

DEVELOPMENT OF NEW OCDMA
ENCODER AND DECODER MODULES

FARAH HAYATI BINTI CHE LAH

SCHOOL OF COMPUTER AND COMMUNICATION
ENGINEERING
UNIVERSITI MALAYSIA PERLIS
2007

DEVELOPMENT OF NEW OCDMA ENCODER AND DECODER MODULES

by

FARAH HAYATI BINTI CHE LAH

Report submitted in partial fulfillment
of the requirements for the degree
of Bachelor of Engineering



MAY 2007

ACKNOWLEDGEMENT

In the name of Allah s.w.t, The Beneficent, The Merciful and to Him only is worth all praises.

Alhamdulillah, with the permission of Allah s.w.t I had finished my final year project and report project beginning 1st Semester 2006/07 till 2nd Semester 2006/07. During the time in accomplish this report project, I deeply obliged to many people who gave a lot of encouragement and supports.

Firstly, I would like to express my honorable thanks to my Project Supervisor, PM Dr. Syed Alwee Aljunid who gave his supports, guides, suggests, encourages, and supervised me to do well in this project development. He had supervised me to know every single part of this project from the beginning till the end of stage. Otherwise, with his guides I managed to do the design although at the beginning had to face some problems.

Secondly, thanks to PLV Puan Sharifah Zarihan and Puan Dayang who had given their permission to use the lab during accomplished the project besides shared some information and suggestion. Words of appreciation also to my friend which also supervised under the same supervisor for their helps, suggests and encourages me during the project. Not forget, my family and the rest friends who gave me inspired to complete my final year project and the report. Thank you very much to all.

APPROVAL AND DECLARATION SHEET

This project report titled Development of new OCDMA Encoder and Decoder Modules was prepared and submitted by Farah Hayati Binti Che Lah (Matrix Number: 031080639) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Communication Engineering) in Universiti Malaysia Perlis (UniMAP).

Checked and Approved by

**(PM DR SYED ALWEE ALJUNID)
Project Supervisor**

**School of Computer and Communication Engineering
Universiti Malaysia Perlis**

May 2007

THE ADVANTAGES OF OCDMA IN TELECOMMUNICATION SYSTEM

ABSTRACT

A desirable feature for future optical networks would be the ability to process information directly in the optical domain for purposes of multiplexing, demultiplexing, filtering, amplification, and correlation. Optical signal processing would be advantageous since it can potentially be much faster than electrical signal processing and the need for photonelectron-photon conversion would be obviated. There has been a tremendous interest in applying Code Division Multiple Access (OCDMA) techniques to fiber optic communication systems. This technique is one of the multiple access schemes that are becoming popular because their advantages such as the flexibility in the allocation of channels, ability to operate asynchronously, enhanced privacy and increased capacity in bursty networks. Especially, direct detection OCDMA systems have been investigated widely to apply for high speed LAN, because they allow multiple users to access network simultaneously. In the case of data transfer where traffic tends to be bursty rather than continuous, CDMA can be used for contention-free, zero delay access. This project is concentrated on the design of encoder and decoder modules for OCDMA system based on Fiber Bragg Gratings (FBGs). The code used in this project is Modified Double Weight (MDW) which is developed in a family of the Double Weight (DW).

KELEBIHAN OCDMA DALAM SISTEM TELEKOMUNIKASI

ABSTRAK

Kemunculan yang mengghairahkan pada masa akan datang dalam bidang rangkaian optik menjadi suatu kebolehan untuk memproses maklumat secara terang-terangan di dalam “domain” optik untuk tujuan pemultipleksan, penyahmultipleksan, penapisan, penguatan dan penghubungkaitan. Isyarat pemprosesan optik memberi kelebihan semenjak ianya berpotensi untuk bergerak lebih pantas berbanding isyarat pemprosesan elektrik dan keperluan untuk penukaran “photonelectron-photon” dapat dihindarkan. Terdapat keinginan yang sangat meluas dalam mengaplikasikan teknik “Code Division Multiple Access (CDMA)” melalui komunikasi fiber optik. Teknik ini adalah salah satu skim akses berganda yang semakin terkenal kerana beberapa kelebihannya. Di antaranya adalah saluran yang diperuntukkan adalah bersesuaian, berkebolehan untuk beroperasi secara berasingan, peningkatan tersendiri dan peningkatan memecahkan kemuatan dalam rangkaian. Terutamanya, pegasan terus system OCDMA telah dikesan secara meluas untuk mengaplikasikannya kepada LAN berkelajuan tinggi kerana membenarkan ramai pengguna mengakses rangkaian secara serentak. Di dalam penghantaran data pula di mana trafik cenderung untuk berpecah lebih baik daripada berterusan, CDMA boleh digunakan untuk bebas daripada kesesakan dan juga tiada kelewatan mengakses. Projek ini menumpukan kepada reka bentuk modul pengkodan dan penyahkodan untuk system “OCDMA” berdasarkan kepada “Fiber Bragg Gratings (FBGs)”. Kod yang digunakan dalam projek ini ialah “Modified Double Weight (MDW)” di mana ia adalah terbina dalam kumpulan “Double Weight (DW)”.