Multiuser Detection and Blind Signal Reception of Time-Hopping PPM Ultra-Wideband Communication System

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ABSTRACT

This thesis is based on time-hopping (TH) pulse position modulation (PPM) in Ultra-Wideband (UWB) impulse radio (IR) communication system, and mainly divides into two parts：multiuser detection and blind interference suppression. We apply a class of linear multiuser detectors (LMDs) to extract the information bits while suppress multi-access interference (MAI) even in the presence of multipath fading. Morever, we develop two types of low-complexity mobile station (MS) receivers. One is originated from the conventional RAKE receiver and the other is designed to meet the minimum output energy (MOE) criterion. However, since accurate channel information is crucial for reliable operation, thereby we propose a blind (non-data aided) channel estimator. The numerical and analytical results demonstrate that not only multi-access interference and near-far problem can be suppressed effectively but also system performance is comprehensively improved.

Keywords : Ultra-wideband(UWB)， Time-hopping(TH)， Linear multiuser detector(LMD)， multi-access interference(MAI)，Blind estimation， Minimum-output-energy(MOE)

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