

## ABSTRACT

Mobile communication systems typically use an antenna that has a fixed beam. Smart antenna is an adaptive array antenna that can change the radiation pattern or other parameters in accordance with changes in signal parameters that will come. Smart antennas will direct the maximum radiation pattern toward the target signal in the signal direction and minimize distractions. Hopefully, with the use of smart antennas will improve the performance of mobile communication systems.

This thesis analyze the performance of smart antenna using least mean square algorithm (LMS) and Recursive least square (RLS) in WiMAX systems. LMS and RLS algorithm will minimize the sum of the squared estimation error in the weighting of the antenna elements. This simulation will analyze the mean square error (MSE) of the signal to noise ratio (SNR) using the test parameters of the desired number of users, amount of interference, the number of antennas, and the number of subcarriers. And this simulation will analyze the signal quality by observing the signal to noise and interference ratio (SNIR) against changes in the amount of interference.

The result is better performance of smart antenna on the use of the RLS algorithm is shown on the graph of MSE which tends to decrease on increasing the SNR in the scale of 0 dB to 20 dB and the value of SNIR in ideal conditions, that is equal to 21.5 dB. The decrease of MSE will be affected by the reduction in confounding signals, increasing the number of antennas, reducing the number of subcarriers, the slow movement performed by the user. Increasing the value of SNIR is indicated by slowing the speed of the user. On multiuser using four antenna elements, the simulation gives a beam adjacent to four users, namely the arrival at an angle of  $0^{\circ}$ ,  $10^{\circ}$ ,  $20^{\circ}$  and  $30^{\circ}$ . Mean square error value results LMS algorithm converge faster than the value approaches zero mean square error of the RLS algorithm. Algorithm use forgetting factor value Ste-factor and the optimum size of the simulation is set at 0.9.

**Keywords :** *beam, smart antenna, least mean square, Recursive least square, mobile WiMAX, forgetting factor, step-size*