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Data Collection for Attack Detection and Security Measurement in Mobile Ad Hoc Networks: A Survey

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Abstract

Mobile Ad Hoc Network (MANET) is becoming one type of major next generation wireless networks. Nevertheless, it easily suffers from various attacks due to its specific characteristics. In order to evaluate and measure the security of MANET in real time and make this network react accordingly, a promising alternative is to integrate detection mechanisms that play a role of the second line of defense to detect attacks in MANETs. We note that in most attack detection mechanisms, it is essential and crucial to collect the data related to security for further analysis. If security-related data collection is untrustworthy, attack detection and security measurement might be impacted and disabled. Unfortunately, few existing studies concern security-related data collection in attack detection for the purpose of trustworthy security measurement. The literature lacks a thorough survey on security-related data collection for attack detection and security measurement in MANETs. In this paper, we propose a number of requirements for trustworthy security-related data collection, and then review detection mechanisms in MANETs that were published in recent 20 years. In particular, we employ the proposed requirements as a set of criteria to evaluate the existing work about security-related data collection. Based on the survey and evaluation, we identify a number of open issues and point out future research directions.

Keywords: MANETs, Security Measurement, Intrusion Detection, Data Collection

1. Introduction

MANETs allow wireless devices (called nodes) to communicate with each other in mobility through local wireless connections. There are two major communication scenarios in MANETs: 1) If two nodes are located at the transmission range of each other, they can employ their **transceivers** to exchange messages directly; 2) When two nodes cannot communicate directly, other nodes cooperatively help forward packets and these nodes are referred to as mobile routers. MANETs exhibit several specific characteristics. First, they have no fixed infrastructure. Second, nodes share common communication media (i.e., limited bandwidth). Third, the network topology of MANETs is dynamic due to a number of reasons (e.g., node mobility). Fourth, the battery power of nodes is constrained. Fifth, nodes have a low physical security level. Sixth, there is no management center. As a consequence, MANETs easily suffer from different kinds of security attacks.

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