

Applying Cluster Merging and Dynamic Routing Mechanisms to Extend the Lifetime of Wireless Sensor Networks

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Abstract

In recent years, the applications of wireless sensor networks have increased steadily. Sensor nodes are often scattered outdoors and their energy consumption depends heavily on the area of coverage and network topology. Many studies were focused on saving the energy of sensor nodes to maintain their functionality. This work aims at extending the lifetime of a wireless sensor network by using cluster merging and dynamic routing mechanisms. Cluster merging can increase the number of sensor nodes in a cluster to balance its energy consumption; dynamic routing prevents the cluster heads from exhausting electric power by forwarding data through detoured routes. The simulation results show that cluster merging followed by dynamic routing is more efficient in extending network lifetime. The best combination of the above two mechanisms is to set the threshold of the remaining energy to 90% for applying cluster merging and 10% for applying dynamic routing, which results in the lifetime about 9 times that of a wireless sensor network without using the adaptive mechanisms.

Keyword : wireless sensor networks, energy saving, adaptive mechanisms, cluster merging, dynamic routing, network lifetime.