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Performance Analysis of Space Time Block Coding for Wireless System using SFT

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Abstract: ***Wireless systems generally deals with the concept of system reliability and spectrum efficiency along with network coverage .For improving the performance of wireless system the concept of Multiple Input Multiple output (MIMO) with Space Time Block Coding is used. Sparse Fourier Trasform is developed for estimating the orders response and Bit error rate in system.The design is considerd for the total noise reduction. The error reduction of STBC-MIMO for 8-Quadrature Phase Shift Keying(QPSK) is obtained. Furthermore, the proposed algorithm applies with the different channels for system order estimation. Simulations in the context of different channels order estimation shows good performance in comparison to existing schemes developed for MIMO systems.***

Keywords: Sparse Fourier Transform (SFT), Multiple input multiple output systems (MIMO), Space Time Block Code (STBC), Orthogonal Frequency Division Multiplexing (OFDM), Fast Fourier Transform (FFT), Rayleigh Fading

1. Introduction

To improve the channel capacity and reliability of wireless systems, Space Time Block Codes are used. The digital communication systems generally require a syncronization and overall channel estimation. Several data-aided parameter estimation algorithms devoted to STBCs have been reported[1]. However, the use of pilot symbols often imposes significant overheads. Furthermore, they are not applicable to more general problems, e.g., spectrum awareness for cognitive radios. Most of the work in blind parameter estimation has focused on the estimation of channel coefficients. Blind channel and carrier frequency estimation for STBCs has been addressed by only one algorithm, but this still requires a few training blocks to resolve an ambiguity which arises in the case of the Alamouti and some other STBCs [2].

This paper proposes error Probability performance of STBC-MIMO have been extensively studied for different channels.The proposed estimator require knowledge of signal-to noise ratio(SNR) and modulation of the transmitted signal.

2. Sparse Fourier Transform

The Sparse Fourier Transform (SFT) is introduced to make the performance of the wireless system better. In this streams of data can be processed 10 to 100 times faster than was possible with the FFT. SFT is the type of Discrete Fourier Transform which is widely preffered for computational tasks. It has wide range of their applications including signal processing communication and data (audio/video/image) compression. For computing the exact DFT it must take time at least proportional to its output size n. In many applications, most of the Fourier coefficients of a signal are small or equal to zero, i.e., the output of the DFT is sparse.

3. Proposed Algorithm

The basic wireless design system concept is always considered with the use of Fast fourier Transform. And it is always considered as that the 100% noise is reduced, which is not truly possible. The problem is often encountered in digital communication systems where unknown signals are transmitted through unknown, multipath channels in many application areas like digital multiuser/multi-access communication systems, digital television systems, multisensory sonar/radar systems, and speech systems. All the systems should be noise free for an optimum design[13]. The basic block diagram is shown in fig 3.1

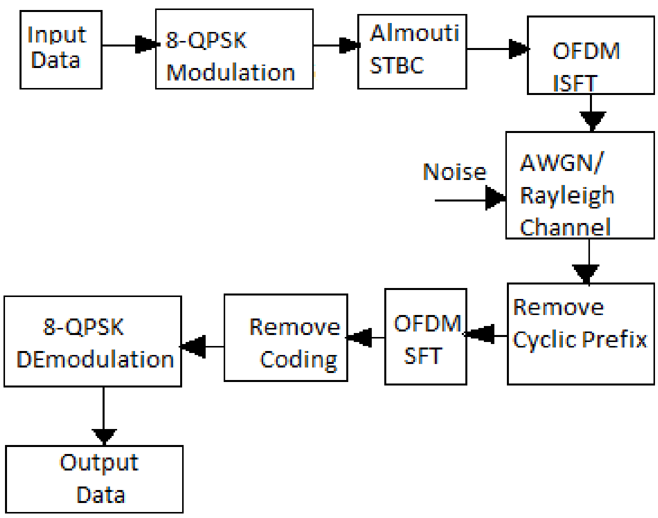

Figure 3.1: Block Diagram For Proposed Methodology

The flowchart for the Simulation is shown if fig 3.2.

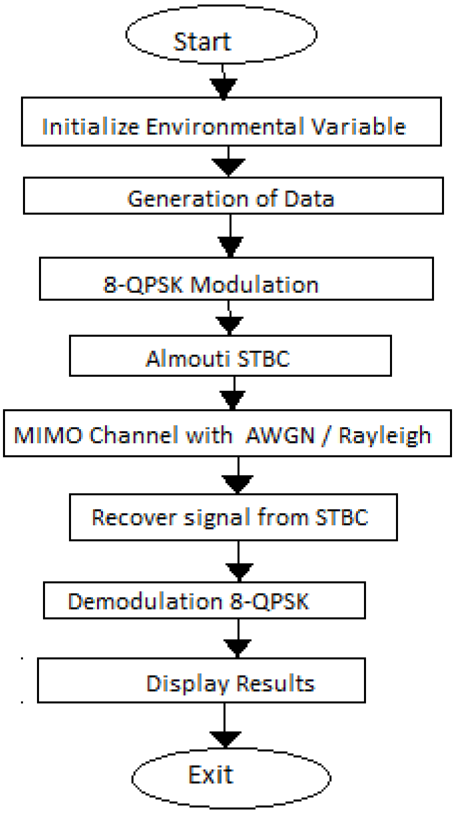

Figure 3.2: Flowchart for Simulation Process

To tackle with this problem we are using Sparse Fourier Transform to increase the signal to noise ratio.The use of Sparse Fourier Transform make the design efficient in comparison to Fast Fourier Transform. As we know that with increase in signal to noise ratio, noise decreases. In this we are assuming denoising at the starting for mathematical ease. The concept helps in the ideal reduction of noise and improves error rate.

The proposed algorithm was validated through Monte Carlo simulations. The transmitted data was modulated using quadrature phase shift keying (QPSK).

4. Simulation Results

The simulation of proposed approach is explained in this section.The results of the proposed system is calculated in terms of error rate i.e reduction in errors (As denoising percentage) as a figure of merit versus signal to noise ratio.

Table 1: The Proposed Method Success Rates

S.No.	*SNR (db)*	*Proposed Algorithm without Denoising*
1.	17	84%
2.	20	39%
3.	22	27%
4.	25	09%
5.	27	07%
6.	30	06%
7.	32	02%
8.	40	01%

5. Conclusion

In this paper, Sparse Fourier Transform is proposed in place of Fast Fourier Transform. It is shown that with the use of Sparse Fourier Transform the better results are achieved without external noise. The simulation results shows the system order effect on denoising concept. The work aims towards the increase in denoising efficiency and improve error rate.

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