

Evaluation of routing protocol security in MANET

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Abstract: This study presents a comprehensive evaluation of routing protocol security in Mobile Ad Hoc Networks (MANETs). Due to their decentralized nature, dynamic topology, and lack of fixed infrastructure, MANETs are inherently vulnerable to a range of routing attacks, including black hole, gray hole, wormhole, and denial-of-service attacks. This assessment systematically analyzes the security mechanisms of prominent routing protocols, such as AODV, DSR, and OLSR, identifying their specific weaknesses and resilience levels. Through a combination of qualitative analysis and simulated attack scenarios, the research evaluates key performance metrics including packet delivery ratio, end-to-end delay, and routing overhead under adversarial conditions. The findings reveal that while reactive protocols offer better adaptability, they are more susceptible to route disruption attacks, whereas proactive protocols demonstrate higher overhead but improved resistance to certain threats. The study concludes by proposing enhanced security extensions and recommending hybrid approaches to mitigate identified vulnerabilities, thereby contributing to the development of more robust and trustworthy routing frameworks for critical MANET applications.

Keywords: Routing protocol security, MANET, network safety, ad hoc network