Connectivity Investigation of Channel Quality-Based Adaptive Gossip Flooding Mechanism for AODV

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Abstract

To address the "broadcast storm" problem associated with flooding-based route discovery mechanism of reactive routing protocols, probabilistic approaches are suggested in the literature. In the earlier work, Gossip flooding mechanism of Haas et.al. was extended with signal quality, to propose channel quality based adaptive gossip flooding mechanism for AODV (CQAG-AODV). Following the cross-layer design principle, CQAG-AODV algorithm tried to discover robust routes, as well as address the "broadcast storm" problem by controlling the rebroadcast probability of Route request (RREQ) packets on the basis of signal strength experienced at the physical layer. This paper investigates the connectivity of CQAG-AODV through theoretical and simulation analysis. Results show that, by accounting the signal strength in the route discovery process, not only does the proposed algorithm floods a lesser number of route requests and controls the broadcast storm, but also maintains a higher level of connectivity to offer high packet delivery ratio; independent of network density and node mobility. Moreover, due to controlled routing overhead and robust route discovery, channel quality based adaptive flooding mechanism offers fringe benefit of energy efficiency as well. CQAG-AODV thus proves its suitability in a variety of use cases of multi-hop ad hoc networks including WSNs and VANETs.

Keywords: multi-hop ad hoc networks, MANET, WSN, VANET, AODV, connectivity, cross-layer design

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