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Optimization of Energy Efficiency for Cognitive Radio with Partial RF Energy Harvesting

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Abstract

The cognitive radio (CR) with energy harvesting is a potential technology to improve both the spectrum efficiency (SE) and the energy efficiency (EE). In this letter, we consider that the secondary users can harvest radio frequency (RF) energy from primary signal and its own signal. The goal is to maximize the energy efficiency of the CR system subject to sufficient protection to the primary user and the power constraint. An efficient algorithm is proposed to optimize the sensing time and the power of the secondary transmitter. Simulation results show that the EE is further improved by using the proposed mechanism.

Keywords: Cognitive radio, spectrum sensing, energy harvesting, spectrum efficiency, energy efficiency

1. Introduction

In modern wireless technologies, a key consideration is that the battery life of a device is usually limited. A promising solution is to harvest radio frequency (RF) energy over the air since it is stable and not dependent on the nature [1].

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