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Coordinated Detection of Forwarding Faults in Wireless Community Networks

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Abstract

Wireless Community Networks (WCN) are crowdsourced networks where equipment is contributed and managed by members from a community. WCN have three intrinsic characteristics that make forwarding faults more likely: inexpensive equipment, non-expert administration and openness. These characteristics hinder the robustness of network connectivity. We present KDet, a decentralized protocol for the detection of forwarding faults by establishing overlapping logical boundaries that monitor the behavior of the routers within them. KDet is designed to be collusion resistant, ensuring that compromised routers cannot cover for others to avoid detection. Another important characteristic of KDet is that it does not rely on path information: monitoring nodes do not have to know the complete path a packet follows, just the previous and next hop. As a result, KDet can be deployed as an independent daemon without imposing any change in the network, and it will bring improved network robustness. Results from theoretical analysis and simulation show the correctness of the algorithm, its accuracy in detecting forwarding faults, and a comparison in terms of cost and advantages over previous work, that confirms its practical feasibility in WCN.

Keywords: Wireless Community Networks, Decentralized detection, Collusion, False accusation

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