A Physical Layer Security-based Routing Protocol in Mobile Ad-hoc Wireless Networks

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Abstract—Physical layer security has been considered as a sustainable technique that is competitive with existing cryptographic approaches to combat security attacks in the next generation wireless networks. In this paper, we study the vulnerability of mobile ad-hoc wireless networks in which there is an eavesdropper monitoring for the data transmissions in the networks. To this end, we propose a Physical Layer Security-based Routing protocol, called PLSR, which uses ad-hoc on-demand distance vector as the underlying technology. The main features and contributions of the proposed PLSR are as follows. First, PLSR considers a cross-layer approach that uses the information of both physical layer and network layer together to support QoS transmission (i.e., secure transmission) efficiently. When a routing route is established, both the physical layer information, PLS information using distance between neighbors and eavesdroppers, and the network layer information, i.e., the number of hops, are considered together as the parameters for route establishment. Second, PLSR establishes the routing routes that can avoid the eavesdroppers to support secure transmission. The performance evaluation of the proposed PLSR using OPNET shows that PLSR can efficiently support the security capability of routing and multi-hop transmission in mobile ad-hoc wireless networks.

Keyword—routing, physical layer security, cross-layer, MANETs

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His current research interests include mobile wireless networks and communications such as ad-hoc networks, sensor networks, wireless internet, cognitive radio networks, ubiquitous networks, cellular networks, and IoT. In particular, he is interested in cooperative routing, multicast routing, energy harvesting, physical layer security, visible light communication (VLC), crosslayer technology, mobile cloud computing. Professor An was listed in Marquis Whos Who in Science and Engineering, and Marquis Whos Who in the World, respectively.