Energy-Efficient and Secure Routing Protocols for WSN Architectures, Strategies, and Performance.

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Abstract: *Recent developments in low-power communication and signal processing technologies have led to the extensive implementation of wireless sensor networks (WSNs). In a WSN environment, cluster formation and cluster head (CH) selection consume significant energy. the widespread adoption of wireless sensor networks (WSN) has resulted in the growing integration of the internet of things (IoT). However, WSN encounters limitations related to energy and sensor node lifespan, making the development of an efficient routing protocol a critical concern. Cluster technology offers a promising solution to this challenge. This study introduces a novel cluster routing protocol for WSN. A novel energy-saving cluster routing model is designed, which can accurately reflect the real situation of WSN and significantly improve the network performance. In this model, the CH node is responsible for collecting aggregated cluster data, and the relay node (RN) is responsible for sharing data transmission tasks with the CH to balance the load, and transmits data to the BS through reasonable inter-cluster routing. In addition, this study considers key factors such as node location, node energy, base station distance, intra-cluster compactness, inter-cluster dispersion, and node directionality to construct different objective functions for selecting CH and RN and designing inter-cluster routing.*

Keywords: Wireless sensor networks (WSNs),Low-Energy Adaptive Clustering, Hierarchy (LEACH), Secure Positioning for Sensor Networks (SPIN)