Implementation of Interleavers and Comparison of MIMO, Rayleigh and BS Channel in Wireless Communication System

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Abstract: **- This paper provides a review on the Interleavers in wireless communication system. In this paper, Interleaver technique is proposed in MIMO, Rayleigh and binary symmetric channel. Interleavers are the way of creating the distinction. The IDMA performance in terms of biterror rate, error rate is evaluated. Here comparison with different channels is done on the basis of error rate and various different parameters.**

***Keywords*-MIMO, Rayleigh, BSC, Interleavers, BPSK**

I. INTRODUCTION

From many years, the broadband communication service in wireless growing fast. It gains extensive popularity in all over the world. Due to various parameters in wireless communication systems, it has many advantages like cost has become less and it is very reliable. It is mobile and portable so can be taken easily from one place to another. Its transmission rate is also very high so large data can be transmitted from transmitter to receiver in very less time. So, time consumption is less and has decreased to a large extent. It is also used in recording purposes and can be used in fifth generation also.

For broadband wireless networks, the MIMO technique can be used in which the multiple input and multiple output communication is done. In wireless communication system, the multiple access technique is one of the most efficient methods, particularly used in mobile phone communication system. In recent that is many years back, much research has been done in order to increase the bandwidth and much effort is made to increase the speed so that data can be transmitted quickly over the channel from the transmitter to the receiver. Previously existed multi- access techniques like FDMA, TDMA and CDMA are used in 1G/2G/3G system scan be used in fifth and sixth generation as well. The rate of transmission of data over the channel can be increased greatly in Mbps. Much faster schemes can be designed in fifth generation.

There are different types of multiple approaching techniques which are proposed for 4G systems follows CDMA, MC-CDMA, OFDMA OFDM and IDMA and can also be used in fifth generation with improvements. In time division multiple access the user are accessed on the basis of time slots. In frequency division multiple access the users are accessed on the basis of different frequency channels. In code division multiple access, every user assigned a single coded sequence and it is used to encode the useful signal at the receiver end.

In Multi-carrier CDMA, it is also a multiple access technique which is used in orthogonal frequency division multiplexing based telecommunication system.

One of the most multi-carrier techniques that are used in modulation system is orthogonal frequency division multiplexing (OFDM). Here the sub carriers with varying frequencies are used. At the receiver end this orthogonality is maintained and to prevent collision the interleavers are used.

Here three schemes using interleavers have been proposed. They use source as transmitter. The scheme use the kasami sequence generator as the source which acts as the transmitter. Here the blocks from the matlab tool box are used for making the scheme which has the transmitter channel and the receiver. The scheme also uses interleavers. The scheme uses MIMO, Rayleigh and binary channel. It uses the modulation and demodulation in the scheme. Here the error rate calculator is used for calculating the error rate. Error rate display is used for displaying the error rate.

The signal flows from the transmitter to receiver. We get the output in response to the input and intermediate channel the signal passes through in the scheme.

Thus, the effect created to simulate the scheme gives us results close to the expected or true values. Therefore the results obtained during the simulation are too much near to the phenomena's of the signal transferring through the urban or the natural day today environment. Thus, such kind of simulation is very helpful in determining the exact effect of the natural phenomena occurring in nature.

II. IDMAMECHANISM

In wireless communication system, Interleaving can be referred as a technique which is commonly used to overcome noise in the channel such as error burst or fading .In Interleaving process, the input data bits reorder itself such that consecutive bits of data are exchanged and splitted

among various blocks in a known pattern among them. At receiver, the Interleaved data is arranged back to original sequence of bits with the help of de-interleaver. As a result, error can be reduced or minimized or can be corrected.

Interleavers Scheme

Schematic diagram of Interleaver Scheme using different channel

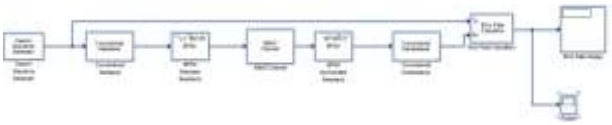

Fig1.

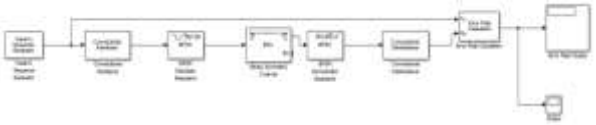

Fig2.

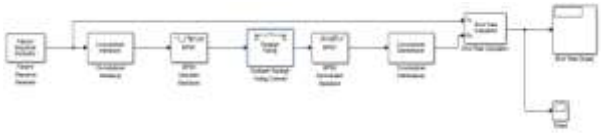

Fig3.

Fig 3 Schematic diagram of IDMA

In fig1.Kasami sequence generator is used as source. Convolutional interleaver are used then binary phase shift keying modulator then MIMO channel is used. It is passed through BPSK demodulator and convolutional deinterleaver is used. Then error rate calculator calculates the error between transmitter and receiver.

In fig2. Kasami sequence generator is used as source. Convolutional interleaver are used then binary phase shift keying modulator then Rayleigh channel is used. It is passed through BPSK demodulator and convolutional deinterleaver is used. Then error rate calculator calculates the error between transmitter and receiver

In fig3. Kasami sequence generator is used as source. Convolutional interleaver are used then binary phase shift keying modulator then binary symmetric channel is used.It is passed through BPSK demodulator and convolutional deinterleaver is used. Then error rate calculator calculates the error between transmitter and receiver

Kasami Sequence Generator

Generate Kasami sequence from set of Kasami sequences

Convolutional Interleaver

It is used for interleaving the date.

BPSK Modulator

Modulate using Phase frequency shift keying method. The PSK Modulator Baseband block modulates using the Binary Phase frequency shift keying method. The output is a baseband representation of the modulated signal.

MIMO Channel

Multiple input multiple output channel.

Rayleigh Channel

It is used in urban environment

BSC

It is binary symmetric channel.

BPSK Demodulator

Demodulate BPSK-modulated data. The PSK Demodulator Baseband block demodulates a signal that was modulated using the Phase frequency shift keying method.

Convolutional Deinterleaver

It is used for deinterleaving the data.

Error Rate Calculator

Compute bit error rate or symbol error rate of input data.

III. SIMULATION RESULTS

Parameter	MIMO channel	Rayleigh channel	BS channel
Target no. of errors	100	100	100
Max. no. of symbols	1e5	1e5	1e5
Error rate	0.4405	0.5046	0.5564
Total no. of errors	100	100	100
The total no. of comparisons	220	196	198

Parameters	
Kasami sequence generator	
Probability of zero	0.5
Initial seed	89
Data type	double
Sample time	1/1200
MIMO channel	
Initial seed	67
Eb/No(dB)	10
No. of bits per symbol	1
Signal power (watts)	1
Symbol period	1

Convolutional Interleaver	
Sample time	1/1200
Row of shift register	6
Register length step	2
Initial condition	0
BPSK modulator	
Phase offset	0
Data type	double
Rayleigh channel	
Initial seed	67
Eb/No(dB)	10
No. of bits per symbol	1
Signal power (watts)	1
Symbol period	1
BSchannel	
Initial seed	67
Eb/No(dB)	10
No. of bits per symbol	1
Signal power (watts)	1
Symbol period	1
BPSK demodulation	
Phase offset	0
Decision type	Hard type
Convolutional deinterleaver	
Sample time	1/1200
Row of shift register	6
Register length step	2
Initial condition	0
Error rate display	
Computational delay	0
Receive delay	0
Display	
Format	short
decimation	1

IV. CONCLUSION

I have outlined the basic principles of Interleaver and the simulation results with the help of MIMO, Rayleigh,, BS channel. I have calculated the error rate by error rate calculator and found error rate of Kasami sequence generator with convolutional interleaver using the MIMO channel is lower than scheme using Rayleigh and binary symmetric channelBased on the implementation of Interleaver I found that Kasami sequence generator with convolutional interleaver using MIMO channel is better.

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