ABSTRACT

The Code Division Multiple Access technique allows many users to simultaneously access a given frequency allocation. User’s separation at the receiver is possible because each user spreads the modulated waveform over a wide bandwidth using unique spreading codes. CDMA is form of multiplexing and a method of multiple accesses that does not divide up the channel by time or frequency but instead encodes data with a special code associated with each channel and uses the constructive interference properties of the special code to perform the multiplexing. CDMA also refer to digital cellular telephony system that makes use of this multiple access scheme.

There are two basic types of CDMA. Direct sequence CDMA (DS-CDMA) and Frequency hoped CDMA (FH-CDMA). In DS-CDMA the signal data is directly multiplied with a user unique high bandwidth pseudo-noise binary sequence. The resulting signal is then mixed up with a carrier frequency and transmitted. The receiver mixed down to base band and then re-multiplies with the binary \{±1\} pseudo-noise sequence. This effectively removes the pseudo-noise signal and what remains is just the transmitted data wave form. A number of different terms are used to refer to CDMA implementations. The original U.S. standard of the telecommunications Industry Association (TIA). IS-95 is often referred to as 2G or second generation cellular system.

Capacity of a communication network is the maximum number of the subscribers that can be accommodated for a given quality of service parameters. The CDMA system is interference limited system since the entire nearby cell uses same frequency spectrum. The capacity of the system decreases as the interference increases. Thus CDMA system capacity is interference limited. The quality of service parameters are signal to noise ratio, signal to interference ratio, bit energy to noise ratio, and bit error rate etc. These qualities of service parameters become poorer due to increase in interference level. Also quality of service parameter becomes poorer due to problem of multipath phenomenon. Thus multipath phenomenon affects the quality of service parameter and in turn capacity of the system.

Interference of electromagnetic waves in communication causes a serious problem. These electromagnetic waves combine vector ally to give a resultant signal which can be large or small depending upon whether the incoming or reflected waves combine destructively or
constructively. The destructively points known as nodes or minima and the constructive points known as maxima occur repeatedly in a regular standing wave pattern along the transmission line. Once the radio wave is launched from an antenna we cannot ensure that it will always reach the receiver antenna directly. Large obstructions such as hills or mountain may weaken the radio waves from a mobile station or even cause a complete loss of the signal. This phenomenon is known as slow fading.

Another phenomenon is that the radio wave reaches the receiver antenna from many directions with different time delay after experiencing reflection or scattering, and these multipath radio waves will also vectorially combine and produces substantial amplitude fluctuations that create an “irregular” standing wave or the multipath fast fading signal. The method of migrating the multipath fading problem is by mean of diversity technique. Diversity system refers to the system in which one has available two or more closely similar, but statistically uncorrelated copies of same desired signal. In troop scatter communication frequency diversity and space diversity are used.

The objective of the present research work is to study the performance of various diversity combining technique in CDMA system that appeared in the literature and to modify the possibilities of enhancements for the existing model and further to apply fuzzy on diversity and handoff in CDMA system.

To fulfill the above objectives, the analysis is carried out as follows:

1. To analyze the probability of bit error rate for combined effect of antenna diversity and spread spectrum diversity
2. To study bit error rate performance for the switched diversity for the optimum switching threshold using fuzzy technique

Chapter 1: presents the introduction and significance of the topic.

Chapter 2 provides a brief review of the diversity, soft handoff (macro diversity) and literature survey.
Chapter 3 Contains concept of fading and diversity technique. Fading in wireless communication, effect of Rayleigh fading on the performance of Space diversity, Time diversity system. This chapter also contains the performance with Multi Input –Multi Output (MIMO) and Multiple input-Single Output (MISO).

Chapter 4 Contains the Performance analysis of DS-CDMA with additive white Gaussian Noise. It discuss the steps for simulation and receiver. All these parameter are created using MATLAB. This Chapter also contain Performance of CDMA under Rayleigh fading and additive white Gaussian noise.

Chapter 5, the macro diversity due to two base station involved in communication with the mobile during soft handoff is considered, the SIR is combined from the two Base stations proposed and the number of users in the system have been calculated. The Probability of bit error rate has been investigated and the probability of bit error rate have been analyzed without diversity and with diversity for different value of the threshold.