Contents

ABSTRACT . . . iii
PREFACE . . . iv
DEDICATED . . . v
ABBREVIATIONS . . . vi
TABLE OF CONTENT . . . ix
LIST OF TABLES . . . x
LIST OF FIGURES . . . xi
Chapter 1 INTRODUCTION . . . 1
1.1 Background . . . 1
1.2 State of the art . . . 3
1.3 Research Problem . . . 4
1.4 Problem Limitation . . . 5
1.5 Objective . . . 5
1.6 Hypotheses . . . 6
Chapter 2 NG-PON STAGE 2 STANDARDS . . . 7
2.1 NG-PON2 ITU-T G.989 Recommendation . . . 7
2.2 System Overview and NG-PON2 trade-offs . . . 8
2.3 NG-PON2 architecture . . . 8
2.4 Wavelength plan for NG-PON2 . . . 11
2.5 Key Optical devices and subsystems for NG-PON2 networks . . . 12
2.5.1 Fibre Attenuation . . . 13
2.5.2 Chromatic Dispersion . . . 13
2.5.3 Optical transmitter . . . 14
2.5.4 Optical Receivers . . . 16
2.5.5 AWG . . . 19
2.6 Dispersion Compensation . . . 20
Chapter 3 MODEL SYSTEM OF NG-PON2 . . . 22
3.1 Definition of devices . . . 23
3.2 Modelling Key Element of NG-PON2 . . . 24
3.2.1 Transmitter . . . 24
3.2.2 Fibre Considerations . . . 27
3.2.3 Power Splitter . . . 28
3.2.4 Optical Filter . . . 29
3.2.5 Receiver . . . 30
3.2.6 Electrical filter . . . 32
3.3 Formula of a Thermal AWG . . . 33
3.3.1 A Thermal AWG Equations Analysis . . . 33
3.3.2 Design Parameters of a Thermal AWG . . . 34
Chapter 4 SIMULATION AND ANALYSIS RESULT . . . 36
4.1 Devices Analysis . . . 36
4.1.1 Transmitter . . . 36
4.1.2 Optical Distribution Network . . . 38
4.1.3 Receiver . . . 39
4.2 DCF cable for overcomes PMD . . . 40
4.2.1 The Combination fibre as Long-Reach PON . . . 40

4.2.2 Power for High Scalability 42
4.3 Calculation and Simulation Results Of Thermal AWG 42
4.3.1 Optical Spectrum Analyis 44
4.3.2 Bit Period Analysis 46
4.3.3 Bit Error Ratio Analysis 47
4.3.4 Optimization NG-PON2 System 50
Chapter 5 Conclusion 52
BIBLIOGRAPHY 53