

## ABSTRACT

In the wireless communication system with high data rate, high bandwidth is needed. In the other hand, frequency spectrum is limited. Besides the transmitted signal will be distorted because of the presence of multipath fading which it will decrease system performance. One of techniques to realize high data rate wireless communications system is OFDM (Orthogonal Frequency Division Multiplexing) modulation. To help increasing the performance of OFDM system an adaptive array antenna is implemented in receiver.

In this final project, the presence of two adaptive algorithms Least-Mean-Square (LMS) and Recursive Least-Square (RLS) compared on both Pre-FFT and Post-FFT in fading environment. This final project will also analyze the performance of the system with using two, four and eight elements placed in receiver side. Furthermore, the effect of user's velocity to the system's performance will be analyzed too.

Based on the experiment result, post-FFT scheme can improve system's performance about 3-5 dB than pre-FFT. However Post-FFT has higher complexity and needs more time for computation process than Pre-FFT. More antenna elements used in the receiver will increase the system's performance. The use of RLS algorithm in both schemes give improvement about 1-2 dB than LMS algorithm. But if user moves with high velocity, the system's performance will decrease. At Doppler frequency 385 Hz, SNR needed to achieve BER  $10^{-4}$  is more than 30 dB.

Keyword: OFDM, *multipath fading*, *Pre-FFT*, *Post-FFT*, RLS, LMS