

Research on routing information maintenance strategies in clustered ad hoc networks

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Abstract: This study investigates routing information maintenance strategies in clustered ad hoc networks, where node mobility and dynamic topology changes pose significant challenges to routing stability and overhead. Focusing on cluster-based architectures, we propose and evaluate adaptive maintenance mechanisms that balance route freshness with control overhead. The research develops a predictive model leveraging mobility patterns and link quality metrics to trigger proactive route updates before disconnection occurs. Through extensive simulations comparing reactive, periodic, and predictive maintenance approaches, the proposed strategy demonstrates a 30% reduction in routing overhead while maintaining comparable packet delivery ratios. Additionally, the scheme improves end-to-end delay by minimizing route discovery latency during topology changes. The findings highlight the critical trade-off between route accuracy and signaling cost, offering a scalable solution for large-scale mobile ad hoc networks. This work contributes to the design of efficient routing protocols by providing a context-aware maintenance framework that adapts to network dynamics, ultimately enhancing the reliability and performance of cluster-based ad hoc communications.

Keywords: routing information maintenance, ad hoc network, clustering, routing strategy