# Abstract


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### A Novel Rake Receiver Based on Continuous Wavelet Transform Designed for UWB Systems


In this paper a new Rake receiver designed specifically for Ultra-Wideband (UWB) systems is presented. The novel Rake receiver is based on continuous wavelet transform (CWT) and is referred to as wavelet Rake receiver (WR). The WR receiver makes use of the huge bandwidth accompanied with the UWB system. The proposed WR receiver uses the CWT components of the transmitted pulse at different scales (frequency resolutions) as the Rake fingers template pulses. The delays of Rake fingers in the WR receiver are taken to be the group delays equivalent to the template pulses center frequency of the fingers. Thus, the WR does not capture the signal energy in the different multipath components at different delays (as in conventional Rake (CR) receiver) but at different frequency components. The WR is presented with UWB single-input single-output (SISO) and multi-input multi-output (MIMO) with analog space time coding (STC) systems. Its performance is compared to these systems with the conventional Rake receiver and Genetic Algorithm (GA) Rake presented in [1] and showed a great enhancement in performance with less receiver complexity.