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PERFORMANCE CHARACTERISATION OF ERBIUM DOPED FIBER AMPLIFIER (EDFA) IN OPTICAL TRANSMISSION SYSTEM

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ABSTRACT

Erbium Doped Fiber Amplifier is a key challenge for today's optical transmission systems. The Erbium Doped Fiber Amplifier (EDFA) has its highest potential and better performances in comparison with other similar amplifiers when operating with a 980 nm or 1480 nm pump wavelength where gains in excess of 25dB and saturated output powers in the range of 20-25mW. This project presents a study of the Erbium Doped Fiber Amplifier (EDFA) performance characteristics over the optical transmission in term of gain, output signal power and amplified spontaneous emission (ASE). The design of Erbium Doped Fiber Amplifier (EDFA) is developed by using equipment ED-AMP OPTOSci. The results achieved are based on experimental setup by comparing the performance characteristics of EDFA while operating with and without 15dB attenuator. From the results, the performance characteristics of Erbium Doped Fiber Amplifier (EDFA) are applicable to improve and support the existing of optical transmission network. It have been confirmed that the pump power applied to Erbium Doped Fiber Amplifier (EDFA) sharply reduces due to absorption in Erbium doped fiber. Therefore, gain and ASE is strongly dependent on the pumping power and signal input power. This satisfied that the EDFA operation in saturation regime leading to maximum gain and minimum ASE.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the modern world of telecommunications, the ever growing demand for bandwidth has far exceeded previous expectations. Therefore, a fundamental change in the requirements for future network structures is needed. Simple and cost effective solutions that do not interrupt working systems are necessary in order to expand the existing links. It is important that the ways of planning and building a communications system are more flexible, so that fewer problems are encountered when expanding the existing structures since the probability of having to build a completely new system decreases.

Service providers and carriers are now involved in the growing competitive pressures due to liberalization in the telecommunications market. It should be realized that the expansion of services and an increase in available capacities are the main requirements in order to face in the world of long distance and in the subscriber access area are fast link for new users. Expending markets of mobile radio, cable TV, video-on-demand, home banking and the internet or World Wide Web are the major factors that driven the rapidly growing demand for data communications and makes it more necessary to upgrade existing fiber links.

One way to upgrade existing fiber links is by laying new fiber in an existing network. However, this is very time consuming and expensive due to high cost of laying cables. In addition, an upgrade to higher bit rates is not possible with every fiber type. The physical properties of the fiber can be more or less neglected with data rates up to 2.5 Gbit/s and short fiber runs. Chromatic dispersion becomes the limiting factor at higher data rates and