

## New Transmission Scheme for MIMO- OFDM System

Shrikant G. Vaidya,

Assistant Professor, Dept. of Electrical Engg, Tulsiramji Gaikwad Patil Engineering College, Nagpur, India

**Abstract:** In this paper presentation on pilot data coding in channel for MIMO-OFDM (Multiple Input Multiple Output- Orthogonal Frequency Division Multiplexing) combination of both are increases the bit error rate performance for mobile wireless cellular system. We developed a new transmission coding scheme for MIMO-OFDM system for inter sub channel interference (ICI) self cancellation over high mobility fading channels between transmission and receiving processing .We transmit pilot data through the transmitting antennas signal via encoding system through the channel at receiver end this encoding data are decoding by decoding system than it use by the user.

**Keywords:** Inter Sub channel interference, MIMO-OFDM, rate reduction factor, Time varying channel

### I. Introduction

MIMO-OFDM is one of the most promising broadband technology for wireless network. OFDM modulation avoids intersymbol interference (ISI) by dividing a broadband channel into a narrowband subchannel. In this process split incoming signal into multiple lower rate signal and transmitted them simultaneously. However the various of a wireless channel with in an OFDM symbol destroys the orthogonally it causes inter subchannel interference (ISI) is reduce or self cancellation in channels. MIMO modulation has easily implemented with minimum increases in cost so it much popular by introducing multiple antennas at the transmitter and Receiver, we can achieve higher data rates with moderate complexity by using channels multipath to transmitted different signal simultaneously. We will simplify channel coding scheme in MIMO-OFDM system, which is to the best knowledge of the authors. The proposed scheme estimate interference gain and performance ICI cancellation itself.

In literature, various time varying channels have been established in a multipath channels so that the estimation performance can be increased in [1], [2] a polynomial model has been developed in [3],[4] and [5]. Recently in [5] the time varying channel vector has been modelled as a matrix. We developed a general structure of transmitter and receiver processing matrices system share the same average signal to interference ratio (SIR) for the developed structure, we further optimize the transmitter and the receiver processing coefficient. The reminder of this paper is organized as follows in section II we introduced coded MIMO-OFDM system. Than we present the principle of new transmission coding scheme for MIMO-OFDM system in section III. Simulation Result are present in section IV to demonstrate the performance of proposed channel coding for MIMO-OFDM scheme, finally section V conclude

### II. Coded MIMO-OFDM System

In the fig 1, it shows the system considered for transmission of pilot data in to a transmitting antennas trough the channel and it received by the received antenna for user required format or required parameters are not in due to channel interferences scattering environment so it convert in to a proper format.

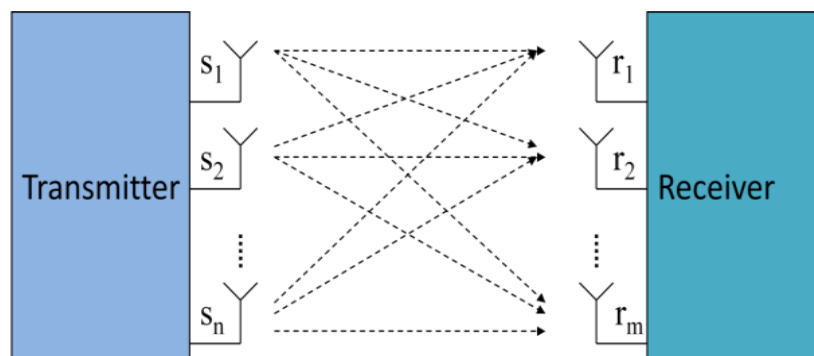


Fig. 1 MIMO-OFDM system model

### III. Principle of Transmission Coding Scheme of MIMO-OFDM System

As described in section II the channel model estimation for a wireless channel with in an OFDM symbol cause ICI and estimate is converted block to the frequency domain operation. Figure 2 shows the system consider in this paper to maintain a practical system by following IEEE standard 802.11 a [6] establish a general reduced rate and design in the blocks OFDM transmission framework with inherent ICI self cancellation capability with transmitter and receiver processing in which first bit of data are pass to a channel encoder which is either SNR (2,4,6...) correlation encoder transmitter are made up of formatter which is use to give proper shape and size for source encoder after receiving pilot data by source encoder from source information it converting the source data into encoding by using random data and give to mapping block than pass it to a channel encoder in which combining conventional coding with VBLAST( vertical Bell Labs Layerd Space-Time) are performing in slow fading environment converter which splits the incoming signal to a number of streams equal to the number of transmitter antennas and OFDM transmission framework with inherent ICI self cancellation capability the OFDM system is transformed into an equivalent one. We are able to design the transmitter signal structure with inherent ICI self cancellation capability without requiring the instantaneous channel state information.

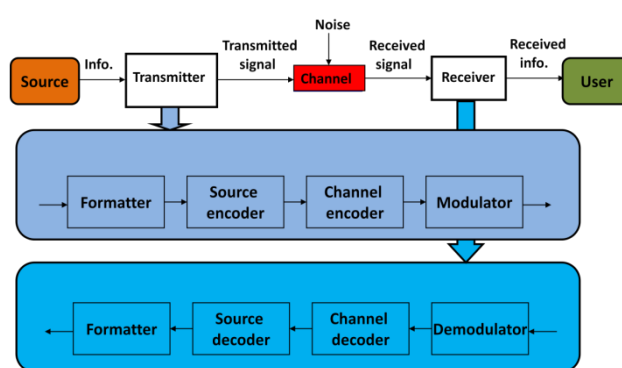


Fig. 2 MIMO-OFDM module structure

In the fig 2, it shows the MIMO-OFDM module structure in which source information in the form of data rate or bit error rate are given to the formatter for proper size and shape of the signal data than transfer it into the source encoder it is a device which transforms the data into some bits this bits are given to channel encoder in which channel estimate and design as per proper estimated coding technique channel encoder are design in such a way that source encoder is to eliminate redundant binary digits from the digitized signal the strategy of the transmitted signal at the receiver the process of encoding for protection against channel than this signal given to the modulator. Modulator is a device which are to modulating signal or carrier signal that contains information to be transform in to the channel. Channel are the Heart of the system in which the data are arranges in matlab coding process properly and it convert properly as per user requirement to farther improvement to the estimator of channel we employ the FFT method introduces in [11] . primary we take an L- IFFT of the LS channel estimate and than pass it to a rectangular window of length equal to channel prefix Channel have noise signal which generated from scattered environment are process by coding scheme by MIMO-OFDM system which are discuss earlier, channel plot data are transmit to the receiver. Receiver are received data which are carries by channel. Receiver are made up of no of blocks like Demodulator, channel decoder, source decoder and finally formatter, receiver process are known as Decrypted, in terms of transmitter Encrypted data. Or vice-versa to the transmission processes and finally piloted data are proper for user required format.

#### A.CHANNLE MODEL

In our system we use preambles that are orthogonal in time by forcing each antenna to transmission alone. Assume, matrix of transmitting system symbol given by  $P=[P1.....P2].....(1)$

Size  $M_t \times L$ . Where  $L$  is the number of training symbols in the preamble transmitted from each antenna the received matrix can be given by  $R=HP+V.....(2)$

Where  $R=(r_1.....r_2)$  is the  $M_R \times L$  matrix of received signal and  $M_R$  is it he number of received antennas and  $V$  be the  $M_R \times L$  noise matrix for reducing rate, inter subchannel interference self cancellation over high mobility fading channels . The effect of this whole variance is finally reduced by  $\delta^2 C_p/L$  is the length of annel matrix. Where  $C_p$  is the length of the channel prefix. Consider an  $N$ - subcarrier OFDM system with the sampling interval  $T_s$  and the subcarrier spacing  $1/T_s$   $N$  Assume that the maximum delay of the multipath channel is  $(L-1) T_s$  without loss of generality

## B. SIMULATION RESULTS

In this section we present Simulation results to demonstrate the performance of the proposed New Transmission Coding Scheme for MIMO-OFDM system. It also reduced rate OFDM Transmission in ICI cancellation. Program for Fig.3 Capacity Vs Number of antenna for a MxM MIMO system, 1XM SIMO system, Mx1 MISO system, SISO system. In this graph we take maximum number of transmit and receive antenna  $M_{\max}=10$ , number of channel realization  $It=1000$  % initialize variables: ergodic capacity for each number of antennas  $C_{mimo} = \text{zeros}(1, M_{\max}); C_{simo} = \text{zeros}(1, M_{\max}); C_{miso} = \text{zeros}(1, M_{\max}); C_{siso} = \text{zeros}(1, M_{\max}); SNR_{dB} = 0;$  % in dB  $SNR = 10.^{(SNR_{dB}/10)}$ ; % linear scale for  $kk=1:It$  for  $M = 1:M_{\max}$  % MIMO  $H_{mimo} = (\text{randn}(M) + j*\text{randn}(M))/\text{sqrt}(2); C_{mimo}(M) = C_{mimo}(M) + \log_2(\text{real}(\det(\text{eye}(M) + SNR/M*H_{mimo}*H_{mimo}')))$ ; %% SIMO  $h_{simo} = (\text{randn}(M,1) + j*\text{randn}(M,1))/\text{sqrt}(2); C_{simo}(M) = C_{simo}(M) + \log_2(1 + SNR*\text{norm}(h_{simo})^2)$ ; %% MISO  $h_{miso} = (\text{randn}(M,1) + j*\text{randn}(M,1))/\text{sqrt}(2); C_{miso}(M) = C_{miso}(M) + \log_2(1 + SNR/M*\text{norm}(h_{miso})^2)$ ; %% SISO  $h_{siso} = (\text{randn} + j*\text{randn})/\text{sqrt}(2); C_{siso}(M) = C_{siso}(M) + \log_2(1 + SNR*\text{abs}(h_{siso})^2)$ ; end end % Compute average over all channel realizations  $C_{siso} = C_{siso}/It$

Finally, we plot the graph,

All our simulation results are in excellent agreement with the theoretical results, to keep the paper with in the length ,we only present some of the simulation results are as follows.

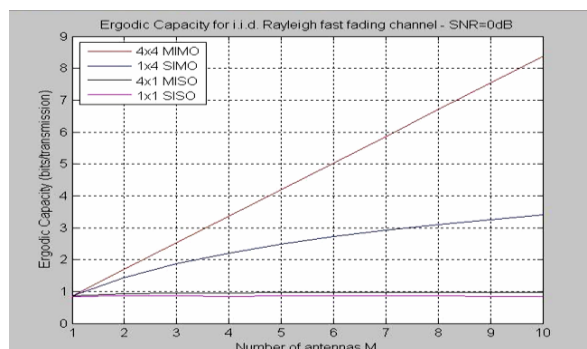


Fig.3 Capacity Vs Number of antenna

From graph, it is observed that every simulation curve is in excellent agreement with the corresponding theoretical curve comparing the capacity of the different system, we can see that the ergodic capacity increases as the number of antennas. The inter tap uncorrelated freq-selective channel has the same capacity as that of the frequency flat fading channel. We now examine the performance of the system in different fading environment. Figure 4 shows the Capacity Vs Number of Antennas for a 4xM and a Mx4 MIMO system. In this we take Maximum number of transmit and receive antennas  $M_{\max} = 8$ ;

## IV. Conclusion

In this paper, we have presented a new channel coding scheme based on capacity and the probability distribution on the instantaneous capacity upper bound for MIMO, MISO, SISO, SIMO wireless system under time varying and frequency selective fading channel and develop general reduce rate OFDM transmission scheme for ICI self cancellation over high fading channel. By transmitter and receiver processing the system performance was investigated through computer simulation showing the proposed coding scheme to that of the commonly used convolution coding and error propagation problem has been avoided in our coding scheme. On the other hand both analysis and simulation results have indicated that the variation of a wireless channel can be well eliminated. We have also investigated the performance of the system under different fading environment. Simulation results have shown that the system performance is better under rich scattering environment.

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