

DAFTAR ISI

LEMBAR PENGESAHAN PEMBIMBING	ii
LEMBAR PERNYATAAN KEASLIAN	iii
LEMBAR PENGESAHAN PENGUJI.....	Error! Bookmark not defined.
HALAMAN PERSEMBAHAN	v
HALAMAN MOTTO	vi
KATA PENGANTAR.....	vii
ABSTRAKSI	ix
DAFTAR ISI.....	x
DAFTAR GAMBAR.....	xiii
DAFTAR TABEL	xv
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang Permasalahan.....	1
1.2 Rumusan Masalah.....	2
1.3 Tujuan Penelitian	2
1.4 Manfaat Penelitian	3
1.5 Batasan Masalah	3
1.6 Metodologi.....	4
BAB II TINJAUAN PUSTAKA	5
2.1. Penelitian Sebelumnya.....	5
2.2. Teknologi 4G LTE (<i>Long Term Evolution</i>).....	8

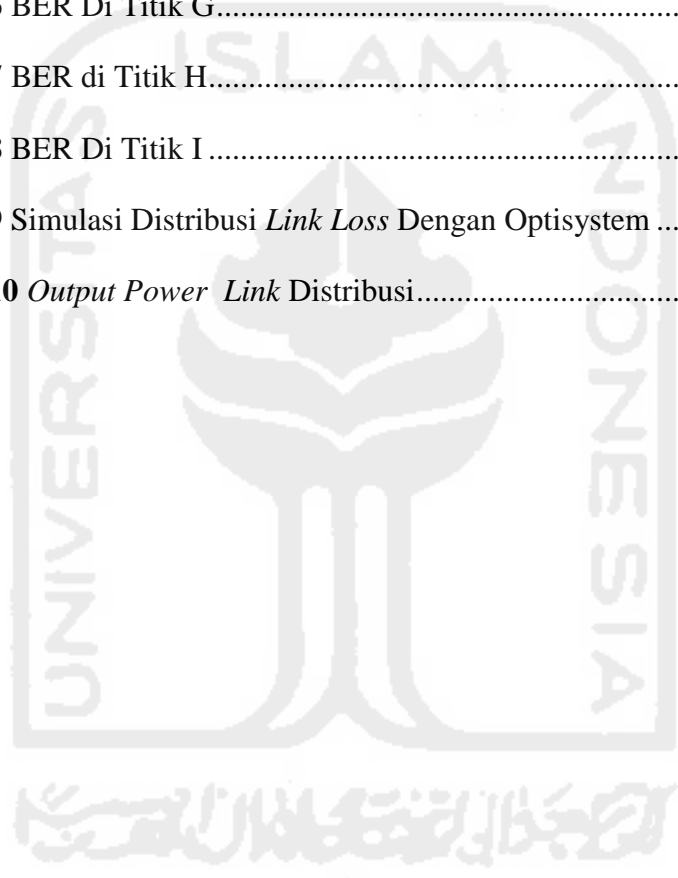
2.2.1. Arsitektur Jaringan <i>4G LTE (Long Term Evolution)</i>	9
2.2.2. Konsep Dasar Jaringan <i>Backbone</i> dan <i>Backhaul</i>	10
2.3. Sistem Komunikasi Fiber Optik	12
2.4. Desain Jaringan <i>Backbone</i>	14
2.5. Perhitungan <i>Power Budget</i>	20
2.6. <i>Rise Time Budget</i>	22
2.7. <i>Synchronous Digital Hierarchy (SDH)</i>	23
2.8. <i>Dense Wavelength Division Multiplexing (DWDM)</i>	25
2.9. Teknologi GPON	26
2.9.1. <i>Link Power Budget Parameter</i>	28
2.9.2. <i>Rise Time Budget Parameter</i>	29
2.9.3. Perhitungan Redaman Pada Setiap Distribusi	30
2.10. Perhitungan Traffik.....	31
BAB III PERANCANGAN SISTEM	33
3.1. Perancangan Sistem	33
3.2. Perhitungan Traffik.....	34
3.3. Penentuan Topologi	36
3.4. Penentuan Sumber Optik dan Detektor Optik	38
3.5. Penentuan Jenis Dan Panjang Gelombang.....	39
3.6. Penentuan Rute dan Distribusi Jaringan Optik.....	40
3.6.1 Parameter Perencanaan Jaringan Serat Optik.....	43
3.7. Perhitungan <i>Link Power Budget</i>	44
3.7.1. <i>Link Power Budget</i> Jalur Distribusi	45

3.7.2.	Perhitungan <i>Loss Power Budget</i> pada Jalur <i>Backbone</i>	53
3.7.3.	Perhitungan <i>Rise Time Budget</i>	54
3.7.4.	Pehitungan Jumlah <i>Splice</i> dan Konektor.....	58
3.8	Permilihan Teknologi GPON Untuk Distribusi Optik.....	59
3.8.1.	<i>Power Link Budget</i> GPON	60
3.8.2.	<i>Rise Time Budget</i> GPON.....	62
BAB IV	SIMULASI DAN PEMBAHASAN	64
4.1.	Simulasi <i>Backbone Link Loss</i>	64
4.1.1.	Power Hasil Simulasi	66
4.1.2.	<i>Bit Error Ratio</i> (BER).....	68
4.2.	Analisa <i>Link</i> Distribusi	70
4.2.1.	<i>Output Power</i> Hasil Simulasi	73
BAB V	KESIMPULAN DAN SARAN.....	75
5.1.	Kesimpulan	75
5.2.	Saran	76
DAFTAR PUSTAKA	77

DAFTAR GAMBAR

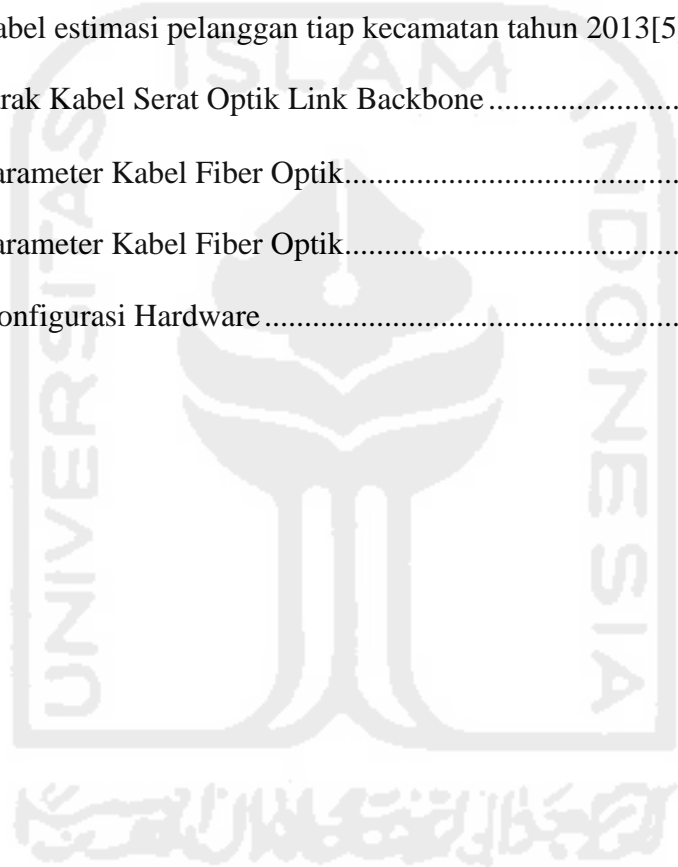
Gambar 1.1 Pertumbuhan Pelanggan Telekomunikasi Nirkabel[1].....	1
Gambar 2.1 Arsitektur Jaringan Long Term Evolution[7].....	9
Gambar 2.2 Komunikasi Jaringan Backhaul-Backbone.....	10
Gambar 2.3 Konsep Umum Mobile Access Dan Agregasi[9]	11
Gambar 2.4 Topologi Jaringan WDM Ring.....	17
Gambar 2.5 Topologi Jaringan WDM Mesh.....	19
Gambar 2.6 Alokasi GPON Untuk Mobile Backhaul [19]	27
Gambar 3.1 Diagram alir penelitian	33
Gambar 3.2 Topologi WDM Ring	37
Gambar 3.3 Konfigurasi Perangkat STM-64	39
Gambar 3.4 Rute Jaringan Backbone Sleman	41
Gambar 3.5 Rute Backbone Transmisi Optik Keseluruhan	42
Gambar 3.6 Rute Distribusi Optik Kalasan-Prambanan	45
Gambar 3.7 Rute Distribusi Optik Kalasan-Berbah	46
Gambar 3. 8 Rute Transmisi Distribusi Optik Seyegan-Moyudan	47
Gambar 3.9 Rute Distribusi Optik Seyegan-Minggir.....	48
Gambar 3.10 Rute Distribusi Optik Seyegan-Godean	49
Gambar 3.11 Rute Transmisi Distribusi Optik Pakem-Turi.....	50
Gambar 3.12 Rute Distribusi Optik Pakem-Cangkringan.....	51
Gambar 3.13 Ilustrasi Design Link Backbone Dan Distribusi.....	53
Gambar 4.1 Simulasi Backbone Link Loss Dengan Optisystem	65

Gambar 4.2 <i>Output Power Link Backbone 1</i>	66
Gambar 4.3 <i>Output Power Link Backbone 2</i>	66
Gambar 4.4 <i>Output Power Link Backbone 3</i>	67
Gambar 4.5 <i>Output Power Link Backbone 4</i>	67
Gambar 4.6 BER Di Titik G.....	69
Gambar 4.7 BER di Titik H.....	69
Gambar 4.8 BER Di Titik I.....	70
Gambar 4.9 Simulasi Distribusi <i>Link Loss</i> Dengan Optisystem.....	72
Gambar 4.10 <i>Output Power Link Distribusi</i>	73



DAFTAR TABEL

Tabel 2.1 Kapasitas dan Kecepatan Transmisi SDH[16].....	24
Tabel 2.2 Standar dari Teknologi GPON.....	26
Tabel 3.1 Estimasi Jumlah Pelanggan Tahun Pertama[5].....	34
Tabel 3.2 Tabel estimasi pelanggan tiap kecamatan tahun 2013[5].....	35
Tabel 3.3 Jarak Kabel Serat Optik Link Backbone.....	37
Tabel 4.1 Parameter Kabel Fiber Optik.....	64
Tabel 4.2 Parameter Kabel Fiber Optik.....	67
Tabel 4.3 Konfigurasi Hardware.....	71



DAFTAR SINGKATAN

ITU-T	= <i>International Telecommunication Union</i>
PDH	= <i>Plesiochronous Digital Hierarchy</i>
SDH	= <i>Synchronous Digital Hierarchy</i>
STM-N	= <i>Synchronous Transport Module, N Level</i>
BER	= <i>Bit Error Rate</i>
TMN	= <i>Telecommunication Management Network</i>
BLER	= <i>Block Error Rate</i>
TDM	= <i>Time Division Multiplexing</i>
TDMA	= <i>Time Division Multiple Access</i>
RF	= <i>Radio Frekuensi</i>
RX	= <i>Receiver</i>
TX	= <i>Transmitter</i>
LTE	= <i>Long Term Evolution</i>
FDMA	= <i>Frequency Division Multiple Access</i>
GGSN	= <i>Gateway Gprs Support Node</i>
GSM	= <i>Global System For Mobile Telecommunications</i>
GPRS	= <i>General Packet Radio Service</i>
HLR	= <i>Home Location Register</i>
HSS	= <i>Home Subscriber Server</i>
IMS	= <i>Ip Multimedia System</i>
IMT-2000	= <i>International Mobile Telecommunications 2000</i>
IP	= <i>Internet Protocol</i>
KPI	= <i>Key Performance Indicator</i>
ME	= <i>Mobile Equipment</i>
MS	= <i>Mobile Station</i>
PDF	= <i>Probability Density Function</i>
PN	= <i>Pseudo-Noise</i>
PS	= <i>Packet Switched Service</i>
QOS	= <i>Quality Of Service</i>

RNC	= <i>Radio Network Controller</i>
RNS	= <i>Radio Network Subsystem</i>
RRC	= <i>Radio Resource Control</i>
SIR	= <i>Signal To Interference Ratio</i>
SRNC	= <i>Serving Rnc</i>
TE	= <i>Terminal Equipment</i>
UE	= <i>User Equipment</i>
UI	= <i>Uplink</i>
4G NETWORK	= <i>Generasi keempat jaringan nirkabel untuk komunikasi mobile</i>
UMTS	= <i>Universal Mobile Telecommunications System</i>
UTRAN	= <i>UMTS Terrestrial Radio Access Network</i>
E-UTRAN	= <i>Evolved UMTS Terrestrial Radio Access Network</i>
ENB	= <i>Evolved Node B</i>
EPC	= <i>Evolved Packet Core</i>
MME	= <i>Mobility Management Entity</i>
S-GW	= <i>Serving Gateway</i>
EPS	= <i>Evolved Packet System</i>
SAE	= <i>System Architecture Evolution</i>
PDN-GW	= <i>Packet Data Network Gateway</i>
UTP	= <i>Unshielded Twisted Pair</i>
NSS	= <i>Network Subsystem</i>
CO	= <i>Central Office</i>
PDN	= <i>Packet Data Network</i>
LED	= <i>Light Emitting Diode</i>
WDM	= <i>Wavelength Division Multiplexing</i>
OADM	= <i>Optical Add/Drop Multiplexer</i>
OXC	= <i>Optical Cross Connect</i>
ADM	= <i>Add Drop Multiplexer</i>
GPON	= <i>Gigabit Passive Optical Network</i>
JARLOKAF	= <i>Jaringan Lokal Akses Fiber</i>
JARLOKAT	= <i>Jaringan Lokal Akses Tembaga</i>

ODC	= <i>Optical Distribution Cabinet</i>
ODF	= <i>Optical Distribution Frame</i>
ODN	= <i>Optical Distribution Network</i>
ODP	= <i>Optical Distribution Point</i>
OLT	= <i>Optical Line Terminal</i>
ONT	= <i>Optical Network Termination</i>
ONU	= <i>Optical Network Unit</i>
OTDR	= <i>Optical Time Domain Reflectomet</i>
PON	= <i>Passive Optical Network</i>
EDFA	= <i>Erbium Doped Fiber Amplifier</i>
OA	= <i>Optical Amplifier</i>
NZDSF	= <i>Non Zero Dispersion Shifted Fiber</i>
NDSF	= <i>Non Dispersion Shifted Fiber</i>
DXC	= <i>Digital Cross Connect</i>
APD	= <i>Avalanche Photodiode</i>
DWDM	= <i>Dense Wavelength Division Multiplexing</i>
NRZ	= <i>Non-Return-To-Zero</i>
SC	= <i>Standart Connector</i>
BSC	= <i>Base Station Controller</i>
BTS	= <i>Base Transceiver Station</i>
ATM	= <i>Asynchronous Transfer Mode</i>
LAN	= <i>Local Area Network</i>
MAC	= <i>Media Access Control</i>
MAN	= <i>Metropolitan Area Network</i>
MPLS	= <i>Multiprotocol Label Switching</i>
WAN	= <i>Wide Area Network</i>