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Impact of mobility speed and network density on the performance of vehicular ad hoc network routing protocols

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Abstract:
Vehicular Ad Hoc Network (VANET) is a type of network that facilitates communication between vehicles usually on highways or in any environment with vehicular traffic such as a parking space. The dynamic nature of vehicular movements makes VANETs' topology highly unstable and prone to transmission unreliability. Hence, to achieve its major goal of traffic safety and enhanced traffic flow, the research community has identified the need for solutions that address efficient data transmission, ultrafast connectivity, reliable handovers, security, and privacy for vehicles. To achieve this, several routing protocols have been developed in the literature. Some of which include Ad hoc on-demand Distance Vector (AODV), Optimized Link State Routing (OLSR), Destination-Sequenced Distance-Vector (DSDV), and Dynamic Source Routing Protocol (DSR). In this paper, a performance analysis of four of these routing protocols in a realistic environment is carried out. Specifically, this work investigated the effect of mobility speed and network density on the efficiency of four VANET protocols using the metrics of packet loss rates, delivery ratio, and average end to end delay. For the evaluated cases, results reveal that OLSR had the best performance for having the lowest average delay, while the DSDV had the best performance in packet loss rates and delivery ratio.