Design of Training-based Mobile Receivers for Multiuser Time-hopping UWB Communication Systems

邱顯晉、武維疆

E-mail: 9806181@mail.dyu.edu.tw

ABSTRACT

Ultra wideband (UWB) impulse radio (IR) is an emerging and very promising short range communication scheme because of the desired features such as low power consumption, resistance to multipath fading, and precise ranging capability. In this work, we show the feasibility of using small training data set to design blind (without channel state information (CSI) and users ’ time-hopping (TH) sequences) mobile station (MS) receivers for UWB IR communication systems. Under multipath fading channel and multiple access interference (MAI), we develop two types of constrained minimum output energy (C-MOE) based binary signal detectors. The first scheme is completely blind such that the desired user ’ s TH code is not exploited for detection. While the second scheme first despreads the received signal in each resolvable path and combines the outputs by C-MOE based weights. Extensive simulations are conducted to evaluate and compare the performance of the proposed detectors. Employing a relatively small training data set, it is demonstrated that the proposed detectors are robust to MAI and near-far problems and approach the optimum bound.

Keywords : Ultra wideband (UWB)、Time-hopping (TH)、Multiple access interference (MAI)、constrained minimum output energy (C-MOE)、near-far

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