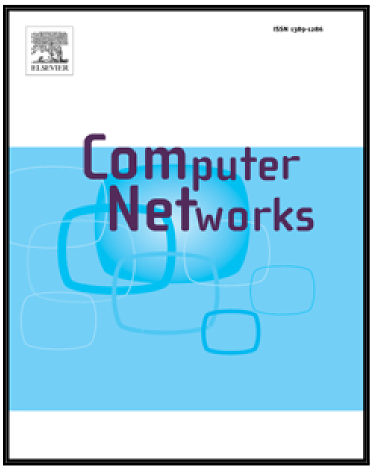

A Novel Packet Salvaging Model to Improve the Security of Opportunistic Routing Protocols

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A Novel Packet Salvaging Model to Improve the Security of Opportunistic Routing Protocols

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Abstract

Opportunistic Routing (OR) protocols are designed to address the reliability of traditional routing protocols in wireless networks. The main concept behind OR protocols is to select a set of candidates (instead of a single) in each step of the routing process to collaboratively route data packets towards their destination. However, choosing a higher number of next-hop nodes increases the probability of selecting malicious candidates in hostile environments. In this paper, we propose a packet salvaging model, which empowers OR protocols to defend against malicious nodes by saving a proportion of dropped or manipulated packets. The proposed approach is modeled using Discrete-Time-Markov-Chain (DTMC), and is applicable in wireless mesh networks. Furthermore, in addition to the proposal of a novel method of calculating various network parameters, including packet delivery ratio, drop ratio, expected number of transmissions, and hop count specific to this model, two new network parameters are introduced known as salvage ratio and direct-delivery ratio. Finally, a comprehensive set of performance evaluations is conducted, using both analytical methods and network simulation. Evaluation results show that the proposed model can significantly nullify the effects of malicious nodes, and increase the network performance.

Keywords: wireless network, opportunistic routing, malicious node, modeling, markov

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