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A Study of Optimized QoS Routing Protocols for Manets Using Genetic Algorithm

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ABSTRACT

Optimized Quality of Service (QoS) routing protocols for Mobile Ad Hoc Networks (MANETs) using Genetic Algorithms (GAs) have emerged as a promising solution to address the dynamic and resource-constrained nature of these networks. MANETs, characterized by their decentralized architecture and node mobility, often suffer from frequent topology changes, limited bandwidth, and variable link quality, making QoS provisioning a significant challenge. Traditional routing protocols fall short in meeting the stringent QoS requirements such as delay, jitter, throughput, and packet delivery ratio. Genetic Algorithms, inspired by the principles of natural evolution, offer an efficient heuristic approach to optimize routing paths by evolving solutions over successive generations. In the context of MANETs, GAs are used to identify optimal or near-optimal routes that satisfy multiple QoS metrics simultaneously. The optimization process involves selection, crossover, and mutation operations to generate diverse routing solutions and avoid local minima. This paper explores the integration of GAs into QoS-aware routing protocols, analyzing their performance against conventional techniques in terms of adaptability, scalability, and efficiency. It also discusses simulation results that demonstrate significant improvements in routing stability and QoS parameters. The study concludes that GA-based routing protocols hold strong potential for enhancing MANET performance in real-time, multimedia, and mission-critical applications.