Performance evaluation of OFDM schemes over multipath fading channels

ABSTRACT

This paper discusses the transmission of the orthogonal frequency division multiplexing (OFDM) signal through the multipath fading indoor channel and its capability to combat the intersymbol interference (ISI) as well as its effective implementation with the discrete Fourier transform is described. The channel model used was based on Saleh-Valenzuela model with lognormal fading distribution of gain amplitudes. Simulation modules were developed and the effect of the multipath on the OFDM system performance with BPSK, QPSK, 16PSK, 64PSK, 16QAM, 64QAM, and 128QAM modulations was evaluated in terms of the bit error rate (BER) as a function of the energy per bit-to-noise ratio (EBNR). The influence of the number of carriers as well as the guard interval duration on the performance was also investigated. Simulations showed that the EBNR required to achieve a certain BER is significantly increased by 8-10 dB for dense multipath fading channels over that required in AWGN channels. These performance measures are useful for the design and assessment of high speed indoor wireless communication systems.

Keyword: OFDM technique; Multipath fading; Indoor channel modeling