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Abstract
The UWB standard committee (802.13 task group 3a) stipulated that Direct Sequence CDMA or multi-band OFDM may be adopted as the transmission technology in 2003. In this thesis, we focus on the UWB multi-band OFDM (MB-OFDM) with RF band of 3 to5 GHz, and evaluate the influence of the frequency offset by simulation using MATLAB. In which, direct conversion receiver (DCR) is adopts as the receiver architecture.
DCR will become popular since the problem of image is circumvented and no image filter is required. However, this approach suffers form some impacts such as DC offset, which can be mitigated using high-pass filter (HPF) after I/Q demodulation. This thesis presents the proper values of 3dB frequency of the HPF by simulation for the MB-OFDM system.
In UWB multi-band OFDM systems, frequency offset must be estimated and compensated at the receiver to improve the communication performance. We use DOA-MATIRX method to estimate the amount of frequency offset, and compensate the frequency error to minimize the effects of inter-carrier interference.
In this thesis, we study the influence of local frequency offset, which also results in DC offset, and estimate the frequency offset for the MB-OFDM system with DCR receiver architecture. By MATLAB program, we present the communication performance evaluation based on bit error rate (BER) and constellation diagram, and determine the optimal value of HPF 3dB frequency corresponding to the different frequency offsets. Finally we modify a frequency offset estimation algorithm, called DOA-MATRIX method, to compensate the frequency error. These simulation results are useful for the RF circuit/system designers in UWB MB-OFDM system.
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