SIMULATION AND ANALYSIS PERFORMANCE OF TURBO CODES AND CONVOLUTIONAL CODES USING BPSK MODULATION TECHNIQUE IN WCDMA ENVIRONMENT

Thesis submitted to the Faculty of Electrical Engineering, Universiti Teknologi MARA in fulfillment of the requirement for the Bachelor Degree of Engineering (Honors) Electrical

SITI SHUHADA BINTI OTHMAN
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA MALAYSIA
40450 SHAH ALAM, SELANGOR

MAY 2009

ACKNOWLEDGEMENT

In the name of Allah s.w.t. The Most Gracious and The Most Merciful for the blessings endowed upon me in completing this project.

I would like to express my deepest gratitude to my Project Supervisor, Pn. Norfishah Bt Ab. Wahab for her guidance, advise and patience in assisting this project. May Allah bless you.

My deepest appreciation also goes to my family members especially my mother for being very supportive and being the source of my inspiration.

Finally, I would like to extend my gratitude to all my friends for their opinions, advises and supports for making this project successful.

ABSTRACT

This project illustrates the analysis performance of BPSK modulation between convolutional codes and turbo codes in WCDMA environment by using simulation technique. In this project, the WCDMA system is considered and the performance of both codes is investigated. Turbo and convolutional codes are used to encode and decode the digital signal before modulation and after modulation process. The main objective is to compare the performance between both codes for digital communication system in different sizes; 256, 512 and 1024 bits. The analysis performances are compared and evaluated by means of bit error rates of BPSK modulation between these codes in AWGN channel for WCDMA applications. This project is simulated by using MATLAB version 7.6.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The third generation cellular mobile communications systems will support several kinds of communication services, including, e.g. voice, images, and even motion picture transmission. Therefore, the users will transmit their information signals using different data rates and their performance requirements will vary from application to application. Wideband code division multiple access (WCDMA) with variable spreading factor and multicode modulation as a multirate scheme is emerging as one of the air interfaces for the 3G mobile communications systems. The high and different user data rates and the large number of users together with multipath dispersive fading channels cause severe intercell and intracell multiuser interference. Fundamental investigations have demonstrated huge potential capacity and performance improvements as a result of using multiuser detection at the expense of increasing complexity of optimum structures. [24]

The salient feature of third generation mobile communications systems is its high capacity for transmitting information over the system data channels. To offer these high data rates with access terminals increasingly both small and functional it is imperative to work at the limit of efficiency in data transmission. [25]

As it is well known in 1948 Claude E. Shannon proved that the fundamental limit of digital transmission on channels with additional white Gaussian noise is given by the classic channel capacity formula $C = W \log2 (1 + S / N)$, where C is the capacity in bit/s,