

## ABSTRACT

Demand of data transmission and voice with high data rate in wireless network this time become main topic when we prepare for future technology. Mobile WiMAX promises high quality as user demand, such as low power, wide coverage, and high capacity. Multicarrier application like OFDM (*Orthogonal Frequency Division Multiplex*), in Mobile WiMAX could mitigate *frequency selective fading*.

Mobile WiMAX is a wireless digital communication technology which is prepare for 4G. We can improve the performance of Mobile WiMAX which is designed this time by using *Smart Antenna*. Utilization of *Smart Antenna* that consists of several antenna elements for beamforming will combined with MIMO. This research is applied to analyze the use of MIMO-Adaptive Beamforming combination which is called *Smart Antenna* in Mobile WiMAX and analyze system performance in fading environment. Adaptive algorithm which is applied in *weighting factor* of antenna in this research is *Least-Mean Square* (LMS) Algorithm. And also considered the effect of user velocity to the system performance.

Simulation result proves that *Smart Antenna* (MIMO-Adaptive Beamforming) application for BER  $10^{-3}$  is better to improve system performance in Mobile WiMAX if compared with system without using *Smart Antenna*. In spite of, processing time of Smart Antenna is longer than without using *Smart Antenna*.

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