

A Double Differential Chaos Shift Keying Scheme for Ultra-Wideband Chaotic Communication Technology Applied in Low-Rate Wireless Personal Area Network

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Abstract : The goal of this paper is to describe the design of an ultra-wideband (UWB) system that is optimized for the low-rate wireless personal area network application. To this aim, we propose a system based on direct chaotic communication (DCC) technology. Based on this system, a 2-GHz wide chaotic signal is directly generated into the lower band of the UWB spectrum, i.e., 3.1-5.1 GHz. For this system, two simple modulation schemes, namely chaotic on-off keying (COOK) and differential chaos shift keying (DCSK), were studied before, and their performance was evaluated. We propose a modulation scheme, namely Double DCSK, to improve the performance of UWB DCC. Different characteristics of these systems, with Monte Carlo simulations based on the Additive White Gaussian Noise (AWGN) and the IEEE 802.15.4a standard channel models, are compared.

Keywords : UWB, DCC, IEEE 802.15.4a, COOK, DCSK

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