9 Financial Status of the Carriers

The first section analyzes the financial status of LTC and ETL up to the financial year 2001 based on the financial data provided by LTC and ETL respectively.

9.1 LTC

LTC was a sole telecommunication provider for the fixed phones and the mobile phones until April, 2002. Firstly, Table 8.1 shows the trends and share of the revenue in Kip. While this table can show the share in a particular year, converted revenue in US$ is more appropriate to analyze the trends cross years (Table 8.2).

Table 8.1 Share of the Revenue in Kip

(million kip, %)

	1998	(Share)	1999	(Share)	2000	(Share)	2001	(Share)
Fixed (Domestic)	7,703	12%	10,205	8%	15,303	9%	31,005	14%
Fixed (international)	28,297	46%	56,786	44%	71,692	41%	56,878	26%
Mobile	7,168	12%	16,388	13%	47,700	28%	93,200	42%
Public Phone	2,068	3%	4,316	3%	4,905	3%	3,281	1%
International Settlement	7,454	12%	22,575	17%	30,531	18%	22,136	10%
Internet							7,803	4%
Others	9,401	15%	18,811	15%	3,169	2%	7,996	4%
Total	62,091	100%	129,080	100%	173,300	100%	222,300	100%

Table 8.2 Share of the Revenue in US$

(Thousand $, %)

	1998	(Share)	1999	(Share)	2000	(Share)	2001	(Share)
Fixed (Domestic)	2,335	12%	1,437	8%	1,940	9%	3,462	14%
Fixed (iinternational)	8,579	46%	7,996	44%	9,089	41%	6,352	26%
Mobile	2,173	12%	2,308	13%	6,047	28%	10,408	42%
Public Phone	627	3%	608	3%	622	3%	366	1%
International Settlement	2,260	12%	3,179	17%	3,871	18%	2,472	10%
Internet							871	4%
Others	2,850	15%	2,649	15%	402	2%	893	4%
Total	18,825	100%	18,175	100%	21,971	100%	24,825	100%
Official Exchange Rate	3,298		7,102		7,888		8,955	

The highest share of the revenue in 2000 was outgoing international calls from the fixed phones, which accounted for 41% of the total revenue. The high share of the international revenue is based on the tariff setting, which places international phone calls high and the domestic call low. The next highest share was the mobile phone, which was 28%; however, the mobile phone marked the highest share in 2001 at 42%. The mobile phone contributes to the total revenue not only by the

increase in the number of subscribers but also by the revenue per subscriber. Table 8.3 shows the trends in the number and the annual increase rate of the subscribers.

Table 8.3 Number of Subscribers / Lines at the End of the Year

	1998	1999	(Increase)	2000	(Increase)	2001	(Increase)
Fixed Line	28,005	31,632	13%	40,853	29%	48,484	19%
Mobile Phone	6,420	9,367	46%	13,773	47%	29,565	115%
Internet						2,248	
Public Phone	194	237	22%	255	8%	340	33%

In 2001, the subscribers of the mobile phone leaped by 115% in response to the expansion of the switching capacity. The average annual increase of the mobile phone subscribers was 69% whereas that of the fixed phone was 20% from the end of 1998 to that of 2001.

Table 8.4 is an estimate of the monthly revenue per subscriber in US$. Excluding the international settlement, per-subscriber revenue from the mobile phones was 2.2 times higher than that from the fixed phones in 2001. The mobile phone has indeed become the very important source of the revenue.

Table 8.4 Monthly Revenue per Subscriber/Line (Estimate)

(US$)

	1999	2000	2001
Fixed	26	25	18
Mobile	24	44	40
Internet			65
Public Phone	235	211	103

* The revenue is divided by the average subscribers of the year and the previous year as listed in Table 8.3.

On the other hand, Internet service was just started at the end of 2000. Although the number of the subscriber is 9% of the fixed phones, the revenue of the Internet per subscriber was estimated to be 3.5 times higher than that of the fixed phone in 2001. The fact that majority of the Internet subscribers are institutions accounts for the high per-subscriber revenue. Undoubtedly, Internet will be another important source of the revenue for LTC near future.

In spite of the rapid growth of the mobile phones and Internet, the increase in total revenue stayed at 21% in 2000 and 13% in 2001 (See Fig 8.1). Three main reasons can be explained.

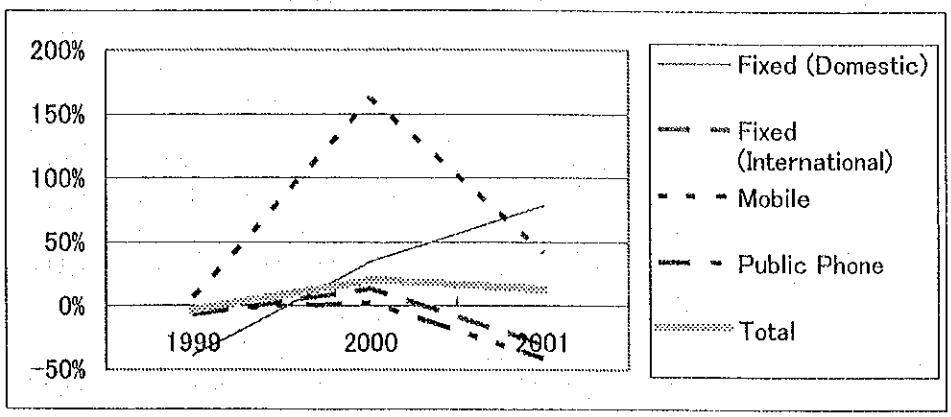


Fig 8.1 Annual Increase Rate of the Revenue (calculated in US$)

Firstly, the decrease in the international revenue seems to have suppressed the growth. The annual growth rate of the international call revenue from the fixed phones stayed at -8% from 1999 to 2001 in average. This seems to have been caused by the prevalent use of Internet. People are shifting from international phone calls to the use of E-mail, chat, and VoIP. VoIP is illegal in Lao P.D.R., yet, the movement is hard to be suppressed.

Secondly, the rate of the domestic call was kept constant until April, 2002 in spite of the decrease in the value of kip. Kip has lost its value against dollar by 47% annually in average from 1998 to 2001. This reduces the effects of increase in the subscribers of the fixed phones by half.

Thirdly, the revenue from the public phone was decreased in 2001. In addition to the above two mentioned causes, the increase in the mobile phones seems to have caused the decrease in the usage of the public phones.

Table 8.2 shows the Income and Expenditure, and Table 8.6 shows the Balance Sheet at the end of Year 2000 and Year 2001.

Table 8.5 Income and Expenditure Statement (LTC)

(million kip, %)

	2000		2001	
Sales				
Fixed Line (Domestic)	15,303	9%	31,005	14%
Fixed (International)	71,692	41%	56,878	26%
Mobile Phone	47,700	28%	93,200	42%
Public Phone	4,905	3%	3,281	1%
International Settlement	30,531	18%	22,136	10%
Internet			7,803	4%
Others	3,169	2%	7,996	4%
Total	173,300	100%	222,300	100%
Operating Expenses				
Salaries, Bonus & Allowances	12,600	7%	15,600	7%
Depreciation	9,813	6%	16,543	7%
Provision			5,357	2%
Repair & Maintenance	22,400	13%	28,000	13%
Other Admin. Expenses & Taxes	1,200	1%	30,700	14%
Total	46,013	27%	96,200	43%
Operating Income	127,287	73%	126,100	57%
Other Income	8,400	5%	10,900	5%
Other Expense	8,400	5%	13,800	6%
Income before Income Tax	127,287	73%	123,200	55%
Income Tax (20%)	25,457	15%	24,640	11%
Net Income	101,830	59%	98,560	44%

Table 8.6 Balance Sheet (LTC)

(million kip, %)

	Dec-00	Dec-01		Change		Dec-00	Dec-01		Change
Assets					Liabilities				
Cash on Hand and in Banks	58,200	41,000	10%	(17,200)	Short Loan	8,000	8,000	2%	
Inventories	9,600	9,300	2%	(300)	Account Payable	20,600	31,300	8%	10,700
Accounts Receivable	46,400	52,000	13%	5,600					
Advances and Others	57,100	95,200	24%	38,100					
Current Assets Total	171,300	197,500	50%	26,200	Liabilities Total	28,600	39,300	10%	10,700
					Stockholder's Equity				
					Capital	86,800	86,800	22%	0
Tangible Fixed Assets*	101,200	159,600	41%	58,400	Appropriated Earnings	91,300	167,800	43%	76,500
Intangible Fixed Assets	36,000	35,400	9%	(600)	Net Income of the Year	101,800	98,600	25%	(3,200)
Fixed Assets Total	137,200	195,000	50%	57,800	Capital Total	279,900	353,200	90%	73,300
Assets Total	308,500	392,500	100 %	84,000	Liability & Stockholder's Equity Total	308,500	392,500	100 %	84,000

* Breakdown of the Tangible Assets

PSTN	48,815	12.9%
GSM	84,163	22.3%
Public Phone	691	0.2%
Internet	372	0.1%
Pager	161	0.0%
Other Telecom Network	3,393	0.9%
Land & Land Improvement	8,032	2.1%
Furniture, Equipment, Computer, Vehicle	7,770	2.1%
Other Tangible Assets	6,202	1.6%
Total	159,600	42.3%

Percentage of the net income on the revenue is 44%, and debt to equity ratio[1] was 11% in 2001. These two criteria alone show high financial stability of LTC.

Furthermore, Table 8.7 shows the investment record of LTC on contract basis. Among $43 million investment from its own fund, $26 million was utilized for development of PSTN. The Rural Telecom project, amounting to $15 million, was funded by the German Development Bank.

Table 8.7 Investment Record of LTC (Contract Basis)

(thousand $)[2]

	1998	1999	2000	2001	Total
PSTN	5,177	5,469	9,182	6,215	26,042
GSM	17	1,399	5,342	2,131	8,889
Transmission	0	42	3,032	4,078	7,152
Internet	250	83	85	156	574
Public Phones	84	198	432	0	715
Sub Total	5,528	7,192	18,073	12,580	43,372
Basic Infrastructure & Others	503	602	8,676	310	10,091
Rural Telecom	1,257	5,442	8,490		15,189
Total	6,785	12,633	26,563	12,580	58,561

9.2 ETL

ETL was re-established in August, 2000, and it began providing fixed and mobile telephone services from May, 2002. Table 8.9 shows the balance sheet. At the establishment, ETL succeeded CSC, FETEX, and Satellite (Standard A) as well as a soft loan from ADB and KfW. ETL received 8.6 billion kip from LTC for leasing these telecommunication facilities in 2001. Since the leasing income was the sole revenue in 2001, depreciation of 4.2 billion kip accounted for 49% of the total revenue, and interest payment of 1.3 billion kip accounted for 16% (See Table 8.8). Quite contrary to the LTC's balance sheet, ETL's debt to equity ratio was 508% at the end of Year 2000. ETL did not hesitate to invest more in its first year's operation. Balance sheet shows increase in the fixed assets by 98 billion kip as well as increase in the long-term loan by 101 billion kip at the end of Year 2001. As a result, the debt to equity ratio became 1,217%. The Government is paying back for ADB and KfW loans until ETL becomes financially stable. On the other hand, the repayment to Shanghai Bell Project will start from 2003. ETL is scheduled to repay approx. $1.5 million annually for 8 years. This amounts to 11.7% of the LTC's net income before depreciation in Year 2001. ETL has to establish its source of income within a year.

[1] The debt to equity ratio is percentage of liabilities divided by capital. The rate is used to judge stability of the financial structure. The lower the rate is, the more stable; vise versa.

[2] Kip is converted into US$ by the mean official rate while Yen, DM, Euro, and Bath are converted by the mean market rate. The exchange rate was referred to IMF (2002) *International Financial Statistics*.

Table 8.8 Income and Expenditure in 2001 (ETL)

(million kip, %)

	2001	
Revenue		
Switching Lease	2,732	32%
CSC Lease	4,964	58%
Satellite Lease	858	10%
Other Lease	1	0%
Total	8,554	100%
Operating Expenses		
Salaries, Bonus & Welfare	1,307	15%
Depreciation	4,150	49%
Repair & Maintenance	71	1%
Other Admin. Expenses	716	8%
Sales Tax	778	9%
Total	7,022	82%
Operating Income	1,532	18%
Other Income	87	1%
Exchange gain	160	2%
Other Expenses	55	1%
Interest payment	1,353	16%
Income before Income Tax	371	4%
Income Tax (35%)	130	2%
Net Income	241	3%

Table 8.9 Balance Sheet (ETL)

(million kip, %)

	Dec-00	Dec-01		Change		Dec-00	Dec-01		Change
Assets					Liabilities				
Cash on Hand and in Banks	36	49	0%	13	Accounts Payable		174	0%	174
Cash in Bank		4,001	2%	4,001	Taxes Payable		256	0%	256
Inventories		393	0%	393	Other Payables		2,137	1%	2,137
Accounts Receivable		968	1%	968	Current liabilities Total		2,567	1%	2,567
Advances and Others		30	0%	30					
Deferred Tax		56	0%	56	Long Term Loans *2	71,199	171,906	91%	100,707
Current Assets Total	36	5,497	3%	5,461	Liabilities Total	71,199	174,473	92%	103,274
Tangible Fixed Assets *1	76,337	168,102	89%	91,765	Stockholder's Equity				
Construction in Progress	8,841	15,178	8%	6,337	Capital	14,015	14,100	7%	85
Land Occupancy Right		38	0%	38	Appropriated Earnings				
					Net Income this year		241		
Fixed Assets Total	85,178	183,318	97%	98,140	Capital Total	14,015	14,341	8%	326
Assets Total	85,214	188,815	100%	103,601	Liability & Stockholder's Equity Total	85,214	188,815	100%	103,601

*1 Breakdown of the Tangible Assets

	Dec-00	Dec-01
CSC	41,206	39,489
SDH & Power for CSC	16,668	15,974
Satellite (Standard A)	5,289	4,802
Switching (Fetex)	7,360	6,624
Microwave	64	4,331
GSM		44,124
Switching (S12)		15,407
Optical Cable		9,334
VOIP		1,075
STM		4,177
Building System Tool		9,540
Machinery		756
Others	5,749	12,468
Total	76,337	168,102

* 2 Breakdown of the long-term loan

		Dec-00	Dec-01
ADB & KfW (CSC)		71,199	71,199
ADB			
	Principal	€ 1,449,895	
	Interest Rate	7.25%	
	Repayment period	2000-2001	
KfW			
	Principal	€ 8,216,077	
	Interest Rate	4.48%	
	Repayment period	2000-2009	
China (Shanghai Bell)			99,354
	Principal	$10,310,949	
	Interest Rate	2.75%	
	Repayment period	2003-2010 (8 years)	
	Average Annual Repayment	$1,510,193	
Others (interest)			1,353

10 Tariff

10.1 Fixed Phones and Mobile Phones

LTC and ETL provide the fixed phones and mobile services at the same price. The call charges in Lao P.D.R. are set low for domestic calls and high for international calls. This discrepancy has been moderated in 2001; the domestic call charges have been increased, and the international call charges have been decreased.

Firstly, the tariffs for the domestic calls are being increased by 5 kip in each month from April, 2002 to March, 2003. This equals to 60 kip increase in each category within a year (See Table 10.1 and Table 10.2).

Table 10.1 Tariff for the Fixed Phones (Domestic)

PSTN→PSTN
PSTN→Mobile

Connection Charge	250,000 Kip plus Installation Charge												
Monthly Charge	Government 5,000 Kip Private 10,000 Kip												
Call Charge (kip/minute)	Until Mar/2	Apr/2	May/2	Jun/2	Jul/2	Aug/2	Sep/2	Oct/2	Nov/2	Dec/2	Jan/3	Feb/3	Mar/3
Local	45	50	55	60	65	70	75	80	85	90	95	100	105
Long Distance *													
30-150 Km	200	205	210	215	220	225	230	235	240	245	250	255	260
151-300Km	250	255	260	265	270	275	280	285	290	295	300	305	310
301-500Km	300	305	310	315	320	325	330	335	340	345	350	355	360
501 Km-	350	355	360	365	370	375	380	385	390	395	400	405	410

* The distance is measured between the cities where the caller and the receiver are respectively located.

The callers from the public phones have to purchase the phone cards as listed in Table 9.2. The call charge from the public phones is set slightly higher than the fixed phones depending on the purchased unit volume.[1] The unit price decreases as the volume of the card unit increases.

Table 10.2 Tariff for the Public Phone Cards

Unit Volume	Price	Price Per Unit
350 Unit	25,000 Kip	71 Kip
400 Unit	28,000 Kip	70 Kip
600 Unit	38,000 Kip	63 Kip
750 Unit	38,000 Kip	61 Kip
1,000 Unit	59,000 Kip	59 Kip
1,050 Unit	61,000 Kip	58 Kip

The domestic call charges from the mobile phone have been also increased similar to the structure shown in the fixed phones (See Table 10.3).

[1] For example, in accordance with the tariff in July, 2002, the local call charge was 2.1 times more expensive than fixed phones, and the long distance and international calls were 1.4 times more expensive provided that a purchased unit costs 63kip.

Table 10.3 Tariff for the Post-Paid Mobile Phones (Domestic)

Mobile→PSTN
Mobile→Mobile

Connection Charge	$ 75												
Monthly Charge	$ 15												
Call Charge (Kip/minute)	Mar/2	Apr/2	May/2	Jun/2	Jul/2	Aug/2	Sep/2	Oct/2	Nov/2	Dec/2	Jan/3	Feb/3	Mar/3
Local	150	155	160	165	170	175	180	185	190	195	200	205	210
Neighboring Provinces	250	255	260	265	270	275	280	285	290	295	300	305	310
Long Distance	350	355	360	365	370	375	380	385	390	395	400	405	410

For the prepaid mobile phones, the customers have to purchase cards beforehand and are charged 700 kip per minute both for local and long-distance calls. Table 10.4 shows the types of the cards. Approx. 30% of the mobile phone subscribers use the prepaid mobile phones. Heavy users prefer to use the post-paid mobile phones.

Table 10.4 Card Price for the Prepaid Mobile Phones (Domestic)

Price of Cards	Expirer Period
70,000 Kip	30 Days
100,000 Kip	45 Days
150,000 Kip	45 Days

* Leftover amount is added to the newly purchased card.

On the other hand, the tariff for the Rural Telephone, the telecommunications system supported by the German Development Bank, has not been changed.

Table 10.5 Tariff for the Rural Telephone

Monthly Charge	Government 5,000 Kip	Private 10,000 Kip
Call Charges		
Local Call		90 Kip / minute
Long Distance	30-150 km	200 Kip / minute
	151-300 km	250 Kip / minute
	301 km -	300 Kip / minute

Secondly, international phone call charges were decreased in July, 2001. 20 countries from Zone 1 to Zone 6 enjoyed the decrease (See Table 10.6). As a result, extremely high tariff settings for the international calls have been rectified (See Table 10.7 for comparison with neighboring countries.). In accordance with the fluctuation in the exchange rate, the tariffs for international calls may be changed with a prior announcement from the carrier.

Table 10.6 Tariff for International Calls (Fixed and Mobile)

No	Destination	Call Charge (Exchange Rate 9,500 Kip/$)			
		US$ per minute		Operator (first 3 minutes)	Kip per minute
		Until June/01	After July/01		
1	Thailand	0.70	0.46	17,600	4,400
2	Australia	1.15	0.90	34,400	8,600
3	Vietnam	2.30	1.49	56,800	14,200
4	Hong Kong	2.30	1.50	57,200	14,300
5	Cambodia	2.30	1.80	68,400	17,100
6	Japan, USA, China, France, Singapore, South Korea, Germany, Taiwan, Malaysia, UK, Canada, Philippines, Indonesia, Sweden, Inidia	2.65	1.90	72,400	18,100
7	Armenia and others	2.30	2.30	87,600	21,900
8	Bulgaria and others	2.65	2.65	100,800	25,200
9	Albania and others	3.00	3.00	114,000	28,500
10	Brunei and others	3.45	3.45	131,200	32,800
11	Yugoslavia and others	3.70	3.70	140,800	35,200
12	Swaziland and others	3.80	3.80	144,400	36,100
13	Sudan and others	4.00	4.00	152,000	38,000
14	Saudi Arabia and others	4.95	4.95	188,400	47,100
15	Inmarsat	11.50	11.50	437,200	109,300

* If calls are made through an operator, 3-minute charge is billed for the first 3 minute. After 3 minutes, the call is charged every 20 seconds. IDD is charged every 20 seconds from the beginning.

Table 10.7 Comparison of the IDD Tariffs with Neighboring Countries

(US$ per minute)

From \ To	Thailand	Japan	USA	UK	Note		
					Carrier	Verified	$Exchange Rate
Thailand		$0.81	$0.54	$0.95	CAT	Jul-01	44.275
Malaysia	$0.79	$0.87	$0.79	$0.84	Telekom	Nov-00	3.8
China	$0.97	$0.97	$0.97	$0.97	MPT	Sep-01	8.2767
Indonesia	$0.72	$1.09	$0.96	$1.09	PT Indosat	Dec-01	10365
Philippines	$1.25	$1.25	$1.50	$1.72	Philcom	May-00	
Vietnam	$2.12	$2.40	$2.30	$2.57	DGT	Feb-01	
Laos (before)	$0.70	$2.65	$3.45	$3.00	LTC	Until Jun-01	
Laos (Present)	$0.46	$1.90	$1.90	$1.90	LTC	After Jul-01	

* The tariffs of the neighboring countries are calculated from Tariffica (2000). The table shows average cost per minute for the first 3-minute call.

10.2 ISP

There are currently three Internet service providers (ISPs) in Lao P.D.R.; LTC, GlobeNet, and Planet Online. LTC holds more than three quarters of the market share. The tariff of LTC is listed in Table 10.8.

Table 10.8 ISP Charge (LTC)

Individual Dial-up Service				
Service Name	Entree Charge	Monthly Charge	Monthly Usage Hours	Extra Charge / Hour
Starter 1	$ 26	$ 6	6 Hours	$ 1.80
Casual 1	$ 32	$ 12	10 Hours	$ 1.75
Casual 2	$ 38	$ 18	15 Hours	$ 1.70
Pro 1	$ 46	$ 26	25 Hours	$ 1.65
Pro 2	$ 53	$ 33	35 Hours	$ 1.55
Busi Pro 1	$ 61	$ 41	50 Hours	$ 1.30
Special Dial Up Service				
Service Name	Simultaneous User	Monthly Charge	Monthly Usage Hours	Extra Charge / Hour
Silver 1	4	$ 60	60 Hours	$ 1.20
Silver 2	6	$ 105	110 Hours	$ 1.20
Silver 3	9	$ 160	180 Hours	$1.20
Golden 1	15	$ 250	300 Hours	$ 1.00
Golden 2	15	$ 315	400 Hours	$ 1.00
Golden 3	15	$ 425	550 Hours	$1.00

Table 10.9 shows the tariff of GlobeNet. In addition to the dial-up service, GlobeNet provides a wireless solution in Vientiane. Subscribers can access at the bandwidth of 512 kbps round the clock.

Table 10.9 ISP Charge (GlobeNet)

Service Name	Entree Charge	Monthly Charge	Monthly Usage Hours	Extra Charge / Hour
E-mail only	$33	$ 11	21 Hours	$ 2.00
Basic	$33	$ 22	21 Hours	$ 2.00
Wireless Solution	$2,393 (for equipment)	$ 300	Unlimited	

Table 10.10 shows the tariff of Plane Online. Planet Online's 'exclusive line' service dedicates one telephone line open for one subscriber to dial-in. It also started a wireless solution from June, 2002.

Table 10.10 ISP Charge (Planet Online)

Dial-up Service				
Service Name	Entree Charge	Monthly Charge	Monthly Usage Hours	Extra Charge / Hour
Economy	$15	$ 11	10 Hours	$ 1.50
Business		$ 22	20 Hours	$ 1.30
First Class		$ 40	50 Hours	$ 1.00
Executive Line		$ 200	Unlimited	
Wireless Solution (Standard Service)				
Number of Computers	Entree Charge	Monthly Charge	Usage Hours	Bandwidth
up to 10	by Quotation	$ 300	Unlimited	64 kbps
11-20		$ 400		96 kbps
21-40		$ 500		128 kibps
41-		$ 700		256 kbps

10.3 Telegraph and Telex

The tariffs for the international telegraph and telex services offered by LTC are listed in Table 10.11 and Table 10.12.

Table 10.11 Tariff for Telegraph (International)

No	Destination (Examples)	Service Charge	
		$/minute	Kip/minute
1	Thailand, France	0.44	4,200
2	Vietnam, Canada	0.46	4,400
3	Japan	0.52	5,000
4	Finland	0.54	5,200
5	USA, UK, Austria	0.58	5,600
6	Hawaii	0.60	5,700
7	Italy	0.63	6,000
8	Saudi Arabia	0.66	6,300
9	Jamaica	0.69	6,600

Table 10.12 Tariff for Telex (International)

No	Destination (Examples)	Service Charge		
		$/minute	First 3 Minutes (kip)	Automatic Transmission (kip/minute)
1	Australia	1.15	33,000	11,000
2	Thailand, Malaysia	1.70	48,600	16,200
3	Vietnam, Armenia, Uzbekistan	2.30	65,700	21,900
4	Japan, France	2.65	75,600	25,200
5	Micronesia	2.90	82,800	27,600
6	Belgium	3.00	85,500	28,500
7	USA, Algeria	3.45	98,400	32,800
8	Alaska	3.70	105,600	35,200
9	Egypt	4.00	114,000	38,000

10.4 Dedicated Lines

Vientiane seems to have demand of no less than 100 users for the dedicated lines, but the dedicated line service is not officially offered.

11 Findings from the Survey

This section discusses the findings from the national telecommunication survey (hereafter called 'the Survey') for the financial and economic analysis. The Survey conducted interviews to 180 household samples and 120 institutional samples[1] in eight areas[2] in January, 2002. The Survey result is useful in understanding the nature of the users and likelihood of their payment to the services.

11.1 Fixed Phones - Household

The Survey identified a line similar to the demand curve for the fixed telephone services among the household users. Randomly selected 180 respondents are divided into four categories. 29% of the respondents are subscribers of the phones at home (Group A), 43% are non-subscribers who make phone calls with payment (Group B), 19% are non-subscribers who make calls free of charge (Group C), and the rest (Group D), 9%, are non-phone users. In order to estimate the economic benefit, the phone usage of Group A is analyzed for the 'with-project' situation while that of Group B is analyzed for the 'without-project' situation.

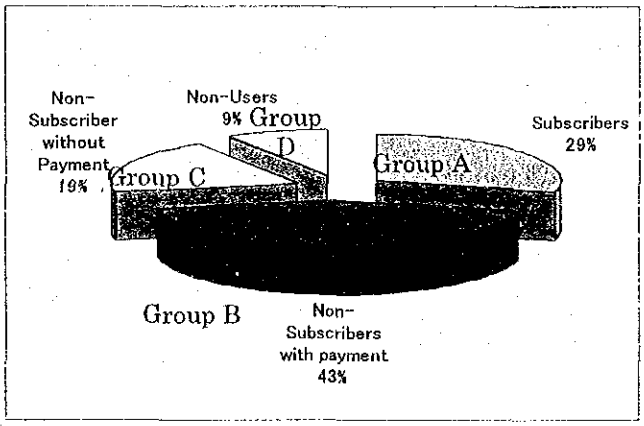


Fig. 11.1 Proportion of the Phone Users and Non-users (Households)

Fig. 11.2 shows that the proportion of the phone subscribers (Group A) becomes higher and that the proportion of the non-phone user (Group D) becomes lower as the income level goes up.

[1] Institutional types include the Government, Development Agencies, Hospitals, Schools, Agro-related industries, trading, shops, hotels, internet cafe, etc.

[2] Luang Phabang, Ngoi, Vientiane, Vangvieng, Savannakhet, Atsphangthong, Pakse, and Laongam.

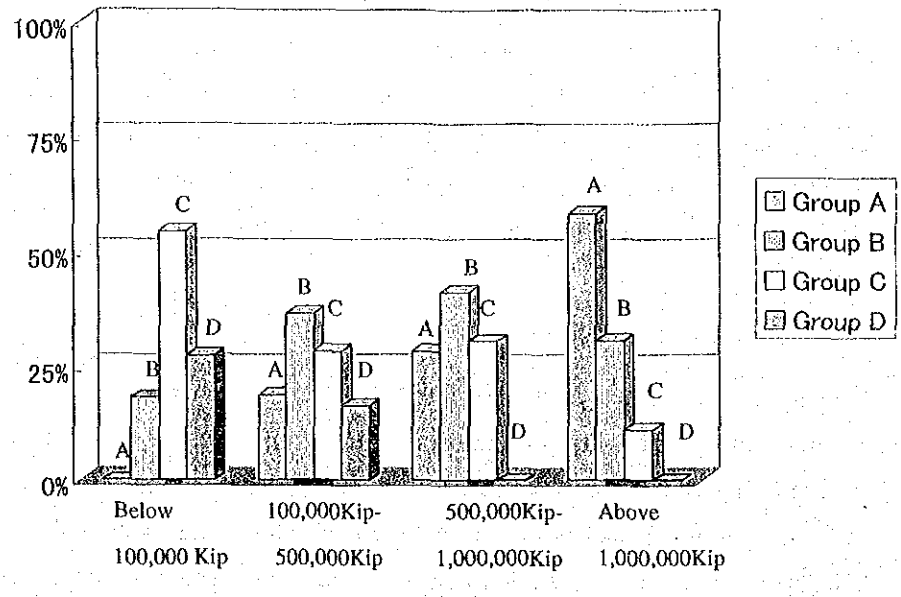


Fig. 11.2 Proportion of the Phone User/Non-User Groups Classified by Income Level (Households)

Within the category of Group B, 41 respondents (55%) pay for the phone calls made at relatives and friends, 37 respondents (48%) use public phones, and 19 respondents (25%) pay at post and telecom offices. The average unit price for non-subscribers is 2,717 Kip while the average calls per month is 9 times[3]. If restricted to public phones, average calls per month is 5.94 times.

In contrast, the attitude of subscribers is varied. The relation between the unit price and frequency of calls for the subscribers is explained along the line, $p=2554kip-9.4 \times q$[4]. The average unit price for subscribers is 1,464 Kip while the average calls per month is 116 times.

[3] The unit price is an estimated average charge for each call. The calls made free of charges are not included in the analysis.

[4] *p-value* for this regression model is 0.3%.

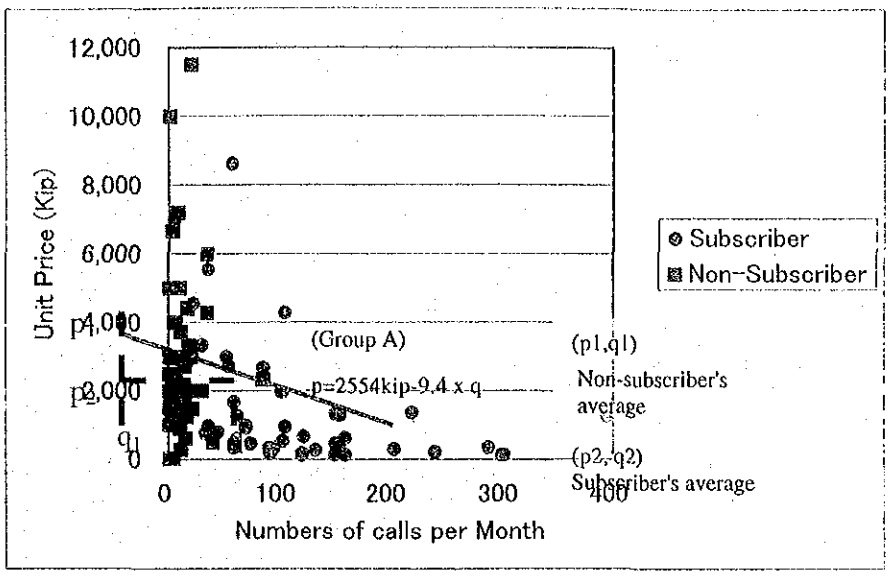
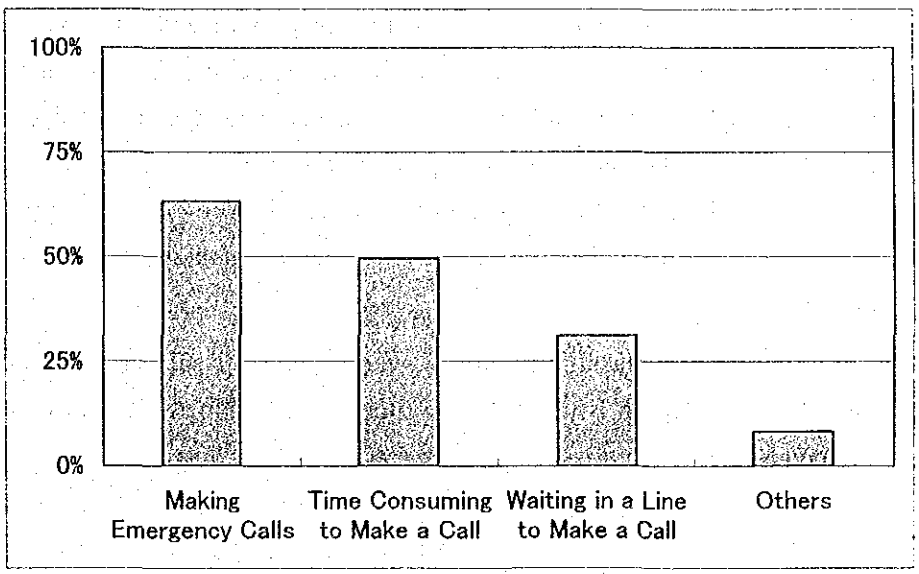


Fig. 11.3 Unit Price and Numbers of Calls Observed in the Survey

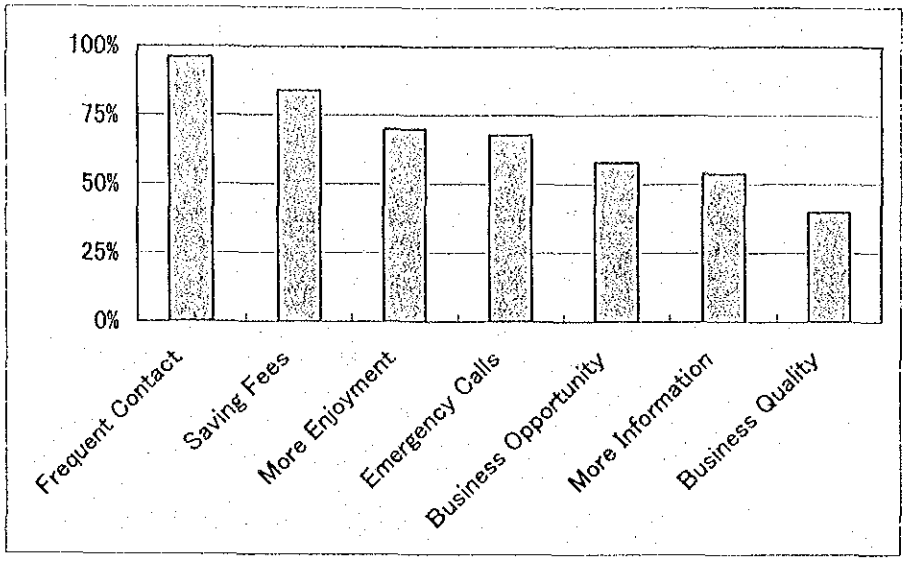
The alternative means of phones for non-subscribers are traveling, mailing, or sending messages with someone who travels. Non-subscribers (Group B and Group C) responded that they found it difficulty in not having phones in terms of making emergency calls, consuming time to make a call outside, and waiting in a line to make a call (See Fig. 11.4).



(Responded by phone users without phones at home)

Fig. 11.4 Disadvantages of Not Having Phones

On the other hand, with home phones, Group A responded that they became able to make contact more frequently, save telecommunication fees, have more enjoyment in life, etc. (see Fig 11.5).



(Responded by home-phone subscribers)

Fig. 11.5 Benefits of Having Phones

Combination of disadvantages of not having phones and advantages of having phones result in difference in frequency of making calls. Because majority of the respondents found it troublesome to make calls outside, non-subscribers make calls when the alternative means of communications are not effective. So they tend to call longer distance and probably talk longer. On the other hand, the subscribers tend to make more local calls than the non-subscribers and probably talk shorter.

The line that goes through point the average cost per call and frequency of calls per month for Group B (2,717kip, 9 times) and Group A (1,464kip, 116times) is defined by:

$$p = 2{,}822\text{kip} - 11.71\, q$$

where p is the Monthly Payment for phone

and q is the frequency of calls per month.

If calculated by above averages, the consumer surplus for the household phone per subscriber per month at the time of the Survey is (shown in the shaded triangular area in Fig. 11.6):

(116 times x (2,822 kip - 1,464 kip)) / 2 = 78,764 kip

The subscribers are asked how much more they are willing to pay for phones monthly if the service level is improved. 25% of the household subscribers responded that they were not willing to pay more while 75% of subscribers said they could pay 12,278 kip more in average. The consumer surplus calculated by the attitudinal difference between Group A and Group B shows 6.4 times as much as the amount answered for the 'willingness-to-pay' question.

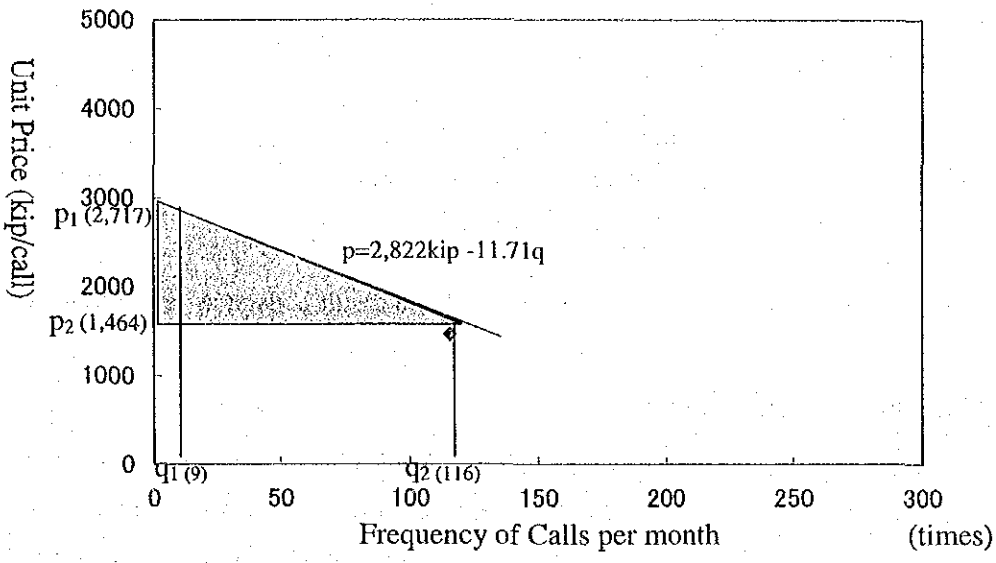


Fig. 11.6 Consumer Surplus of the Household Telephone Subscriber

Furthermore, net economic benefit of the household phone (Shaded Area in the Fig. 11.7) per month per subscriber at the time of Survey is:

Area D ((116-9) x (2,717 kip-1,464 kip)) / 2 = 67,035.5 kip
+ Area E (116-9) x 1,464 kip = 156,648 kip
= 223,683.5 kip

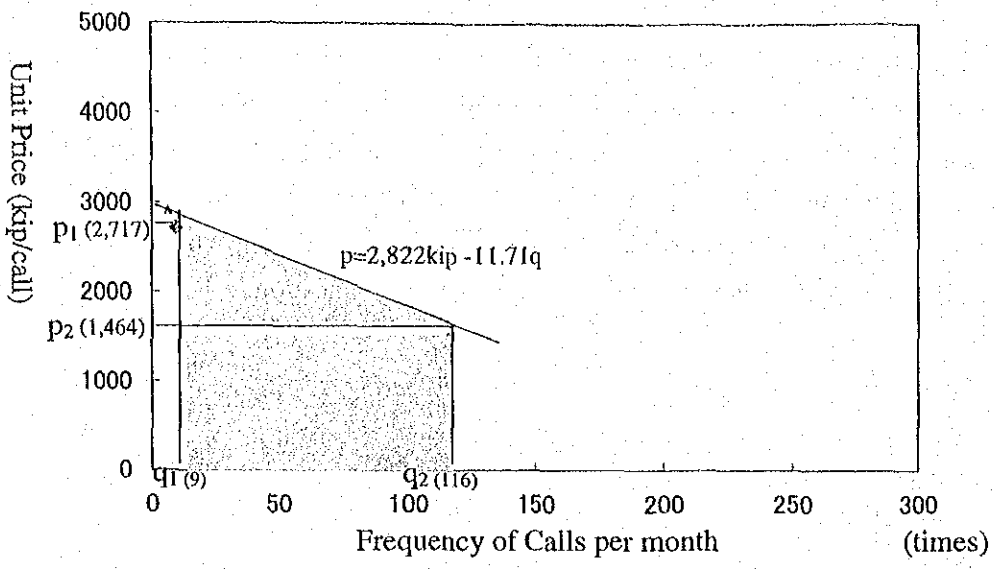


Fig. 11.7 *Economic Benefit of the Household Phones*

In order to raise confidence in calculation, above result is used as referential data.

11.2 Fixed Phones - Institutions

The most important classification of the fixed phone subscribers is between households and institutions. Firstly, the proportion of the user groups is much different between the two categories. While the Survey found that 29% of the household respondents were subscribers, the figure was 73% for the institutional respondents (See Table 11.1 for comparison and Fig. 11.8 for the grouping of the user-type).

Table 11.1 Comparison of the Proportion of User Type between Households and Institutions

	Households		Institutions	
Subscribers	52	29%	87	73%
Non-Subscribers with payment	77	43%	15	13%
Non-Subscribers without payment	35	19%	10	8%
Non-Users	16	9%	8	7%
Total	180	100%	120	100%

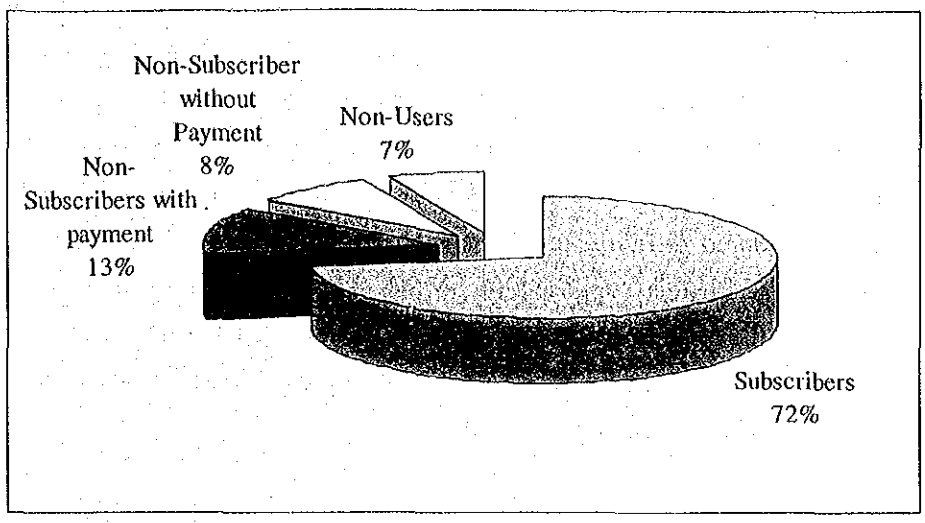


Fig. 11.8 Proportion of the Phone Users and Non-users (Institutions)

Secondly, the monthly phone bill of the institutional subscriber is 6.7 times as high as that of the household subscribers; the former is 1,129,103 kip while the latter is 169,491 kip. The amount of the phone bill and the size of the institution are statistically related (see Fig. 11.9).

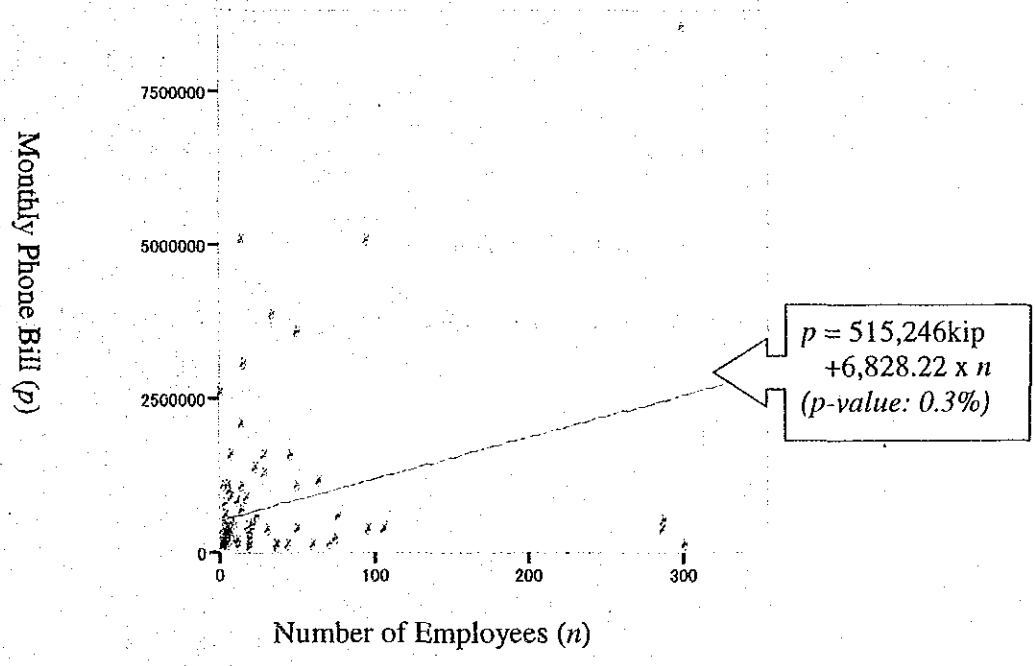


Fig. 11.9 Monthly Phone Bill vs. the number of Employees of the Group A

Accordingly, the demand curve for institutional telephone is assumed to be much different from that for household telephones. The average payment per call for the Group B is 2,631 Kip while average frequency of calls per month is 42 times (See Fig. 11.10 for the scatter graph of the Group B). The Survey did not include the questions on the frequency of calls in the institutional questionnaire since it was considered difficult for a particular respondent to answer such question. If the average cost is supposed to be the same as the household subscriber, the average call frequency is calculated as 772 times per month. Then the economic benefit of the institutional subscriber becomes 1,494,675 kips per month per subscriber (Fig. 11.10 shaded area).

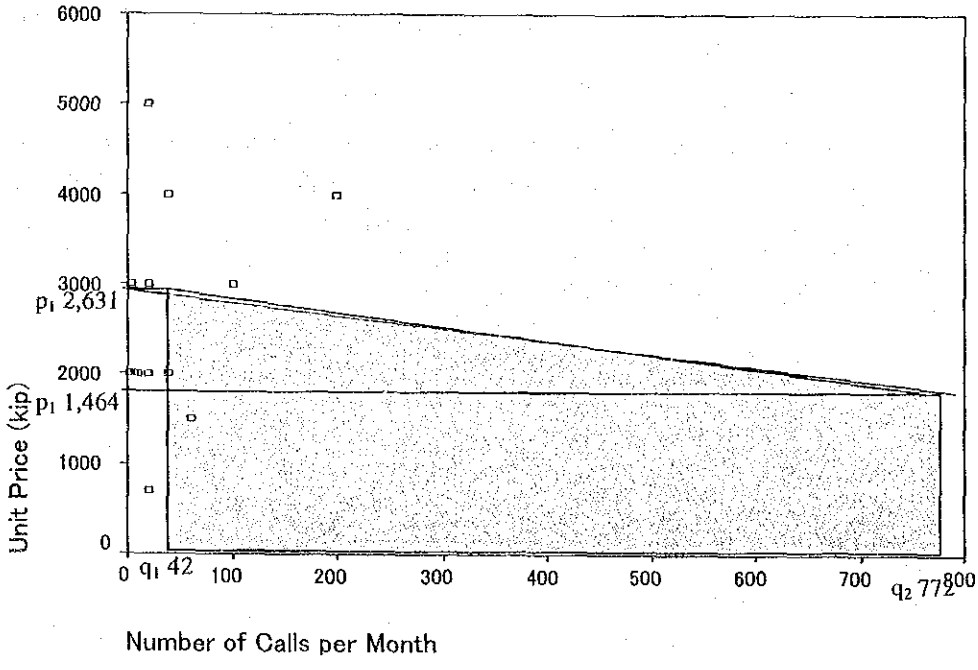


Fig. 11.10 Hypothetical Model for the Economic Benefit of Institutional Phones

11.2 Mobile Phones

The Survey found 11 households (6%) and 41 (34%) institutions of the mobile phone subscribers. The higher the level of income or the institutional size, the more likely the respondents possess the mobile phones (See Fig. 11.11).

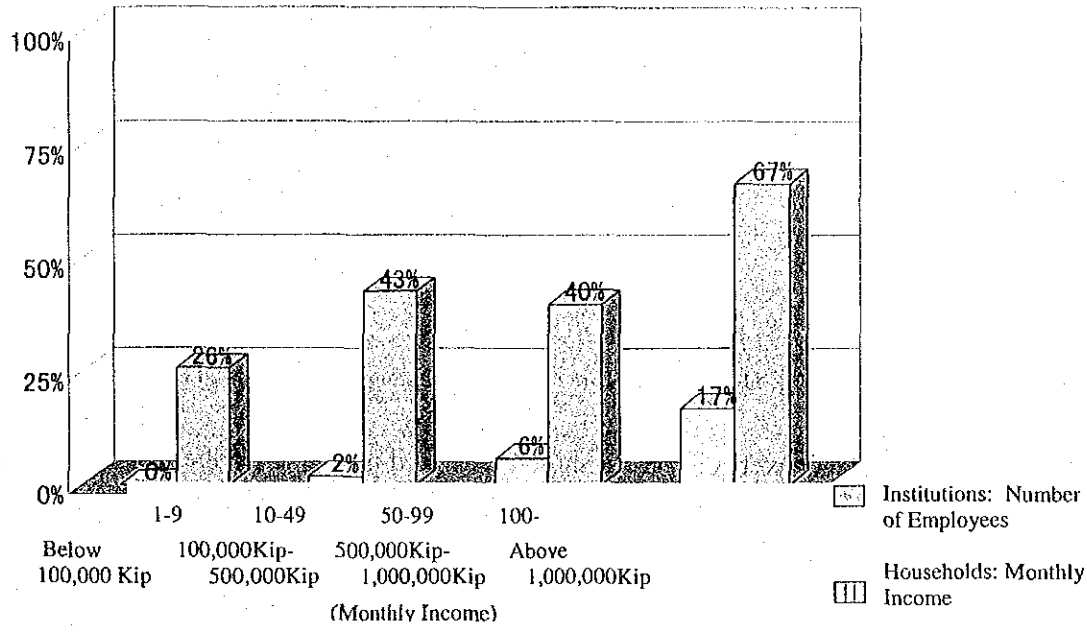


Fig. 11.11 Percentage of the Mobile Phone Subscribers Classified by Income Level and Firm Size

Hypothesis for with and without situations is hard to establish for the mobile phones. The alternative methods of the mobile phone is assumed to be the fixed phones, but the result of the Survey for the institutions did not support the hypothesis. 6 of the household mobile-phone users also subscribe the fixed phones. Compared between the mobile phone users and non-users among the household samples, the former pays less for the fixed phones than the latter. This supports the hypothesis that the mobile phone is used as an alternative method of the fixed phones for the households. However, the institutional mobile phone users pay more for the fixed phones than non-users (See Fig. 11.12).

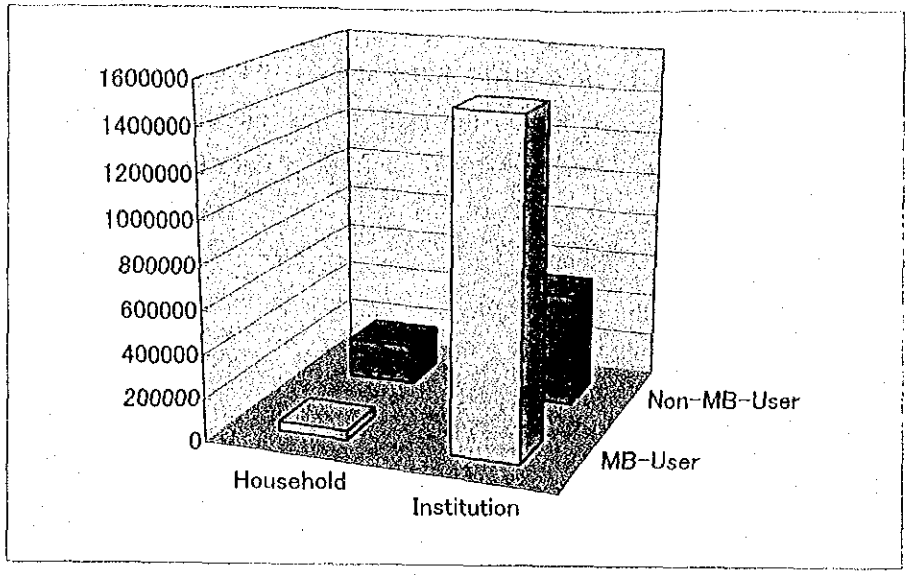


Fig. 11.12 Comparison of the Fixed Phone Bills Classified by the Mobile Phone Users

Moreover, Fig. 11.13 shows that fixed phone subscribers pay more for the mobile phones than the non-subscribers.

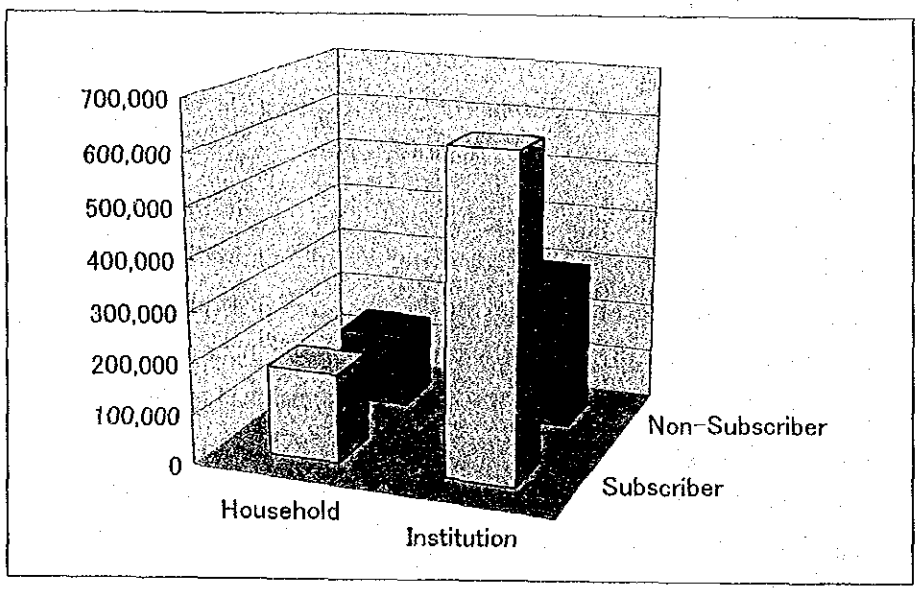


Fig. 11.13 Comparison of the Mobile Phone Bills Classified by the Subscribers of the Fixed Phones

On the other hand, 7 household samples answered that they could pay 30,714 kip more in average if the service level is improved, and 14 institutional samples answered that they could pay 168,357 kip more. Like the result from the fixed phones, the answers to the willingness to pay questions may underestimate the

consumer surplus of the mobile phones. Billing and frequency data are planned to be collected in order to identify the economic benefit of the mobile phones.

11.3 Internet

The Survey found 10 households Internet users (6% of the population) and 30 institutional Internet users (25%). Like the mobile phone, the Internet is likely to be enjoyed among the higher income households or larger institutions (See Fig. 11.14).

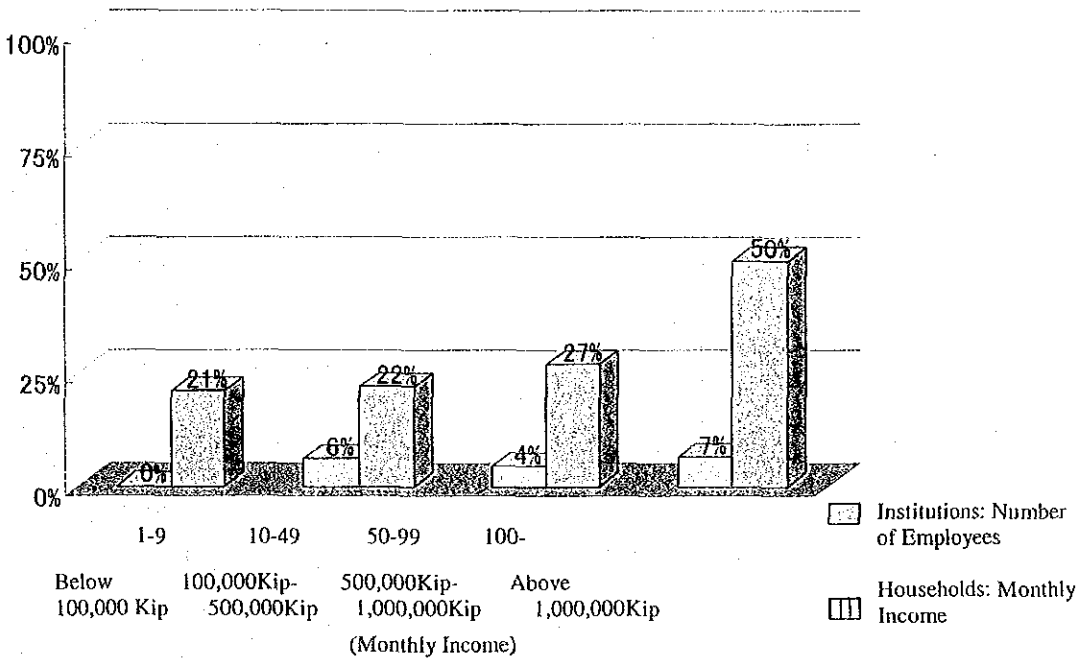


Fig. 11.14 Percentage of the Internet Users Classified by Income Level and Firm Size

The household users make an access to Internet mainly from Internet Cafe for 3.1 hours per week in average. No household user subscribers Internet at home. Respondents answer show that usage fee of the Internet at Internet Cafe is 9,000 kip per hour. Difference in unit price is minimum between usage of by dial-up service from home and that at Internet Cafes. Considering the equipment and dial-up cost, using the Internet at home offsets the labor-loss and transportation fee to go to the Internet Cafe. If we consider that the usage at Internet Cafe is the 'without-project' situation for the household users, the amount that is able to calculate for the economic benefit is the difference in supplier's revenue caused by higher frequency at home.

On the other hand, correlation between the Internet bill and the number of employees were not identified in the Survey (See Fig. 11.15). This means that the way the institution uses the Internet has a wide variation and that it can't be quantitatively calculated if based on the Survey. Likewise, the amount of willingness to pay did not accord with the amount of monthly bill for Internet nor the number of employees. The average monthly bill for the institutions which provide Internet access services to the customers, i.e. Internet Cafes and hotels, was 1,402,071 kip (n=7). Only one of these institutions answered that it can pay 425,000kip more if the service level is improved. For the other institutions, the average monthly bill was 685,400 kip (n=5) and the amount of willingness to pay was 209,583 kip (n=6).

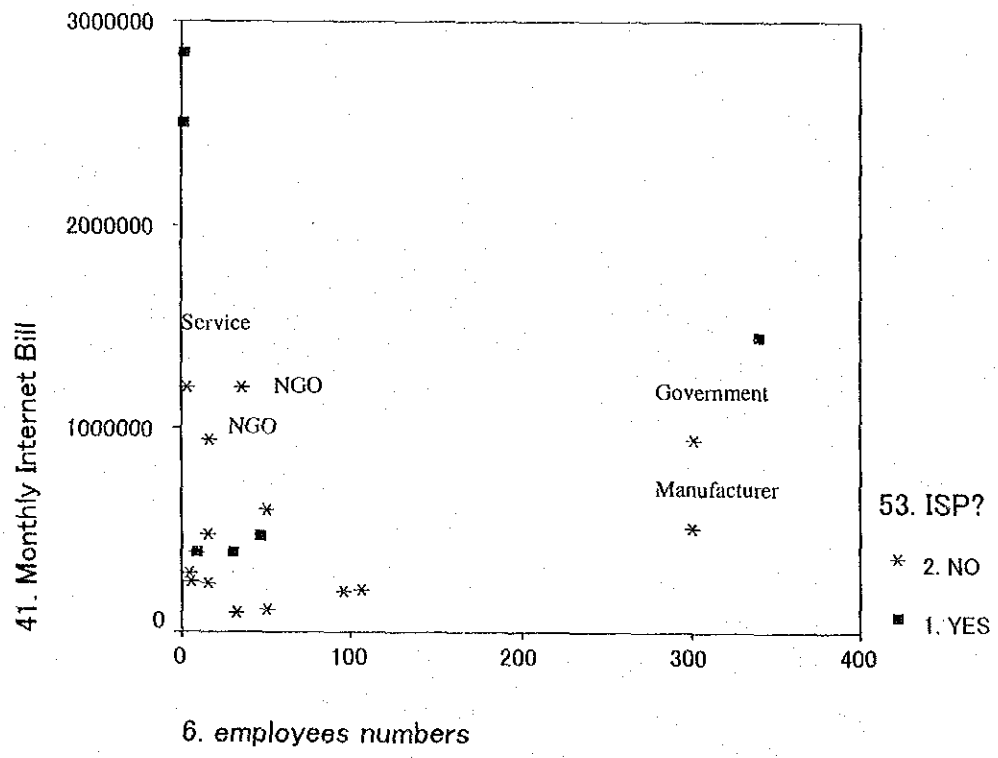


Fig. 11.15 Monthly Internet Bill and Number of Employees

EXISTING FACILITIES

1. Switching Facilities

1.1 Switching

The nationwide switching network in the Lao P.D.R. are shown in the following 4 figures. Fig.1 shows Northern Area Switching Network in Lao P.D.R.. Fig.2 shows Central Area (Vientiane Municipality) Switching Network in Lao P.D.R.. Fig. 3 shows Central Area (Vientiane Province/Borikhamxay) Switching Network in Lao P.D.R.. Fig. 4 shows Southern Area Switching Network in Lao P.D.R.

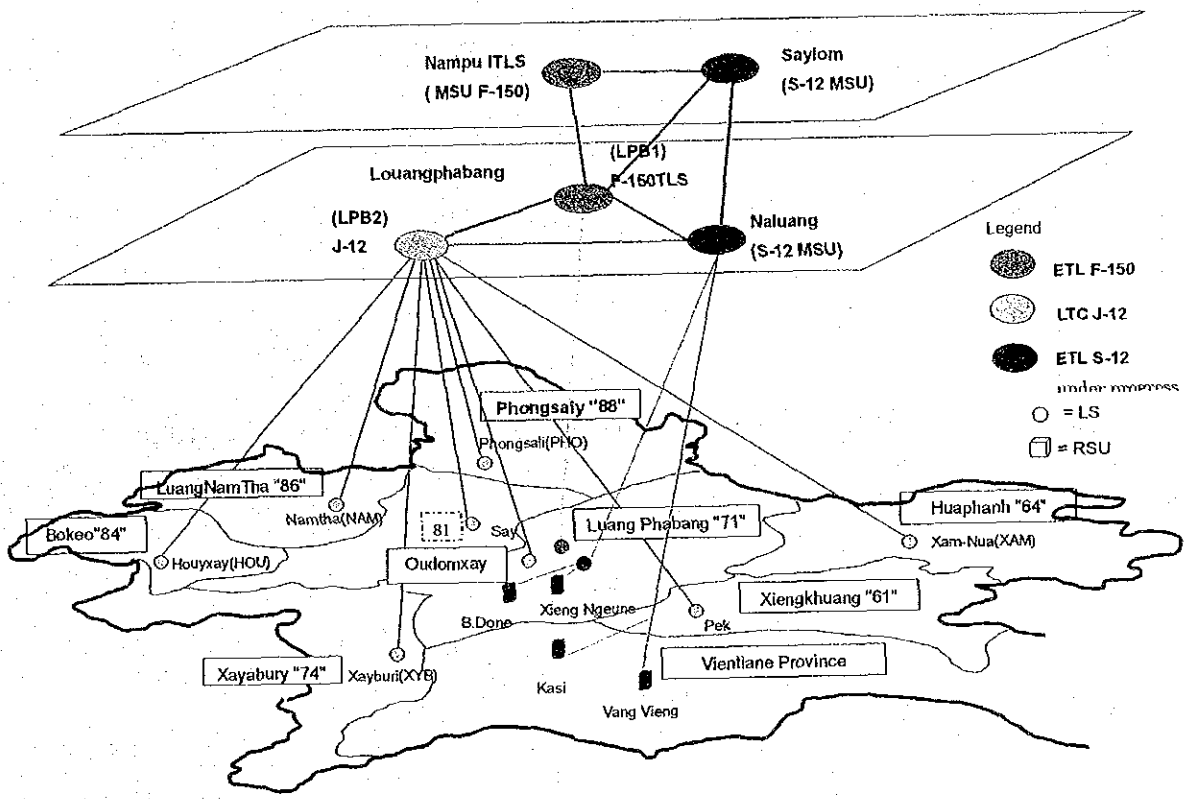


Fig. 1 Northern Area Switching Network in Lao P.D.R.

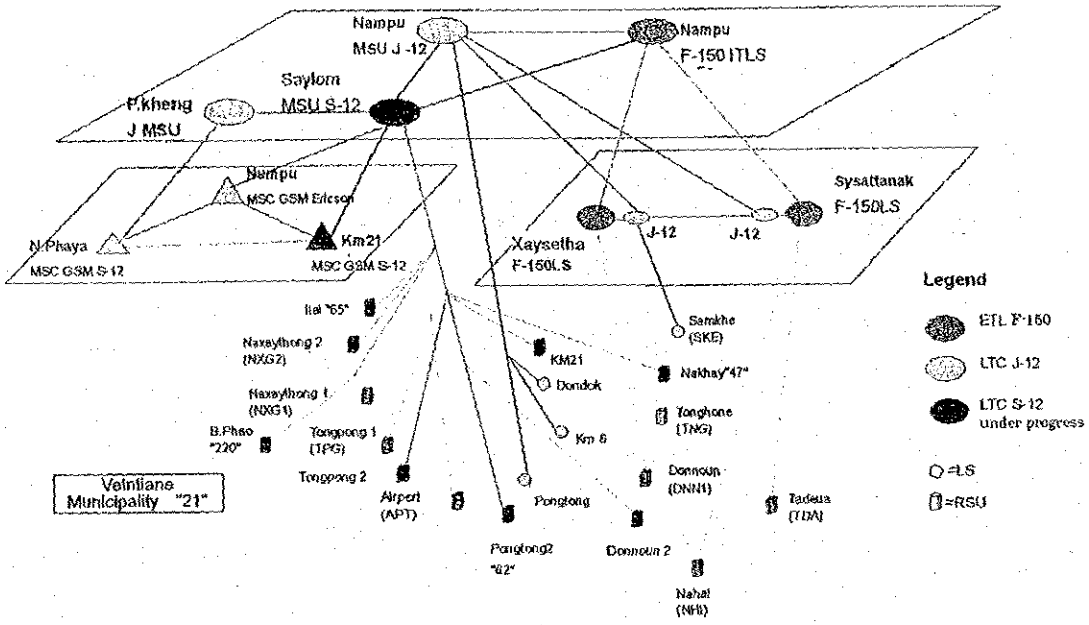


Fig. 2 Central Area(Vientiane Municipality)Switching Network in Lao P.D.R.

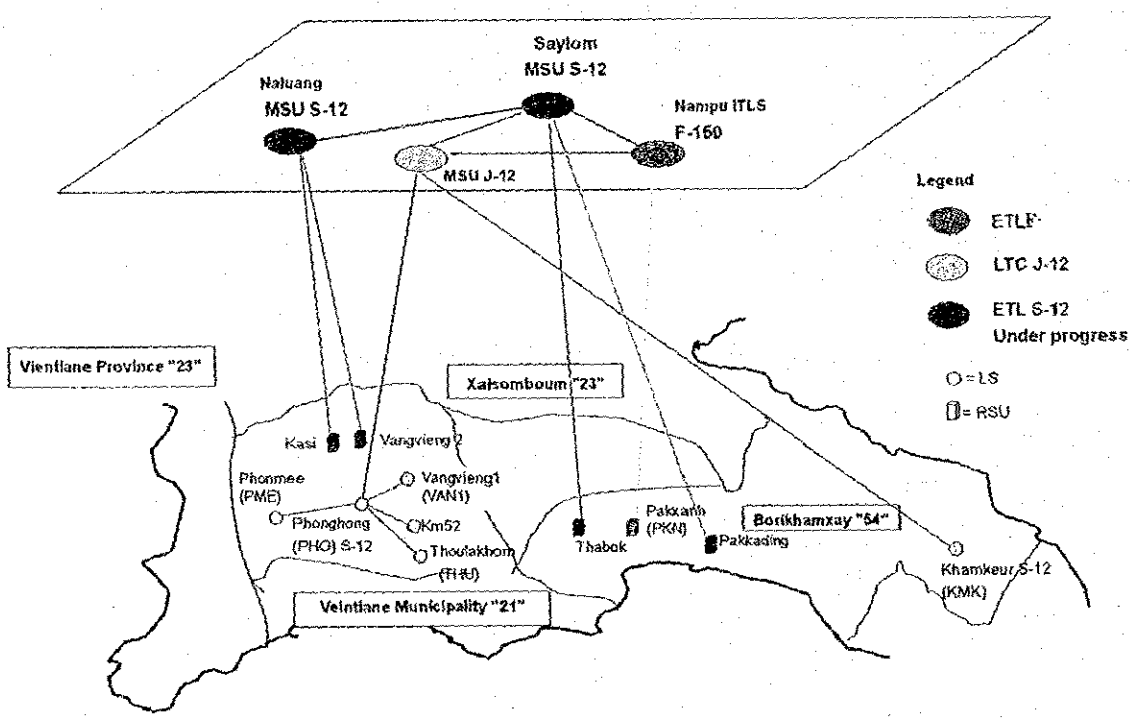


Fig. 3 Central Area (Vientiane Province/Borikhamxay) Switching Network in Lao P.D.R.

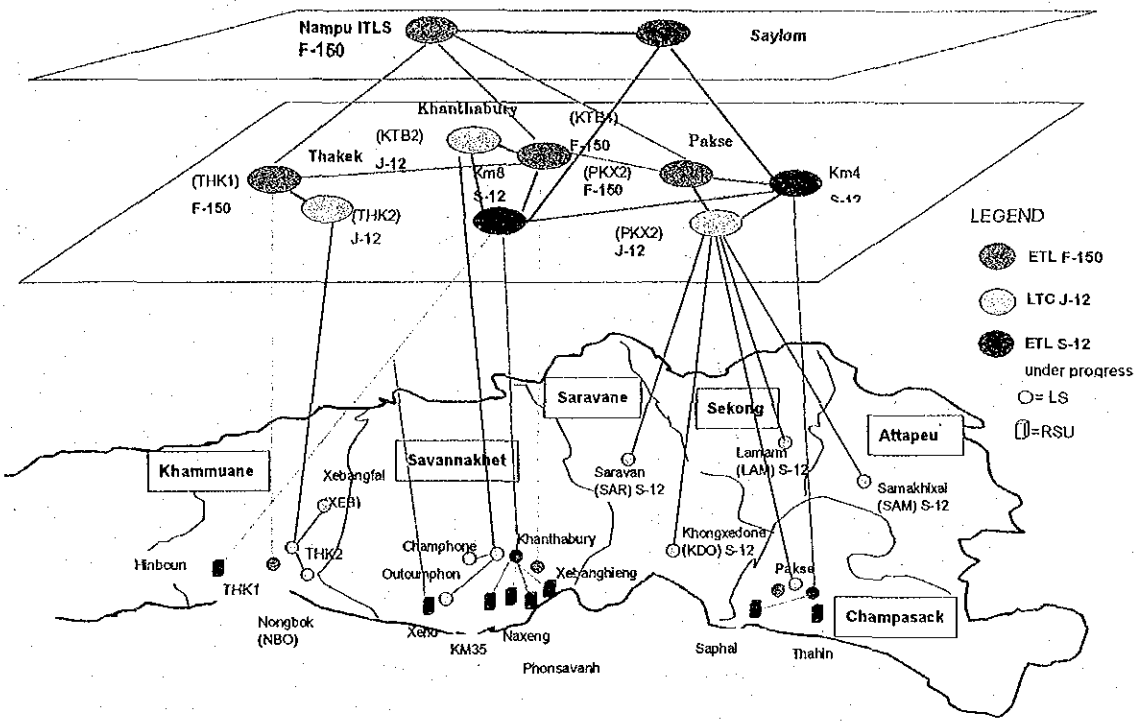


Fig. 4 Southern Area Switching Network in Lao P.D.R.

1.2 International Switching

One international Service Center is installed in Vientiane and connected to an Earth station with a capacity of 482 channels. The Earth station is using Intelsat to connect directly to 9 destinations, connections to the rest of the world is performed by transit from there.

The second Earthstation via Asiasat was taken out of service recently.

On the CSC (China Southeast Cable), has been put into service in a march 2000, connection to Thailand is realized with 60 channels and to Vietnam with 30 channels beside the existing microwave systems.

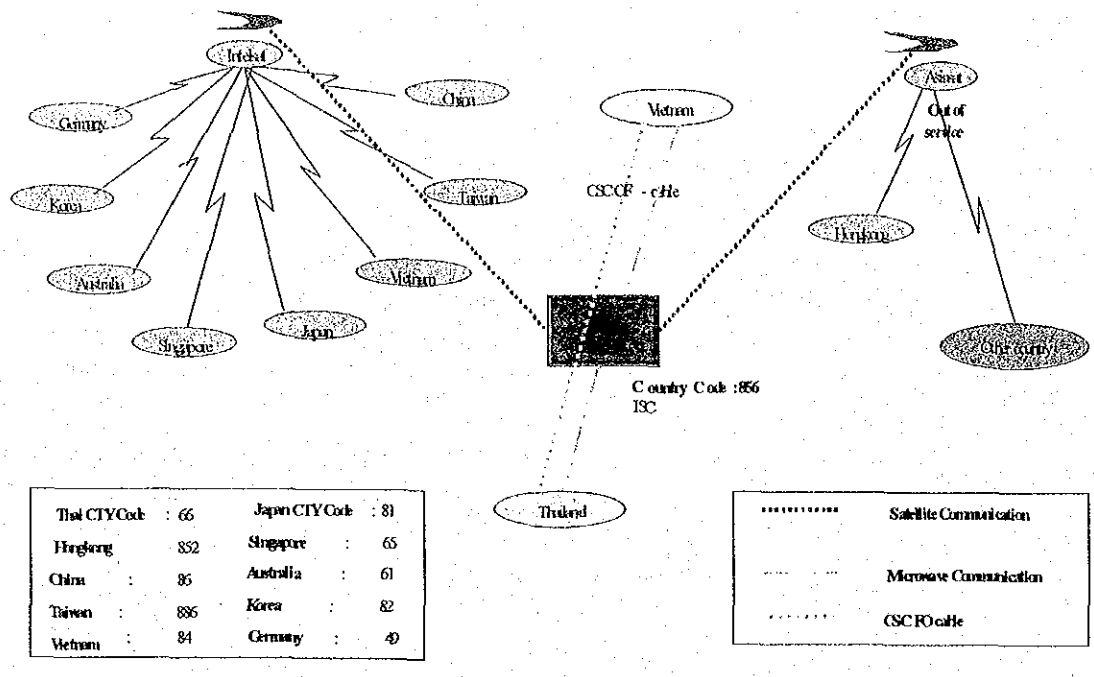


Fig. 5 International Switching

2. Transmission and Radio Facilities

Table 1 List of Data & Reference

No.	Name of Data	Description	Received Date
1	Current Transmission Facilities	Site Location and System with its capacity	LTC and ETL on Oct. 2001
2	Current Transmission Network	Map of Location and Network Route	LTC and ETL on Oct. 2001
3	Multiplex Hierarchy of Laos Northern Route	Configuration of System (1/3–3/3page)	LTC on Oct. 2001
4	Existing Vietiane Mun. Junction Network	Route of Network and its capacity	ETL on Nov. 2001
5	Rural Communications Network	Site Location and Specified Project Phase	LTC on Nov. 2001
6	Overview of Rural Telecom-Networks Phase I to IV	Map of Location and Network Route	LTC on Nov. 2001
7	Current Mobile Subscribers Telephone System	Site Location and Number of BSC & BTS	LTC on Nov. 2001
8	GMS Network Project 2 Phase I ETL Year 2001	Site Location and Specified Network Route, etc.	ETL on July 2002
9	OFC Transmission Plan-ETL-C Project of Phase II	Site Location and Route	ETL on July 2002

Table 2 Current Transmission Facilities

Section		System	Capacity	Note
Backbone Network				
Southern Route				
Vientiane (VTE)	Pakxane (PAK)	2 GHz Micorwave	34 Mbps 1+1	Numphou = Vientiane
Pakxane (PAK)	Thakhek (THA)	2 GHz Micorwave	34 Mbps 1+1	
Thakhek (THA)	Xeno (XEN)	2 GHz Micorwave	34 Mbps 1+1	
Xeno (XEN)	Ban Nafong (NAP)	2 GHz Micorwave	34 Mbps 1+1	
Ban Nafong (NAP)	Salavan (SAL)	2 GHz Micorwave	34 Mbps 1+1	
Ban Nafong (NAP)	Pakxe (PAX)	2 GHz Micorwave	34 Mbps 1+1	
Pakxe (PAX)	Khong (KHG)	7 GHz Micorwave	34 Mbps 1+1	
Northern Route				
Vientaine (VTE)	P. Kaonan (KAO)	2 GHz Micorwave	34 Mbps 1+1	Numphou = Vientiane
P. Kaonang (KAO)	Phonehong (PHO)	2 GHz Micorwave	34 Mbps 1+1	
P. Kaonang (KAO)	Vangvieng (VAN)	2 GHz Micorwave	34 Mbps 1+1	
Vangvieng (VAN)	Ban kioukacham (KIO)	2 GHz Micorwave	34 Mbps 1+1	
Ban Kioukacham (KIO)	Phonsavan (PHN)	7 GHz Micorwave	34 Mbps 1+1	Pek = Phonsavan
Ban Kioukacham (KIO)	Xaignabouli (XBI)	7 GHz Micorwave	34 Mbps 1+1	
Ban Kioukacham (KIO)	Loungprabang (LPB)	2 GHz Micorwave	34 Mbps 1+1	
Louangprabang (LPB)	Oudomxai (Xai)	7 GHz Micorwave	34 Mbps 1+1	
Oudomxai (Xai)	Namtha (NTH)	7 GHz Micorwave	34 Mbps 1+1	
Junction Network In Vientiane Capital				
Numphou (VTE)	Air Port	FOT	2 Mbps 1+0	
Numphou (VTE)	Thongpong	FOT	8 Mbps 1+0	
Numphou (VTE)	Naxaythong	FOT	8 Mbps 1+1	
Numphou (VTE)	Mobile Center	FOT	2 Mbps 1+1	
Numphou (VTE)	Xaisetta (VTX)	FOT	140 Mbps 1+1	
Numphou (VTE)	Sisattanak (VTS)	FOT	140 Mbps 1+1	
Xaisetta (VTX)	Donnoun	FOT	8 Mbps 1+0	
Xaisetta (VTX)	Thangon	FOT	8 Mbps 1+1	
Sisattanak (VTS)	Nahai	FOT	8 Mbps 1+0	
Sisattanak (VTS)	Thadeua	FOT	8 Mbps 1+1	
International Network				
Numphou (VTE)	Saylom	FOT	34 Mbps 1+1	
Saylom	Vientiane E/S	7 GHz Micorwave	34 Mbps 1+1	
Vientiane E/S	Asisat-2 100.5 deg	6 GHz Micorwave	IDR	
Vientiane E/S	Intelsat 64 deg. IOR	6 GHz Micorwave	IDR	
Numphou (VTE)	Nongkhai (Thailand)	7 GHz Micorwave	34 Mbps 1+1	

E/S : Earth Station FOT : Fiber Optic Transmission System

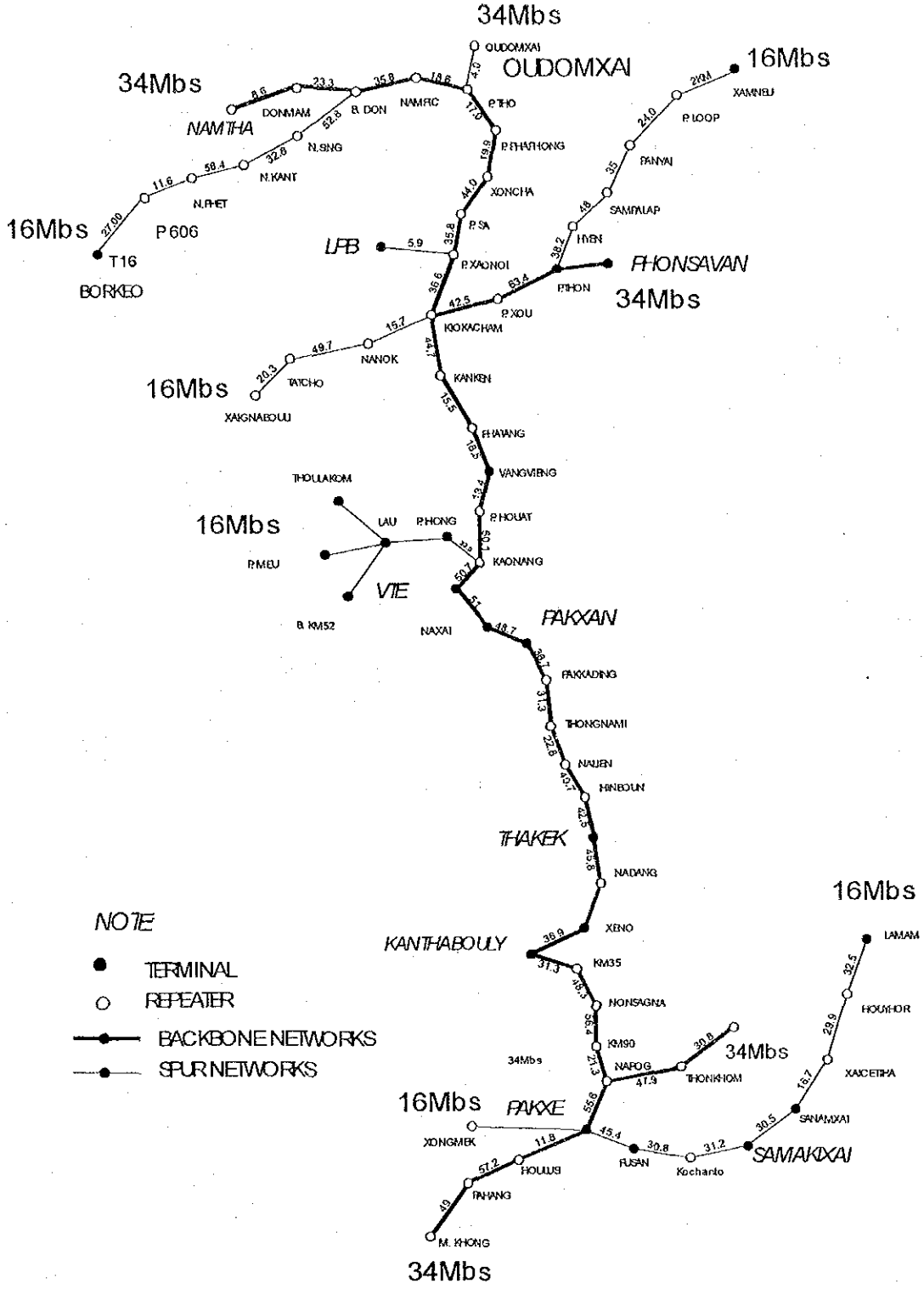


Fig.6 Current Microwave Transmission Networks

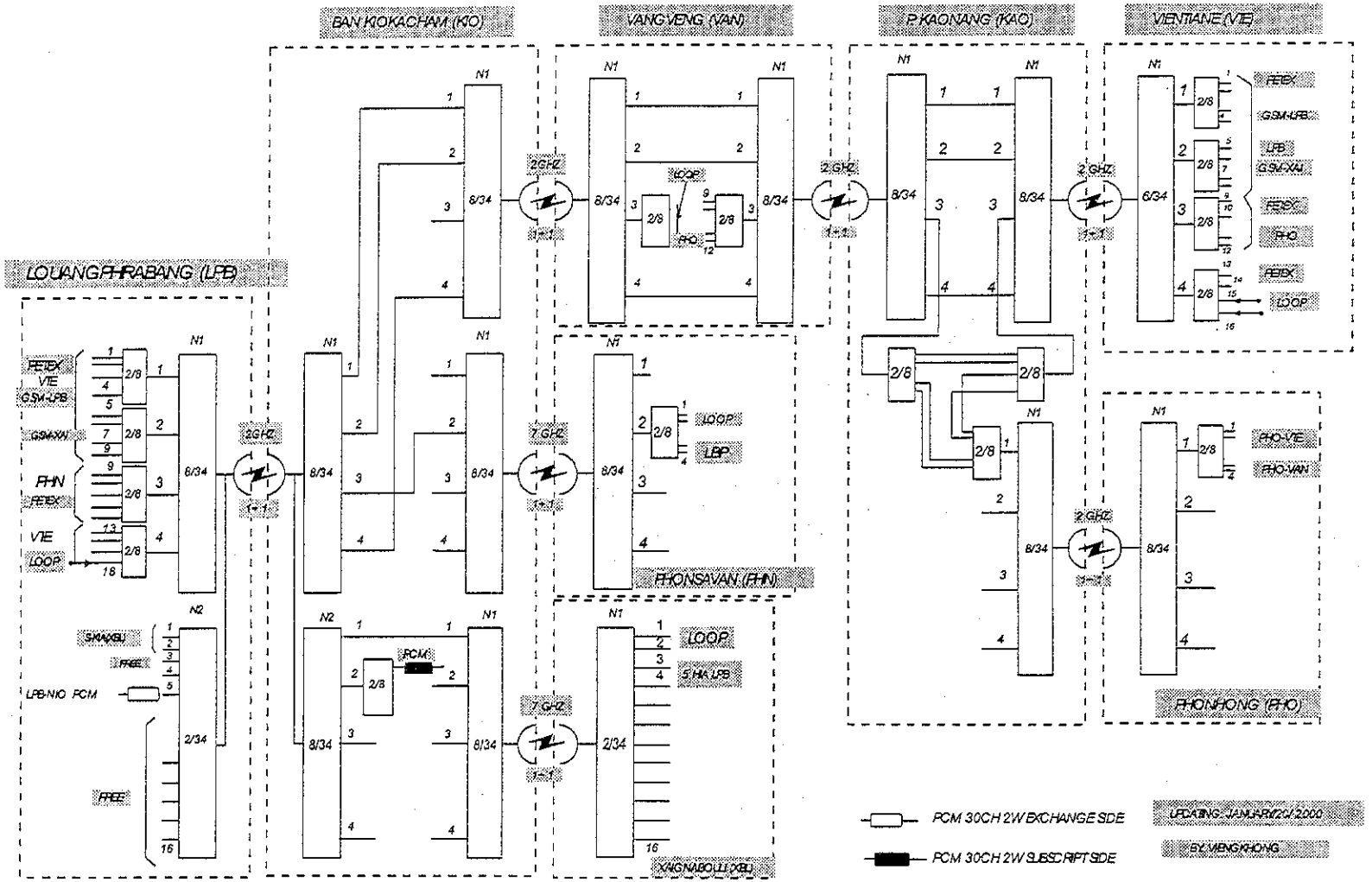


Fig. 7 Multiplex Hierarchy of Laos Northern Route

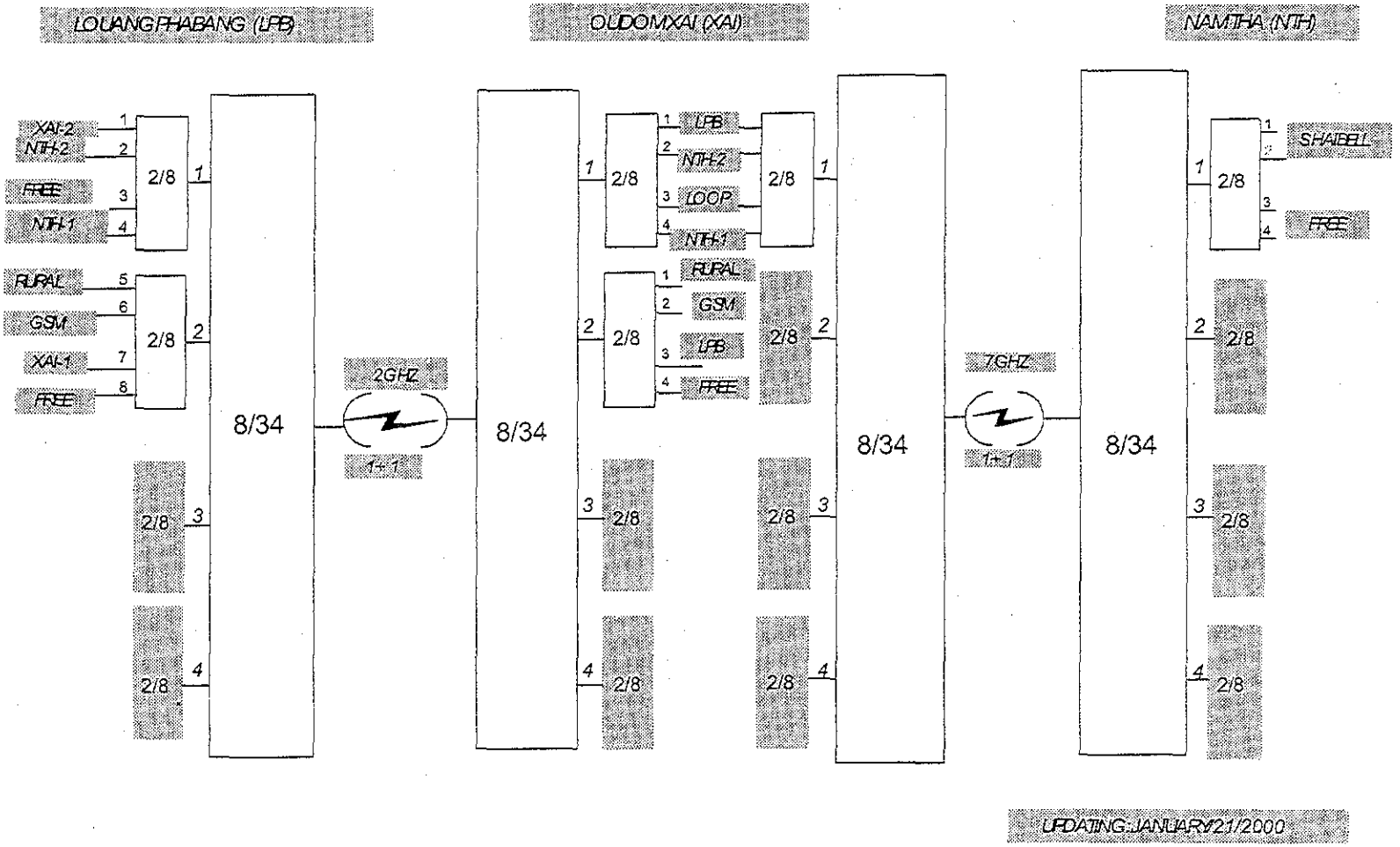


Fig. 8 Multiplex Hierarchy of Laos-Northern-Louangphabang-Oudomxai-Hamtha

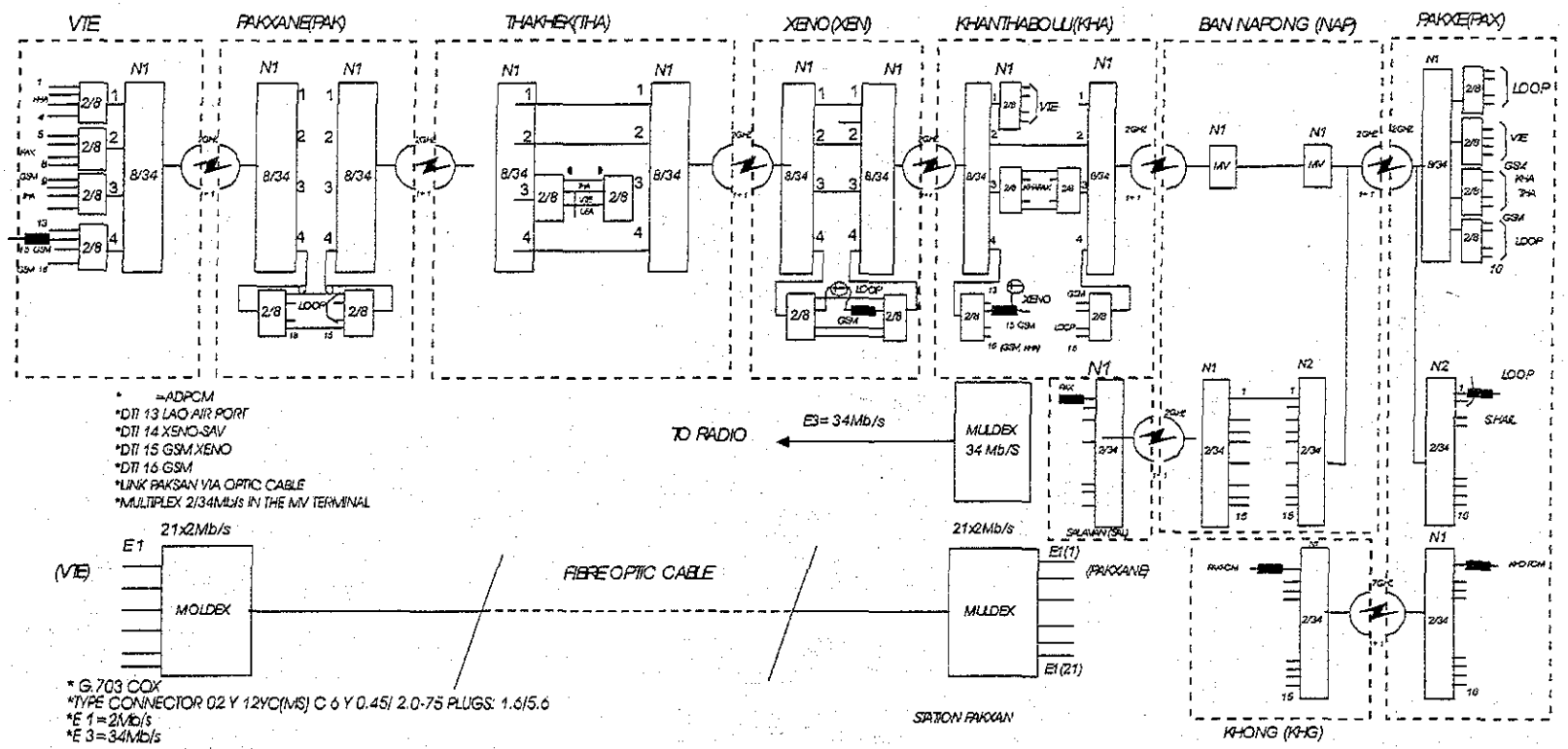


Fig. 9 Multiplex Hierarchy of Laos Southern Route

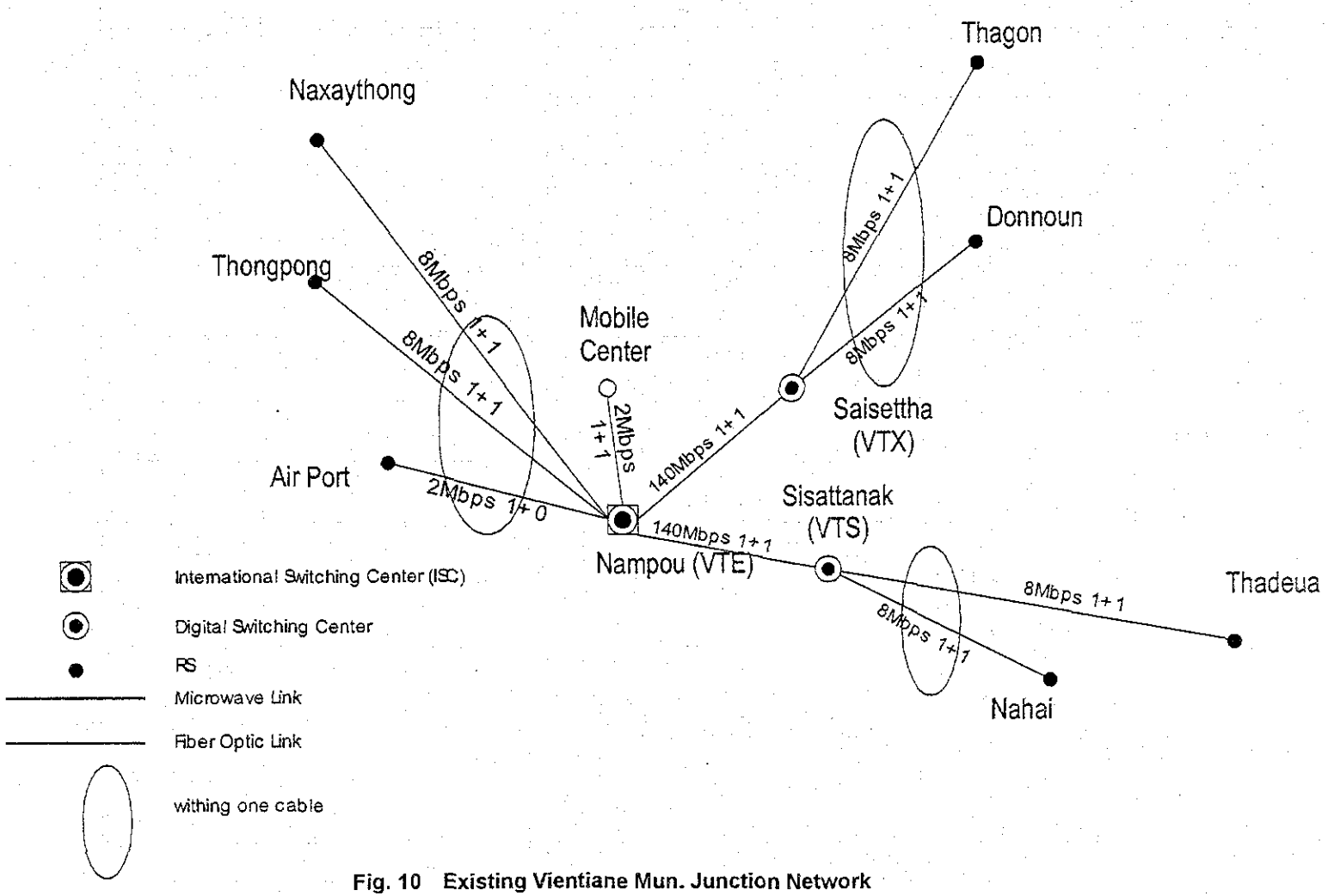


Fig. 10 Existing Vientiane Mun. Junction Network

Table 3 Rural Communications Network (1/3)

				Rural Radio Telecom (O-RMAS)									
No.	LAC	Province	Location	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	capacity	Total capacity	HF SSB	Cordless	VSAT
1	88	Phongsaly								168			
			Phongsaly		16	32			48		1	1	
			Mouang Khoa		8	16			24		1		
			Mouang Boonnua			24			24		1		
			M. Boontai				24		24		1		
			Mouang Gnot Ou					24	24		1		
			Mouang Mai					24	24		1		
2	86	Luang Namtha							0	76			
			Ban Don			4			4				
			Mouang Sing				48		48		1	1	
			Mouang Viengphouka				24		24		1		
3	84	Bokeo							0	172			
			Mouang Houayxay		24	24			48		1		
			Mouang Thonpheung			24			24		1		
			Nam Phet			4			4		1	1	
			Ban Mouangmom				24		24		1		
			Mouang Paktha				24		24				
			Ban Xinangchai				24		24				
			Mouang Pha ou dom					24	24				
4	81	Oudomxay							0	116			
			Mouang Namo				24		24		1		
			Mouang Houn				24		24		1		
			Mouang Pakbeng				24		24		1		
			Nampick			4			4				
			Soncha				12		12				
			Lamua				4		4				
			Mouang Beng					24	24		1		
5	64	Houaphan							0	232			
			Mouang Xam N	24					24		1		
			Mouang Vieng Xay				48		48		1		
			Mouang Xing Kho				24		24			1	
			Ban Pahang				12		12				
			Ban Sopmon				4		4				
			Mouang Houamouang					24	24		1		
			Mouang Xamtai					48	48		1		
			Mouang Et					24	24			1	
			Mouang Viengthong					24	24		1		
6	71	Luangphrabang							0	160			
			Kiokacham	8		8			16				
			Mouang Phoukhoun			16			16		1		
			Mouang Nambak				24		24		1		
			Mouang Pakou				24		24		1	1	
			Mouang XiengNgeun				24		24		1	1	
			Mouang Nan				24		24		1		
			Nam Ok Hou			4			4		1		
			Phou Song			4			4				
			Mouang Phonxay					24	24				
7	61	Xiengkhouang							0	168			
			Mouang Pek	24					24		1		
			Mouang Kham			24			24		1		
			Mouang Khoun				24		24		1		
			Mouang Phaxay				24		24		1	1	
			Mouang Nonghet					24	24		1		
			Mouang Phoukout					24	24			1	
			Ban Nongphet					24	24				
8	74	Sayaboury							0	220			
			Mouang Sayabouly		24				24		1		
			Mouang Hongsa			24			24		1		
			Mouang Paklay			24			24		1		
			Mouang Kenthao				48		48		1		
			Mouang Phiang				24		24		1		
			Tatchao			4			4				
			Mouang Ngeun					24	24		1		
			Boten					24	24		1		
			Mouang Xieng Hon					24	24		1		

Table 4 Rural Communications Network (2/3)

				Rural Radio Telecom (D-RMAS)									
No	LAC	Province	Location	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	capacity	Total capacity	HF SSB	Cordless	VSAT
9	23	Vientiane province							0	400			
			Mouang Vang V	24					24			1	
			Mouang Phonho	24					24				
			Mouang Kheoo	24					24		2		
			Mouang Kao	24					24				
			Mouang Toulak	24					24				
			Ban Lak 52 (km	24					24				
			Ban Phonmi	24					24				
			Ban Namon				24		24				
			Ban Thahua				24		24				
			Ph. Houat			4			4				
			Mouang Hinheup					48	48			1	
			Ban Sensum					12	12				
			Mouang Xanakham					48	48		1		
			Mouang Kasi					48	48		1		
			Ban Phatang					24	24				
10	21	Vientiane municipality							0	72			
			Mouang Phia La	12		12			24				
			Ban i Lay	12		12			24				
			Mouan Pakngum				24		24				
11	54	Bolikhamxay							0	124			
			Nam Theun dam		16	8			24				
			Mouang Khamkeut		20				20		1		
			Mouan Bolikhan				24		24		1	1	
			M. Pakkading				24		24			1	
			M. Thaphabat				*24*		24		1		
			Ph. Hai			8			8				
12	51	Khammouane							0	148			
			Ban Hinboun		8	16			24				
			M. Ngom Malat		8	16			24				
			M. Nakai Mei		8	12			20				
			M. Nongbok			24			24			1	
			Ph. Thoun			4			4				
			M. Pakhinboun				24		24				
			Nahi			4			4				
			M. Mahaxay mai					24	24		1		
13	41	Savannakhet							0	348			
			M. Athsaphangthong		8	16			24				
			M. Outhounphone		24				24				
			M. Champhone		24				24				
			M. Songkhone		12	12			24				
			KM 35			24			24				
			M. Xaiphouthong			24			24			1	
			Ban Nadeng			12			12				
			M. Phin				24		24		1		
			M. Xepon				24		24		1		
			M. Atsaphon					48	48			1	
			M. Phalanxai					24	24			1	
			M. Xaibuli					24	24			1	
			M. Xonbouli				24		24			1	
			Ban Densavan					24	24				
14	34	Saravane							*0*	*188*			
			M. Khongsedon		20	28			48				
			M. Saravane		20				20		1	1	
			M. Laongam		12	36			48			1	
			M. Vapi			24			24		1		
			Tatset				24		24				
			M. Lakhongpheng					24	24		1		
15	38	Sekong							0	72			
			M. Lamam		12	36			48		1		
			M. Thateng					24	24		1	1	
16	31	Champassak							0	164			
			M. Champasak		16	8			24				
			Phon Thong		16	4			20				
			M. Soukhouma		12	12			24			1	
			M. Paksong			24			24				
			Donthalat				24		24				
			M. Pathoumphon					24	24		1		
			M. Mounlapamok					24	24			1	

Table 5 Rural Communications Network (3/3)

				Rural Radio Telecom (D-RMAS)									
No	LAC	Province	Location	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	capacity	Total capacity	HF SSB	Cordless	VSAT
17	36	Attapou							0	68			
			M. Sanamxay			8	-4		4				
			M. Samakhixay			20	28		48		1		
			M. Xaisettha				12		12		1	1	
			Houay Ho				4		4				
		Xay somboune Speclal											
			Xaysomboune								1		1
			Longsane								1		
			Phun									1	
			Hom								1		
			Thathom									1	
		Total capacity		248	336	660	848	804	2,896	2,896	61	27	0

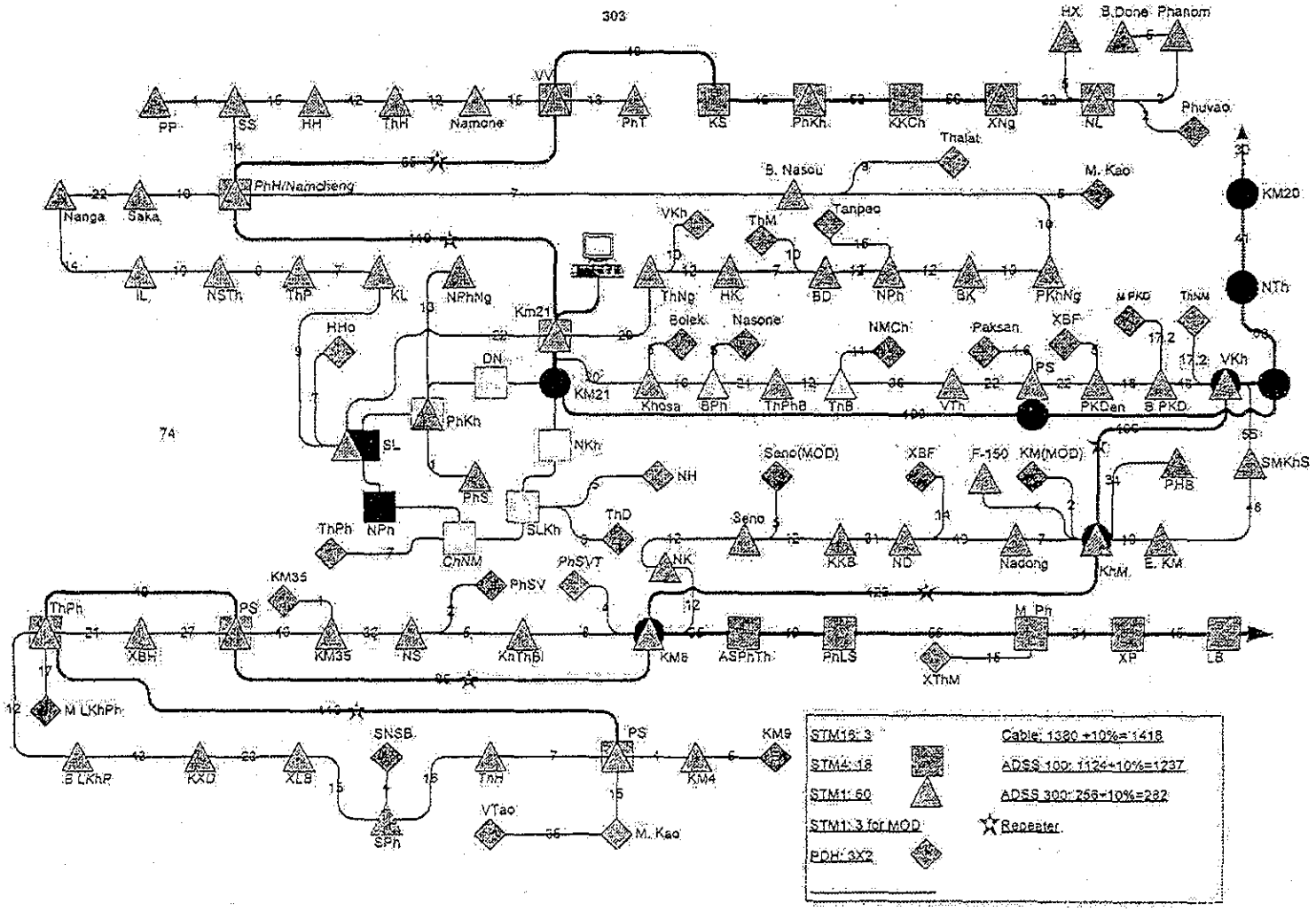


Fig. 11 OFC Transmission Plan-ETL-C-Project of Phase

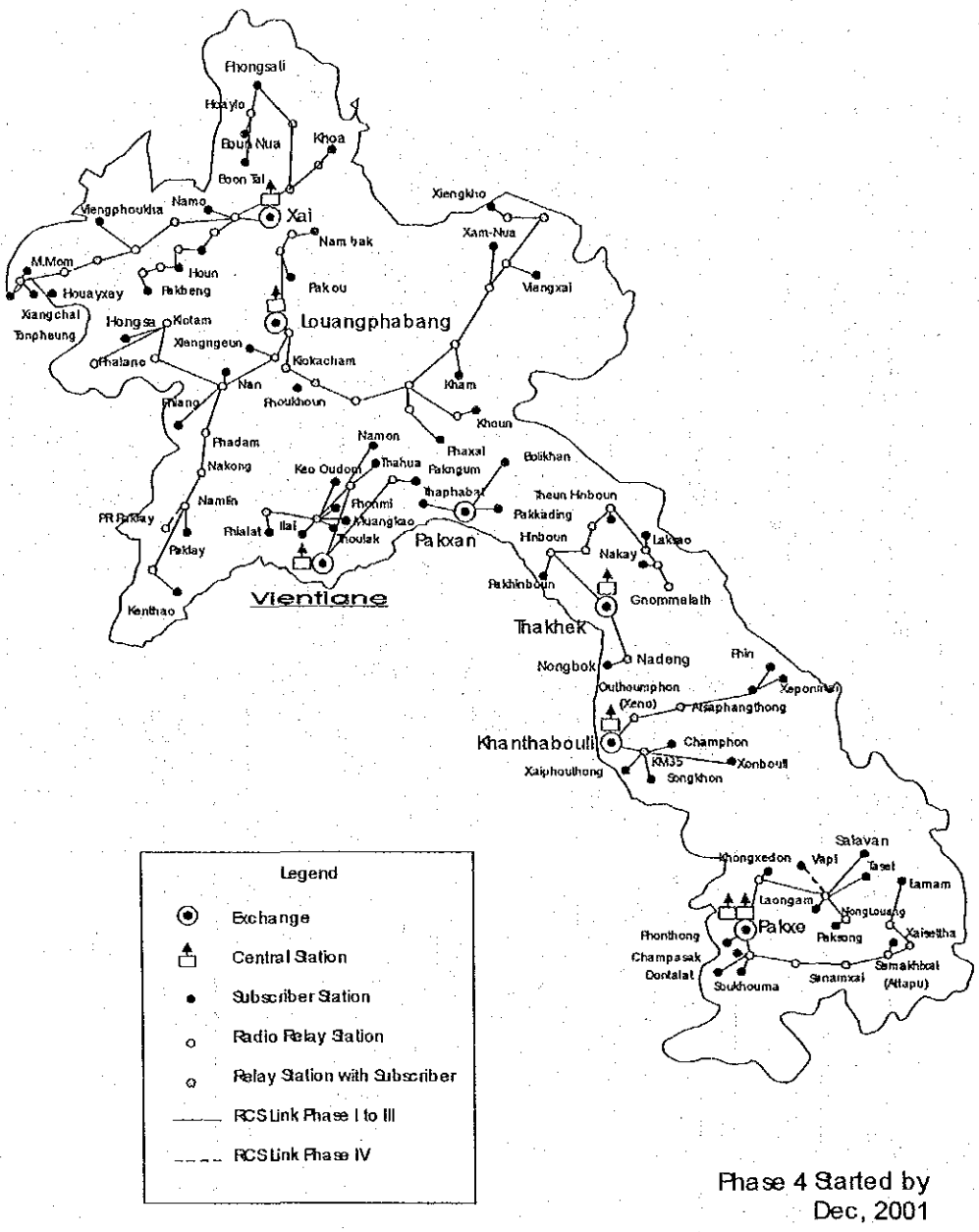


Fig. 12 Overview of Rural Telecom-Networks Phase I to IV

Table 6 Current Recent Mobile Subscribers Telephone System

No	Name of Site	BSC	BTS	Microwave Commu	Number of Mobile Subscribers
1	Vientiane (Saylom)	1	13	12 Links	unknown
1.1	Luangprabang		1	1	Do
1.2	Xiengkhouang (Phonsavane)		1	1	Do
1.3	Oudomxai		1	1	Do
2	Khanthabouli	1	5		
2.1	Pakxan		1	1	Do
2.2	Thakhek		1	1	Do
2.3	Xeno		1	1	Do
2.4	Pakse		1	1	Do

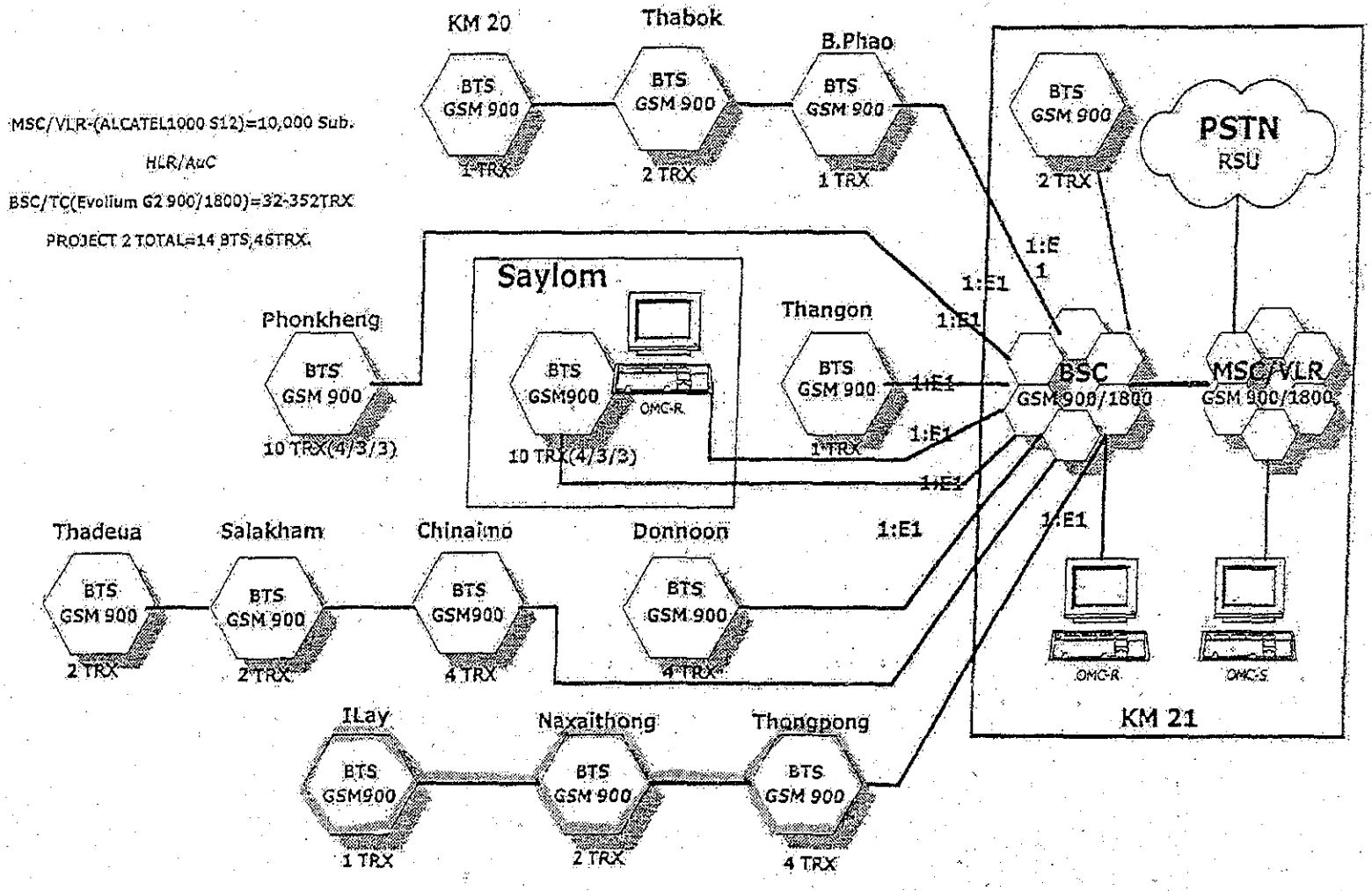


Fig. 13 GSM Network Project 2 Phase 1 ETL Year 2001

3. Outside Plant

3.1 Rehabilitation Work in Vientiane

Due to the budget constraint, the secondary cable has not installed in proportion with the primary cable. Also, the small size cables as 20 to 30 pair of cables have repeatedly been installed. In order to recover those situations, the following items should be planned and carried out. The basic figures of existing facilities are collected from LTC Maintenance office in November, 2001. The details of Rehabilitation Work shall be studied in the feasibility study.

3.1.1 Additional Secondary Cable

Drop wires have been laid for many years instead of aerial distribution cable. There are too many deteriorated drop wires causing many faults – 80 to 90% of total faults. Those drop wires shall be replaced with additional aerial cables.

The number of additional cable pairs is the difference between the necessary pairs (1.4 times of existing primary cable pairs) and the existing cable pairs of secondary cable.

The necessary pairs (1.4 x 38,860) — Existing secondary cable pairs (40,606) = 13,798 pairs

Average length per pair of the existing secondary cable is calculating in dividing total length of existing secondary cables. The average length per pair is 217,582 ÷ 40,606 = 5.36 Meters

Thus, the additional length of the secondary cable is calculated as following;

13,798 pairs × 5.36 meters = 73,957.28 Meters.

3.1.2 Additional Distribution Point and telephone Pole

Together with the additional secondary cable, because Distribution Point is put on the secondary cable, DP shall be added simultaneously. On the other hand, the existing interval length of each DP position is about 150 meters, because the pole which supports the secondary cable is mostly the electric pole (more than 80 % of the total poles) and it is difficult to put DP on the electric pole , usually the telephone pole is installed between the electric poles in order to put DP. The additional DP is necessary on existing secondary cable which has DP at interval of 150 meters . — It is necessary to shorten the interval as the average length of 75 meters at least. This interval length shall be applied on additional secondary

cable.

(1) The additional DP on existing secondary cable

The number of DP on existing secondary cable is calculated as follows;

The total length of the existing secondary cable in Vientiane (as of Nov.2001) is 217, 582 m. The present interval length150 meters.

The present number of DPs on existing cable	217,582 ÷ 150 =	1,451 pieces.
The required number of DPs	217,582 ÷ 75 =	2,901 pieces
Additional number of DPs on existing cable	2,901 −1,451 =	1,450 pieces

(2) The additional DP on additional secondary cable.

The number of DP on additional secondary cable is calculated as follows;
The additional cable length ÷ average interval;73,957.28 ÷ 75 = 986.09

(3) Total number of additional DP

(1) + (2) = 1,450 + 987 = 2,437

(4) Additional installation of poles to put Distribution Point

The pole should be installed at the new DP.

Total number of poles is 2,437.

3.1.3 Replacement of small size cables to 200 pairs or 400 pairs cable

The Study Team observed that there are many cable spans exceeding 4 cables in one cable span (approximately 10 km). Details shall be studied in the feasibility study. This situation causes violation of Regulation to keep distance from the ground and difficulty of cable work..

3.1.4 Relocation of aerial cable to Duct System and Underground Distribution System

The Study Team observed that there are some cable spans exceeding 600 pairs in one span (approximately 3 to 5 km). The pole cannot hold heavy load of cables and it is slanting and dangerous. Those cables shall be relocated to duct system.

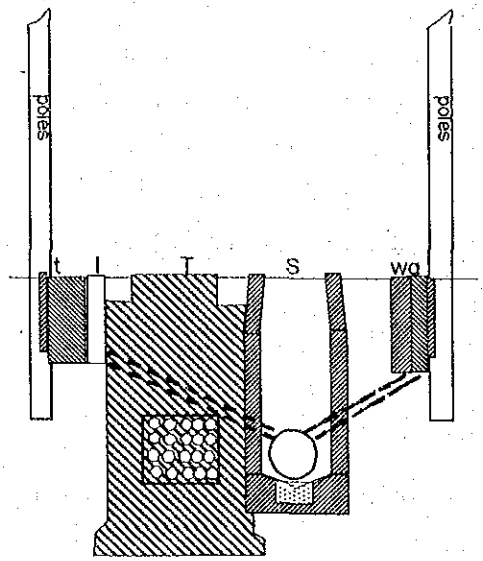
On the other hand, it has become difficult to keep regulated distance from the electricity and from the ground especially at commercial areas in Vientiane. For the sake of safety of maintenance work and facilities the underground distribution

system shall be installed in the future. In order to promote the installation of underground distribution system, the following items shall be considered;

- The present road composition and the future plan of Road Authority
- Unfortunately Road Authority does not have the standard dimension figure of the road at present time, but the carrier shall get permission from the Authority and shall have coordination with other lifeline companies.
- Refer to Example of standard dimension figure. It often happens that the underground distribution system become expensive, however, the suitable underground system shall be studied.

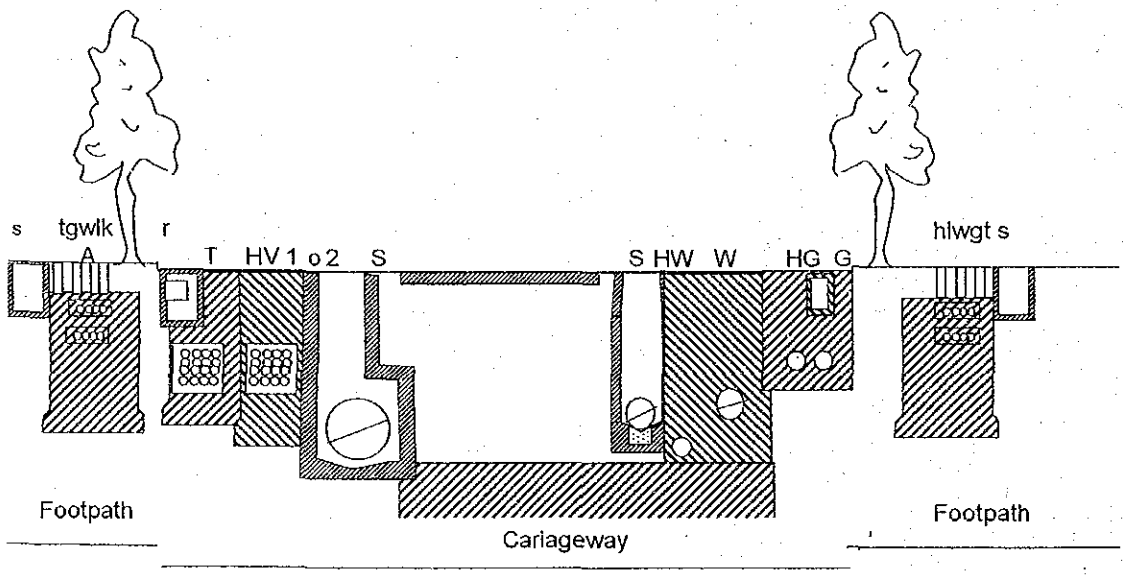
3.1.5 Example of layout and position of underground constructions

Examples of layout and position of underground construction are shown in followings two drawings.



LEGEND				
Kinds of Facilities	Main Line		Branch Line	Note
Telephone Line	TA		i	
High Voltage Power	HV_1	HV_2	k	HV_1: Duct type HV_2: Trough type
Distribution Line of Power			l	
Water Pipe	W	HW	w	
Drainage	S		s	
Gas pipe	G	HG	g	

(a) Road Width 8m (No discrimination of footpath and carriageway)



(b) Position of Underground Facilities (Example of Tokyo Metropolitan Area)

Fig. 14 Road Configuration and Life Lines

3.2 Standard

3.2.1 Design of Outside Plant (Exert)

(1) Design Period

- 5 years, (Primary Cable)
- 10 years, (Secondary Cable)
- 15 years (Manhole and Duct)

The optimum period for each facility is decided on economical comparison of the model case, if the actual period is shorter than the above figure, the installation work will be repeated and if longer , it will be as the state of over-investment.

(2) Underground or Aerial Cable

a) Aerial Cable up to 600 P totally in the span, the maximum pairs of a cable 400 p

b) up to 3 cables

(3) Fixed Distribution Area (C.C.C Area)

a) 600 to 1,200 subscribers – 15 years demand

b) Big Business buildings, offices business (Special demand) more than 100.

(4) Aerial Cable Design

a) Selection of route

i). Suitable for distribution 05 cable

ii). Shortest route

iii). Safety of poles (traffic, road construction work etc.

iv). Re electricity other facilities

b) Selection of diameter of cable core

i). Uni gauge or two gauges

c) Decision of number of pairs

i). 10 pairs sub unit – 10 years demands

ii). Assembly of sub units from the end pole to feeding poles.

iii). Calculation of summary of sub unit

3.2.2 Standard and Regulation

- Attenuation Loss 7dB
- Loop Resistance 1500 Ω
- Clearance from the ground (Regulation) 5.5 m to 7.0 m
- Separation from electrical

Power line (Regulation)

0,25 to 0,4 KV	20 cm to 1,0 m
~ 22 KV	1,5 m to 2,5 m

- Earth Resistance

DP	30 Ω
Cabinet	5 Ω
MDT	2 Ω
Messenger Nine	30 Ω
Network Equipment	5 Ω

3.2.3 Installation Manuals

a) As a whole, manuals as the same in Thailand are used. Illustration, Dimensions, and Figures of the plant facilities are shown.

b) The process of installation, method to construct materials to be adapted, to be used, and caution to be taken are not explained in detail.