

Research Project Title	Rapid Signal Acquisition Techniques Based on a Mixture of the Immediate-decision and the Delay-decision Methods
Research Project Credits	6
Candidate	Miss A-lin Yongwiriyaikul
Research Project Advisor	Dr. Watcharapan Suwansantisuk
Program	Master of Engineering
Field of Study	Electrical and Information Engineering
Department	Electronics and Telecommunication Engineering
Faculty	Engineering
Academic Year	2013

Abstract

Signal acquisition is an important task that needs to be complete at a receiver before a start of communication. Signal acquisition incurs a decision stage, which traditionally are achieved either by the immediate-decision method or by the delay-decision method. At present, the receivers employ a single decision method in every operating environment, leaving the benefits of the other method unrealized. This research aims to acquire the signals fast and accurately. The specific objectives are (a) to design an optimal method for signal acquisition, by mixing the benefits of the two decision methods, (b) to quantify the performance of the proposed method based on a commonly-used metric, the mean acquisition time (MAT), and (c) to compare the MAT of the proposed method with the MATs of the immediate-decision and the delay-decision methods. The research methodology is the Monte Carlo simulation of the acquisition system. The main research result shows that a critical value exists for the operating signal-to-noise ratio (SNR). In particular, when the SNR is below the critical value, the receiver should use the delay-decision method. When the SNR is above the critical value, the receiver should use the immediate-decision method. The research results are useful in a design of fast and accurate acquisition, which is important in transmission of time-sensitive data.

Keywords : Estimation and decision theory / Optimization / Signal acquisition / Wireless communication