ABSTRACT

Wireless communication system development nowadays focused to support the services with high data rate and at the same time that system must give good performance. The multi-hop communication system using relay's diversity techniques which is supported by a reliable coding is a system that can fulfill the above feature.

This research has a result prototype simulation of cooperative wireless communication system with Alamouti codes and OFDM system, 3 hops in Rayleigh fading channel. From Alamouti research, Space Time Block Code (STBC) for multi antenna system can perform high quality signal at the receiver in the Rayleigh fading channel and the noisy system. In this research, STBC is applied to single antenna system and single carrier (Distributed-STBC/DSTBC) which is able to reduce the complexity of the system but the system performance even can be maintained and improved in the presence of cooperative communication system or multi-hop system (relay's diversity). Simulations performed using 1 relay. Simulation tested for several conditions, different schemes on the relay system, the type mapper is used, the influence of subcarriers, the influence of the power ratio, and the effect of the MS speed and different relay.

Simulation results show that by using scheme 2 (relay sends orthogonal symbol of symbols sent transmitter) on the relay system is able to deliver better quality performance than scheme 1 (symbols are transmitted the relay with same sent transmitter). Power needed for BPSK to reach BER 10^{-3} is 24.57 dB. And QPSK to reach better performance 25.23 dB power up is needed for scheme 1 to have the same quality as the system scheme 2.

Keywords : **Relay’s diversity, multi-hop system, OFDM, Single Antenna, Distributed-STBC/DSTBC, diversity, Noise, Rayleigh fading**