

ATTENUATION-LIMITED FIBER LENGTH BASED
ON POWER BUDGET EQUATION

NOR NAJWA ISMAIL

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA

ATTENUATION-LIMITED FIBER LENGTH BASED ON POWER BUDGET EQUATION

**This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons) Electronics (Communication)**

UNIVERSITI TEKNOLOGI MARA



**NOR NAJWA ISMAIL
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR**

JULY 2012

ACKNOWLEDGMENT

In the name of ALLAH Most Gracious Most Merciful

Alhamdulillah, a lot of thanks to ALLAH S.W.T for His wills and blessings, I successfully completed my Final Year Project (FYP) for my first degree of Bachelor of Engineering (Hons) Electronics (Communication).

Warm expression and sincere thanks to staff from Telekom Malaysia Bhd. especially to Sir Karim Ahmad, supervisor of UniFi who assists in introducing me about fiber optic for Passive Optical Network (PON) architecture. I also would like to express my highest gratitude to my FYP Supervisor, Madam Norbaiti Binti Sidik for the right guidance and encouragement given from the early phase of my FYP project to the end of the last stage of my project thesis. My great appreciation goes to my family who has supported me throughout the years. Their love and motivation provides me the spirit to complete this thesis successfully.

I also would like to express my gratitude to Dr Nur Emileen Abd Rashid and Madam Suhaila Subahir for helping me in giving some ideas in this project and to all friends who always besides me and never stop giving the motivations and encouragement during FYP process.

ABSTRACT

This project is to identify the best fiber length between Optical Line Terminal (OLT) and Optical Network Unit (ONU) in Passive Optical Network (PON) architecture for tree topology with 64 users based on the power budget equation. Parameters such as the number of connectors, splices and splitters should be considered since it will affect the system performance. Besides that, the transmission rates and types of photodetector also need to be considered. The simulated analysis of power loss, Bit Error Rate (BER) and Quality Factor (Q factor) evaluates the improvement of the performance. The simulation results are obtained by using Optisystem 7.0. The simulated results indicated the transmission rates 4.8Gbit/s with APD photodetector can be used for farthest fiber length.

TABLE OF CONTENTS

DECLARATION	I
ACKNOWLEDGMENT	II
ABSTRACT	III
TABLE OF CONTENTS	IV
LIST OF FIGURES	VII
LIST OF TABLES	X
LIST OF SYMBOLS AND ABBREVIATIONS	XI
CHAPTER 1: INTRODUCTION	1
1.1 INTRODUCTION	1
1.1.1 OPTICAL LINE TERMINAL (OLT)	2
1.1.2 OPTICAL SPLITTER	2
1.1.3 OPTICAL NETWORK UNIT (ONU)	2
1.1.4 CONNECTOR	3
1.1.5 SPLICE	4
1.2 BACKGROUND OF STUDY	4
1.2.1 POWER LOSS	4
1.2.2 QUALITY FACTOR (Q FACTOR)	5
1.2.3 BIT ERROR RATE (BER)	5
1.3 PROBLEM STATEMENT	5
1.4 OBJECTIVES	6
1.5 SCOPE OF WORK	6
1.6 THESIS ORGANIZATION	7
CHAPTER 2: LITERATURE REVIEW	8
2.1 INTRODUCTION	8
2.2 OPTISYSTEM 7.0	8
2.2.1 BENEFITS	9