

# INTRODUCTION

## ➤ **Context**

Mobile Ad Hoc Networks (MANETs) are composed of mobile nodes connected by wireless links. All nodes can freely and dynamically self-organize into arbitrary and temporary “Ad Hoc” network topologies. MANETs are self-organizing networks because they do not use any infrastructure such as base station or router. This implies that every node performs as a host as well as a router since it is in charge of routing information its neighbors, contributing to and maintaining connectivity of the network. Thus, in a MANET, the routing protocol used is of primary importance because it determines how a data packet is transmitted over multiple hops from a source node to a destination node.

In previous research, routing methods were divided into three categories, proactive (table-driven) methods, reactive (on-demand) methods and hybrid protocols. In the proactive routing methods, each mobile node periodically broadcasts the contents of its routing table to its neighboring nodes. Each mobile node also receives the information broadcasted from the other nodes and updates its routing table. As a result, each mobile node has information on the network topology.

On-demand routing protocols like AODV, resolve the problem of periodic broadcasting overhead found in table-driven methods by adding a routing procedure before sending data. A mobile node in an on-demand protocol follows a procedure to find a routing path. It then uses the discovered path to transmit data.

The steps to send a packet from sender to destination through AODV are as follows: Firstly, the source node starts route discovery through broadcasting Route Request (RREQ) packet then adjacent nodes will forward RREQ until the packet is reached at the destination or RREQ arrives at the node that has a new fresh route to the destination. Secondly, a Route Reply (RREP) is sent by receiver to the source (originated route). Once the sender-node receives a RREP, it can initialize using this path for data packet transmission. In the case of link failure, Route Error (RERR) is sent back to the source node. It is generated by the node at which link failure is occurred.

## ➤ **Objectives**

Our work has the following objectives:

- ✓ Studying the behavior of mobile Ad Hoc networks and AODV routing protocol.
- ✓ Defining the problem which appears in AODV routing protocol.
- ✓ Defining the link state information that used for mobility prediction method.
- ✓ Proposing a link failure prediction method for MANETs.

- ✓ Implementing and Modifying the AODV routing protocol to introduce prediction.
- ✓ Simulating the enhanced AODV protocol, and analyzing the routing performance without and with mobility prediction using the results of simulation.

### ➤ **problem statement**

While on-demand routing protocols can reduce the network resources (bandwidth, energy, etc...) consumed from periodic broadcasting overhead in table-driven protocols, they need to discover and maintain the routing path. Once the found path is broken, a rerouting procedure is necessary to find a new path to complete the data transmission. However, if the frequency of rerouting increases, routing performance decreases. Therefore, how to enhance the reactive protocol AODV that finds a stable path much earlier before a link will fail, and reduces the frequency of path breakages in order to increase routing performance in terms of the metrics end-to-end delay and packet delivery ratio ?.

### ➤ **Proposed Solution**

Mobility prediction of a node is the estimation of their future movements thus the link availability. In MANETs, the main advantage of link availability or link lifetime prediction is to estimate link available time in order to improve routing performance. Many network state information have been used for mobility prediction such as velocity and location of nodes. In our work, we interest in suggesting a new algorithm for mobility prediction in Ad Hoc networks. The network state information used is the received signal strength indicator (RSSI), RSS measurements can provide indication to the connectivity strength between two nodes. The RSS can be obtained by measuring the power level of the received signal.

Our proposed algorithm uses RSS and RSS changing rate to predict the time changing rate after which a node will leave its transmission range and the path will be broken. After that, the upstream node will discover another route to the destination witch does not contain the failed node.

### ➤ **Outline**

#### Chapter 1

Presents an overview of mobile ad hoc networks, with its characteristics, applications, and mobility models, this chapter provides also an explanation of AODV routing protocol, with its working and different routing information which used in the network.

## Chapter 2

Provides some background knowledge to our work, this includes a set of concepts used in mobility prediction, different criteria types that are commonly used by MANET researches, and discussion of some recent prediction methods.

## Chapter 3

Defines the problem statement which concerning the mobile ad hoc networks, and provides an explanation of proposed solution.

## Chapter 4

Compares the routing performance between AODV routing protocol and AODV-LP with Link Prediction this is done after implementation and simulation of our protocol in NS2 environment, and after configuration of initial simulation parameters, and defining the performance measurements, this work provides a benchmark for the best performance AODV can possibly achieve when prediction used.