Successive Transmit Beamforming Algorithms for Multiple-Antenna OFDM Systems

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BACKGROUND

In this paper, we focus on the design and evaluation of new transmit beamforming algorithms for the multiple-input single-output (MISO) orthogonal frequency division multiplexing (OFDM) systems. The OFDM technique is very effective in combating frequency selective fading since it converts the broadband channel into several parallel flat fading channels. However, to implement transmit beamforming, the channel state information on each individual subcarrier has to be conveyed from the receiver to transmitter.

TECHNOLOGY DESCRIPTION

In order to reduce the channel feedback requirement in the OFDM system, University researchers have developed an algorithm that takes the time and frequency domain correlation of the channel fading into consideration. Based on our successive beamforming (SBF) technique, we develop several classes of feedback algorithms for the OFDM systems. These new algorithms use the knowledge from the previous frame or neighboring subcarrier to aid the beamforming codebook design for the current subcarrier. Through numerical simulations, researchers have demonstrated that the proposed SBF algorithms require very little channel feedback, yet they provide better performance than that of the other existing OFDM beamformers. In addition, it is shown that different SBF algorithms behave differently in various fading environments, and the most suitable algorithm for the given fading scenario was determined using a numerical sweeping approach. The major difference between this invention and the prior art is that the University's invention addresses transmit beamforming for a time varying frequency selective fading channel, whereas known solutions have assumed quasi-static fading channels.

APPLICATIONS

This invention can be used for the existing and next generation wireless communication systems. It can be adopted for any OFDM wireless system with multiple transmit antennas. For example, it can be used in IEEE 802.11n WiFi system or the emerging WiMax systems. Another major area of application is the communication systems in the defense industry.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,315,323	11/20/2012	2006-110

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OTHER INFORMATION

CATEGORIZED AS

» **Communications**
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