Multiuser Detection and Blind Signal Reception in Ultra-Wideband Communication System Employing Time-Hopping PAM

劉毅帆、武維疆

E-mail: 9510174@mail.dyu.edu.tw

ABSTRACT

This thesis aims to employ time-hopping（TH）antipodal pulse amplitude modulation（PAM）in Ultra-Wideband（UWB）impulse radio（IR）system. It mainly divide into two parts：multiuser detection and blind signal reception. Most past works rely on strict power control and perform single-user detection (matched filtering) on the desired signal. We apply a class of linear multiuser detectors (LMDs) to extract the information bits while eliminate multi-access interference (MAI) in the presence of multipath fading. Morever we develop two types of low-complexity mobile station (MS) receivers. One is based on the RAKE reception scheme 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. Both analytical and numerical are conducted in this thesis and the results demonstrate that not only multi-access interference（MAI）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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