

BAB V

KESIMPULAN

1. Migrasi yang dilakukan dari *Asynchronous Transfer Mode (ATM) Switch* ke metro ring, tidak mengganti seluruh media transmisi maupun perangkat yang telah digunakan saat ini. Perubahan yang terjadi, antara lain: pada struktur jaringan dari ATM *Switch* menjadi metro ring, penggantian ATM *Switch* dengan *aggregator / ethernet switch* didalam jaringan yang menghubungkan antara DSLAM dengan BRAS dan penggantian DSLAM maupun NMS Alcatel dengan DSLAM serta NMS Huawei.
2. Untuk melayani sambungan langsung yang telah terpakai saat ini sebanyak 49 ssl, dalam migrasi yang dilakukan pada daerah Cideng menghasilkan data penggunaan DSLAM lebih efisien yang hanya membutuhkan 3 (tiga) buah DSLAM Huawei, dibandingkan keadaan saat ini yang membutuhkan penggunaan 5 (lima) buah DSLAM Alcatel.
3. Setelah dilakukan migrasi di STO Cideng dari *Asynchronous Transfer Mode (ATM) Switch* ke metro ring, dimana dengan pemakaian 3 (tiga) buah DSLAM Huawei dan total kapasitas sambungan yang disediakan sebanyak 2465 ssl dengan sambungan yang terpakai 1360 ssl, sehingga masih memiliki sambungan yang belum terpakai sebanyak 1105 ssl.

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LAMPIRAN I

- **Nota Dinas PT. Telkom Kandatel Jakarta Utara**
- **Data Infrastruktur DSLAM Alcatel di STO cideng**
- **Data RK di PT. Telkom Kandatel Jakarta utara**

Nomor : C/Tel.4571/K000/D02-F202.3002/2009
 Kepada : Sdr. SM ACCESS NETWORK PLANNING DAN PERF DIVRE II
 Dari : DEPUTI MANAJEMEN JAKARTA UTARA
 Lampiran : 2 (dua) file
 Perihal : Perencanaan penggantian DSLAM & RDSLAM DIVRE II di Kandang Jakarta Utara

1. Menunjuk:
 - a. Nota Dinas VP ACCESS Nomor C. Tel. 326/TK303/DO-C 008 1000/2009 tanggal 18 Januari 2009 perihal permintaan penggantian DSLAM dan Remote DSLAM DIVRE II untuk STO Cideng.
 - b. Nota Dinas POH MGR CAPEN MANAGEMENT DIVRE II Nomor C. Tel. 20/TK 0000/D02-V104/2009/2009 tanggal 17 Februari 2009 perihal Hasil Survey DSLAM dengan Supporting Facility.
2. Tujuan:
 - a. Meningkatkan citra perusahaan PT.TELKOM dengan meningkatkan kualitas layanan.
 - b. Menambah kapasitas DSLAM pada STO Cideng yang mana mengacu pada hasil survey tahun 2008 terhadap pertumbuhan pelanggan sampai tanggal 10 Desember 2008 sebesar 8% per bulan.
3. Pelaksanaan :
 - a. Persiapan
 Ada beberapa hal yang harus dipersiapkan sebelum memulai penggantian, yaitu:
 1. Menyiapkan RKS (Rencana Kerja dan Syarat- syarat).
 2. Perumusan Masalah.
 3. Pengumpulan data
 - b. Perhitungan

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TELKOM

Perhitungan dalam hal ini dilakukan untuk:

1. Menganalisa data lapangan.
 2. Menentukan kapasitas masing-masing DSLAM dan RDSLAM.
 3. Membuat spesifikasi jaringan yang tepat.
- c. Pengetesan
 Pengetesan dilakukan terhadap seluruh perangkat yang termasuk dalam perencanaan meliputi :
 1. Pengetesan elektrik.
 2. Pengetesan fisik.
- d. Pembuatan Standard
 Membuat standard rancangan sebagai acuan dalam operasional maupun maintenance.
- e. Hasil Rancangan
4. Demikianlah kami sampaikan dan atas perhatiannya diucapkan terima kasih.

Jakarta, 12 Maret 2009

Irwani Mahry
 NIK 632997

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DATA INFRASTRUKTUR DSLAM ALCATEL
DATTEL JAKARTA UTARA
 POSISI : S/D 25 FEBRUARI 2009
 LOKASI CIDENG

NO URUT	LOKASI PERANGKAT DSLAM	SERIAL	REF	NO RAK	MERA P MODUL	JENIS LAYANAN MODUL	STATUS	LETAK MODUL							
								00	01	02	03	04	05	06	07
1	STO CIDENG	SCBA	CD	01	META	ADSL		1	1	1	1	1	1	1	1
2	STO CIDENG	SCBA	CD	02	META	ADSL		1	1	1	1	1	1	1	1
3	STO CIDENG	SCBA	CD	03	META	ADSL		1	1	1	1	1	1	1	1
4	STO CIDENG	SCBA	CD	04	META	ADSL		1	1	1	1	1	1	1	1
5	APT MEDITERRANEA GAJAH BUDA	SPLT	CD	01	META	ADSL		1	1						

NO	SERIAL	Jumlah Modul										Jumlah Modul Per Lokasi	Port Modul	Jml Port Modul (Port) Airtel	Jumlah Nomor Speedy (ADSL) ALCATEL		
		00	01	02	03	04	05	06	07	08	09					10	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1,344	1,344
2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
4	4																
5	5															48	48

JAKARTA, 25 FEBRUARI 2009
 OFF.2 VALIDATION

V.EDY DJATMIKO
 NIK. 631823

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DATA INFRASTRUKTUR DSLAM ALCATEL
DATTEL JAKARTA UTARA
 POSISI : FEBRUARI 2009

NO URUT	STO	LOKASI DSLAM	MERK DSLAM	POTENSI			TOTAL POTENSI	Tercapai
				ADSL	ADSL2+	G.SHDSL		
1	MKR	STO Muara Karang	ALCATEL	1,728	-	-	1,728	1,700
2	MKR	Apt. Pantai Mutiara	ALCATEL	72	-	-	72	72
3	KTA	STOKota	ALCATEL	480	-	-	480	485
4	CID	STO Cideng	ALCATEL	1,344	-	-	1,344	1,300
5	CID	Apt. Mediterania Gajah Buda	ALCATEL	48	-	-	48	46
6	MBS	STO Mangga Besar	ALCATEL	1,152	-	-	1,152	1,135
7	MBS	Harco Mas Mangga dua	ALCATEL	96	-	-	96	96
8	MBS	DLU Mangga dua	ALCATEL	384	-	-	384	19
9	MBS	Mangga dua Square (FCLR)	ALCATEL	168	-	-	168	163
10	KMY	STOKemayoran	ALCATEL	336	-	-	336	324
11	PDW	STO Padenangan	ALCATEL	768	-	-	768	751
12	STR	STO Sunter	ALCATEL	1,032	-	-	1,032	1,020
13	TPR	STO Tanjung Priok	ALCATEL	648	-	-	648	627
14	CI	STO Cilincing	ALCATEL	288	-	-	288	288
15	MRD	STO Marunda	ALCATEL	48	-	-	48	48
Sub Jumlah ALCATEL :				8,592	-	-	8,592	8,057

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Data RK di PT. Telkom Kandatel Jakarta utara

TELKOM

No.	STO	RK	RK PRIMA				
			FEBRUARI 2009		KAPASITAS		
			JML.	RK	SEK	PRIM	TOTAL
1.	MKR (Muaru Karang)	86	3	RCT	160	87	247
				RCP	298	279	577
				RZ	311	274	585
2.	KTA (Kota)	42	2	RAH	158	15	153
				RK	217	38	255
3.	CID (Cideng)	104	3	RDK	439	55	494
				RDJ	253	39	292
				RZ	139	49	188
4.	MBS	102	5	RBS	170	49	219
				RL	131	25	156
				RCQ	258	61	319
				RCS	137	280	417
				RCP	101	309	310
5.	STR (Sunter)	71	5	RAD	115	91	206
				RJ	156	114	270
				RA	91	101	192
				RAT	104	662	766
				RB	191	177	368
6.	KMY (Kemayoran)	12	2	RJ	59	46	105
				RH	72	55	127
				RBE	157	29	186
7.	TPR (Tanjung Priuk)	68	4	RBL	113	31	144
				RBF	133	25	158
				RK	116	183	299
8.	CE (Cibinong)	38	2	RP	296	117	413
				RAE	237	117	354
TOTAL RK		533	29				

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LAMPIRAN II

- **Parameter elektrik Multi Layanan PT. Telkom**
- **Standard parameter Fiber G.652**
- **International standard and recommendations**

No.	Sistem	Bit rate	Redaman (dB)	Tahanan Loop (Ω)	S/N (dB)	Impedansi (Ω)
1	ISDN BRA	144Kbps	≤ 36(40KHz)	≤ 1.105	≥ 21	110-210
2	ISDN PRA	2Mbps	≤ 25(130KHz)	≤ 267	≥ 17	110-210
3	HDSL -2 Pair	2Mbps	≤ 27(150KHz)	≤ 614	≥ 22	80-170
4	HDSL -1 Pair SDSL	2Mbps	≤ 22(150KHz)	≤ 560	≥ 23.1	80-170
5	G.SHDSL	0,7Mbps	≤ 53(150KHz)	≤ 1.200	≥ 17,5	80-170
6	G.SHDSL	1 Mbps	≤ 48(150KHz)	≤ 1.100	≥ 22,5	80-170
7	G.SHDSL	2Mbps	≤ 38(150KHz)	≤ 900	≥ 24	80-170
8	ADSL Lite (G.Lite)	512Kbps	≤ 65(300KHz)	≤ 1.200	≥ 25	60-160
9	ADSL Lite (G.Lite)	1,5 Mbps	≤ 60(300KHz)	≤ 1.181	≥ 30	60-160
10	ADSL	2Mbps	≤ 35(300KHz)	≤ 654	≥ 28,4	60-160
11	ADSL	4Mbps	≤ 30(300KHz)	≤ 561	≥ 33,4	60-160
12	ADSL	6Mbps	≤ 25(300KHz)	≤ 467	≥ 38,4	60-160

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STANDARD PARAMETER FIBER G.652

Parameters	Requirements	Standards
Transmission Losses	0,3 - 0,45 dB/km in the 1310 nm region 0,15 - 0,30 dB/km in the 1550 nm region 1600-16,50nm region: Under study	ITU-T G.652 IEC 793-1-2 IEC 794-1-2-3
Cut-off wavelength (λ _c)	1100nm (λ _c = 1270nm cabled fibre)	IEC 794-1-2-3
Chromatic dispersion parameters	1300 nm - λ _c - (32-4 nm)	
Zero-dispersion wavelength (λ ₀)	Somax: -0,093 ps/(nm.km)	
Zero-dispersion slope (S ₀) (nm ⁻²)	D = 53 ps/(nm.km) @ 271 - 1310 nm	
Chromatic dispersion (D) (ps/(nm.km))	D = 3,5 ps/(nm.km) (1208 - 1330 nm) D = 20 ps/(nm.km) on the 1550 nm region	
Polarisation mode dispersion coefficient	Under study	
Longitudinal attenuation uniformity	Under study	

GEOMETRICAL PARAMETERS		
Mode field diameter, tolerances	9 to 10 microns ± 10% at 1310 nm	
Mode field concentricity error	1 micron at 1310 nm	ITU-T G.652
Cladding diameter, tolerances	125 ± 2 microns	IEC 793-1-2
Cladding non-circularity	2%	IEC 794-1-2-3
Primary coating diameter	245 microns ± 10 microns	
Secondary coating diameter	900 microns ± under study	

MECHANICAL PARAMETERS		
Proofstress level	0,350 GPa, recommended - 0,70 GPa	ITU-T G.652
n factor (dynamic fatigue parameter)	nd = 20	IEC 793-1-2
Tension	45 N	IEC 794-1-2-3
Coating strippability	1,2 - F = 3 N	
Environment test (temperature, humidity)	-40 °C, + 80 °C (checking after test losses, strippability, etc.)	

International standard and recommendations

Tabel 5.20 International standards and recommendations (part1)

Standard Code	Standard Name
ITU-T G.991.2	Single-Pair High-Speed Digital Subscriber Line (SHDSL) Transceivers
ITU-T T.902.1	Asymmetrical Digital Subscriber Line (ADSL) Transceivers
ITU-T G.992.3	Asymmetrical Digital Subscriber Line (ADSL) Transceivers-2
ITU-T G.992.5	Asymmetrical Digital Subscriber Line (ADSL) Transceivers-Extended Bandwidth
ITU-T G.994.1	Handshake Procedures
ITU-T G.996.1	Test procedures for Digital Subscriber Line (DSL) Transceivers
ITU-T T.997.1	Physical Layer Management for Digital Subscriber Line (DSL) Transceivers
IEEE 802.2	IEEE standard for local and metropolitan area networks : Specific requirements Part 2 : Logical Link Control
IEEE 802.3	IEEE standard for local and metropolitan area networks : Specific requirements Part 3 : Carrier Sense Multiple Access with Collision Detection(CSMA/CD) Access Method and Physical Layer Specifications (includes 802.3ab, 802.3ac and 802.3ad)

Tabel 5.20 International standards and recommendations (part2)

Standard Code	Standard Name
IEEE 802.3u	Definition of Fast Ethernet (100BTX, 100BT4, 100BFX)
IEEE 802.3x	Definition of Full Duplex operation in a switched LAN
IEEE 802.3z	Definition of Gigabit Ethernet (over fiber)
IEEE 802.3ad	Definition of Ethernet VLAN Trunking
IEEE 802.1d	MAC Bridges
IEEE 802.1p	Traffic Class Expediting and Dynamic Multicast Filtering
IEEE 802.1q	IEEE standard for local and metropolitan area networks : Virtual Bridged Local Area Networks
IEEE 802.1w	Rapid Reconfiguration of Spanning Tree
IEEE 802.1x	Port Based Network Access Control
RFC0768	UDP
RFC781	The TFTP Protocol (Revision 2)
RFC0791	IP

Tabel 5.20 International standards and recommendations (part3)

Standard Code	Standard Name
RFC0792	ICMP
RFC0793	UDP
RFC0826	ARP
RFC0854	Telnet
RFC0894	Standard for transmitting IP packet on Ethernet
RFC112	IGMPv1
RFC1155	Structure and identifier of the Internet management information based on TCP/IP
RFC1157	Simple Network Management Protocol (SNMP)
RFC1213	Internet Network Management Information Base based on TCP/IP : MIB-II
RFC1493	Bridge MIB
RFC1661	Point to point Protocol (PPP)
RFC1907	Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)

Table 5.20 International standards and recommendations (part4)

Standard Code	Standard Name
RFC2131	DHCP Relay
RFC2236	Internet Group Management Protocol, Version 2 Internet
RFC2516	A Method for Transmitting PPP over Ethernet (PPPoE)
RFC2662	Standard SNMP MIB for ADSL Lines
RFC3031	Multi-protocol Label Switching Architecture
RFC3032	MPLS Label Stack Encoding
RFC3036	LDP Specification
RFC3140	ADSL Line Extension MIB
TR-048	Test specifications (DSL Forum)
ETSI TS 101 388	European requirements for ADSL (2002-2005)
ETSI ETR 328	European requirements for ADSL (1996)
ETSI TS 101-952-1-1 v111(2002-2005)	POIS

Table 5.21 International standards and recommendations on the EMC (part1)

Standard Name	Standard Description
EN55022	Information technology equipment-Radio disturbance characteristics-Limits and methods of measurement
EN55024	Information technology equipment-Immunity characteristics-Limits and methods of measurement
CISPR22	Information technology equipment-Radio disturbance characteristics-Limits and methods of measurement
CISPR24	Information technology equipment-Immunity characteristics-Limits and methods of measurement
ETSI EN 300 386	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Telecommunication Network Equipment; Electromagnetic Compatibility (EMC) requirements
EN61000-4-2	Electromagnetic Compatibility (EMC) Section 4-2 Electronic discharge immunity test-Basic EMC Publication
EN61000-4-6	Electromagnetic Compatibility (EMC) Part4 Testing and Measurement techniques Section6 Immunity to conducted disturbance, induced by radio-frequency fields

Table 5.21 International standards and recommendations on the EMC (part2)

Standard Name	Standard Description
EN61000-1-5	Electromagnetic Compatibility (EMC) Part4-5 Testing and measurement techniques-Surge immunity test
IEC61000-4-2	Electromagnetic Compatibility (EMC) Part4-2 Testing and measurement techniques-Electrostatic discharge immunity test
IEC61000-4-5	Electromagnetic Compatibility (EMC) Part4-5 Testing and measurement techniques-Surge immunity test
IEC61000-4-6	Electromagnetic Compatibility (EMC) Part4-6 Testing and measurement techniques-Immunity to conducted disturbances, induced by radio-frequency fields
ETSI EN201 468	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Additional Electromagnetic Compatibility (EMC) telecommunication equipment for enhanced availability of service in specific applications
ETSI EN 300 132-2	Power supply interface at the input to telecommunication equipment. Part2. Operated by direct current (DC)

Table 5.22 International standards and recommendations on the grounding

Standard Name	Standard Description
ITU-T K 20	Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents
ITU-T K 41	SERIES K. PROTECTION AGAINST INTERFERENCE Resistibility test for telecommunication equipment exposed to overvoltages and overcurrents-Basic recommendation
ITU-T K 45	SERIES K. PROTECTION AGAINST INTERFERENCE Resistibility of access network equipment to overvoltages and overcurrents

LAMPIRAN III

- **Spesifikasi DSLAM Alcatel**
- **Spesifikasi DSLAM Huawei MA-5600 dan MA-5300**





Product Name: Alcatel-Lucent 7300 Advanced Services Access Manager (ASAM) – ANSI Version

Product Description

The award-winning Alcatel-Lucent 7300 ASAM is the successor to the Alcatel-Lucent 1000 ASAM, the most widely deployed digital subscriber line access multiplexer (DSLAM), in the world, and the driving force behind splitterless full rate ADSL.

The Alcatel-Lucent 7300 ASAM enables mass deployment of revenue-generating broadband services for both business and residential customers – no matter how far they are from the central office. The Alcatel-Lucent 7300 ASAM simplifies deployment of broadband services like high-speed Internet access, toll-quality voice over DSL, and VPNs for telecommuting.

The Alcatel-Lucent 7300 ASAM offers the industry's best performance, power density and scalability, with support for splitterless full-rate and G.Lite ADSL, as well as HDSL-2 and G.shdsl. Temperature-hardened and UL-listed, the Alcatel-Lucent 7300 ASAM allows service providers to reach all potential DSL customers – whether served by a central office or a remote facility like a digital loop carrier (DLC) or multi-dwelling unit (MDU).

Benefits

- Deliver mass-deployable services for both business and residential customers.
- Deliver service to more customers on a single network connection.
- Grow at the pace of demand.
- Simplify provisioning and test access.
- Seamlessly integrate with the largest installed base of DSLAMs in the world (the Alcatel-Lucent 1000 ASAM).
- Deploy more lines under NEBS restrictions.

Features

- Lowest power consumption on the market – 1 watt per ADSL line.
- Highest density – service up to 2,000 DSL lines per network connection.
- Highly scalable – from 8 lines to 5,000 lines on a single DS-3 or OC-3.
- Full rate ADSL and G.Lite on a single line card.
- HDSL-2 and G.shdsl line cards.
- Voice over DSL support.
- Fully redundant system ensures reliability.
- Metallic test access (MTA) simplifies troubleshooting.
- Temperature hardened and UL listed.

Technical Summary

- System Capacity
- Up to 120 lines per shelf (5 cards, 24 lines each) with splices
- 5 slots
- Extendable to 1,440 lines (12 x 120)
- Ultra density line card: 24 lines per board

Interface Cards

- ATM network
- STM-1 (155 Mb/s)
- E3 (34 Mb/s)
- DS3 (44 Mb/s)
- 4 x E1 BIA (4 x 2.0 Mb/s)
- 1,310/1,550 nanometer dark fiber
- Up to 96 MB on-board memory
- Optional 1+1 redundancy (APS/EPS)
- STM-4 upgrade table

Ethernet network

10/100-T interface
VLAN support according to IEEE 1Q standard
ISP or other service identification based on VLAN
User traffic mapped to VLAN
4,095 VLAN IDs
Security (fire-walling) based on VLAN

Line Interface Cards

ADSL - multi-standard auto-detect ADSL
POTS: ITU-T G.dmt
POTS: ITU-T G.lite
POTS: ANSI T1.413
ISDN: ITU-T G.dmt B
ISDN: ETSI TS 101 388
24 lines per board
ITU.T.G.SHDSL
24 lines per board
ILMI 4.0 automatic CPE configuration (PVC and SVC)
VDSL: DMT multi-standards-based
8 lines per board, evolving to 12 and 24 in next version
Passive splitter types: TBR21
600 impedance
ETSI harmonized impedance splitter (TR 101 728)
ISDN
Subtending line cards
4x E1 RMA
E3
DS3
STM-1
1,310/1,550 nanometer dark fiber

IP Service Module

10/100 Ethernet interface
RFC 1483/RFC 2544 (bridged, routed), PPPoE, PPPoE
L2TP, MPLS (RFC 2547 bis in static mode), virtual routing
RIP, RIPv2, OSPFv2, BGP4
RADIUS Management
Element management layer (EML) through Alcatel 5523 AWS Element Manager (AWS)
Network management layer (NML) through Alcatel 5620 Network Manager (NM)
Interfacing with other (legacy) OSSs, including CORBA
Connectivity:
Over ATM network, in-band PVC (ATM VP/VC)
Out-of-band through 10/100 Ethernet port
Local management through a web-based craft terminal. Software runs on a standard PC with Windows 2000 or higher, and any browser software

ATM Service Characteristics

Supported ATM QoS classes: UBR, UBR+, CBR, RT-VBR/nrt-VBR, GFR
Multi-QoS per line
Up to 10,368 connections (PVC/SVC) per system
Up to 16 connections (VC) per line

Physical Specifications

Height: 53 cm (20.9 in.)
Width: 48.2 cm (19.0 in.)
Depth: 30 cm (11.8 in.)
Maximum 3 shelves per rack

Other Characteristics

Test bus for metallic line test
Integrated vertical cross-connect
Soft connection of individual DSL lines
Connector for external test equipment
5 Gb/s backplane

Power

Average power consumption: 1.2 W per ADSL line

Product Safety and Environment

EN 60950 A1, A2, A3, A4, A11, Class 1 (IEC 950)
ETS 300 019-1-3 class 3.1E
Temperature hardened
Operational temperature range: 0 C to 45 C (32 F to 113 F)

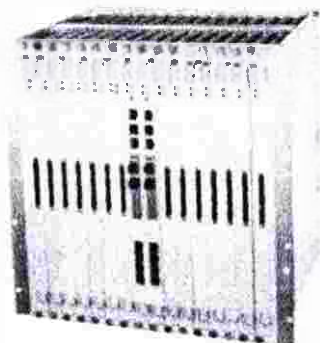


Table 5.1 Dimensions of the MA5600

Parameter	Dimensions (W x D x H)
H66-18 cabinet	600 mm x 600 mm x 1800 mm
MA5600 cabinet	N66-22 600 mm x 600 mm x 2200 mm
MA5600 service shelf (without mounting brackets)	437.5 mm x 420 mm x 43.8 mm
MA5600SPL shelf (without mounting brackets)	436 mm x 420 mm x 39.35 mm
Board (minimum dimensions, with the front panel and connector)	254 mm x 372 mm x 399.5 mm

Table 5.6 Board in the MA5600 service shelf

Board Type	Silk Screen	Slot
Control Board	SCUB	Slots 7-8
	SCUK	
	ADFE	
Service Board	ADFF	Slots 0-6, 9-15
	ADBF	
	SFEA	
Interface Board	AIUG	Slots 0-6, 9-15
	ISUA	
ISU	ISUA	Slots 14-15
	ISUU	

Table 5.6 Performance parameters of the MA5600

Parameter	Specification
Backplane bus capacity	MA5600 210 Gbps
System L2 packet forwarding	72 Mbps
Switching mode	Store and forward
Switching forwarding delay	less than 20µs for a64-byte Ethernet frame forwarded at a 100 Mbps Ethernet port
Full configuration bit error rate	$< 10^{-7}$

Table 5.8 Specifications of the 100Base-TX port

Parameter	Specification
Transmission rate	Full duplex 100 Mbps
Connector type	RJ-45 (RJ45)
Transmission reach	100m
Cable type	Twisted pair
Standard compliance	IEEE 802.3u

Table 5.9 Specifications of the 100Base-FX port

Parameter	Specification	
Transmission rate	Full duplex 100 Mbps	
Connector type	LC	
Interface mode	Multi-mode	Single-mode
Transmission reach	2 km	15 km
Central wavelength	1310 nm	1310 nm
Transmission power	-19 dBm to -14 dBm	-15 dBm to -8 dBm
Extinction ratio	8 dB	8.2 dB
Receiver sensitivity	-30 dBm	-28 dBm
Standard compliance	IEEE 802.3x	

Table 5.7 Configuration parameters of the MA5600

Item	Description
Management port	SCU: <ul style="list-style-type: none"> • 1 10/100M maintenance network port • 1 serial port for local configuration • 1 environment monitoring port
GE ports on a board	SCU: 1-6
FE ports on a board	SCU: 1-6 optical ports SCU: 1-4 electrical ports
Maximum number of ADSL2+ ports in a shelf	MA5600: 896
Maximum number of SDSL ports in a shelf	MA5600: 448
Maximum PVCs for a port	ADSL port: 8 ADSL port: 4
Maximum QoS queues for a port	GE uplink port: 8
ATM ports on a board	ARUG: 1-4
IMA/E1 ports on a board	ARUG: 8

Table 5.10 Specifications of the ADSL2+ port

Parameter	Specification
Transmission rate	Upstream: 1.2 Mbps Downstream: 24 Mbps
Port quantity	64
Connector type	Delander
Transmission reach	6.5 km
Cable type	Twisted pair
Frequency	Upstream: 20 kHz to 138 kHz Downstream: 138 kHz to 2.208 MHz
Modulation	Discrete multi-tone (DMT)
Service supported	ADSL2+
Standard compliance	ITU-TG 99.01 ITU-TG 99.02 ITU-TG 99.03 ITU-TG 99.05 ANSI T1.413

Table 5.11 Specifications of the G.SHDSL port

Parameter	Specification
Transmission rate	192 kbps to 2312 kbps (symmetrical)
Connector type	Delander
Transmission reach	3 km to 6 km
Cable type	Twisted pair
Rate adjustment step	64 kbps
Line code	TC-PAM
Frame protocol	ATM
Standard compliance	ITU-TG 991.2 Annex A ITU-TG 991.2 Annex B

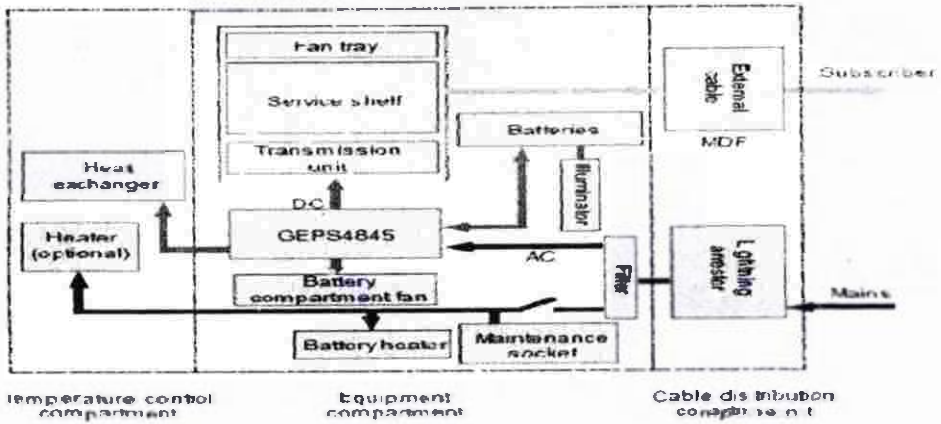
Table 5.12 Specifications of the STM-1 optical port

Attribute	Description		
Transmission rate	155Mbps		
Connector type	SC/PC (square)		
Fiber type	G652		
Application class code	L-1	S-1	L-11
Working Wavelength	1310 nm	1310 nm	1310 nm
Wavelength range	1260-1360 nm	1261-1360 nm	1263-1360 nm
Port mode	Multi-mode	Single-mode	Single-mode
Maximum reach	2km	15km	40km
Optical source	MLM	MLM	MLM
Maximum mean transmit optical power	-8 dBm	-8 dBm	0 dBm
Minimum mean transmit optical power	-15 dBm	-15 dBm	-5 dBm
Extinction ratio	8.2 dB	8.2 dB	10 dB
Minimum receiver sensitivity	-23 dBm	-28 dBm	-31 dBm
Minimum receiver overload power	-8 dBm	-8 dBm	-10 dBm

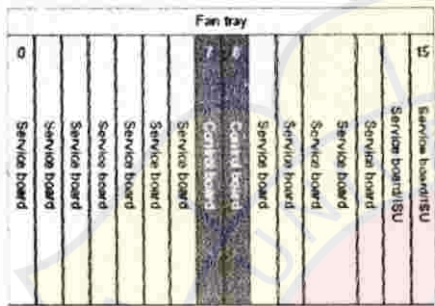
Table 5.14 Specifications of the E1 port

Parameter	Description
Transmission rate	2048 kbps
Bit rate error tolerance	± 5.0 ppm
Line code	HDB3
Nominal impedance	75Ω (ohms)
Transmission reach	≤ 1000 m
Nominal pulse width	24 ns
Port protection capability	ITU-T K.20 compliant

Power Distribution

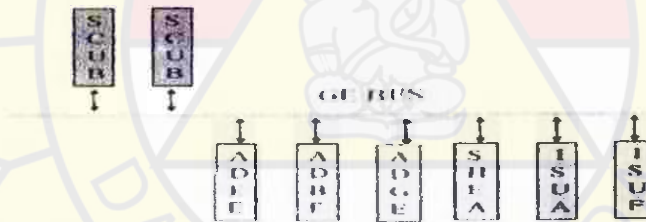


Frame Architecture



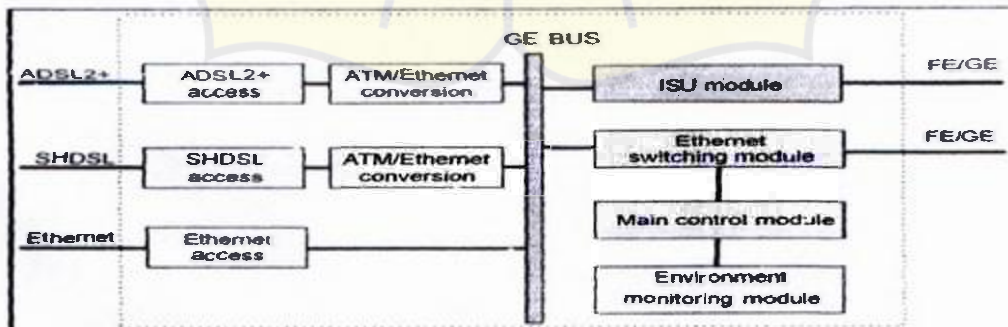
- Service frame offers 16 slots.
- Service frame :
 - ⇒ Slots 7 and 8: The main control board SCUB
 - ⇒ Slots 0-6 and 9-15: Service boards ADCE / ADBF / ADGE / SHEA
 - ⇒ Slot 14, 15: ISUA / ISUE board (optional)

System Functional Block Diagram



- MA5600 adopts large capacity backplane with non-blocking GE bus.
 - ⇒ Backplane capacity is 210 Gbit/s. (MA5300 : 32 Gbit/s)
 - ⇒ Packet forwarding rate is 72 Mpps. (MA5300 : 19 Mpps)

Function Modules



LAMPIRAN IV

- Surat Keterangan dari PT. TELKOM Kandatel Jakarta Utara
- Surat Keterangan Pengambilan Data di PT. TELKOM Kandatel Jakarta Utara





SURAT KETERANGAN

No : 3081 PS.000/D02/C202000/2009

Yang bertanda tangan dibawah ini Assisten Manager Fiber & Radio Access Maintenance (FRAM) PT TELKOM Kantor Jakarta Utara Jalan Yos Sudarso Kav.23-24 Jakarta, dengan ini menerangkan bahwa:

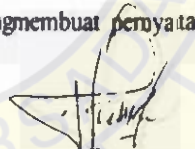
Nama : RIFKY OCTOVIARDY
Asal Universitas : UNIVERSITAS DARMA PERSADA
NIM : 05210001
Jurusan : TEKNIK ELEKTRO TELEKOMUNIKASI

Telah melaksanakan kegiatan Kerja Praktek di Unit kerja kami selama 30 (tiga puluh) hari terhitung mulai tanggal 06 MARET 2009 sampai dengan tanggal 05 APRIL 2009

Demikian surat keterangan ini saya buat, dengan sebenar-benarnya dan untuk dipergunakan sebagaimana mestinya.

Jakarta, 19 Agustus 2009

Yang membuat pernyataan


H. SUDIRMAN
NIK: 560535

Committed 2U



SURAT KETERANGAN

No.: 307/PS.000/D02/C/202000/2009

Yang bertanda tangan di bawah ini Asisten Manager Fiber & Radio Access Maintenance (FRAM) PT. TELKOM Kandatel Jakarta Utara Jalan Yos Sudarso Kav. 23-24 Jakarta, dengan ini menerangkan bahwa:

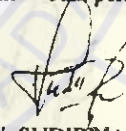
Nama : RIFKY OCTOVIARDY
Asal Universitas : UNIVERSITAS DARMA PERSADA
NIM : 05210001
Jurusan : TEKNIK ELEKTRO TELEKOMUNIKASI

Telah melakukan pengambilan data untuk Tugas Akhir pada unit kerja Fiber & Radio Access Maintenance (FRAM) PT. TELKOM Kandatel Jakarta Utara, berupa data sebagai berikut:

1. Data Infrastruktur DSLAM Alcatel bulan Februari 2009.
2. Data Infrastruktur DSLAM Huarwei bulan Februari 2009 - Juli 2009.
3. Data RK di PT. TELKOM Kandatel Jakarta Utara.
4. Data penambahan kapasitas.

Demikian surat keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Jakarta, 19 Agustus 2009
Yang membuat pernyataan


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NIK : 560535



LAMPIRAN V

- **Riwayat Hidup Penulis**

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1988 – 1994 : SDN 13 Pagi Lubang Buaya, Jakarta