ABSTRACT

Orthogonal Frequency Division Multiplexing (OFDM) is a transmission technique that can save bandwidth and its use can reduce the negative effects of frequency selective fading. To increase capacity, a Low-Density Signature Orthogonal Frequency Division Multiplexing (LDS OFDM) system is proposed that allows overloading factors of more than 100%. Overloading factor is the ratio between the number of users (effective) divided by the number of subcarriers.

This Final Project combines the OFDM with the LDS technique called LDS-OFDM because the overloading factor is more than 100% so that the receiver section needs to use Multi-User Detection (MUD). This final project uses an algorithm that is, Message Passing Algorithm (MPA) with system parameters, namely the number of users as much as 6 and the number of subcarriers as much as 18. The LDS-OFDM system will be compared with Multi-Carrier Code Division Multiple Access (MC-CDMA) where both systems will use one of the same modulation techniques, namely Quadrature phase-shift keying (QPSK).

The result of the simulation is a graph of the Bit Error Rate (BER) against Eb / No. LDS-OFDM compared with MC-CDMA on BER 10-4 had Eb / No 13.16 dB results on MC-CDMA and 14 dB on LDS-OFDM. Overloading factor variations of more than 100% at BER 10-4, overloading 100% requires Eb / No 14.64 dB, 17 dB at 133% overloading and 200% overloading requires more than 20 dB to reach BER 10-4. The greater the value of overloading factor in LDS-OFDM, the system performance decreases, because the symbol spread is not optimal for subcarriers. Increased overloading factor makes the data stream of each user more and more, while the number of symbols that can be sent to subcarriers is lower. LDS-OFDM simulation without using MPA only has BER 0.059 results with Eb / No 20 dB, because there is no repetition and no correction on incorrect bits.

Keywords: *LDS-OFDM, MC-CDMA, MPA, BER, MUD.*