Low Power Baseband Receiver Architecture Using STBC-OFDM With Flexible Mapper And Flexible Demapper For Mobile WMAN

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Abstract—This paper introduce a space-time block-coding orthogonal frequency-division multiplexing downlink baseband receiver for mobile wireless metropolitan area network. The introduced baseband receiver applied in the system with two transmit antennas and one receive antenna aims to provide high performance in outdoor mobile environments. It provides a simple and robust synchronizer and an accurate but hardware affordable channel estimator to overcome the challenge of multipath fading channels. Recently, space-time block-codes (STBC) have gained much attention as an effective transmit diversity technique to provide reliable transmission with high peak data rates to increase the capacity of wireless communication systems. Introduce a space-time block-coded orthogonal frequency-division multiplexing (STBC-OFDM) scheme for frequency-selective fading channels the following of the Flexible mapper and Flexible demapper the following of the Flexible mapper and Flexible demapper the following of the Flexible mapper and Flexible demapper the following of the Flexible mapper and Flexible demapper the following of the Flexible mapper and Flexible demapper We can choose any of the QAM mode (4, 16, 32 and 64) for providing the high speed transmission of data.

Keywords—Baseband receiver, channel estimator, space time block code orthogonal frequency division multiplexing (STBC-OFDM) system, WMAN

I. INTRODUCTION

Portable internet services requires high data rate and mobile capability to provide various multimedia transmissions. Mobile World Wide Interoperability for microwave access (WiMAX) is an extension for providing mobility of wireless metropolitan area network (WMAN) [5]. It is based on an orthogonal frequency division multiple access (OFDMA) technique to support multiple access scheme and multiple input multiple output (MIMO) Systems over multipath fading channels. Space time block code orthogonal frequency division multiplexing (STBC-OFDM) systems with multiple antennas can provide diversity gains to improve transmission efficiency and quality of mobile wireless systems [1], [4], but accurate but accurate channel state Information (CSI) is required for diversity combining, coherent detection and decoding. Moreover, the system performance is also sensitive to the synchronization error. Therefore, high quality synchronization and channel estimation are two crucial challenges for realizing a successful STBC-OFDM system in outdoor mobile channels. The STBC-OFDM downlink baseband receiver for mobile WMAN is proposed and implemented. First, a novel match filter is proposed to precisely detect symbol boundary. Then, we use a two-stage channel estimator to accurately estimate CSI over fast fading channels [3].

Provision of a STBC-OFDM downlink baseband receiver architecture that is capable of high-speed transmission at high mobility. Integration of a simple and robust synchronizer and an accurate but hardware affordable channel estimator to overcome the challenge of outdoor fast fading channel. Implementation of a successful STBC-OFDM downlink baseband receiver for mobile WMAN [5].STBC is a technique used in wireless communication to transmit multiple copies of data stream across a number of antennas and to exploit the various received versions of the data to improve the reliability of data-transfer. The fact that the
transmitted signal must traverse a potentially difficult environment with scattering, reflection, refraction and so on and may then be further corrupted by thermal noise in the receiver copies. Efficient use of the spectrum by allowing overlap. The word orthogonal indicates that there is a precise mathematical relationship between the frequencies of the carriers in the systems.

II. SYSTEM ARCHITECTURE

Source encoding, one purpose of the source encoder is to eliminate redundant binary digits from the digitalized signal. The strategy of the channel encoder, on the other hand, is to add redundancy to the transmitted signal in this case so that errors caused by noise during transmission can be corrected at the receiver. The process of encoding for protection against channel. The source encoding as shown in the Fig.1. In coding theory, decoding is the process of translating received messages into code words of a given code. There have been many common methods of mapping messages to code words. These are often used to recover messages sent over noise channel, such as a binary symmetric channel. The constellation mapper take a bit stream as an input and maps it onto appropriate constellation symbols, according to the modulation method. The constellation demapper takes packets of the received constellation points as an input, and outputs the corresponding soft decision bit stream.

The serial to parallel convertor is used for converting the serial data into parallel one and parallel to serial data is used for converting the parallel data into a serial one. Guard interval insertion to decrease receiver complexity. An analog-to-digital convertor (abbreviated ADC, A/D or A to D) is a device that converts a continuous physical quantity (usually voltage) to a digital number that represents the quantity’s amplitude. Up converter is a part to convert signal up for transmission.

Basically, mixer part for frequency upward conversion is called upconverter. Down convertor is a part to convert RF signal down to IF or base band. Before an OFDM receiver can demodulate the subcarriers, it has to perform at least two synchronization tasks. The first one is to find out where the symbol boundaries are and what the optimal timing instants are to minimize the effects of Inter Carrier Interference (ICI) and Inter Symbol Interference (ISI). The use of multi-amplitude signalling schemes in wireless OFDM systems requires the tracking of the padding radio channel. The paper addresses channel estimation based on time-domain channel statistics. Using a general model for a slowly fading channel,
Shows the architecture of the existing downlink baseband receiver. The receiver includes a symbol boundary detector, an integer carrier frequency offset (ICFO) estimator, and a fractional carrier frequency offset (FCFO) estimator, an FFT, a two-stage channel estimator, an STBC decoder, and a demapper as shown in Fig.2. Synchronization includes symbol timing, sample clock, and carrier frequency synchronization. The proposed synchronizer concentrates on the symbol boundary detection and the carrier frequency recovery loop. An ISI free region of symbol timing detection is determined by the difference in length between the CP and the channel impulse response [2]. Since the introduced system has two transmit antennas, the signals transmitted from different antennas may arrive at the receiver with different delays due to multipath effect.

Therefore, the decided boundary must locate in the common ISI free region to prevent the respective ISI effects from other symbols. Carrier Frequency Recovery. The accurately estimated FCFO value can be used to correct the ICFO detection. When the estimated FCFO value locates in the strong region, the matching results have strong reliability to determine ICFO by detecting the peak value.

When the estimated FCFO value locates in the weak region, there are two possible peaks in the matching results. Thus, the ICFO value will be adjusted by the information of the FCFO value and these two peaks. A two-stage channel estimation method is used to realize a successful STBC-OFDM system in outdoor mobile channels in the initialization stage, the significant paths are identified during the preamble symbol time.

In the following of the paper, the signal mapper and signal demapper is being used where in this existing architecture only a fixed QAM is being chosen. Whereas by using the Flexible mapper and Flexible demapper the following of the (4, 16, 32, 64) QAM modes can be chosen so that in the signal mapper and signal demapper only the fixed 16 QAM is being chosen so that its symbol can take 4 bits per symbol in transmitting data by Introducing the Flexible mapper and Flexible demapper we can choose any of the QAM mode on introducing the 64 QAM the symbol can take up to 6 bits in them so that higher transmission of the data is being taken by this Flexible mapper.

III. PROPOSED FLEXIBLE MAPPER AND FLEXIBLE DEMAPPER

Fig. 3: STBC-OFDM system with two transmit antennas and one Receive antennas with Flexible Mapper and Flexible Demapper.

Shows the figure of the STBC-OFDM system with two transmit antennas and one receiving antennas where the signal mapper is being replaced by the Flexible Mapper and Flexible Demapper.

Fig. 4: Architecture of Flexible Mapper
In the following of introducing the Flexible Mapper and Flexible Demapper instead of using the signal mapper and signal demapper that it has more advantages than using of the signal mapper and signal demapper since signal mapper can be used only for fixed QAM (Quadrature Amplitude Modulation) in existing paper we use 16 QAM so that using of the 16 QAM only 4 bits can be accepted per symbol where as using of this Flexible Mapper the user can choose any type of the QAM mode for example (4, 16, 32, 64) QAM so we are introducing the 64 QAM mode so that it can able to accept upto 6 bits per symbols so it leads to higher transmission of datas.

Fig.5: Architecture of Flexible Demapper

It has the following of the one ROM ,one interconnection network in them. It is possible to reuse this architecture for a fading channels. The constellation point ROM is used for storing the values of I and Q components. The Euclidean distance is the distance between two points. Transmitting point and Receiving point. Where using of this 16 QAM the diagrametric representation shows the each of the symbols in them since it is an example of 16 QAM each symbol can able to accept upto 4 bits in them as shown in the figure.6. the diagrametric representation of example of 64 QAM as shown in the figure.7

Fig.6 : Example signal space diagram for 16 QAM

Example of the mapper with the 64 QAM is being shown as follows Where in the example of using the 64 QAM as shown in the figure 6 the each symbols can able accept upto 6 bits in them where as in the 16 QAM it can able to accept only 4 bits so by using of this 64 QAM it will be more usefull for highspeed transmission of data.

Fig.7: Example of 64 QAM
IV. SIMULATION RESULTS OF STBC-OFDM SYSTEM USING SIGNAL MAPPER AND SIGNAL DEMAPPER

Fig. 8. Transmission of data from transmitter

The following of the transmission of the data as shown in figure 8 where transmission of the data from the transmitter which is the transbit where input data is being transmitted from the transmitter.

Fig. 9. The STBC transmission of data from the Transmitter

The following of the transmission of the data from the transmitter which is the transbit where input data is being transmitted from the transmitter in the following STBC transmission of data in which the multiple copies of data are being transmitted from the transmitter to the receiver where it is used for robust transmission of data it is used for securing data from reflection, refraction etc.

Fig. 10. The channel estimator for finding the channel state information.

V. POWER, AREA AND DELAY TABLES

Table 1. the obtained power is 40.95 mW
VI. CONCLUSION

The downlink baseband receiver for mobile WMAN that is applied in the STBC-OFDM system with two transmit antennas and one receive antenna. A simple symbol boundary detector, a carrier frequency recovery loop the two-stage channel estimator has significant performance improvement for successfully realizing the STBC-OFDM system in outdoor mobile environments it is used for improving the transmission efficiency. In the existing system the Signal mapper and Signal demapper has been used it can able to accept only fixed QAM in it the 16 QAM is been used. In the proposed flexible mapper and Flexible demapper it is dedicated to constellations of (QPSK, 16 QAM, 32 QAM, 64 QAM) where we use the 64 QAM which can accept more bits for each symbols than 16 QAM. So the proposed Flexible mapper and Flexible Demapper is used for high data transmission efficiency.

VII. REFERENCES
