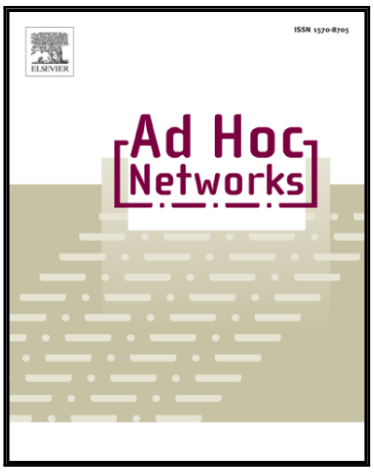

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A convex optimization model for topology control in network-coding-based-wireless-sensor networks

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Abstract

The energy consumption is one of the most common issues in the Wireless Sensor Networks (WSNs). Since the communication usually accounts as a major power consumption, there is some techniques, such as topology control and network coding, to decrease the activity of sensors' transceivers. If we utilize the techniques synchronously, then may overall performance do not increase as expected. This paper provides an optimization problem for energy consumption in WSNs, where the network employs both topology control and network-coding-based multi-cast simultaneously. This approach improves overall performance in comparison with employing them distinctly. The proposed optimization problem is transformed into a convex problem which leads to a numerous theoretical and conceptual advantages. Then the Karush-Kuhn-Tucker (KKT) optimality conditions are presented to derive analytical expressions of the globally optimal solution. Simulation results show that the proposed approach decrease end-to-end delay and has a significantly lower energy consumption than conventional ones.

Keywords: Wireless Sensor Network; Topology Control; Energy consumption; Network Coding; Multi-cast routing; Convex optimization; Graph.

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