

Research and evaluation of context-aware routing techniques ensuring quality of service for vehicular ad hoc networks

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Abstract: This thesis investigates and evaluates a context-aware routing technique designed to ensure Quality of Service (QoS) in Vehicular Ad Hoc Networks (VANETs). VANETs are characterized by high node mobility, frequent topology changes, and intermittent connectivity, which pose significant challenges for reliable data transmission. Traditional routing protocols often fail to maintain stringent QoS requirements for critical applications like safety warnings and traffic management. This research proposes a novel routing framework that dynamically adapts its path selection decisions based on real-time situational parameters, including vehicle density, velocity, link quality, and traffic priority. The technique integrates a multi-metric decision-making mechanism to optimize end-to-end delay, packet delivery ratio, and throughput. Extensive simulations were conducted using network simulators under various urban and highway scenarios. The performance of the proposed protocol is compared against standard routing approaches. Results demonstrate that the context-aware method significantly improves network stability and QoS metrics, particularly in high-mobility environments, by effectively mitigating route failures and reducing overhead. This work contributes a robust solution for enhancing the reliability of communication in intelligent transportation systems.

Keywords: Context-aware routing, quality of service, ad hoc network, traffic