## ABSTRACT

Release 6 of 3GPP (Third Generation Partnership Project) adds HSDPA (High Speed Downlink Packet Access) in WCDMA (Wideband Code Division Multiple Access) as an effort to make system more efficient for packet data applications by increasing peak data rates and reducing packet latency. Theoretical data rate for HSDPA is approximately 14 Mbps. The actual HSDPA rate achieved is still much lower than that. Therefore the use of Multiple-antenna on transmitter and receiver, known as a Multiple-Input Multiple-Output (MIMO) technique, considered to be able to improve the system performance of physical layer by increasing the capacity and getting gain diversity.

This final thesis simulates the physical layer model of HSDPA depicted in 3GPP standards. These include generation of transport blocks, turbo coding, rate matching, scrambling and mapping as the modulation. The MIMO Space Time Block Code (STBC) scheme with two transmitters and two receivers is integrated in physical layer of HSDPA. Some important features of HSDPA are also simulated as the test performance of STBC 2x2 which is compared by Single-Input Single-Output (SISO) HSDPA. These features are Fast Retransmission, Adaptive Modulation and Coding (AMC), the use of Hybrid Automatic-Repeat-Request (HARQ), and 2 ms Transmission Time Interval (TTI). These systems are tested in rayleigh fading channel with Gaussian noise (AWGN).

The simulation result shows that STBC 2x2 HSDPA gives improvement average about 1,625 dB, 1,975 dB, and 6,825 dB for each transmission to SISO HSDPA in doppler frequency of 0 Hz, 5.8 Hz, and 19.4 Hz. The STBC 2x2 also reduces the power about 3 dB for achieving 1000 kbps HSDPA throughput compared with SISO HSDPA in 0 Hz doppler frequency.

Keywords: HSDPA, STBC, AMC, Fast Retransmission, Throughput