

Analysis of a Fuzzy Based Intrusion Detection System in Wireless Ad Hoc Networks

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Abstract: Technology and its growth is considerably enormous. This massive growth allows the opening of new fields of application in the domain of wireless networking and mobile ad-hoc networks (MANET) is one of its kinds. Mobile ad hoc network is widely used from collaborative computing to time critical applications in indoor and outdoor environment. Mobility of ad hoc network makes very attractive in all areas of mobile applications. Nodes participating in mobile ad hoc networks are autonomous, self-configurable and act as a router as well. These types of networks are dynamic in nature and have short life time. Dynamic nature and limitations of the wireless transmission medium make MANET unsecured and vulnerable to various attacks. It is very tough to implement security for this networks and it opens up doors for further research work on this area. There is a great scope for designing a system to identify attacks and take countermeasures to minimize it and keep the performance of the network within acceptable limits. Intrusion detection system is one of its kinds and considered as security mechanism for MANET. This thesis explores different types of intrusion detection system like misuse detection and anomaly detection for mobile ad hoc networks. Anomaly detection techniques for ad hoc networks depend on the characterization of normal behavior pattern of wireless nodes. This research work focuses on wireless node behavior based detection technique. Most of anomaly intrusion detection systems are focusing on upper layer traffic to a profile normal behavior of wireless node. This research work focus on media access control (MAC) layer and network layer of wireless node. It is inefficient to use a large feature set of MAC layer and network layer due to energy limitation in ad-hoc network. A minimal feature set from MAC layer and network layer were proposed. This research work proposed an anomaly intrusion detection system for mobile ad hoc network using fuzzy logic and weighted average method. The network performance of mobile ad hoc network with intrusion detection system was analyzed using various network parameters. Further the performance of the performance of the intrusion detection system was analyzed using detection rate and false alarms. Results show good improvement in detection rate and other performance metrics.

Keywords: wireless network , MAC Layer, mobility.

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