ABSTRACT

Multi-Code Multi-Carrier Code Division Multiple Access (MTC-MC-CDMA) is a system that has ability to accommodate variable data rate. This system used multi-carrier scheme to reduce multi-path effect and interference, and used multi-code scheme to support variable data rate. The main problems are how to allocate rate effectively and power optimally so each user can achieve target QoS (Quality of Service) and maximal system capacity. The solving for these problems are using rate adaptive and power control that can predict channel variation accurately so it can give accurate compensation for Multiple Access Interference (MAI) and attenuation because multi-path fading.

This thesis has been researched the performance of MTC-MC-CDMA system combined with power control and rate adaptive scheme. The power control algorithm is composed with fuzzy logic ANFIS (Adaptive Neuro fuzzy Inference System) algorithm. Fuzzy power control is implemented in *Mobile Station* (MS) dan *Base Tranceiver Station* (BTS). Fuzzy Power control algorithm used training data function to analyze all input parameter from user measurement result like *Signal to Interference and Noise Ratio* (SINR). This algorithm is also used membership function to grouped users input with different weight. With mapping to the fuzzy rule base, this algorithm decide power control command. In user equipment, fuzzy power control is implemented as a enhance power control command from BTS.

Research has been done through simulation of MTC-MC-CDMA system that combine with fuzzy power control and rate

adaptive. This thesis researched the performance of MTC-MC-CDMA system from BER (Bit Error Rate) achievement for each SNR user, BER values for different interference user to know maximal capacity handled by sistem. This thesis is also researched fuzzy power control performance from dynamic range achievement and average of user transmit power compare with convensional novel algorithm.

The research results, show that the performances of MTC-MC-CDMA system with fuzzy power control scheme are improve. The improvement can be seen from better BER achievement and capacity impovement if its compares with konvensional novel power control. Fuzzy power control algorithm is also give less dynamic range and user transmit power than konvensional novel power control. But the architechture of fuzzy power control algorithm, however is much more complex and long computational than convensional power control.

Keyword : MTC-MC-CDMA, *Rate control*, *Fuzzy Power Control*, *ANFIS*