

ABSTRACT

SC-FDMA as LTE uplink main technology due to its lower PAPR ratio than OFDMA. SC-FDMA has high sensitivity to doppler shift that can destroy orthogonality and cause ICI. Therefore, need to do channel estimation to improve system performance. In previous works, system performance improvement has been done by using LS technique, but this technique has low performance. Therefore, MMSE channel estimation technique has been proposed in this research.

In this research, LTE MIMO SC-FDMA system using channel estimation based on MMSE are evaluated. In SC-FDMA, channel need to be estimated by using MMSE technique at the receiver. Generated data at transmitter pass through modulation and pilot symbol inserted in modulated data at subcarrier periodically and send it through channel. In the receiver, perform pilot extraction and MMSE channel estimation calculation to get estimated channel, and then perform equalization to obtain data symbol. This data symbol send through demodulation to obtain data output. Channel estimation performance evaluation has been done at variation of speed user movement at outdoor environment by using QPSK and 16-QAM modulation at Rayleigh and AWGN channel. Rayleigh channel model is depicted as outdoor environment with many building block with much reflection. In this research, we observed performance channel evaluation by using BER and Eb/No parameters.

Simulation result said that generally performance of channel estimation with QPSK modulation is better than 16-QAM modulation to get same of BER value based on requirement of Eb/No. MMSE channel estimation give better performance at multipath fading channel at 3 km/h with Eb/No value 18.91 dB with target BER 10^{-5} at QPSK modulation and Eb/No value 22.84 dB target BER 10^{-5} at 16-QAM modulation, recommended using lower requirement of Eb/No, because easier to get target BER 10^{-5} , so that more optimum for communication quality.

Keyword: SC-FDMA, pilot symbol, modulasi, Rayleigh, AWGN, BER, Eb/No