

Multipath routing techniques in wireless mesh networks

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Abstract: This thesis investigates multipath routing techniques in wireless ad hoc networks to address the inherent challenges of dynamic topology, limited bandwidth, and link instability. While single-path routing is susceptible to route failures and congestion, multipath routing offers enhanced reliability, load balancing, and improved throughput. The study proposes a novel multipath routing protocol that constructs multiple node-disjoint or partially disjoint paths between source and destination nodes. The protocol incorporates a path selection metric based on link quality, residual energy, and hop count to optimize performance. Through extensive simulations in NS-2, the proposed protocol is evaluated against standard single-path and existing multipath protocols. Results demonstrate significant improvements in packet delivery ratio, end-to-end delay, and network lifetime. The findings confirm that the proposed technique effectively mitigates route breakages and balances traffic load, making it a robust solution for scalable and energy-constrained wireless ad hoc networks.

Keywords: multipath routing, wireless ad hoc network, routing protocol, ad hoc network