

# Energy-efficient Power Allocation Scheme for Multi-relay Cooperative Communications

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**Abstract**—For the increasing cost of energy and infrastructures of wireless communication systems, energy-efficient communication technologies become an important concern for the standardization authorities and cellular operators. In this paper, we propose an energy-efficient relay selection and power allocation strategy subject to a total power constraint. The proposed scheme first selects the transmission mode according to the energy efficiency of the different transmission link. Then, we analyze the energy efficiency of the proposed system and present the optimal number of the relay nodes and the best power distribution factors in broadcasting phase and the cooperative transmission phase. Closed-form expressions of the energy efficiency of the proposed scheme are derived. Simulation results show that the proposed scheme achieves good energy efficiency in both low and high signal-to-noise ratio region.

**Keyword** — Energy Efficient; Cooperative Communication; Green Communication; Outage Probability; Power Allocation.



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