Research on the Enhanced-Ant-DSR routing protocol based on the ant colony pathfinding method to improve Manet network performance.

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Abstract: This study proposes and evaluates Enhanced-Ant-DSR, a novel routing protocol for Mobile Ad Hoc Networks (MANETs) inspired by ant colony optimization. Traditional Dynamic Source Routing (DSR) suffers from high route discovery latency and poor adaptability to dynamic topologies. Enhanced-Ant-DSR integrates the swarm intelligence of ant foraging behavior to improve route discovery and maintenance. In the proposed protocol, forward ants explore the network using a probabilistic approach based on pheromone concentration and hop count, while backward ants reinforce optimal paths. This mechanism enables the discovery of multiple, high-quality routes, reducing end-to-end delay and increasing packet delivery ratio. Simulation results using NS-2 demonstrate that Enhanced-Ant-DSR significantly outperforms standard DSR and AODV in terms of throughput, routing overhead, and network resilience under varying node mobility and traffic loads. The findings confirm that bio-inspired routing offers a robust solution for enhancing MANET performance in dynamic environments.

Keywords: Enhanced-Ant-DSR, MANET, routing protocol, ant colony optimization