Research and evaluation of the effectiveness of some techniques for maintaining and updating link state in wireless ad hoc networks

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Abstract: This study investigates and evaluates the effectiveness of several techniques for maintaining and updating link-state information in mobile ad hoc networks (MANETs). Due to the dynamic topology and limited bandwidth of MANETs, efficient routing depends critically on accurate and timely state information. The research analyzes proactive, reactive, and hybrid approaches to state maintenance, focusing on their performance under varying network conditions such as node mobility and traffic load. Through simulation-based experiments, key metrics including packet delivery ratio, end-to-end delay, routing overhead, and throughput are assessed. The results indicate that while proactive methods offer lower latency, they incur significant overhead in highly mobile environments. Conversely, reactive techniques reduce control traffic but may suffer from increased initial delays. Hybrid strategies demonstrate a balanced trade-off, adapting to network dynamics more effectively. The findings provide practical insights for selecting appropriate state maintenance techniques to optimize routing performance in decentralized wireless networks.

Keywords: MANET, routing protocols, link state update, wireless network