Toward Optimal Power Control and Transfer for Energy Harvesting Amplify-and-Forward Relay Networks

ABSTRACT

In this paper, we study an amplify-and-forward (AF) relay network with energy harvesting (EH) source and relay nodes. Both nodes can continuously harvest energy from the environment and store it in batteries with finite capacity. Additionally, the source node is capable of transferring a portion of its energy to the relay node through a dedicated channel. The network performance depends on not only the energy arrival profiles at EH nodes but also the energy cooperation between them. We jointly design power control and transfer for maximizing the sum rate over finite time duration, subject to energy causality and battery storage constraints. By introducing auxiliary variables to confine the accumulated power expenditure, this non-convex problem is solved via a successive convex approximation (SCA) approach, and the local optimum solutions are obtained through dual decomposition. Also when channels are quasi-static and the power control values of the source (relay) node are preset to a constant, a monotonically increasing power control structure with the time is revealed for the relay (source) node with infinite battery capacity. Computer simulations are used to validate the theoretical findings and to quantify the impact of various factors such as EH intensity at nodes and relay position on the sum rate performance.

EXISTING SYSTEM

- In existing system, an optimal power allocation policy to maximize the throughput of an EH AF relay network under a high signal-to-noise ratio (SNR) approximation and without energy cooperation between source and relay nodes.
- By using power splitting or time switching protocols, SWIPT systems for minimizing the outage probability of two way DF relay networks.
- Several relay selection policies for wireless-powered DF relay networks, while a relay selection scheme was investigated in under a timing structure for enabling EH, relay selection, and AF information relaying.

PROPOSED SYSTEM

- In existing system, an iterative power control and transfer algorithm is proposed in the inner loop by solving a sequence of sub-problems.
- To achieve the optimal solution, theoretical results show that at the end of transmissions, the source node has to exhaust the harvested energy either for data transmission or WPT.
- Similarly, the relay node has to exhaust all of its harvested energy either from the environment or the source node for relaying.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

- Processor - Intel core i3
- RAM - 2B
- Hard Disk - 20 GB

SOFTWARE REQUIREMENTS

- Operating System : LINUX
- Tool : Network Simulator-2
- Front End : OTCL (Object Oriented Tool Command Language)

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