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Abstract
Wireless LAN IEEE 802.11a, which uses orthogonal frequency division multiplexing (OFDM), offers different communication data rates through 6 to 54 Mbps depended on different modulation techniques. OFDM signal is more sensitive to timing error, frequency offset, nonlinear effect of power amplifier and phase noise in oscillator. This thesis first studies the performance evaluation of the influences by timing error and frequency offset in OFDM system, and then presents detailed analysis and computer simulation by MATLAB for nonlinear effect of power amplifier and phase noise in oscillator.

In the simulation of nonlinear effect of power amplifier, the power gain is assumed to be 11.5 dB and the OIP3 is 28.5 dB. If the input power of the amplifier is equal to 4 dBm, the EVM is about 7.5 %; while the input power is changed to 7 dBm, the EVM becomes 17.2 %. It can be seen that the nonlinear effect causes more EVM when driving power increases.

For the simulation of phase noise, we concern the influence of ICI error using EVM and BER. In the EVM simulation, if the phase noise is equal to -90 dBc/Hz@100 kHz, the EVM is about 0.9 %; while the phase noise increases to -70 dBc/Hz, the EVM increases to 8.7 %. In the BER simulation, if BER=10-3 with AWGN channel is required in a system planning and the phase noise is -70 dBc/Hz@100 kHz, for the case of the OFDM/QPSK signal which needs about 0.5 dB more Eb/No than that without counting in phase noise. While for the case of the OFDM/16-QAM signal, more 2.2 dB Eb/No is required. It is concluded that higher transmitter power will be requested with larger value of M in M-ary QAM. These results are very useful for RF circuit/system designers in OFDM system.
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