PERFORMANCE EVALUATION OF 10GBIT/S, FOR SINGLE AND 4-CHANNEL OPTICAL TRANSMISSION SYSTEMS AT 1550nm USING SEMICONDUCTOR OPTICAL AMPLIFIER

Thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Hons.)
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ABSTRACT

A performance evaluation of optical transmission systems operating at 10 Gbit/s, for single and 4-channel in the 1550nm window of standard single-mode fibers is investigated experimentally. It is shown that, for 90km, the use of a semiconductor optical amplifier, with an unsaturated gain of 26dB, degrades the receiver sensitivity by 2.7dB. By adopting a multichannel WDM technique, the transmission capacity can be expanded without increasing the data speed and the chromatic dispersion effect.

The OptSim simulator was used to model the structure, to assess the behavior and performance of the transmission system [6]. Parameters such as Q factor and bit error rate (BER) were calculated and have been confirmed experimentally using eye diagram technique. From this simulation, it is confirmed that the SOA is applicable for WDM transmission system with high bit rate because of its inherent wide bandwidth [1].

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In the name of Allah S.W.T

The Merciful and Gracious

Praise is for God, Lord of the world,

May His Blessings and peace upon our Prophet Muhammad S.A.W

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TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 OPTICAL FIBER TRANSMISSION SYSTEM

Early optical communication systems sent light through air. Today, light is sent through glass smaller than human air. Not only is the small size attractive to various industries that use fiber optic cable, but the high bandwidth, no crosstalk, and security leave twisted pair and copper wire behind. The basic fiber system has an encoder for the signal and a light source or transmitter to convert the electrical to light. The optical fiber is the transmission medium that links to a light detector and amplifier. A basic of optical transmission system is shown as below:

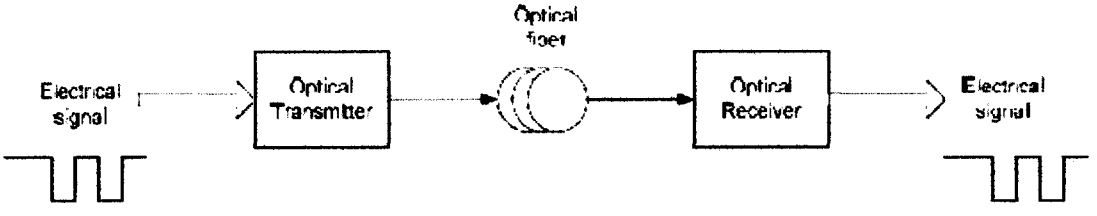

Figure 1.1: A basic optical transmission system

Optical fibers are best suited for long distance, high bandwidth communications between two points. Applications of fiber optics can be found in many areas of our daily lives [1].