first time. In many years ago they have done optical communication with many modulation technique (i,e)PSK,QPSK,BPSK and QAM. Those techniques have very complexity at the constellation design and at receiver. Those techniques have less launching power and system design involves very cost.

Then the system was designed with APSK which reduces the complexity but OFDM have more PAPR value which increases nonlinearity, it leads to loss of signal power. Hence CO-OFDM was designed to reduce PAPR value.

PRINCIPLE OF OPERATION

In this paper the principle of operation is based on the CO-OFDM technique which is similar to the existing paper. The OFDM modulation is also implemented at transmitter.

The constellation design of 32APSK consists of 5bits per symbol.

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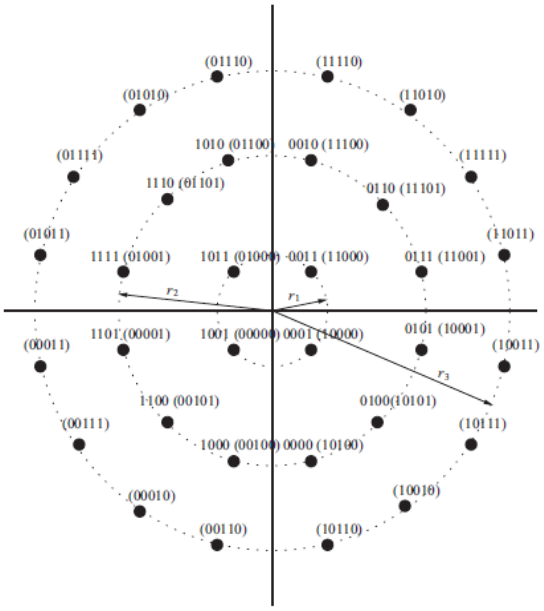

FIG.1. constellation for 32APSK

The 32 APSK modulation is used inorder to improve the Q-factor and BER value. The constellation design of APSK consists of 5 bits per symbol. Hence it increases the transmission rate of the data and more information can transmitted per transmission than 16 APSK.

The PAPR value which is to be less is also maintained to be lower. The CO-OFDM technique which is used have a high spectral efficiency and performs coherent detection at the receiver. In previous paper it consists of non-coherent detection which consists of complex structure , hence it can be overcome.

The OFDM design consists of guard interval at end of each symbol and cyclic prefix inorder to avoid overlapping of consecutive symbols. The optical bandpass filter is placed at fiber to eliminate the unwanted symbols.

SIMULATION SETUP

Our simulation tool is the communication toolbox in matlab. We are simulating Q-factor ,BER and SER. The iteration rate of the setup is kept as 25 and size of the constellation is 32.

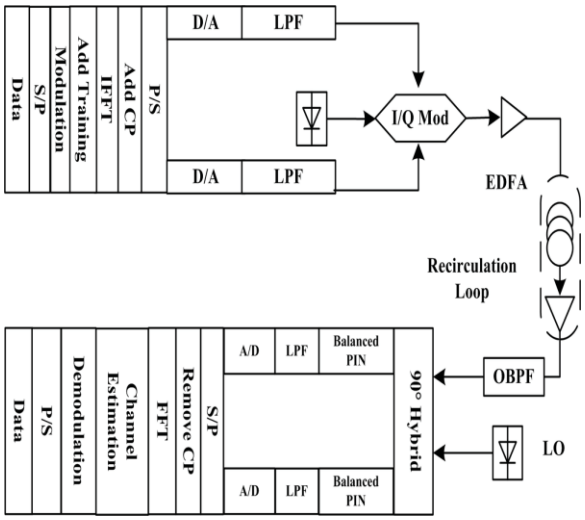

FIG.2. simulation model for co-ofdm

The simulation setup is similar to 16 APSK but only the modulation technique which is 32 APSK is used. Since it increases the bit rate and hence performance of the system can also be improved by analyzing BER, SER.

The erbium doped fiber amplifier is placed at the fiber to strengthen the weak signal after modulation. The local oscillator is placed to generate error free signal. At receiver the demodulation is performed.

(i) BER

The bit error rate is the value which indicates the number of errors in the bit transmission. The BER value obtained using 32 APSK is 10e-4 which is more efficient than 16 APSK.

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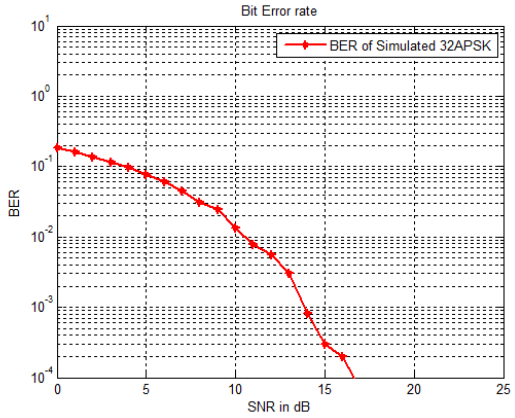
If the bit error rate is increased then PAPR value is decreased and hence nonlinearity can minimized. Then launch power can also increased and transmitted for long distance.

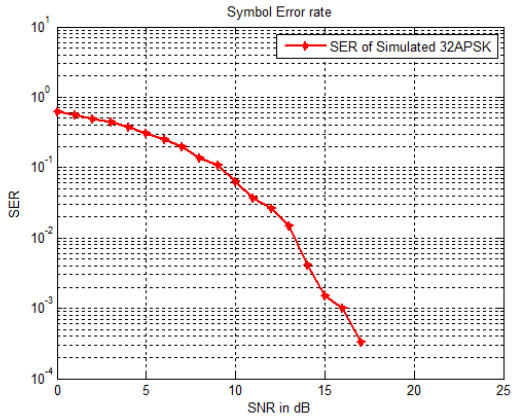


(ii) SER

The symbol error rate is the value which indicates the number of errors in the symbol transmission. The SER value obtained is 10e-3.8.

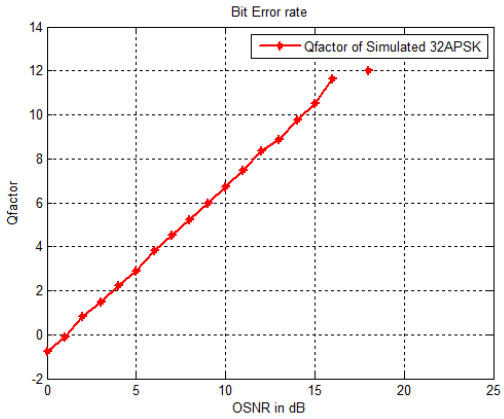
In OFDM the bits are transmitted as symbol hence SER value also have to be maintained accurately.

If SER value is more, then bit loss can be minimized.



(iii) Q-factor

The Q-factor value obtained using 32 APSK is 11.9 for 17db, where 16 APSK consists of 11.5 for 16db. Hence this modulation technique increases Q value.



The Q-factor value is very important for the modulation technique, it implies that how efficient our system. Here Q value is calculated with OSNR value hence it indicates that loss is reduced than existing paper.

CONCLUSION

We have proposed 32APSK encoded coherent optical orthogonal frequency division multiplexing. The simulation results on BER and SER is also shown. It is interesting to see that Q value is reached upto 11.9 , BER is increased to 10e-4 and PAPR value is also maintained to be less.

FUTURE RECOMMENDATIONS

This technique can also used with 64 APSK with increasing points in the constellation design. Hence Q value can also be increased further.

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