

Research on efficient, reliable, and energy-saving multipath routing techniques based on improved AOMDV protocol

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Abstract: This thesis investigates the design of an efficient, reliable, and energy-efficient multipath routing protocol based on an enhanced version of the Ad hoc On-demand Multipath Distance Vector (AOMDV) protocol. While AOMDV effectively discovers multiple disjoint paths, it often suffers from high routing overhead and suboptimal energy consumption in dynamic wireless networks. To address these limitations, we propose a novel routing scheme that integrates a link quality-aware path selection mechanism with an adaptive energy-saving strategy. The proposed protocol evaluates candidate routes based on a composite metric combining residual energy, path reliability, and end-to-end delay, thereby avoiding low-energy nodes and unstable links. Additionally, a dynamic route maintenance mechanism is introduced to reduce control overhead by selectively updating paths only when significant degradation is detected. Simulation results demonstrate that the enhanced protocol significantly improves network lifetime, packet delivery ratio, and throughput while reducing average end-to-end delay and routing overhead compared to the standard AOMDV. This work provides a robust solution for energy-constrained and reliability-sensitive applications such as wireless sensor networks and mobile ad hoc networks.

Keywords: AOMDV, multipath routing, energy saving, reliability