Research on routing techniques aware of quality of service requirements for multi-rate ad hoc networks

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Abstract: This thesis investigates Quality of Service (QoS)-aware routing techniques for multi-rate mobile ad hoc networks (MANETs). Unlike traditional single-rate networks, multi-rate MANETs allow nodes to dynamically adjust transmission rates based on channel conditions, introducing significant challenges for routing protocols that must simultaneously satisfy application QoS demands and optimize network throughput. This research proposes a novel routing framework that integrates cross-layer information, specifically physical layer signal quality and MAC layer contention, to make informed route selection decisions. The proposed protocol dynamically evaluates path quality by considering both the achievable data rate and end-to-end delay constraints. Through extensive simulations, the study demonstrates that the proposed technique significantly improves packet delivery ratio and reduces average end-to-end delay compared to conventional hop-count-based and single-rate routing protocols. The findings contribute to the development of adaptive routing solutions capable of supporting real-time multimedia applications in dynamic wireless environments, offering a practical balance between QoS guarantees and efficient spectrum utilization in multi-rate ad hoc networks.

Keywords: QoS-aware routing, multi-rate ad hoc network, quality of service, routing technique