

## ABSTRACT

Mobile WiMAX communication system based on the IEEE 802.16e is designed to provide services through more sub-channel. This technology is next amendment from 802.16d and has supported the ability to serve mobile and nomadic user. Mobility of user cause channel conditions changing, so the transmitter must be adapted to changing the channel conditions in order to maintain the quality of data in receiver. To overcome the problems mobile WiMAX can use MIMO technique and adaptive modulation. MIMO technique that can be used is Space Time Block Code and Spatial Multiplexing. STBC Technique has reliability to get lower BER with lower data rate while Spatial Multiplexing offer high data rate however the ability to get lower BER is not good as STBC.

Based on the problem, simulation and analysis the systems integration of STBC and SM with adaptive modulation have done in this final project. The STBC that used in project is Alamouti 2x2 and the SM system is VBLAST. The purpose of this final project is to analyze mobile WiMAX 802.16e performance with STBC-VBLAST system, and to get threshold from each level of modulation that use in adaptive modulation technique. The user speed that use in this project is 3 Km/hour and environment models are pedestrian with low delay spread and medium delay spread.

Based on the simulation result, to reach  $10^{-3}$  BER value, STBC system in environment of pedestrian with low delay spread equal to medium delay spread that is 9.66 dB Eb/No value for QPSK, 16.6 dB for 16QAM, and 13,74 dB for 64QAM. VBLAST system in environment of pedestrian low delay spread, 12.91 dB for QPSK, 19.16 dB for 16QAM, and 26.45dB for 64QAM while in medium delay spread 12.91 dB for QPSK, 21.25 for 16QAM, and with 64QAM modulation  $10^{-3}$  BER value is not reached. STBC-VBLAST system in environment of pedestrian with low delay spread not value for QPSK, 18.33 dB for 16QAM, and 25.83 dB for 64QAM . Medium delay spread, 12.08 dB for QPSK, 18.33 dB for 16QAM, and 25.83 dB for 64QAM.

**Keyword** : WiMAX, *Space-Time Block Code (STBC)*, *Vertical-bell laboratory layered space-time (V-BLAST)*, *Modulasi Adaptif*, *Bit Error Rate (BER)*, *Eb/No*.