

**UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

**COLLEGE OF GRADUATE STUDIES AND
ACADEMIC ADVANCEMENT**

**A Proposed Method to Detect Misbehaving Nodes
During Route Discovery Phase in MANET's**

**By
Hala Mustafa Ibrahim Mohammed-Zain**

A Thesis

**Submitted to the College of Graduate Studies and Academic
Advancements In Partial Fulfillment of the Requirement for the Degree
of Master of Science in Information Systems**

Supervisor

Prof. Noureldien Abdelrahman Noureldien

Jan 2017

Abstract

MANETs are a collection of independent mobile nodes with no fixed infrastructure and no central management communicates via wireless link. Each node in MANETs acts as a client and a router to forward control and data packets to other nodes, therefore, nodes need to collaborate to perform the objective of the network. Collaboration between MANETs nodes is specified by a routing protocol, such as, AODV and DSR.

A node that violates the protocol specifications in any of the two phases of the routing protocol, route discovery and packet forwarding is considered to be misbehaving node. Misbehaving nodes disrupt the network operations. Many of intentional attacks such as black hole attack are result of misbehaving.

Many methods have been proposed to detect misbehaving nodes during the route discovery phase. In this research a comprehensive literature review for existing route discovery misbehaving nodes detection methods is presented. In addition a new control packet based misbehaving detection method for AODV MANETs is proposed.

1.1 Introduction

The tremendous growth of wireless networking in the communication field and demand for connectivity lead to huge evolving in a wireless network to enable mobility, this particular cause emerging of new disciplines in the wireless network called mobile ad hoc network, it's the result of advance mobile devices and use of wireless networks.

Mobile ad hoc network is an independent mobile node system each node connect to other nodes by wireless links its infrastructure less, has no fixed routes, all nodes are capable of movement freely has dynamic nature and it's can be connected in an arbitrary manner. Nodes in this network can function as router to maintain and find a route to destination or function as data endpoint, also has no central administrative management nodes must collaborate with other nodes in the network to perform network objective.

This network is easy and inexpensive to setup this advantage makes it suitable for rapid applications such as military applications, disaster, emergency search and rescue operations, meetings and conference to allowing sharing information quickly [1].

1.2 Research Problem

Nodes in MANETs must collaborate together and share their resources (bandwidth, battery power, etc.) to attain the objective of the network. Several nodes refuse to collaborate either to selfishness or maliciousness, such nodes are called misbehaving nodes. Misbehaving nodes compromise the network security and breach confidentiality, integrity and availability of the network.

1.3 Research Objectives

The objectives of this research are:

- 1- Identify the types of the misbehaving during the route discovery phase.
- 2- Classify existing detection methods for detecting misbehaving nodes during route discovery phase.
- 3- Develop a misbehaving detection method that allows the source node to detect misbehaving nodes during the route discovery phase.



4- Enable the source node to determine the secure and optimal route to destination node.

1.4 Research Question

- To achieve the objective of this research the following questions has to be answered: 1- What are the types of misbehaving during route the discovery phase ?

2- How the existing detection method can be classified ?

3- How AODV protocol can be improved to detect misbehaving during the route discovery phase ?

1.5 Research Methodology

To answer research questions, a scientific literature review is used to collect, evaluate and use scientific papers relevant to research topics. Details of the methodology is presented in chapter 3.

Based on the classification of detection method, a new control-packet detection method is proposed.

1.6 Thesis Structure

This thesis includes six chapters. Chapter 2 introduces an overview of MANETs, their protocols and types of misbehaving. Chapter 3 describes the research methodology that used to achieve objectives of this research. Chapter 4 provides a classification of detection methods for misbehaving nodes in route discovery phase. Chapter 5 introduces our proposed detection method, finally chapter 6 includes conclusion and future work.