Utilizing MIMO Technology in High Speed Wireless LANs

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Multiple-input multiple-output (MIMO) channels have been shown to offer significant increase in system capacity (bit/s/Hz) when compared to conventional single-input single-output (SISO) systems. The current trend in the wireless local area networks (WLAN) is towards higher user data rates which can be achieved using MIMO techniques.

The goal of our final year project is to develop a system in which an Access Point (AP) that can support Multiple Input Multiple Output (MIMO) in order to communicate with multiple mobile STAs simultaneously.

The system also has at least 5 times the bit of an existing Wireless LAN, and is compatible with the existing WLAN protocols.

Figure 1 Enhance the ability of the congestion control in the WLAN by MAC layer of IEEE 802.11a/b/g modification.
Figure 2 Investigated a special Multi-user MIMO algorithm that decomposes the MIMO channel in several individual single user channels.

Figure 3 The MAC layer scheduling algorithm and the packet loss handling method are modified so that the data rate can be increased by deferring the transmission which encounters a poor channel.
Computing the performance in term of bit error rate (BER) against Signal to Noise Ratio (SNR):

Figure 4 MRC uplink with 2, 3 and 4 antennas

Figure 5 Multiuser decomposition algorithm over flat fading channel and SVD