The analysis of transmitting OQPSK signals through AWGN channel

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Abstract - **The simulation method of comparative analysis of radio signals with OQPSK at low signal-to-noise ratio is considered in this paper.**

Keywords - **OQPSK, signal-to-noise ratio, AWGN, Simulink, Matlab.**

I. INTRODUCTION

Modern growth of demand on the radio channels induces the use of spectral effective methods of modulation, intended for diminishing of spectral overload of communication systems. One of such methods of modulation is offset quadrature phase shift keying (OQPSK).

The quality of receiving of OQPSK signals depends from such critical parameter as signal-to-noise ratio (SNR) [1].

The method of analysis of detection of OQPSK signals at different SNR values using Matlab environment is considered in this paper.

II. MAIN PART

In wireless communications, errors caused by channel, can rapidly worsen a quality of output signals. This effect calls a threshold effect. This effect appears at some unique signal to noise ratio, which depends from type of wireless channel and type of modulation, used for informational signal [2].

In this work, we analyze the channel with additive white gaussian noise (AWGN) and signals with OQPSK. For this, we use the simulation model of wireless system, realized by using tools of Simulink library in Matlab program environment. Simulation model consists of four main blocks: OQPSK modulator, communicational channel, signal detector, analyze tools. The complex offset phase shifted signal is generated in OQPSK modulator block. Generated signal then moves to communicational channel block, where it applies with additive gaussian noise. After that, the signal moves to the signal detector block, where it passes through demodulation process. With the help of analyze tools, we can compare input and output signals and count up a number of errors, occurred during simulation. Also we can determine the SNR of threshold effect for current AWGN channel.

Current simulation model has the following opportunities:

- realization of generation of informational signals, modulated with QPSK and OQPSK;
- realization of AWGN wireless channel with possibility of changing the rate and intensity of noise;
- possibility of statistical analyzing of number of errors, in output signal with current noise level;
- receiving of graphical plot of input and output complex signal in square and polar axis;

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The results of simulation are represented on Fig.1 (SNR=10) and on Fig. 2 (SNR=2.8). At Fig. 2 we can precisely see the failure of tracking the phase of output signal at 13-th second of simulation.

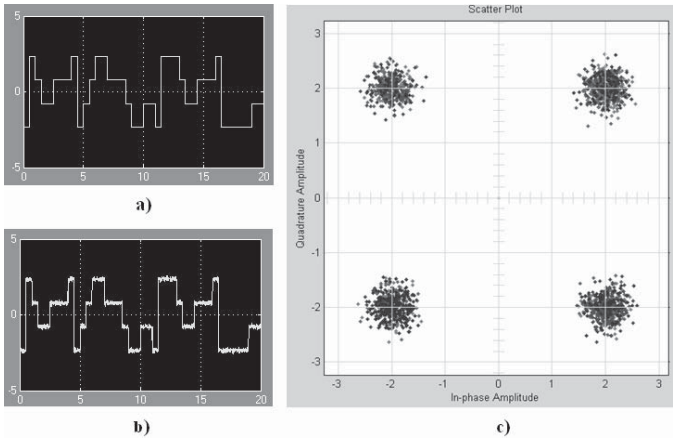

Fig.1 Input (a) and output (b,c) signals at SNR=10

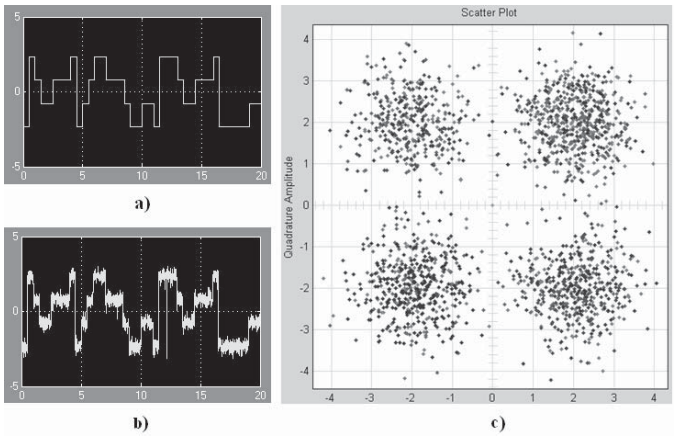

Fig.1 Input (a) and output (b,c) signals at SNR=2,8

The modification and analyzing of signal detector using current method lies in basement of further researches. The methods of reducing of necessary SNR on Physical layer of OSI model is the goal of further research work.

III. CONCLUSION

In this work, the program simulation was made using Simulink tools. The determination of threshold effect for wireless AWGN channel was the goal of this simulation. The number of errors in OQPSK signal raise rapidly at SNR=2.8.

REFERENCES

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