CHAPTER 7

SUMMARY AND FUTURE SCOPE

In this work, the problem of large envelope fluctuation have been analyzed for MIMO-OFDM system. All the proposals are tested on the IEEE standards viz., IEEE 802.11a and IEEE 802.16e. The four issues described in section 2.4 have been undertaken and successfully implemented.

In the first proposal, two hybrid methods are developed with the combination of two conventional PAPR reduction methods, namely, active gradient project (AGP) and partial transmit sequence (PTS). The proposed active partial sequence (APS) PAPR reduction method is a serial combination of AGP and PTS methods in time domain. It provides better CCDF performance for WLAN (IEEE 802.11a) standard, but for WiMAX (IEEE 802.16e) it requires improvement. Another proposed active transmit sequence (ATS) hybrid PAPR reduction method is a parallel combination of AGP and PTS technique. The ATS method gives better CCDF performance for large number of subcarriers (N = 200) and also maintains the power spectrum of the transmitted MIMO-OFDM signals. The major issues come across these hybrid approaches are slight degradation in bit error rate (BER) performance and high computational complexity.
In the **second** proposal, new combinational linear equalization algorithm is developed for further improvement in BER performance. Linear equalization algorithm is used to mitigate the problem of inter symbol interference brought due to channel delay. The proposed (ZF-MMSE-SIC) linear equalization algorithm provides better BER performance for both the design examples of MIMO-OFDM system. At the same time, high computational complexity of the proposed APS and ATS PAPR reduction methods are required to find suitable alternative in MIMO-OFDM signals.

In the **third** proposal, the main focus of the proposed approaches is to diminish the complexity in terms of number of multiplications and additions required in the APS and ATS PAPR reduction methods in MIMO-OFDM system. Here, multi-layer perceptron (MLP) neural network (NN) model with Levenberg-Marquadt (LM) training algorithm is employed in place of conventional AGP PAPR reduction scheme. The proposed NN based PAPR reduction techniques i.e., NN-APS and NN-ATS provides superior performance in term of computational complexity than other conventional techniques. But due to the large convergence time of neural network based PAPR reduction model, it is not well suited for real time applications.

In the **final** proposal, the reduction of convergence time have been done by using adaptive network based fuzzy inference system (ANFIS). In ANFIS based MIMO-OFDM model, NN model is replaced by ANFIS structure in NN-APS and NN-ATS PAPR reduction schemes and also ANFIS based adaptive equalization algorithm is employed at the receiver for superior performance of MIMO-OFDM system under fast time varying fading environment. The ANFIS based MIMO-OFDM models efficiently works well for real time applications.
The large envelope fluctuations and inter symbol interference in MIMO-OFDM is still an ongoing issue, especially for portable devices where the need to minimize the power amplifier linear range is paramount. Therefore, following are the works that may be considered as a future scope in this direction:

- The proposed techniques can apply on some other standard application of MIMO-OFDM, namely, LTE, DAB, HIPERLAN/2 and 3GPPP systems.

- The channel estimation is an area which required a lot of attention and improper channel estimation degrades the performance of the multi-carrier system. The channel estimation using soft-computing methods is also a new research area for future.

- The timing and frequency offset in multicarrier modulation techniques is also require proper attention for better performance under noisy environment.

- The designing of smart antennas is also provide great explore to the research in future.