A NEW WIRELESS PRS-OFDM SIMULATION MODEL

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Abstract

In this paper a new PRS-OFDM model is presented applicable to wireless communication systems from first to fifth class and from second to ninth order. It has been simulated over communication channels with Rayleigh, Rice, and Additive White Gaussian Noise present. The experimental results reveal improved BER and CIR and decreased ICI using high order PRS system in comparison to OFDM system without PRS. This model could be employed into various wireless mobile communication systems, in telemedicine, DVB, optical communication systems, etc.

1. INTRODUCTION

For one OFDM system the correlative coding, known also as PRS will be done in frequency area. The research shows that correlative coding in that are is a simple solution for the ICI interference problem, also makes OFDM systems less sensitive to frequency errors [11]. In addition correlative coding does not reduce the bandwidth efficiency when added to the system. Figure 2.1 shows a simplified block diagram for the proposed correlative coding OFDM system.

2. MAIN TEXT

The source signal before being coded is show with a_k , where k is the carrier $k = 0,1,..., N-1$, (N is the total carrier count). Having bipolar manipulation BPSK in mind a_k values shifts between -1 and, for which a zero average and independent conditions are accomplished.

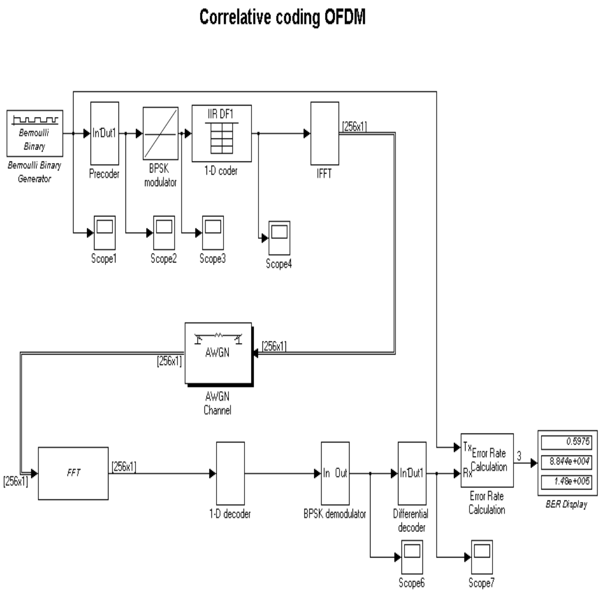

Fig. 2.1

Let us have D for k-carrier delay. Then the proposed correlative coding using $F(D) = (1-D)$ polynomial is realized as:

$$b_k = a_k - a_{k-1}$$

There the coded symbols $b_k, k \in [0, N-1]$ are modulated on N carriers. b_k accepts three possible values (-2, 0, 2). Equation (2.6) represents correlation between neighboring symbols - b_k, b_{k-1}, that's why independency condition is no longer true. To prevent error multiplication in decoding due to correlative coding a pre modulation bi-phase BPSK encoding (XOR) is performed – similar to single carrier duo-binary signalization. In the OFDM systems carriers' ICI signal is a function of channel deviation and subcarriers modulated signal values. Due to the communication signals random nature ICI is a random process also. It uses CIR to assess systems ICI level by comparing CIR in OFDM systems with and without correlative coding. System with $(1-D)$ correlative coding evaluates CIR with:

$$\mathrm{CIR} = \frac{\sin^2(\pi\varepsilon)/(\pi\varepsilon)^2}{\sum_{l=1}^{N-1}|S(l)|^2 - \frac{1}{2}\sum_{l=2}^{N-1}[S(l)S^*(l-1) + S(l-1)S^*(l)]} \qquad (2.1)$$

To demonstrate the improvements by the proposed system is compared with the CIR values of these correlation OFDM system without coding. Then CIR expression for normal OFDM system:

is:

$$\mathrm{CIR} = \frac{\sin^2(\pi\varepsilon)/(\pi\varepsilon)^2}{\sum_{l=1}^{N-1}|S(l)|^2} \qquad (2.2)$$

Then to calculate the block error rate Error rate calculation makes the necessary calculations are displayed on irezlutatite display. Received BER results are given in tabl. 1 and fig. 2.2.

SNR, [dB]	BER, [%]
0	20
3	9
4	7
5	4
6	2
7	1
8	0.4
9	0.15
10	0.04
11	0.009
12	0

Tabl. 1

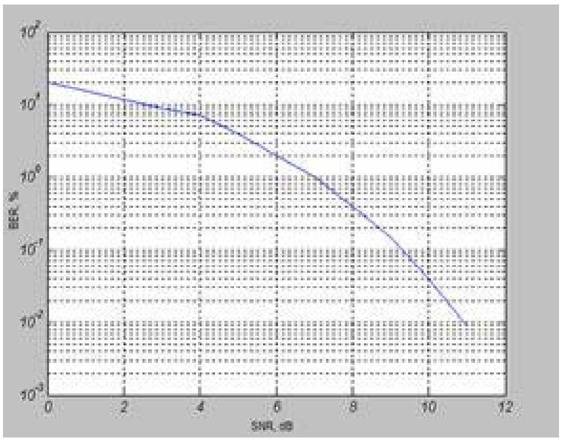

Fig. 2.2

Compared with normal OFDM system, CIR is improved by 3.5 dB (for OFDM system with correlative coding of 1-D polynomial) with no reduction in bandwidth and increase system complexity

3. CONCLUSION

Created a model of OFDM system using correlative coding. Following that simulation are shown graphs of the signals from some points of the sistem. There are graphs of BER and OFDM system with correlation and without correlative coding.

4. APPENDIX AND ACKNOWLEDGMENTS

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