



Advanced Communication Network using Markov Chain Technique in MIMO-OFDM

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Abstract: To implement a realistic channel, markov chain is applied. Markov chain helps to achieve better BER performance. Channels like AWGN, Rayleigh and Rician is studied for Line-Of-Sight and Non Line-Of-Sight propagation. Comparison between these channels is implemented for selection of better communication channel. MIMO-OFDM transmit multiple data signals parallel. Since markov chain is irreducible, it is possible to travel from one state to another. This will result into error free communication.

Keywords: MIMO, OFDM, Markov Chain, BER.

I. INTRODUCTION

With the awareness of the mobile phone technologies, subscribers now a day's look for appropriate package including the entire advance features. Through mobile communication, users can use these applications at anytime and anywhere. The First Generation (1G) mobile phone networks uses analog signals to transmit the voice calls only between the two transmitters. Next stage in the development of wireless technology is second Generation (2G) mobile network which overcome the limitations of 1G. 2G technology is based on transmission of voice and data with digital signals. Because of low speed and incompatible technologies used on previous generations, third Generation (3G) was arrived. The main features of 3G is that it allows higher data transmission rates and increased capacity for traditional voice call and high speed data applications such as Global Roaming, internet, mobile, video conferencing, video calls and 3D gaming. 4G stands as an acronym for fourth generation communication system which describes the next step to the 3G technology. As the users can use the mobile multimedia at anytime anywhere with global mobility support on integrated wireless solution and customized personal service at higher data rates than previous generations, 4G is called as MAGIC. Fifth Generation (5G) is a packet switched wireless mobile communication system with extensive area coverage and high through put. Hence it is called as Real World Wireless or Wireless World Wide Web (WWWW).

II. LITERATURE REVIEW

In [1], OFDM-MIMO with index modulation is considered to boost the data rate. It uses separate data frames for demodulation at receiver. Due to different error performances it is difficult to analyze the number of detectors. On the basis of TDD system, 5G supports radio access network. Combination of MIMO-OFDM results into flexible UL/DL[2]. Characteristics of channel can be estimated using Markov chain after channel classification. To obtain significant result with minimum errors Markov chain is used over several channels [3]. With the separation of indoor and outdoor Multiple Input Multiple Output (MIMO) is used for higher spectral efficiency and improved coverage for cell edge users. New applications include high spectral efficiency, increased number of users[4].

III. MIMO-OFDM-MARKOV CHAIN

MIMO-OFDM with the combination of markov chain becomes very effective communication system for error free communication network. MIMO-OFDM transmits multiple data signals which then transmitted in parallel form with the help of OFDM. Markov chain then allow these signals to operate independently. Following figure.1 shows the concept of markov chain with the communication channel.

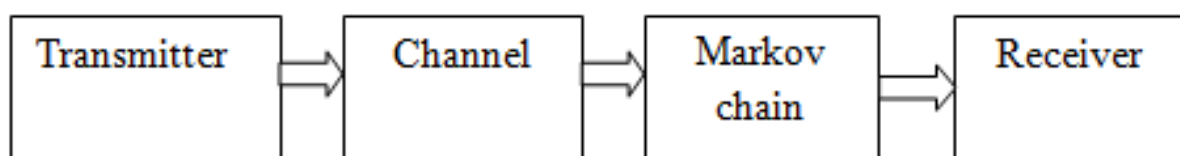


Figure 1. Markov chain with communication network



As shown in above figure 1, Markov channel is added into basic communication system. Markov chain adds fake emission matrix into communication channel so that it will create different data pattern than transmitted one. This will helps to reduce the loss of information and creates secure communication network.

IV. RESULTS AND DISCUSSION

With the study of Markov chain technique and BER calculations of different fading channels, we conclude the following results.

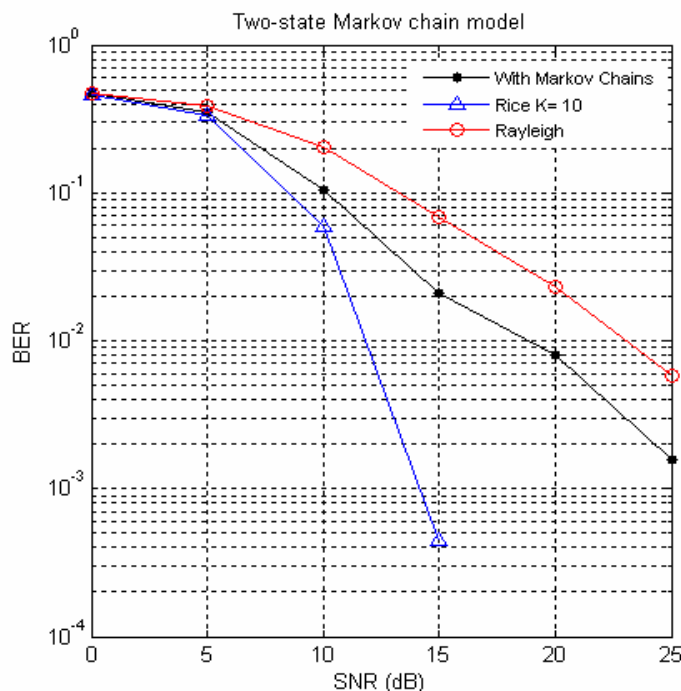


Figure 2.2 States markov chain

Figure 2. shows the 2 states markov chain with the Rayleigh and rician channel. Rayleigh channel operates with the ratio of 0:5:25. As the value of K changes, BER of operating channel also varies.

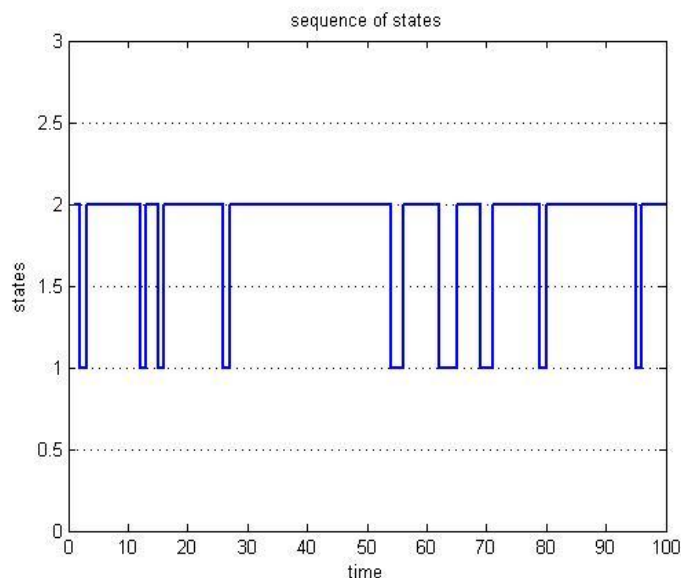


Figure.3 markov chain with fake data

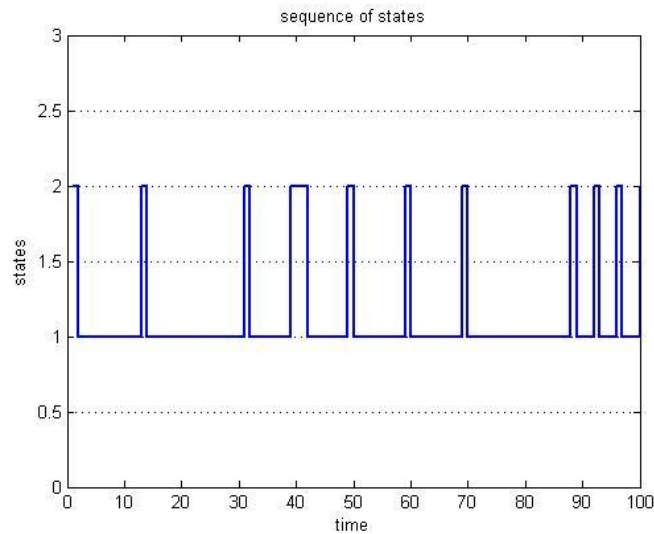


Figure 4. Markov chain with fake pattern

As observed from figure 3 and figure 4, data will vary with the minimum time period. Since markov chain generates fake pattern, data will remains secured.

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