

## **ABSTRACT**

*Adaptive sub channel represents the usage mechanism sum of the sub carriers adaptively pursuant to characteristic fading. This technique is used to arrange the energy transmitted at subscriber station. Its way that is with the power concentration for the certain sub channel. WiMax use OFDM (Orthogonal Frequency Division Multiplexing) technique to improve performance in multi path environment or Non Line Of Sight. OFDM is special form of multi carrier modulation (MCM), where a single data stream is transmitted over a number of lower rate sub carriers. Adaptive sub channel is very compatible applied at system using multi carrier technique because the principle adaptive sub channel is usage sum up the sub carriers adaptively pursuant to characteristic fading.*

*WiMax IEEE 802.16e has a weakness that is asymmetric coverage between Subscriber Station with the Base Transceiver Station (BTS) that is influenced by limitation of SS transmit power. This problem can be overcome by using adaptive sub channel technique because this technique can arrange the power transmit of SS so receiver will receive desired signal. Applying adaptive sub channel has an effect on to data rate. When we used a few of sub channel, data rate became lower conversely. To balance low data rate we use adaptive modulation. Modulation type of adaptive modulation and the number of sub channel for adaptive sub channel is very depend on channel condition.*

*Besides adaptive sub channel, MIMO ( Multiple of Input of Multiple Output) is also applied at this research. MIMO System*

*represents one of technique to improve the performance that is influenced by multi path fading by using multi antenna; beside transmitter and receiver ( M,N). MIMO that is used at this research is MIMO STBC ( Space Time Block Code ) 2x2. Channel used in simulation is rayleigh channel with quasi static character.*

*The result of this research at a speed of 30km/hour, MIMO system use adaptive subchannel and adaptive modulation give the performance improvement equal to  $\pm 5$  dB to system of SISO of moment BER  $10^{-3}$ .*

*Keyword : adaptive sub channel, MIMO, WiMax, IEEE 802.16e*