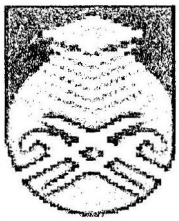
THE PERFORMANCE OF BLOCK CODES IN DIGITAL COMMUNICATION SYSTEM

This thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Honours) UNIVERSITI TEKNOLOGI MARA



NOR AFZAN BINTI AZMI
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450, Shah Alam
Selangor Darul Ehsan
NOV 2007

ACKNOWLEDGEMENT

In the name of ALLAH the Most Gracious, Most Merciful and HIM alone is worth all praises. I would like to express my gratitude to my project supervisor, Pn. Husna Abd. Rahman for her utmost guidance, patience, support and supervision through this project. Greatest gratitude also to my parent and those who have helped me directly or indirectly in completing this project.

ABSTRACT

Error control coding incorporates information into the signal that allows a receiver to find and correct bit error occurring in transmission and storage. Since such cording detects or corrects errors incurred in the communication or storage channel, it is often referred to as channel coding. [1]

This project involves the design of a complete digital communication system. The objective is to first compare the performance of different type of channel without block code. The channels used are AWGN channel, Multipath Rayleigh channel and Rician Fading channel. The second objective is to evaluate the performance of different type of block codes using AWGN channel. AWGN channel is selected because AWGN channel is a good model for satellite and deep space communication link. It is not a good for most terrestrial links because of multipath, terrain blocking, interference, and other. However for terrestrial path modeling, AWGN is commonly used to simulate background noise of the channel, in addition to multipath, terrain blocking, interference, ground clutter and self interference that modern radio systems encounter in terrestrial operation. The block codes that are covered are Hamming code and BCH code. For every different block codes the n-bit and k-bit parameters vary.

TABLE OF CONTENT

CHAPTER **PAGES**

DECLARATION..... iii

ACKNOWLEDGEMENT..... iv

ABSTRACT..... v

TABLE OF CONTENTS..... vi

LIST OF FIGURES..... x

LIST OF TABLES..... xii

LIST OF ABBREVIATIONS..... xiii

1 INTRODUCTION

1.1 Digital Communication System..... 1

1.2 Objectives..... 2

1.3 Scope of Work..... 2

1.3.1 Type of Codes..... 3

1.3.2 Type of Channels..... 3

1.3.2.1 AWGN Channel..... 3

1.3.2.2 Rayleigh Fading Channel..... 4

1.3.2.3 Rician Fading Channel..... 4

1.3.3 Type of Modulation..... 4

1.3.4 Type of Calculation..... 5

CHAPTER 1

INTRODUCTION

1.1 DIGITAL COMMUNICATION SYSTEM

A typical communication system incorporating coding is shown in Figure 1. Error control coding is applied after the source information is converted into digital format by the source encoder. The separation between coding and modulation is conversional, although it will be found later that there are two must be design together. At the receiver, the operations are carried out in reverse order relative to the transmitter [2].

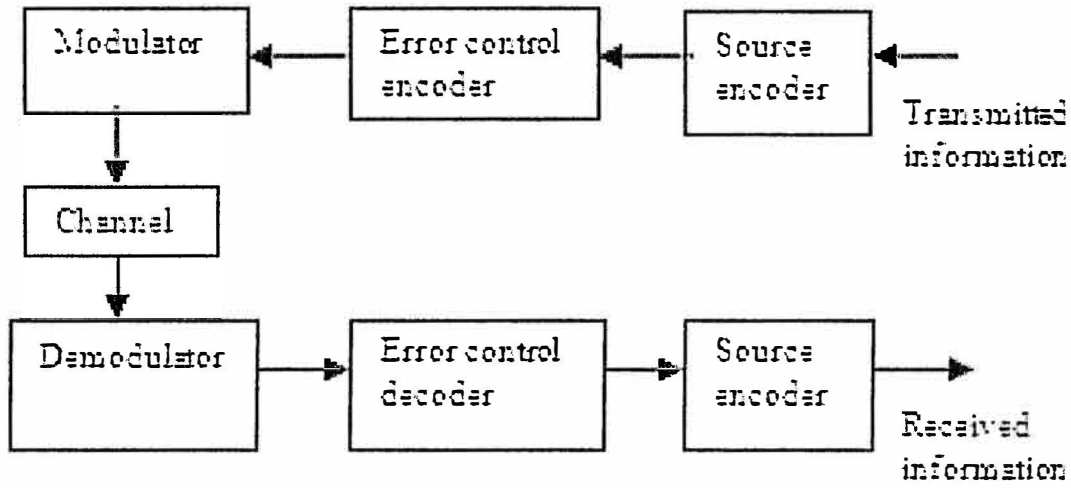


Figure 1: Coded communication system

Forward error control (FEC) devices are often located close to the receiver of an analog signal, in the first stage of digital processing after a signal has been received. That is, FEC circuits are often an integral part of the analog-to-digital conversion process. Many FEC coders can also generate a bit-error rate (BER) signal which can be used as feedback to fine-turn the analog receiving electronics. The maximum fraction of errors that can be corrected is determined in advance by the design of the code, so different forward error