

PERFORMANCE ANALYSIS OF GFSK MODULATION USED IN BLUETOOTH RADIO

This thesis is presented in partial fulfillment for the award of the
Bachelor in Engineering (Hons) in Electrical

UNIVERSITI TEKNOLOGI MARA



ZAIRA AZMIRA BT ZAINUDDIN
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM

ACKNOWLEDGEMENT

Firstly, my greatest gratitude goes to God almighty for giving me the strength and health to complete this final project in time. Then, I would like to express my thankfulness to Associate Professor Ruhani bt Hj. Ab. Rahman as my supervisor who always encourage me and guide me all the way through this journey. Also my gratitude goes to my family who always supportive and believe in me. And not to forget to all my friends and whoever that involves directly or indirectly and sticking with me through thick and thin in making this project a success. God bless you all.

ABSTRACT

This project focuses on a digital modulation technique which is Gaussian Frequency Shift Keying (GFSK). GFSK modulation technique is used in Bluetooth radio.

The simulation of GFSK modulation technique has been performed using Matlab and Simulink. Three common modulation schemes which are binary phase shift keying (BPSK), frequency shift keying (FSK) and minimum shift keying (MSK) were tested to compare their respective total error values. The GFSK modulator is then simulated using four different BT values. The simulation output is analyzed to produce the desired performance.

TABLE OF CONTENTS

DECLARATION

ACKNOWLEDGEMENT

ABSTRACT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

CHAPTER	PAGE
1. INTRODUCTION	
1.1 Introduction	1
1.2 Objectives of project	2
1.3 Scope of Works	3
1.4 Thesis Organization	3
2. INTRODUCTION TO BLUETOOTH TECHNOLOGY	
2.1 Introducing Bluetooth	5
2.2 Regulation of Unlicensed Bands	5
2.3 Frequency Bands	7
2.4 Bluetooth Protocols and Profiles	8
2.4.1 The OSI Model	8
2.4.2 Bluetooth Protocol	10
2.4.3 Bluetooth Profiles	13
2.5 Bluetooth Radio	15
2.5.1 Radio Operations	15

CHAPTER 1

INTRODUCTION

1.1 Introduction

The ability to communicate with people on the move has evolved remarkably since Guglielmo Marconi first demonstrated radio's ability to provide continuous contact with ships sailing the English channel. That was in 1897 and since then new wireless communications methods and services have been enthusiastically adopted by people throughout the world. Particularly during the past ten years, the mobile radio communications industry has grown by orders of magnitude, fueled by digital and RF circuit fabrication improvements, new large-scale circuit integration, and other miniaturization technologies which make portable radio equipment smaller, cheaper and more reliable. Digital switching techniques have facilitated the large scale deployment of affordable, easy-to-use radio communication networks. These trends will continue at an even greater pace during the next decade [1].

Bluetooth wireless technology is a short-range communications system intended to replace the cables connecting portable and/or fixed electronic devices. The key features of Bluetooth wireless technology are robustness, low power and low cost. It is the simple choice for convenient, wire-free, short range communication between devices. It is a globally available standard that wirelessly connects mobile phone, portable computer, cars, stereo headsets, MP3 players and more. Bluetooth technology is available in an unprecedented range of applications from mobile phone to automobile to medical devices for use by consumers, industrial markets, enterprise and more. The low power consumption, small size and low cost of the chipset solution enables Bluetooth technology to be used in the tiniest devices. Bluetooth carries the wireless local area network (WLAN) concept to a