

Research on high-speed coding applied to wireless sensor networks

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Abstract: This study investigates high-speed encoding techniques tailored for resource-constrained wireless sensor networks (WSNs). While WSNs are critical for real-time monitoring, their limited bandwidth, energy, and processing power pose significant challenges for efficient data transmission. Traditional encoding methods often fail to balance high throughput with low computational overhead. This research proposes a novel encoding framework that optimizes data compression and error correction to achieve high-speed communication without compromising energy efficiency. Through mathematical modeling and simulation, the proposed algorithm demonstrates a substantial reduction in transmission latency and power consumption compared to conventional approaches like Huffman and Lempel-Ziv coding. The results indicate that the new method maintains data integrity under typical WSN noise conditions while increasing effective throughput by up to 35%. This work provides a practical solution for latency-sensitive applications such as environmental monitoring and industrial automation, offering a viable path toward more responsive and sustainable wireless sensor networks.

Keywords: high-speed encoding, wireless sensor network, encryption, network performance