

Chapter 93

Issues Related to Network Security Attacks in Mobile Ad Hoc Networks (MANET)

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ABSTRACT

Mobile Ad Hoc Network (MANET) is a collection of communication devices or nodes that wish to communicate without any fixed infrastructure. The nodes in MANET themselves are responsible for dynamically discovering other nodes to communicate. A number of challenges like open peer-to-peer network architecture, stringent resource constraints, shared wireless medium, dynamic network topology etc. are posed in MANET. In this research, we identify the existent security threats an ad hoc network faces, the security services required to be achieved and the countermeasures for attacks in each layer. To accomplish our goal, we have done literature survey in gathering information related to various types of attacks and solutions, as well as we have made comparative study to address the threats in different layers. Finally, we have identified the challenges and proposed solutions to overcome them. There is no general algorithm that suits well against the most commonly known attacks such as wormhole, rushing attack, etc.

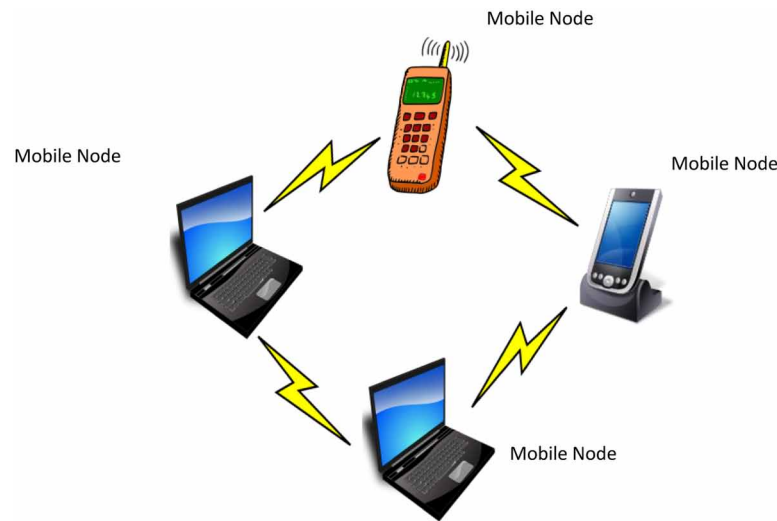
1. INTRODUCTION

Mobile Ad Hoc Network (MANET) is the category of wireless networks which do not require any fixed infrastructure or base stations or in other words Mobile Ad Hoc Network is a collection of wireless mobile communication devices or nodes that communicate with each other without any fixed infrastructure or centralized administration. The nodes in MANET themselves are responsible for dynamically discovering other nodes to communicate. In MANET, it may be necessary for one wireless mobile node to enlist other hosts in forwarding a packet to its destination due to the limited transmission range of wireless network interfaces. Each wireless mobile node operates not only as a host but also as a router forwarding packets for other wireless mobile nodes in the network that may not be within the direct transmission range of each other. Each node participates in an ad hoc routing

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Figure 1. Structure of Mobile Ad Hoc Network (MANET)



protocol that allows it to discover multi-hop paths through the network to any other node. This type of wireless networking of Mobile ad hoc network is also called infrastructureless networking, since the mobile nodes in the network dynamically establish routing among themselves to form their own network on the fly.

Now-a-days, Mobile ad hoc network (MANET) is one of the recent active fields and has received marvelous attention because of their self-configuration and self-maintenance capabilities. While early research effort assumed a friendly and cooperative environment and focused on problems such as wireless channel access and multihop routing, security has become a primary concern in order to provide protected communication between nodes in a potentially hostile environment. MANET has not well specified defense mechanism, so malicious attacker can easily access this kind of network. Although security issues in Mobile Ad-hoc Networks (MANETs) have been a major focus in the recent years, the development of most secure schemes for these networks has not been entirely achieved till now. This chapter will provide an overview about the security issues and optimum solutions in each layer of MANET with challenges. In this chapter, we will identify the existent security threats an ad hoc network faces, the security services required to be achieved and the countermeasures for attacks in each layer. To accomplish our goal, we will carry out an extensive literature survey in gathering information related to various types of attacks and solutions, as well as we shall go through the comparative study to address the threats in different layers. The results of this research will enable us to minimize the attacks on each layer of MANET efficiently.

Although the ongoing trend is to adopt ad hoc networks for commercial uses due to their certain unique properties, the main challenge is the vulnerability to security attacks. A number of challenges like open peer-to-peer network architecture, stringent resource constraints, shared wireless medium, dynamic network topology etc. are posed in MANET. As MANET is quickly spreading for the property of its capability in forming temporary network without the aid of any established infrastructure or centralized administration, security challenges has become a primary concern to provide secure communication.

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