ABSTRACT

The demand for faster data rates is increasing exponentially, as wireless communication systems progress enormously. The fundamental issue with wireless communication is, the signal is subjected to interference and fading before reaching the receiver. The solution to these issues is multiple-input multiple-output (MIMO) system. It facilitates remote admittance or wireless access to divergent applications, including Wi-Fi, WiMAX. The system also helps to enhance data efficiency for fourth generation systems and long-term evolution (LTE). Similarly, in 5G new radio networks, Non Orthogonal Multiple Access (NOMA) is a promising scheme to play a key role. Unlike traditional multiple access systems, NOMA enables various users to competently distribute the similar sources (i.e., frequency, code and time) at different power levels, such that the user with lower channel gain is provided with higher power and vice versa. Multiple Input Multiple Output (MIMO) technologies incorporate ten to hundreds of antennas at the base station to accommodate multiple users, thus increasing the throughput and spectrum efficiency. The use of NOMA and MIMO techniques together can result in considerable performance benefits and better wireless services to meet the demands of vast connectivity.

The performance of MIMO systems is carefully investigated in this thesis. The performance of MIMO systems has been studied under various fading channel conditions. The channel characteristics for both conventional MIMO and massive MIMO are estimated. Non-orthogonal multiple access algorithm is designed using a power allocation technique. The effect of transmitting several information streams or data symbols over the power domain through AWGN and Rayleigh channel are characterized using the key techniques such as Non-Orthogonal multiple access which is represented as NOMA and Orthogonal multiple access which is represented as OMA.

NOMA, OMA, and AOMA performance analyses are depicted using average sum value with respect to SNR. The comparative performance is highlighted using the simulation results.

Keywords: Channel Estimation, Compressed Sensing, Massive multiple input multiple output (Massive MIMO), Orthogonal Frequency Division Multiplexing (OFDM)