Shadowing-Fading-based Intersection Geographic Opportunistic Routing Protocol for Urban VANETs

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Abstract: In vehicular ad-hoc networks (VANETs), the presence of obstacles such as buildings and trees cause shadowing and fading, which interfere with the propagation of radio waves. Despite this, most of the existing opportunistic routing protocols do not consider shadowing in their simulations, which may lead to an overestimation of VANET performance. To solve this problem, our proposed routing protocol can minimize the effect of shadowing by actively selecting street intersection nodes as relay nodes. In this study, we investigated the effect of shadowing on an existing routing protocol, link state aware geographic opportunistic (LSGO) routing, using a shadowing obstacle model implemented in ns-3. Additionally, we propose a shadowing-fading-based intersection geographic opportunistic routing protocol (SIGO). SIGO determines the priority of a relay node by considering the distance between the relay node and the destination node, the link quality between these nodes, and a street intersection relay index (IRI) in which the best relay node is selected according to the influence of shadowing. Through simulations, we demonstrated the effectiveness of SIGO' communication performance in terms of an improvement in the packet delivery ratio and the decrease in end-to-end delay.