Chapter One
Introduction

1.1 Preface

The beginning was "with a basketball-sized bundle of technology called Sputnik 1. Launched by the Soviet Union on October 4, 1957, the world's first artificial satellite was followed four months later by the first U.S. satellite, Explorer 1. The race into space was on, and with it came a new way of looking at the Earth. By the end of the 20th century, more than 2,200 satellites were circling the planet, many of them providing steady streams of scientific data, along with views of the Earth never before imagined possible". [1]

One of the basic communications satellite's equipment is the transponder. "A transponder is a wireless communications, monitoring, or control device that picks up and automatically responds to an incoming signal. The term is a contraction of the words transmitter and responder. Transponders can be either passive or active". [2]

1.2 Problem Statement

There are many types of signals that affect the satellite communication which is a transmission of data through wireless channel (free space communication), the noise is the most common problem facing the satellite. The communication here will have high

bit error rate, therefore, bigger bandwidth and hence high power consumption.

In addition, many power saving methods were developed each has its performance according to the link type and the power value that used in transmission. That makes it difficult to use the suitable one.

1.3 Proposed Solution

The microsatellite has been proposed as a solution to overcome the high power consumption with the use of two different models to be compared with Saleh model that reduce the BER value.

1.4 The Aim and Objectives

The main aim of the project is to optimize the power consumption by enhancing the quality of the signal transmitted by the microsatellite with the acceptable minimum bit error rate; this can be achieved through the following objectives:

1) To simulate the microsatellite link.
2) To enhance the quality of transmitted signal by reducing the BER.

1.5 Methodology

In this thesis the basic fundamentals of satellite were studied first, then microsatellite was chosen from the satellite classifications to be the system under study. After that, detailed link components

were presented. Since noise affects negatively the signal transmission and BER values and hence increases the power consumption, Matlab Simulink tool was used to generate a simulation using QAM modulation with the use of three models including Saleh model, Rapp model and cubic. This show how the system performance could be improved and a comparison of the power saving and optimization models was evaluated.

1.6 Thesis Outlines

The rest of the thesis is organized as follows:

Chapter Two describes the basic satellite communication fundamentals along with microsatellite.

Chapter Three illustrate the simulation used.

Chapter Four discusses the results obtained from the matlab simulation.

Chapter Five presents a conclusion that summarizes the work done and recommendation for future work.