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Performance Evolution of Watermarked Image Transmission over MIMO Wimax System

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Abstract

In wireless communication, the receiver side BER strongly affected by channel noise, interference, distortion, synchronization error and wireless multipath fading chanel, and MIMO (Multiple-input and multiple-output) is the use of antennas at both the end in wireless communication to improve BER performance. In this paper proposes a new NEA (embedding algorithm) for using digital watermarking image. The algorithm is performed for digital image as data. In the compared for NEA and well established Cox's modified embedding algorithm. A digital image watermarking are using discrete wavelet transforms and discrete cosine transforms. The Space-Time Block Coding with Multiple-Input Multiple-Output set-up for use in wireless fading channels. Comparison of diversity gain with MIMO systems in terms of BER for High QAM modulation scheme. The simulated using MATLAB and bit error rate (BER) performance is observed. The results has been shown in the paper for the simulation in various condition.

Keywords: WiMAX, Image Watermarking, Multiple-Input Multiple-Output (MIMO), Space-Time Block Coding (STBC), QAM Modulation, etc.

Introduction

Wireless communications are an emerging field that has experienced a significant development over the last several years. The availability of broadband networks offers high performance connectivity to over a billion of internet users around the world. In this paper, the distribution of works of art, includingpictures, music, video and textual document has become easier. With the widespread and increasing use of the Internet, digital formsof these media are easily accessible. In this is clearly advantageous, that it is easier to market and sellone's works of art. Watermarking is defined as adding (embedding) a watermark signal to the host signal. Such image changes are called watermarks. The watermark can be detected or extracted later to make an assertion about the object. A general scheme for digital watermarking. The Image watermark message can be a logo picture, sometimes a visually recognizable binary picture or it can be binary bit stream.

The information embedding routine improve small signal, determined by the key and generate the watermarked signal. Only the owner of the data knows the key and it is not possible to remove the message from the data without the knowledge of the key. The transmission channel includes the possible attacks, such as lossy compression, geometric distortions, any common signal processing operation and digital-analog and analog to digital conversion, etc. But then, the watermarked image passes through the transmission channel. After the watermarked image passes through these possible, the message is tried to be extracted at the watermark detector. The decoding process can itself performed in two different ways. In one process the presence of the original un-watermarked data is required and other blind decoding is possible.

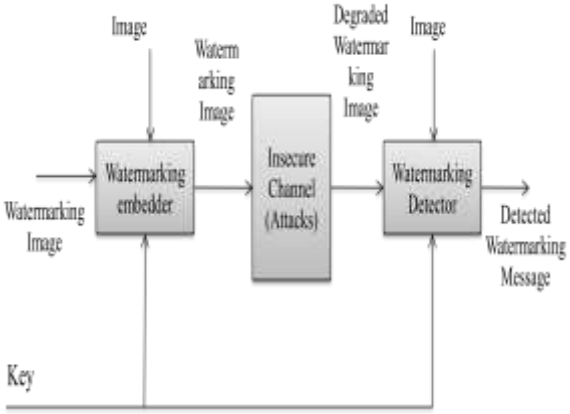

Fig: 1 Watermarking System

Multiple-Input-Multiple-Output (MIMO)

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Multiple-Input-Multiple-Output (MIMO) communication techniques have been an important area of focus for 4th generation wireless systems. This is mainly because of their potentials for high capacity, increased diversity, interference suppression.

The MIMO is an acronym that stands for Multiple Input Multiple Output. Its antenna technology that is used both in the transmitter and the receiver for wireless radio communication. Multiple-Input-Multiple-Output (MIMO) technology has attracted attention in wireless communications because it offers significant increases in data throughput and link range without additional bandwidth or transmission power. It achieves this by higher spectral efficiency (more bits per second per hertz of bandwidth) and link reliability or diversity. Because of these properties, A MIMO is an important part of modern wireless communication standards such as IEEE802.16 WiMAX module.

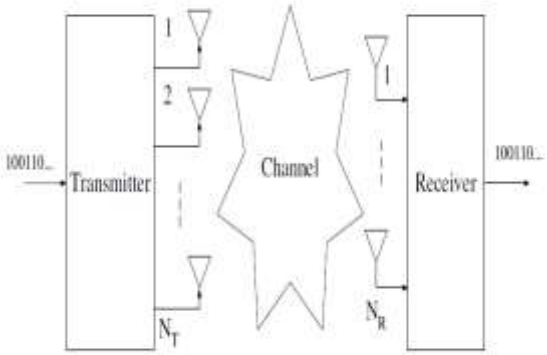

Fig: 2 MIMO system

Digital Watermarking

Digital watermarking is a technique to embed copyright information or other information into an image or video or audio. In one of the best solutions to prevent illegal modifying, copying, and redistributing multimedia information.

Embedding method

A digital watermarking method is referred to as spread-spectrum if the marked signal is obtained by an additive modification. In the spread-spectrum watermarks are known to be modestly robust, and but also to have a low information capacity due to host interference. The digital watermarking method is said to be of quantization type if the marked signal is obtained by quantization. A Quantization watermarks suffer from low robustness, between have a high information capacity due to rejection of host interference. Digital watermarking method is referred to as amplitude modulation if the marked signal is embedded by additive modification which is similar to spread spectrum method, is particularly embedded in the spatial domain.

The watermark embedding system has the original image, secret key, and the watermark as inputs, and watermarked image as the output. The extraction process has the secret key, the watermarked image. In the original image or the original watermark or both as inputs. The output of the extraction algorithm is either suspect watermark or some confidence measure.

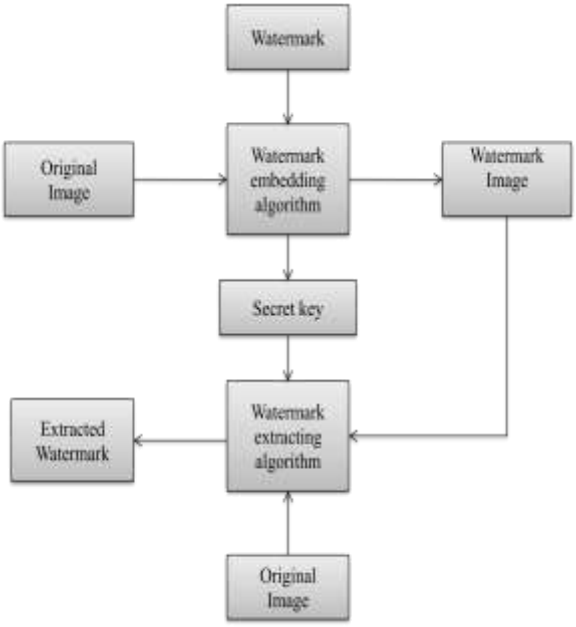

Fig: 3 Watermark embedding and extracting model system

Additive white Gaussian noise (AWGN)

The study of communication systems, in the classical (ideal) additive white Gaussian noise (AWGN) channel, with in statistically independent Gaussian noise samples corrupting data samples free of inter symbol interference (ISI), is the usual starting point for understanding basic performance relationships. An additive white Gaussian noise (AWGN) channel and adds white Gaussian noise to the signal that passes through it.

In constructing a mathematical model for the signal at the input of the receiver, in the channel is assumed to corrupt the signal by the addition of white Gaussian noise as below, as therefore the transmitted signal and receiving signal, white Gaussian noise and received signal are expressed by the following equation with s (t), n (t) and r (t) representing those signals respectively:

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$r(t) = s(t) + n(t)$ (1)

$S(t) \Rightarrow \oplus \Rightarrow r(t)$

Where n (t) is a sample function of the additive white Gaussian noise (AWGN) process with probability density function (pdf) and power spectral density as follows.

$\theta nm = 0.5N_0[W/H_z]$ (2)

Results and discussion

This color image again converts in to gray watermarking image.The Image in the form of image matrix, and then we convert it in serial data. This serial data convert in to binary data.

Watermarked Image-

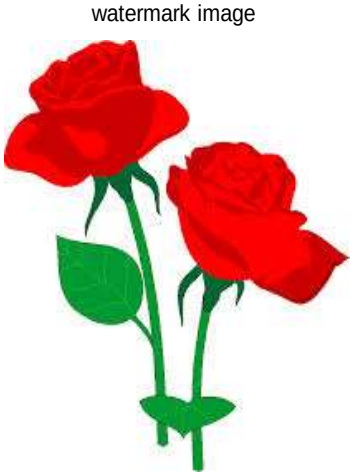

Fig: 4 Watermarking Image

Convert color to gray image-

Fig: 5 The Watermarking Image Convert to Gray Watermarking Image

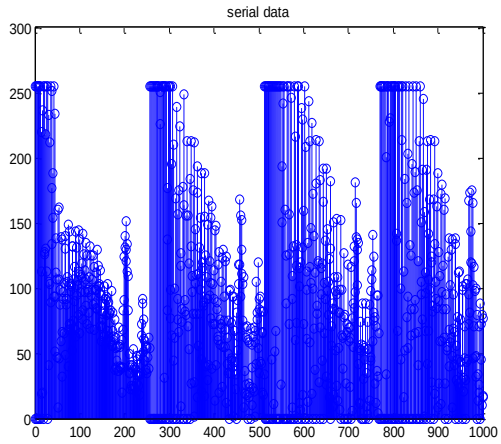

Fig: 6 PLOT the serial data

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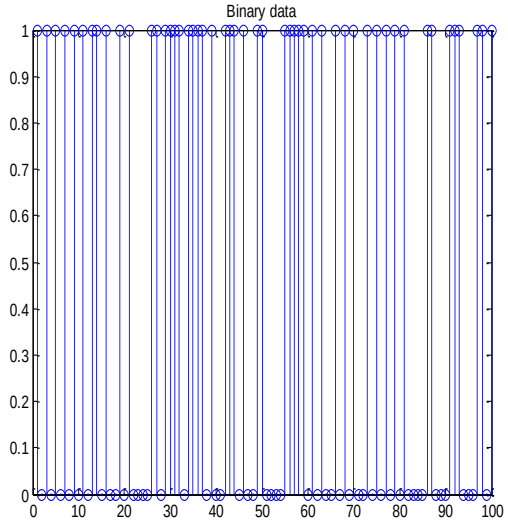

Fig: 7 Plot serial binary data

Conclusion

In this paper, digital image watermarking based on wavelet transforms. The host image has converted the watermark image with respect to DWT. Then transmit image is using WiMAX and MIMO system. In the during simulation study various modulation schemes which support the high data rate are used for simulation, and performance enhancement with different receiver diversity has been demonstrated. This scheme due to higher frequency used in WiMAX system. It is found with increase of modulation order the capacity enhancement is compare to SNR and PSNR etc.

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