RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

MIMO – ALAMOUTI SCHEME

DIGITAL COMMUNICATION SYSTEMS

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1. Introduction and Motivation

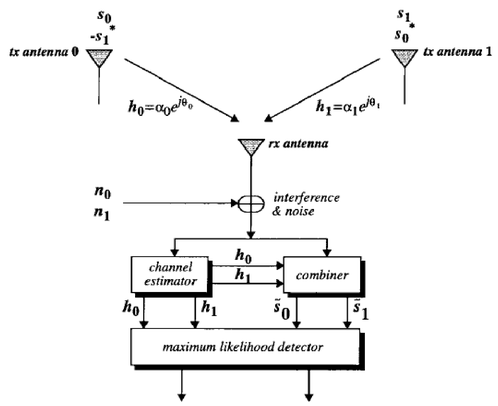
Space-time block coding is a technique used in wireless communications to transmit multiple copies of a data stream across a number of antennas and to exploit received versions of the data to improve reliability of data transfer. Increasing the performance of a wireless communication system in a multipath fading channel is a huge challenge. Usually, increase in transmitter power considerably increases the SNR. However, transmitter power cannot be increased beyond a certain level due to the FCC regulations. Hence, there is a need to go for diversity schemes, especially at the transmitter, as receiver diversity will increase bulkiness and make it more costly to design.

2. Problem Statement

• To implement a MIMO Wireless Communication system (Alamouti scheme), with two transmitters and one receiver.

•To analyze the performance of the system in terms of Bit Error Rate (BER).

3. Representation of Transmit Diversity Scheme



4. Design:

TRANSMITTER :

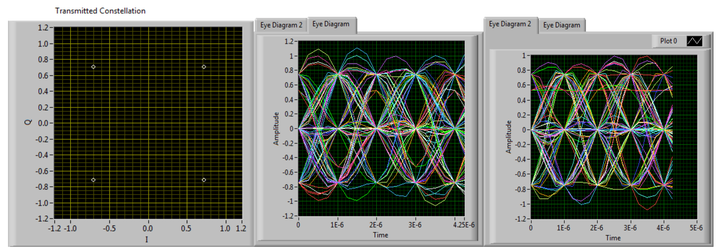
1. Random Bit Generator
2. Symbol Mapper
3. Stream Split
4. Pulse Shaping
5. TX Apply Channel

RECEIVER:

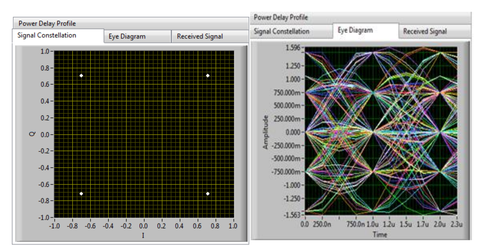
1. Matched Filtering
2. Synchronization
3. Simple Estimate
4. Combiner
5. Decoder
6. Error Detect

5. Results

TRANSMITTER CONSTELLATION AND EYE DIAGRAMS:



RECEIVER CONSTELLATION AND EYE DIAGRAM:



6. Applications

1. Used in Mobile radio telephone standards like 3GPP and 3GPP2.
2. IEEE 802.16e incorporates MIMO-OFDMA, where problems of multipath are handled effectively.

7. References

1. Siavesh M. Alamouti, "A Simple Transmit Diversity Scheme for Wireless Communications," *IEEE Journal on Select Topics in Communication, 1998.*
2. Andrea Goldsmith, "Wireless Communications." *Cambridge University Press.*