Ph: 9585554590, 9585554599
Email: support@salemsmartreach.com
URL: www.salemsmartreach.com

Throughput Maximization in Wireless Powered Communication Networks

Abstract:

This paper studies the newly emerging wireless powered communication network in which one hybrid access point (H-AP) with constant power supply coordinates the wireless energy/information transmissions to/from a set of distributed users that do not have other energy sources. A "harvest-then-transmit" protocol is proposed where all users first harvest the wireless energy broadcast by the H-AP in the downlink (DL) and then send their independent information to the H-AP in the uplink (UL) by time-division-multiple-access (TDMA). First, we study the sum-throughput maximization of all users by jointly optimizing the time allocation for the DL wireless power transfer versus the users' UL information transmissions given a total time constraint based on the users' DL and UL channels as well as their average harvested energy values. By applying convex optimization techniques, we obtain the closed-form expressions for the optimal time allocations to maximize the sum-throughput. Our solution reveals an interesting "doubly near-far" phenomenon due to both the DL and UL distance-dependent signal attenuation, where a far user from the H-AP, which receives less wireless energy than a nearer user in the DL, has to transmit with more power in the UL for reliable information transmission. As a result, the maximum sum-throughput is shown to be achieved by allocating substantially more time to the near users than the far users, thus resulting in unfair rate allocation among different users. To overcome this problem, we furthermore propose a new performance metric so-called common-throughput with the additional constraint that all users should be allocated with an equal rate regardless of their distances to the H-AP. We present an efficient algorithm to solve the common-throughput maximization problem. Simulation results demonstrate the effectiveness of the common-throughput approach for solving the new doubly near-far problem in wireless powered communication networks.