CHAPTER 2

SOCIO-ECONOMIC OVERVIEW AND TELECOMMUNICATIONS

CHAPTER 2 SOCIO-ECONOMIC OVERVIEW AND TELECOMMUNICATIONS

2.1 Topographical Features

The Lao P.D.R. is situated in the center of the Indochina Peninsula and is South-East Asia's only land-locked country as well as the least populous country in the Indochina Peninsula. The 1995 census recorded a population of 4.6 million, which is just under half that of Cambodia and less than ten percent that of Myanmar, Thailand or Vietnam. Its total area of 236,800 km^2 is between that of Cambodia and Vietnam, and less than half that of Thailand and Myanmar.

Table 2.1 Lao Population and Area Compared with Neighboring Countries

Country	Population Size (1995 Census)	% of Lao Population	Land Area (km^2)	%of Lao Land Area
Lao P.D.R.	4.6 million	----	236,800 km2	----
Cambodia	9.8 million	213	181,000 km2	76
Myanmar	46.5 million	101	676,600 km2	286
Thailand	59.4 million	129	513,100 km2	217
Vietnam	75.5 million	164	330,400 km2	140

Source: Quote from Country Census (1995)

Some 70 percent of the country is composed of mountains and high plateaus. Elevations below 200m account for only 16 percent of the total land area. The plains region is situated along the Mekong River, which runs 1,898 km through Lao territory.

Even today, traveling and communications within the country is particularly difficult during the wet season because of poorly constructed and poorly maintained roads and lack of telecommunications network services. Thus, territorial and economic integration is one of the main policy targets of national development. Currently, National Road 13, between Namtha on the Chinese border and Kinak on the Cambodian border, is the only year round access, notwithstanding the fact that the section south of Savannakhet has not been entirely paved. Road 13 links the capital Vientiane to Luangphrabang in the North, and to Thakhek, Savannakhet and Pakse in the South. It is connected to the Thai roading network by a bridge in Vientiane and by another bridge that was constructed in Pakse recently. A third bridge is planned at Savannakhet as a part of the East-West Corridor highway project to connect with the Vietnam border.

Since 1975, the territorial organization (provinces) of Lao P.D.R. has been redrawn, with the number of provinces increased from 13 to 18. Vientiane province was

divided into three. Luangnamtha and Saravane provinces were split into two. The special zone of Xaysomboun was also created. Presently, the country is divided into 18 provinces, 142 districts and 10,912 villages. These villages are widely scattered through rural areas in the country and access roads are rare except along the national roads.

According to the criteria for defining a 'rural area' as set forth in "The Government's Strategic Vision for the Agriculture Sector in December 1999", some 80 percent of the Lao population lives in rural areas, with most living in villages with a traditional social structure. However, there is an increasingly significant dichotomy in levels of rural development between the flat lands along the Mekong corridor, and the sloping lands elsewhere in the country (refer to Table 2.2).

With much better access to markets and information, the Mekong corridor, which includes some 20 percent of the rural population, has entered a period of agricultural transformation. Market forces are starting to deliver agricultural inputs through commercial channels, farmers are beginning to market an increasing proportion of production, and rural industries and services are beginning to develop.

In contrast, the sloping areas are characterized by subsistence agricultural systems with farm households locked in poverty, constrained by poor infrastructure, limited services, poor access to regional markets and technology flows, and lack of capital to fuel the transformation process.

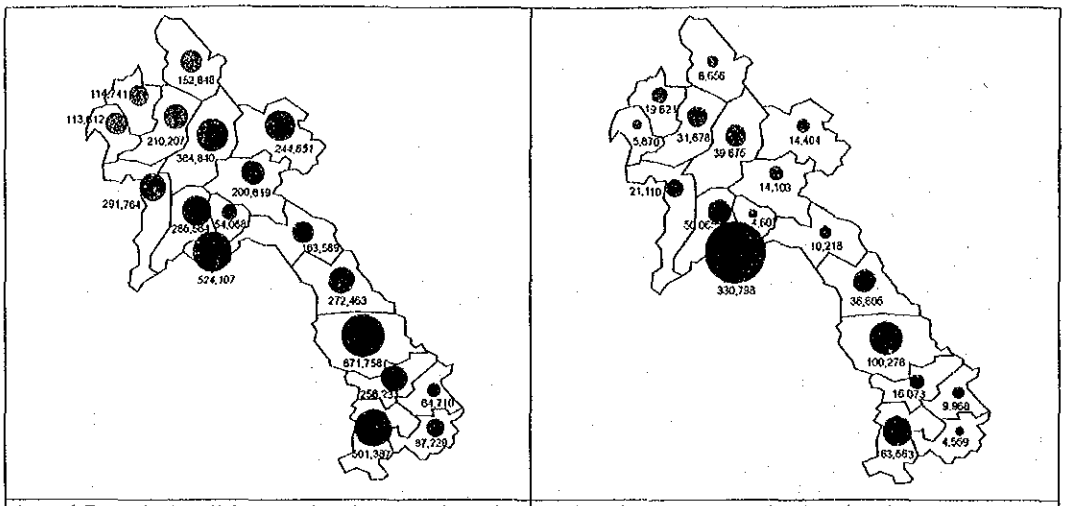
Table 2.2 Rural Area Classification

Flatland in the Mekong Corridor (Emerging rural market economy)	**Sloping Land** (Subsistence Farming)
Some 20 percent of rural population resides in the territory along the Mekong Corridor.	The rest of the rural population (80 %) resides the sloping and mountainous lands.
Basic educational and health services are accessible to most of the population	Many areas still lack access to basic educational and health services.
Most villages have all weather access to road transport and markets. Increasing number of villages with access to electricity.	Poor and non-existent road access. Very limited electrification.
Adequate agricultural technology flows from regional markets	Very limited or non-existent agricultural technology flows.
Rural savings mobilization and agricultural lending mechanisms are beginning to function.	Very limited or non-existent rural savings mobilization and credit.
Domestic and regional markets interacting.	Little or no domestic and regional market interaction.
Market information and price signals operative in many areas.	No market information mechanisms.
Commercial activity diversifying with rural industries and services emerging. Free access for local and foreign entrepreneurs.	Predominantly subsistence agriculture, with limited (mostly barter) transactions. Very limited, if any, rural services.
Agro-geographic conditions favoring flatland farming systems.	Agro-geography in high relief requires balanced sloping land farming systems and integrated environmental management.
Higher and increasing demand for telecommunications services in this area.	Basic and minimum demand for telecommunications services related to the BHN in this area.

Source: Modified from "The Government's Strategic Vision for the Agriculture Sector", December 1999.

In Lao P.D.R., an urban area is defined as an area that satisfies at lease three of the following five conditions; (i) there is a market, (ii) there is a road for motor vehicle access, (iii) there is a district or provincial office; (iv) the majority of households are electrified, and (v) there is tap water supplied to the majority of households.

According to the criteria for defining an 'urban area' as set forth in "The Government's Strategic Vision for the Agriculture Sector in December 1999", the country's largest urban area is Vientiane municipality with a population of over 300,000 or some 40 percent of the country's urban population. The four largest provincial capitals, Luangphrabang, Pakse, Savannakhet, and Thakhek are classified as secondary towns and have populations ranging from 20,000 to 60,000. The remaining provincial capitals have populations ranging from 4,000 to 20,000 and have only very basic urban infrastructure.



Total Population Distribution by Province in Lao P.D.R.	Urban Population Distribution by province in Lao P.D.R.

Source: "Basic Statistics of the Lao P.D.R. 2000", NSC/SPC, 2002

Fig. 2.1 Total and Urban Population Distribution in Lao P.D.R. (1995 Census)

The table below shows the urban characteristics based on the expected urban roles and present urban conditions. Presently, telecommunications services are rapidly expanding in Vientiane municipality and four Regional Centers (Khanthabuly, Luangphrabang, Pakse and Thakhek). Other provincial districts and 130 district centers are, however, still in an initial stage of development.

Table 2.3 Major Urban Center Characteristics

City/ Town	Population Range	Expected Core Functions	Present Infrastructure and Services
Capital City Vientiane	> 300,000	National Capital, Center for international communication	All basic services, public transport, private solid waster management. However, value-added telecommunications services are strongly required for further growth of Lao economy.
Regional Centers/ Secondary Towns Khanthabuly Luangphrabang Pakse Thakhek	20,000 to 60,000	Regional economic center; international transport hub; provincial government and administration; tourism	All basic services. However, expanding commercial and tourism industries require a higher standard of telecommunications service for their daily socio-economic activities.
Other Provincial Capitals 13 provincial capitals	4,000 to 20,000	Provincial government and administration; some transport	Rudimentary services; water supply systems being improved; no solid waste management; power and telecommunications being developed.
Small Towns 130 district and sub-district towns	< 2,000 to 15,000	District administration; rural support	Mostly rudimentary services; few serviced roads; few water supply systems; no solid waste management systems; limited power and limited telecommunications services.

Source: Modified based on the ADB, Lao P.D.R.: Urban Sector Strategy Study, July 1998

2.2 Population Features

2.2.1 1995 National Population Census

Based on the 1995 Census, the population of Lao P.D.R. was projected to increase to 5.2 million by the year of 2000 with an annual population growth of 2.8 percent, to 6.8 million in 2010 and 8.7 million in 2020. The population in mid-year 2000 was reported at 5.2 million. Thus, population pressures will increase strongly, even if density remains low. Household size, consisting on average of 6 persons per household, varies with ethnic origin. The size of urban households is the smallest in Vientiane City and municipality. Urban households are larger in the southern and northern areas. Its capital, Vientiane, holds some 598,000 inhabitants including rural areas. Lao P.D.R. has a low rate of urbanization, with an urban population of 17 percent according to the census. The urban population exceeds 50 percent in the four districts of Vientiane City and in Pakse. In the other towns in the Mekong Valley it ranges from 28 percent to 50 percent . The largest living quarters are found in the three biggest towns: Vientiane, Savannakhet and Pakse, and in the peri-urban districts of Vientiane, where villas are common. All the other provincial capitals contain a mixture of large, medium and small dwellings, with the exception of recently urbanized Lamarm (Sekong), where medium-sized and small dwellings predominate. Over 70 percent of urban dwellings in the Mekong Valley and on Vientiane Plain are connected to the public electricity grid. The dwellings located along the Mekong upstream from the Vientiane area on the route linking the capital to Xamneua, rely on a mixture of public electric supply and small private generators. However, most of the population resides in rural areas where transport and electrical infrastructure are scarce and incomes are very low.

2.2.2 State Planning Committee (SPC) Population Projection

According to the SPC population projection prepared in the year 2000, the national population will increase by 1.4 million during the period from 2000 to 2015and by 2.1 million and from 2000 to 2020 (see Table below). The 1.4 million population increase during 2000 to 2015 will consist of 0.3 million in urban population and 1.0 million in rural population. Future urban growth rate is always greater than the rural rate in each 5-year interval. However, it is noted that the population projections done by the SPC disagree with those indicated by the SPC Report prepared in 2001. Tables 2.4 and 2.5, show the population projections for 2020 were indicated as 7.8 million and 8.3 million, in the 2000 and 2001 reports respectively.

The urban/rural growth rates are widely divergent over the 20 year period, resulting

in an increase in the urban population to 26 percent of the total population from 20 percent currently. This pattern of development would be similar to the experience of other countries, including Thailand and China. Adoption of a more market-based economic system encourages a re-alignment of sector growth rates. Growth of the service and industry sectors will mean growth in urban centers, requiring more telecommunications service investment in urban infrastructure.

Table 2.4 Population Projection for Lao P.D.R., 1995-2020

	'95-'00	'00-'05	'05-'10	'10-'15	'15-'20
Population (million)	5.026 million	5.683 million	6.388 million	7.079 million	7.758 million
Urban	0.87 "	1.03 "	1.18 "	1.33 "	1.48 "
Rural	4.24 "	4.74 "	5.29 "	5.75 "	6.27 "
Population Growth Rate	2.5 %	2.4 %	2.2 %	2.0 %	1.7 %
Urban	3.3 %	3.0 %	2.7 %	2.3 %	2.0 %
Rural	2.4 %	2.3 %	2.1 %	2.0 %	1.7 %

Note: Assumptions:
(1) A gradual decline in the population growth rate from 2.5 %/ annum to 1.7 percent by 2020, reflecting a decline in the fertility rate to 3.2.
(2) An urban population growth rate of 3.8 % in 2000, gradually declining to 3 % by 2020.
(3) A rural population growth rate of 2.2 % in 2000, gradually declining to 1.5 % by 2020.
(4) A dependency ratio of 95 percent in 2000, gradually declining to 60 % by 2020.
Source: SPC "Medium-Term Expenditure Framework and The Public Investment Program (PIP), Government of Lao P.D.R." April 2000

2.3 Economic Features

2.3.1 Status of Income and Expenditures in Lao P.D.R.

With an annual per capita income of US$350 (2000), Lao P.D.R. is one of the least developed countries in the region. Most people survive on subsistence agriculture. Around 39 percent of the people live in poverty. The Lao economy is based mainly on agriculture, which employs over half of the work force and contributes over 50 percent of the Gross Domestic Product (GDP). Between 1992 and 1997 the economy grew by an average of 7 percent a year. Due to the Asian financial crisis, inflation hit over 100 percent in 1999, but dropped to 24 percent in 2000 and continues to stabilize. The country depends upon foreign assistance to carry out its development objectives and reduce poverty. In 1997 foreign aid accounted for 38 percent of the government's budget and in 1999 foreign aid per capita stood at US$58.

The 1997-98 Lao expenditure and consumption survey shows that per capita

income in Vientiane municipality (US$437)was then 4.5 times higher than in Oudomxay (US$98), and 2.3 times higher than the national average (US$189). Xayabury and Champassack appear to have been relatively well off, with over US$280. Vientiane and Borikhamxay provinces are have an income of over US$210.

Four types of provinces can be distinguished according to income structure. Income from trade and wage employment is ahead of agriculture only in Vientiane municipality and in Champassack. In the second type, rental income and transfers from abroad equal or exceed trade and wage employment. This is the pattern in the provinces of Khammouane and Savannakhet and in Sekong, where numerous development projects have been implemented. The third type, which includes most of the provinces of the northern half of the country plus Attapeu in the South, combines income from agriculture and income from trade and wages. The fourth type, almost exclusively agricultural, includes isolated provinces such as Phongsaly and Xaysomboun, and provinces such as Oudomxay in the North and Saravane in the South.

Annual average rural consumption is equivalent to 65 percent of urban consumption, at US$170 and US$260 respectively. The disparity between the extremes is much wider in the countryside than in urban areas.

2.3.2 SPC "Draft Socio-Economic Development Strategy"

According to the SPC "Draft Socio-Economic Development Strategy for 2020, 2010 and the Five year Socio-Economic Plan (2001-2005)", the GDP per capita (US$) will be at US$700- 750 in 2010 and US$1,200 - 1,500 in 2020 (see Table below). In 2000, the GDP per capita was reported at US$ 350 in Lao P.D.R. by the SPC report. However, it suggested that the actual GDP per capita would be equal to roughly twice (around US$700 in 2000) the official figure.

Table 2.5 Recent Socio-Economic Strategy for 2020, 2010 and 2005 in Lao P.D.R.

SPC Report	'01-'05	'01-'10	'01-'20
Estimated Population	5.9 million (2005)	6.7 million (2010)	8.3 million (2020)
Population Growth Rate		2.4 % p.a.	2.2 % p.a.
Annual GDP growth rate	Around 7-7.5% p.a.	Around 7% p.a.	Around 7% p.a.
GDP per Capita	**US$ 500-550 (Y2005)**	**US$ 700-750 (Y2010)**	**US$ 1,200-1,500 (Y2020)**
Objectives by interval	- 4-5% annual growth (Agriculture), - 10-11% a.g.(Industry) - 8-9% a.g. (Service), - Agriculture 47% of GDP - Industrial 26% of GDP - Service: 27% of GDP	- Increase of locally made products to replace imports. - Improvement of basic infrastructures: electricity, hydropower, processing industry, special economic zones, border trade zones. - Further serious opening up of the economy, trade and investment cooperation with foreign countries.	- Increased GDP share for industry and service sectors
Telecommunications	- It is expected that Lao will reach 2.2 teledensity.		

Source: Source: SPC "Socio-Economic Development Strategy for 2020, 2010 and Five years Socio-Economic Plan (2001-2005)", 2001 (translated document)

(1) Industry and Handicraft

Within the next five years, industrial zones need to be established in Vientiane Municipality, Savannakhet, Champasack and Oudomxay. A Special Economic Zone will be located in Savannakhet.

(2) Service Sectors

Installation of a satellite service and optic fiber system, expanding the telecommunication system into the rural areas in order to serve the areas of advertising, information dissemination and long distance education, improving and extending both domestic and international post network.

It is expected that Lao will be able to reach 2.2 teledensity by 2005.

(3) Sector Projections to 2020

If Lao P.D.R. were able to achieve and sustain a rapid growth rate in the order of 6-8 percent annually, over the next 20 years, dramatic shifts in the composition of the economy would be anticipated. To achieve such growth rates would require growth of the agricultural sector by about 3.5 - 5 percent annually and growth of the industrial and service sectors by between 8 - 12 percent annually.

Table 2.6 Sector Projections to 2020

Sector Distribution of GDP	1998	2020
Agriculture Sector Share of GDP	53.0%	30.0%
Industry Sector Share of GDP	22.0%	40.0%
Services Sector Share of GDP	25.0%	30.0%

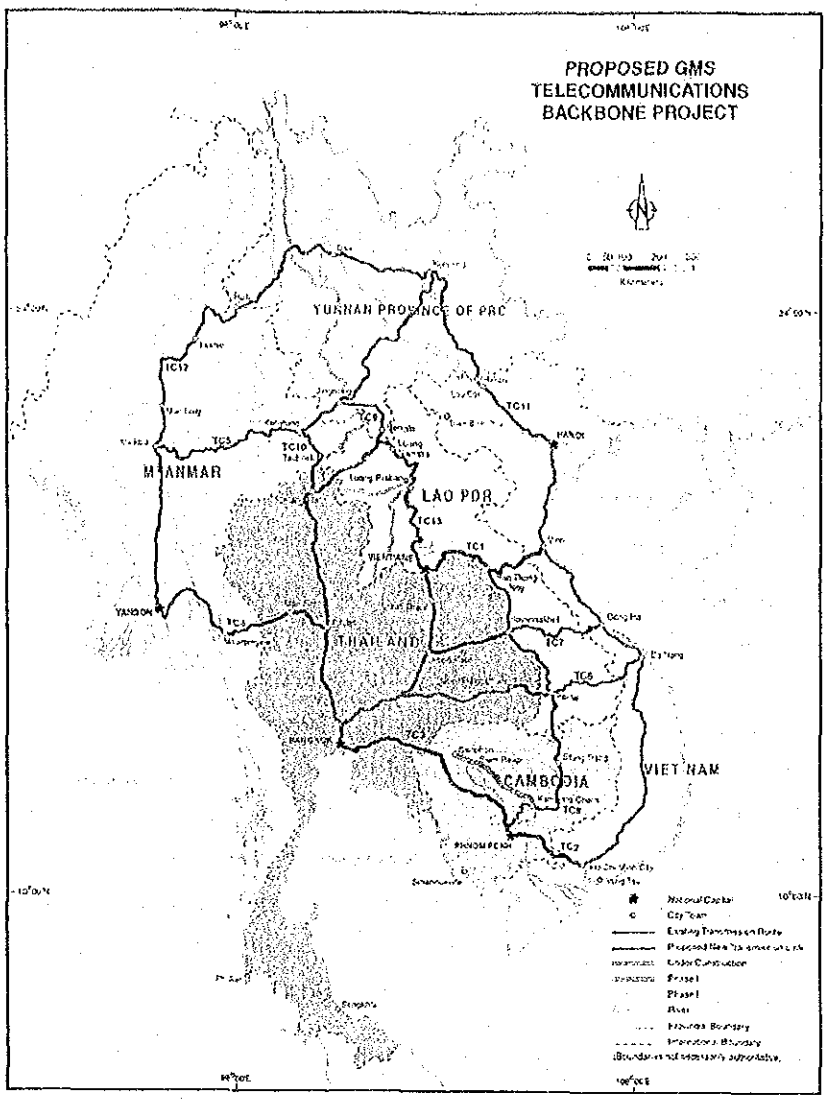
Source: SPC "Medium-Term Expenditure Framework and The Public Investment Program (PIP), Government of Lao P.D.R.", April 2000

2.4 Telecommunications in Lao P.D.R.

(1) Telecommunications

Since 1986, when the New Economic Mechanism was adapted, the government of Lao P.D.R. has been promoting social and economic development under the policy of a market-oriented economy. Such reforms and development have been executed by the government, as well as assisted by international organizations for the various sectors. In line with this policy, the telecommunication sector in Lao P.D.R. was privatized at the year 1996 as a joint venture with a Thai investor (Shinawatra International Public Company Limited). However, this telecommunications privatization policy has been revised due to the importance of a national telecommunications development strategy able to resolve keen issues such as digital divide among regions and the frequent telephonic traffic congestion caused by a deficiency in the nation-wide telecommunication facilities (e.g.: switching and telephone line capacity, and human resources).

Also, Lao P.D.R. has a responsible position for promoting telecommunications development programs planned for the Greater Mekong Sub-region (GMS). This development concept of GMS proposed by ADB is to apply an area or regional development approach to GMS, promoting networks among the six Mekong riparian countries and including support activities for a common standard of telecommunication services.



Source: Greater Mekong Subregion, ADB.2002

Fig. 2.2 Proposed GMS Telecommunications Backbone Projects

The telephone density reported by MCTPC was0.41 services per 100 persons in 1996 and it doubled to 0.91 in 2001 within five years. Also, the number of fixed telephone subscribers increased from 19,468 in 1996 to 48,557 in 2001. In Vientiane municipality in 1999, telephone density was five times higher at 3.4 (approx. 28,000 lines) than the 0.65 average for the country and there was a waiting list of 8,897 potential subscribers the same year.

Vientiane municipality accounted for around 60 percent of the total fixed line capacity of Telecommunications services in Lao P.D.R. and 65 percent of the total subscribers in the country in 2000. The second highest total number of subscribers is in the province of Savannakhet with only 2,653 (8.3%) followed by Luangphrabang province with 1,573 (5.0%). Presently, telephone services are limited even within a part of the provincial capital areas.

The mobile subscriber base grew from 3,790 in 1996 to 29,545 at the end of 2001. In 2000, the numbers of subscribers have been added more than twice of mobile subscribers in 2000, totaling 15,772 units. The GSM network is available in Vientiane and ten provincial capitals. Nearly 80 percent of mobile subscribers are in the Vientiane area. Prepaid mobile telephone service was only launched in 2000. New companies planning to enter the mobile market will launch with prepaid services. If mobile telephone coverage can be extended this could be a big boost to telecom access. In 2001, mobile subscribers accounted for nearly 40 percent of the total telephone subscribers in Laos and mobile density represented 0.55 comparing with the fixed teledensity of 0.91.

The digital switching systems were first introduced in 1994 and all the nodes are digitalized and are interconnected by a microwave digital backbone network. The current number of subscribers is shown in Table 2.7. This chart shows the significant changes that occurred in the Lao P.D.R. together with the rapid changes in subscriber numbers and equipment.

Table 2.7 Current number of Telephone Subscribers

	1995	1996	1997	1998	-	2001
Switching Capacity						
Digital	18,416	25,196	33,361	34,428		59,863
Analog	1,402	600	350	300		0
Manual	592	490	332			-
Number of Subscribers						
Digital	15,186	18,762	24,108	27,412		45,863
Analog	1,168	529	277	189		0
Manual	248	177	168	132		-
Telex Service						
Capacity	452	452	452	452		452
No. of Subscribers	60	60	57	58		42

Source: ETL

Mobile telephone and the Internet service have become popular among the people of Lao P.D.R., especially in Vientiane and Luangphrabang. The service was lunched by LTC in 1996 utilizing GSM technology that is common in the Southeast Asian countries. The number of subscribers is increasing as stated in the Table 2.8. In 2001, LTC expanded its mobile service in Savannakehet, Pakse, Oudomxay, Xienkhuang, Saravane, Balikhamxay, Thakhek, Bokeo, Luangpabang and Ventiane provinces. It exceeded 20,000 in the year 2000 and was still increasing in the year 2001.

Internet users appeared in the official statistics beginning in 2000. Internet cafes were first seen in the year 1997 and have increased in number since. Current statistics show 2,610 Internet connections; however, this figure does not include the

people who visit Internet cafés, hence more than 5,000 potential users exist and the number is growing.

Table 2.8 Number of Mobile subscribers and Internet Users

	1996	1997	1998	1999	2000	2001
Number of Mobile subscribers	3,790	4,915	6,453	9,048	20,000	29,545
Number of Internet Users	-	-	-	-	2,610	n.a.

MCTPC presented a development plan for the year 2001-2005 at the MCTPC general meeting held in October 2001 and the teledensity objective will be approximately 2.2 in 2005.

A major development of the local city area network is now being undertaken by a German Aid project. A local city area network known as the Rutel radio system is being constructed for expansion of the telephone services in local city areas to provide service for a maximum of 320 subscribers connected through over 28 TDMA channels to a base station. The subscriber terminals are connected to the base station by a line of sight radio link.

Table 2.9 Telecommunications Service in Lao P.D.R. (1996-2001)

	1996	1997	1998	1999	2000	2001
Number of Fixed Telephone Subscribers	19,468	24,553	28,472	34,493	47,887	48,557
Fixed Line Teledensity	0.41 (Sub/100pop)	0.48	0.55	0.65 (Vientiane:3.4)	**0.79**	**0.91**
Number of Mobile Telephone Subscribers	3,790	4,915	6,453	9,048	13,773	29,545
Mobile density (Sub/100pop)	---	---	---	---	**0.27**	**0.52**
Telex	60	60	58	---	46	46
Internet Subscribers	---	---	---	---	2,610	n.a.
GDP per Capita (US$)	---	---	US$320	---	$350	
Population (Thousand)	---	---	---	5,091.1	5,218.3	5,325.0 (projected)

Source: LTC, MCTPC and SPC/NSC (GDP per Capita)

(2) Telephone Density

The relation between Telephone Density and GDP per Capita in selected Asian countries is shown in the Table below. A direct relationship between higher Telephone Density and higher per capita GNP can be identified in all countries except Vietnam.

In the past, fixed-line teledensity (lines per 100 inhabitants) would have been a reliable measure of a country's progress. But, by 2000, the mobile network had grown to rival, and in some cases surpass, the fixed-line network in many Asian countries. Thus, the methodology used to construct Table 2.10 uses ranking for 'total teledensity', that is the sum of fixed-lines and mobile subscribers per 100 inhabitants, as the measure of comparative performance. The ranking of Vietnam, Indonesia, Lao and Cambodia by fixed teledensity is different than the ranking classified by Total Teledensity. This discrepancy is caused by mobile telephone penetration, which does not always correspond with the level of per capita GDP. Cambodia, as a good example, is able to expand teledensity despite falling GDP per capita.

Table 2.10 Telecommunications Services in Selected Asia Countries (Fixed +Mobile)

Country	Malaysia	Thailand	Philippines	Vietnam	Indonesia	Lao	Cambodia
Fixed Teledensity (1998)	20.16	8.35	3.70	2.58	2.70	0.55	0.19
Fixed Teledensity (1999)	20.30	8.57	3.88	2.68	2.91	0.65	0.25
Fixed Teledensity (2001)	19.91	9.39	4.02	3.76	3.70	0.93	0.25
Rank of Fixed Teledensity (2001)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Total Teledensity in 1990 (Fix+Mob)	9.4	2.5	1.0	0.1	0.6	0.2	0.0
Total Teledensity in 2000	41.2	14.3	12.4	4.2	4.9	1.0	1.2
Total Teledensity in 2001	49.9	21.3	17.7	5.3	6.2	1.5	1.9
Rank of Total Teledensity (2001	*1*	*2*	*3*	*5*	*4*	*7*	*6*
GDP per Capita **(1998)**	US$3,333	1,862	898	335	605	249	196
GDP per Capita **(2000)**	US$3,838	2,012	983	393	723	315	175

Note: Total teledensity is the summation of Fixed-line and Mobile subscribers per 100 inhabitants.
Source: 1998 Teledensity is obtained from Japan ITU Association Data Book,1999,
: 1999 Teledensity and 1998 GDP per Capita are obtained from World Telecommunication Indicators, ITU March 2001.
: 2001 Teledensity (Fixed and Total) are obtained from World Telecommunications Development Report, ITU March 2002

(3) Telephone Service Disparity

The disparity in teledensity between the urban and rural areas within the countries neighboring Lao P.D.R is very high, except for Malaysia, by a factor of more than seven. The figures are shown Table 2.11 below. Except for Indonesia and Cambodia, the growth rate of mobile telephone service is much higher than that of fixed service. In Cambodia, the mobile telephone annual growth rate (76.3% p.a. during 1995-99)has been quite high during the last 5 years compared to other Asian countries, and mobile teledensity (0.81) is much higher than fixed telephone density (0.25). Generally speaking, mobile telephone users increase at a much higher pace in developing countries, where the fixed telephone line network and capacity have not been well developed.

Table 2.11 Regional Disparity of Telephone Line Density in Selected Countries (1998 & 2000)

Country	Year	Primacy City (A)	Other areas (B)	National Average	(A)/(B)
Thailand	1998	36.1	4.7	8.4	7.7
	2000	38.4	5.4	9.2	7.1
Malaysia	1998	30.0	18.9	19.5	1.6
	2000	28.2	19.8	20.3	1.4
Indonesia	1998	22.5	1.8	2.7	12.5
	2000	24.7	2.1	3.1	11.8
Philippines	1998	9.2	0.9	2.1	10.2
	2000	14.2	2.4	4.0	5.9

Source: ITU, World Telecommunication Development Report, 1999 and ITU, World Telecommunication Development Report, 2002

Table 2.12 Telecommunications Density by Type of Services in Selected Countries

Selected Asian Countries	Density				Per 100 households (1998: (upper)1999 figure, lower 2001figure)
	Per 100 population				
	Telecommunications		Internet		
	Telephone Lines	Mobile telephones	Users	Hosts	PCs
Indonesia (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**3.7 (15.8%)**	**2.5 (71.2%)**	**1.86**	**0.021**	**1.07**
Thailand (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**9.4 (9.4%)**	**11.9 (34.1%)**	**5.56**	**0.113**	**2.67**
Malaysia (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**19.9 (6.0%)**	**30.0 (38.6%)**	**23.95**	**0.311**	**12.61**
Philippines (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**4.0 (14.0%)**	**13.7 (66.6%)**	**2.59**	**0.040**	**2.20**
Singapore (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**47.2 (5.3%)**	**69.2 (45.0%)**	**36.30**	**4.792**	**50.83**
Cambodia (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**0.25 (25.6%)**	**1.70 (58.5%)**	**0.07**	**0.005**	**0.15**
Lao P.D.R. (1999)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2001)	**0.93 (21.2%)**	**0.52 (63.6%)**	**0.17**	**0.003**	**0.28**
Average in Low Income Countries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2.9 (13.0%)	**0.95 (92.3%)**	**0.62**	**0.010**	**0.59**

Note: Numbers in Upper Parenthesis indicate Compound Annual Growth Rate (%) of main telephone lines and mobile subscribers between 1995 and 1999.
Numbers in Lower Parenthesis indicate Compound Annual Growth Rate (%) of main telephone lines and mobile subscribers between 1995 and 2001.
Number of Samples for calculation of average in Low Income Countries is different in each sample year.

Source: ITU, World Telecommunication Indicators, March 2001 and ITU, World Telecommunication Development Report, March 2000

CHAPTER 3

ICT DEVELOPMENT

CHAPTER 3 ICT DEVELOPMENT

3.1 ICT development in Lao P.D.R.

3.1.1 Introduction

The revolution in information and communications technology (ICT) with the convergence of communications and computer technologies is transforming the way we live, the way we do business, the way we share information, the way governments are run and the way social services are delivered. ICT can reduce knowledge gaps both within countries and between developed countries and developing countries. Most developing countries have been struggling to adopt and make maximum use of ICT for further social and economic development. Lao P.D.R. is not an exception. In accordance with the 'Socio-Economic Development Strategy For 2020, 2010 and the Five year Socio-Economic Plan (2001-2005) dated February 13, 2001, the Government of Lao P.D.R. has been making a great effort to transform her economy from a barter economy to a market economy. This new economy should have the following priorities, human resource development, rural development to alleviate poverty, commodity production and infrastructure development including telecommunications infrastructure. ICT will be expected to serve the Government of Lao P.D.R. as a tool for human resource development through e-Education, for rural development to eliminate poverty, to improve public healthcare through Telemedicine, for vitalizing her industry and economic activities through e-Commerce, and for decentralization of governmental power to ensure cost-effective and transparent public service through e-Government.

The Government of Lao P.D.R. has been trying to develop ICT since 1996 when STEA was given approval by the Prime Minister's Office, to implement the overall policy for monitoring and controlling Information and Technology in Lao P.D.R.[1] STEA tried to formulate a national ICT master plan for the purpose of transforming society into an "Information Society" and fostering an ICT industry by clarifying goals, determining direction and policies to adopt and to directly develop ICT in Lao P.D.R.. Up to present, no national ICT master plan has been formulated for the following reasons,

- Insufficiency of infrastructure
- Insufficiency of resources (Budgetary and Human Resources)
- Low level of ICT literacy
- Insufficiency of awareness at the policy level

[1] Outline of draft of IT Master Plan by STEA is attached to the supporting document.

- No coordination on ICT issues among governmental agencies
- Low public motivation (minimal or unclear benefits)

As STEA stated, it is obvious that the insufficiency of the telecommunications infrastructure is one of the constraints prohibiting the adoption of ICT in Lao P.D.R. However, the biggest problem seems to have been the fact that there was not any common vision or strategy for ICT development which would prioritize telecommunications infrastructure development with a multimedia platform concept and promote application development as was done in the US through the National Information Infrastructure (NII). The formulation of these strategies must involve consultation between the Government of Lao P.D.R. and the private sectors. Without such a national vision or strategy it is very vague and difficult for MCTPC to develop a telecommunications infrastructure on which ICT will be fostered. It is obvious that such an infrastructure should be the highest priority for MCTPC. For that purpose, MCTPC should achieve a comprehensive understanding of the ICT development process including technology evolution, transformation of society etc.

3.1.2 Outline of the present status of Information Technology (Computerization) in Lao P.D.R.

- Computer

In 2001, there were about 20,000 computers in Lao P.D.R. and this number was increasing by about 500 units per month.[2] By end of 2002, it is projected that there will be nearly 30,000 computers in Lao P.D.R. The number of computers is expected to reach 50,000 in 2005. Those computers, most of which are located in Vientiane, are purchased mainly by the government, international organizations such as the UN, and other donor agencies.[3] However, there are a few local businesses and individuals that own computers. There is a tendency for an increase in the number of computers purchased by provincial centers for word processing and the completion of statistical data to be reported to the head offices of each of the ministries. The price of a computer is stable at around US$700 per unit which is not affordable for most Laotians.[4] It is obvious that the government will make efforts to utilize e-Government applications in future.

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[2] Source and prediction by STEA.

[3] List of Hardware and software being used at the Government of Lao P.D.R. is attached to the supporting documents.

[4] Prices of computers seem to have reached the bottom. Performance in term of CPU's speed and capacity of the Hard Disk will improved at significantly but the price of a computer will be stable around at US$700 which is not affordable for most of the Laotians.

- Computer Networks of the Government of Lao P.D.R.

  The Government of Lao P.D.R. collected information and data stored on floppy disks from the provinces. The Ministry of Health, the Ministry of Education, the Ministry of Commerce and the Spastics Center have plans to extend networks to the provincial centers to collect and exchange information and data. Most ministries have LAN; however, these networks utilize different software and databases that lack compatibility, not only between ministries but also inside of the individual ministries .

- IT Education (Human resource development)

  Formal IT education at the tertiary level is only available at the National University of Laos (NUOL). In the university, providing IT education is inefficient and ineffective because of a lack in flexibility to adopt new technology trends in the IT sector. There are about 20 private educational institutes[5] that provide IT training, these are located mainly in Vientiane where the demand for IT related training is high.

  The Ministry of Education has an IT Master Plan it intends to implement, mainly to establish management of information systems (MIS) inside the Ministry. The Ministry of Education will try to promote Internet Access for the schools.

3.1.3 Networked Readiness in Lao P.D.R.

The team applied the principles outlined in "Readiness for the Networked World: A Guide for Developing Countries"[6] to assess the current status of ICT development in Lao P.D.R. because of its systematic, flexible and comprehensive approach that lends itself to application in a rapidly evolving ICT sector. "Readiness for the Networked World: A Guide for Developing Countries" has 19 indicators.[7] In each indicator, there are 4 degrees of development from STAGE 1 to STAGE 4.[8]

The Study Team collected data and information necessary to determine the stage of the current nationwide development of ICT in each indicator and made radar charts to show the results of that study. Fig. 3.1 presents that information. If ICT

[5] There are about 20 private institutes that provide IT training. Outlines of IT training in private institutes are shown in the supporting documents.

[6] "Readiness for the Networked World: A Guide for Developing Countries" by the Center for International Development (CID) at Harvard University is attached to the supporting document.

[7] Those 19 indicators are Telecommunications Infrastructure, Internet Availability, Internet Affordability, Speed and Quality, Hardware and Software, School Access, Enchanting Education through ICT, Developing an ICT Workforce, People and Organizations on Line, Local Content, ICT in Life, ICT in the Workplace, ICT Employment Opportunities, B to C, B to B, e-Government, Telecommunications Policy and Trade Policy.

[8] Roughly STAGE 1 = "least developed", STAGE 2 = "partially developed", STAGE 3 = "developed" and STAGE 4 = "well developed."

development in Vientiane is excluded, most of the indicators are at STAGE 1 as shown in Fig.3.2 'Network Readiness in Lao P.D.R. (excluding Vientiane Municipality)'.

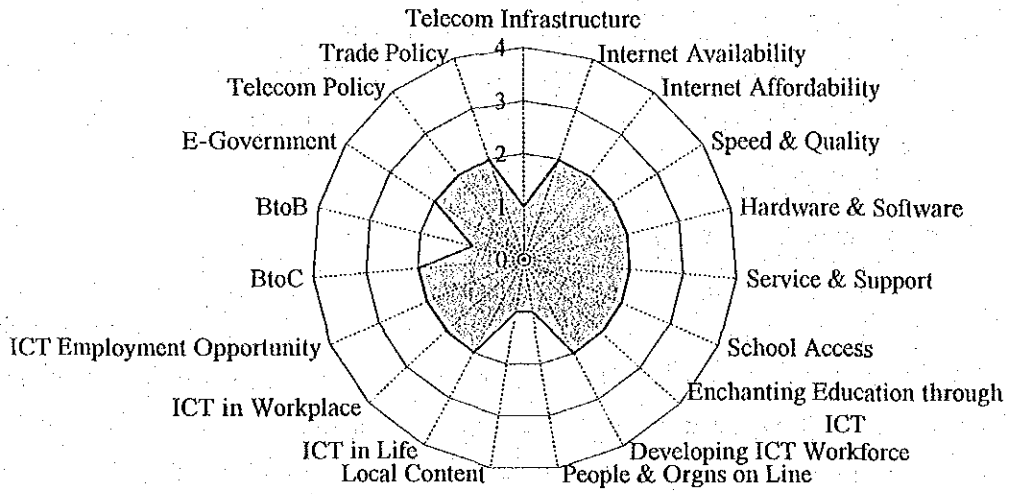


Fig.3.1 Network Readiness in Lao P.D.R. (including Vientiane Municipality)

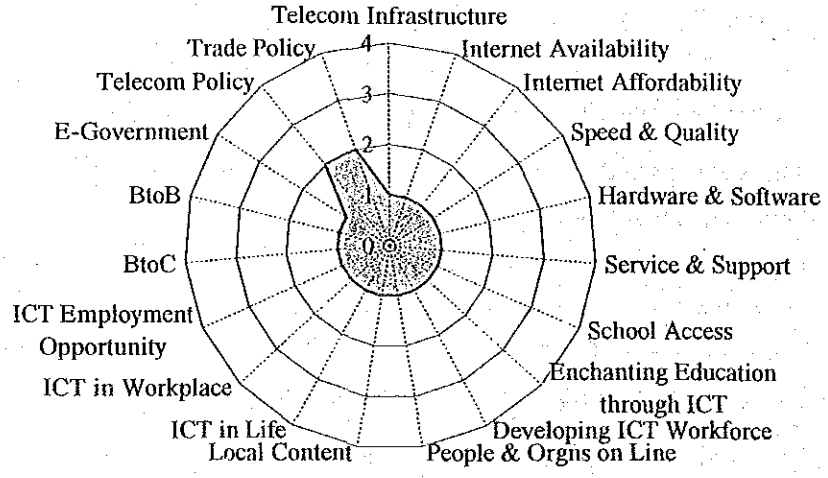


Fig.3.2 Network Readiness in Lao P.D.R.(excluding Vientiane Municipality)

Fig. 3.3 'Network Readiness in Vientiane Municipality, shows the present situation of ICT development in Vientiane Municipality.[9] ICT, especially the Internet, eliminates barriers and is gradually permeating into society even though it does not have enough telecommunications infrastructure with a teledensity of 0.92

telephones per 100 inhabitants,[10].

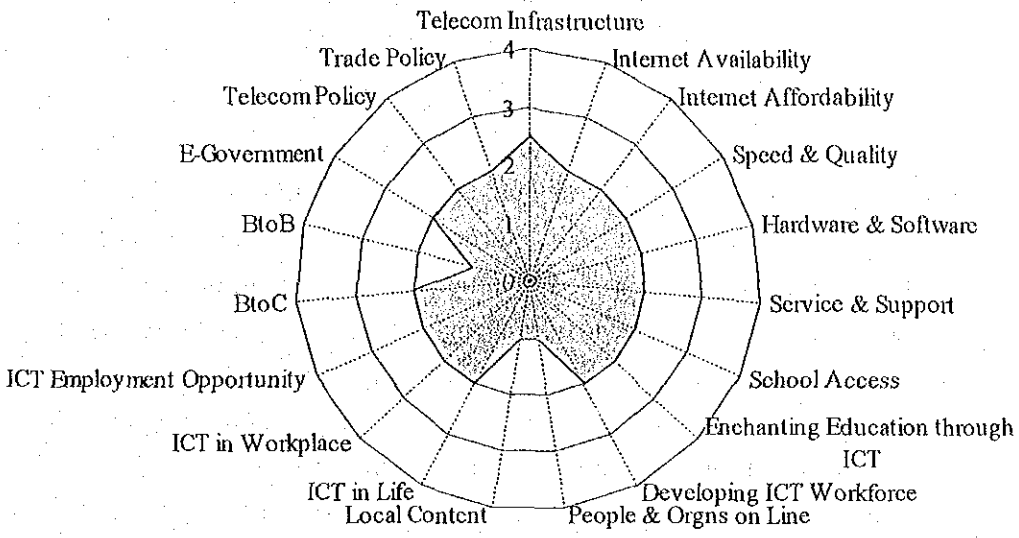


Fig.3.3 Network Readiness in Vientiane Municipality

The Internet has become popular in Vientiane since the Internet Café was established by InterCom in 1998 for the public, mainly for tourists and foreigners. Now, the young enjoy e-mail, chatting and browsing web sites at the Internet Café in Vientiane. There are three ISPs; LaoTel, GlobeNet and Planet Online, that provide dial up Internet Access, mainly in Vientiane. Fig. 3.3, Network Readiness in Vientiane Municipality shows that the status of ICT development in Vientiane municipality is at STAGE 2 on average. In 2002, the teledensity of fixed phones is forecast to be 3.34 lines per 100 inhabitants and the penetration rate of mobile phones is forecast to be 4.6 % of the population which will place Vientiane in the middle of STAGE 2. The area represents approximately 70% of the teledensity of the entire nation and that the indicator of Telecommunications Infrastructure lies between STAGE 2 and STAGE 3, which suggests that there is some potential to develop ICT with the existing telecommunications infrastructure. Also, most of the economic activities, large size business and educational institutions are located in the area. It is obvious that the fundamental factors and environment to develop ICT in Vientiane Municipality already exist. To develop ICT is like "setting fire" to fuel It is necessary for the government of Lao P.D.R. to ignite the fuel with the heat of an "ICT Policy" and a "Strategic ICT Development Master Plan" at the best time to burn at an appropriate speed. Vientiane Municipality is the appropriate ignition point for ICT development. Vientiane Municipality is considered to be the most

[9] Analysis of ICT development in Vientiane Municipality is attached to the supporting document.
[10] Based on the 2002 ITU World Telecommunication Development Report

suitable of all the cities in Lao P.D.R. to introduce ICT and incubate and ignite ICT industries with a capacity to produce local niche contents such as web design for local SMEs, CAD design, and software programming.

Nationwide, on average, the status of telecommunications infrastructure is at STAGE 1. Insufficiency of telecommunications infrastructure is a bottleneck not only for further social and economic development but also for ICT development. There is little local content available and that is also a bottleneck because for ICT development an abundant and continuous flow of information and data is mandatory, preferably in the local language. With a tendency for price reductions in PCs and software, PCs will become affordable for the public. However, it takes some time to develop a telecommunications infrastructure, the human resources and local content to motivate the society to be receptive to ICT and ICT skills. Telecommunications infrastructure and human resources, including efforts to improve the ICT literacy of the Laotians, should be developed simultaneously. The Study Team found that there are three major constraints for ICT development in Lao P.D.R. Those major constraints are:

- Lack of a common sharing of vision and strategy to develop ICT within the Government of Lao P.D.R.
- Insufficiency of the Telecommunications Infrastructure
- The society is not ready to accept ICT because of;
  Lack of human resources, low ICT literacy, lack of local content, un-affordability and un-availability of hardware & software due to low income, and unclear benefits from ICT development.

To develop ICT is to transform the society itself into a "Networked Society" in which ICT is accepted, ICT is being used everywhere, all the time, at an affordable cost, ICT engineers are being educated and ICT related jobs are being created. The transformation of society to accept ICT can not be achieved solely through the efforts of MCTPC without the cooperation of other ministries and governmental agencies, the private sector and the citizens. MCTPC needs to advocate the importance and potential of ICT and promote a telecommunications development master plan to other ministries and governmental agencies so that they may understand the potential and direction of ICT development and its relationship to the development of the telecommunications infrastructure.

3.1.4 ICT Development Scenario in Lao P.D.R.[11]

By applying the guidelines outlined in "Readiness for the Networked World: A Guide for Developing Countries", the relationship of the ICT Development scenario in Lao P.D.R. in 2005, 2010 and 2015 with the development of telecommunications infrastructure can be determined. If the indicator of telecommunications infrastructure (the teledensity of fixed phone and the penetration rate of mobile phones) can be raised to the next higher stage, all of the other indicators tend to ratchet up to the same stage as each indicator links with and drives others.

The development steps for ICT applications to e-Government, e-Education, telemedicine and e-Commerce in 2005, 2010, and 2015 are shown. There are many kinds of e-Government applications and it is preferable that those applications be integrated into "One-Stop Public Services" in the future. No specific e-Government application is studied in this master plan.

Introduction of e-Education in an effective manner[12] will solve the problems of insufficient numbers of teachers, quality of teachers, insufficiency of education materials and more. The development steps for e-Education have been selected for study because human resources development is one of the biggest issues in Lao P.D.R

Also, the development stages for e-Commerce have been selected for study because ASEAN will promote e-Commerce in the region within the framework of e-ASEAN and utilization of ICT will help to grow SMEs and business opportunity in Lao P.D.R. The more SMEs use ICT, the more ICT will develop.

(1) ICT Development in 2005

1) Outlook for ICT Development in 2005

Fig. 3.4 shows the potential for ICT development in Lao P.D.R. in 2005. The teledensity of fixed phones is forecasted to be 2.84 telephones per 100 inhabitants and the penetration rate of mobile phone is forecasted 1.94% of the population, the of Telecommunications Infrastructure indicator will then be at STAGE 2. Most of the indicators are forecast to reach STAGE 2. However, the indicators of People and Organizations on Line, Local Content and B to B are expected to increase at a relatively slow speed and it will take some time to raise those indicators.

[11] ICT Development Scenario in Vientiane Municipality in 2005, 2010 and 2015 are studied in the supporting documents.
[12] Ministry of Education has an IT Master Plan.

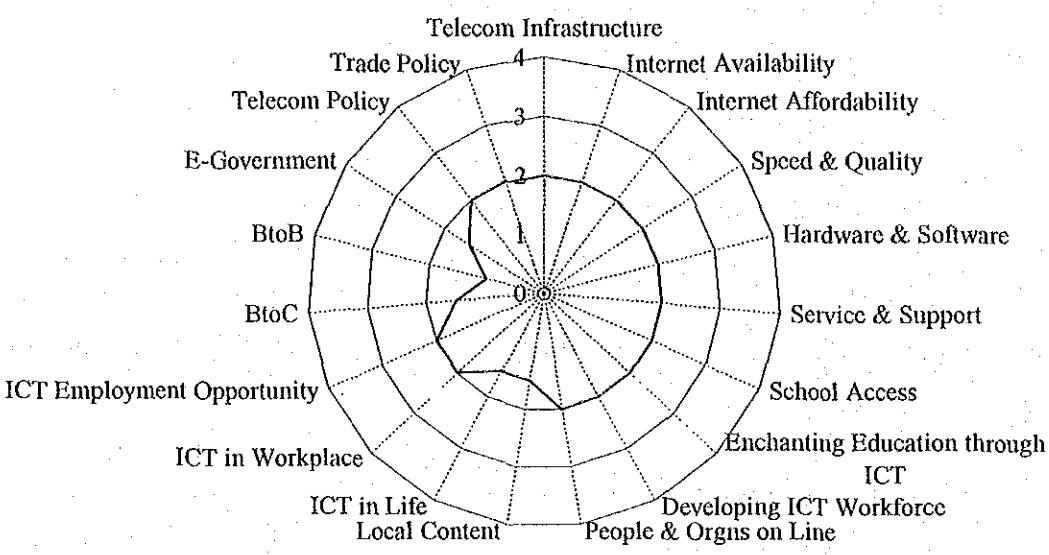


Fig.3.4 Potential for ICT Development in Lao P.D.R in 2005

2) ICT Applications in 2005

a) e-Government application

Since 1996 each ministry and governmental agency has started its own ICT project including e-Government. By 2005, some of those e-Government applications will finish the pilot phase.[13] MCTPC should cooperate with other ministries and governmental agencies to define the vision of a National Information Infrastructure (NII). In accordance with the NII, MCTPC should initiate pilot projects for e-Government applications to exchange information and data on the City Link Networks in Vientiane and between branch offices in Luangprabang, Khammuane, Savannakhet and Champasak. Development of e-Government applications in 2005 is expected to be at the pilot project implementation stage .

b) e-Education

There are few teachers and an insufficient quantity of educational materials, such as textbooks, in the Lao language and no electronic educational materials. As the education sector is not well developed enough to implement e-Education in 2005, MCTPC should cooperate with the Ministry of Education to put the highest priority on the rapid introduction of telephone service and Internet access to every vocational

[13] Please refer to proposed ICT projects in the IT Master Plan (Draft) by STEA in 1996 in the supporting documents.

and high school. MCTPC should try to introduce newly developed ICT from overseas to the Ministry of Education for adoption

Some e-Education pilot projects will be recommended including e-Education between NOUL Dondok Campus and NOUL Soak Pa Luang Campus or between NOUL and overseas educational institutes utilizing the City Link in Vientiane Municipality.

c) Telemedicine

Some district hospitals own and use PCs for recording medical history, accounting, and drug inventory control but there are too few telephone lines to provide adequate service. Their highest priority demand on the telecommunications sector is for basic telephone services not telemedicine. As the medical and health sector is not well-developed[14] enough to implement telemedicine in 2005, MCTPC should cooperate with the Ministry of Health to put the highest priority on the introduction of basic telephone services and try to replace HF/SSB transceivers currently used for emergency medical communications in rural areas.

Using the City Link, a network connecting the Ministry of Health, hospitals in Vientiane and local hospitals in Luangprabang, Khammuane, Savannakhet and Champasak will be established; but the main usage will be to collect statistical data in the health sector. Using the City Link, some pilot telemedicine projects will be implemented. Also, a medical and public healthcare website will be established that will contain general medical and public health information including an introduction of hospitals, general information on diseases, and more.

d) e-Commerce

A legal framework and promotion policy is necessary to promote e-Commerce, protect the privacy of information, authorization and promotion of SMEs to use ICT. Those will be established under the e-ASEAN framework by 2005. MCTPC should enhance the telecommunications infrastructure; especially increasing the capacity of the international gateway for both telephone and the Internet, the introduction of a high speed IP network in Vientiane Municipality and the establishment backbone capacity to Luangprabang, Khammuane, Savannakhet and Champasak are necessary.

[14] There is no doctor's association in Lao P.D.R. to study and develop Telemedicine.

3) Telecommunications Infrastructure in 2005

The outlook of the telecommunications infrastructure in urban and rural areas in 2005 is shown below;

- Urban (mainly Vientiane Municipality)
  Internet users: 35,640 (Necessary number of lines for dial up access: 1,600)
  International gateway (The Internet): 4 Mbps
  ADSL users: 750
  Backbone Capacity to Luangprabang, Khammuane, Savannakhet and Champasak: 12 Mbps to 48 Mbps
- Rural
  Increase access to ISP in Luangprabang, Khammuane, Savannakhet and Champasak. (Approximately 500 total dial up lines)

(2) ICT Development in 2010

1) Outlook for ICT Development in 2010

Fig. 3.5 shows the potential for ICT development in Lao P.D.R. in 2010. The teledensity of fixed phones is forecast to be 4.0 telephones per 100 inhabitants and the penetration rate of mobile phones is forecast at 3.97% of the population. The Telecommunications Infrastructure indicator will almost reach STAGE 3. Most of indicators are forecast to exceed STAGE 2. Hardware and Software indicators will reach STAGE 3 because it is expected that hardware such as PCs will be affordable and the level of income of the Laotians will go up. Due to enacting of a policy for the promotion of SMEs to use ICT and Cyber Law, the indicators of People and Organizations on Line, Local Content, B to C, and B to B will start increasing at a relatively high speed.

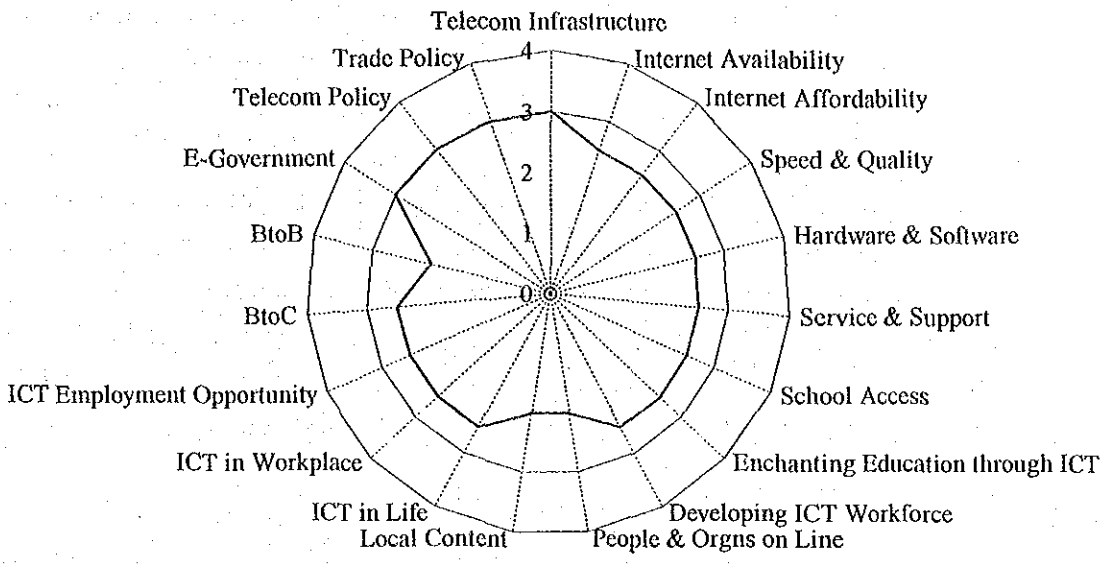


Fig.3.5 Potential for ICT Development in Lao P.D.R in 2010

2) ICT Applications in 2010

a) e-Government application

Some e-Government applications will be implemented nationwide. MCTPC will continue to provide technical advice and integrate future e-Government applications into the nationwide e-Government network to aim at "one stop public service" through the network. Increasing backbone capacity between Luangprabang, Khammuane, Savannakhet and Champasak is necessary.

b) e-Education

MCTPC should cooperate with the Ministry of Education to put the highest priority on the rapid introduction of telephone service and the Internet Access to every primary school. MCTPC should introduce newly developed ICT in education from overseas to the Ministry of Education for adoption including ICT in education. e-Education will be regularly used within Vientiane Municipality (some connected with foreign educational institutes) using the City Link and an international gateway.

c) Telemedicine

The demand for simple telemedicine applications such as teleconsultation and tele-pathology will appear in 2010 in Vientiane and other major local

cities such as Luangprabang, Khammuane, Savannakhet and Champasak. Host hospitals located in Vientiane will provide medical consultancy and training to those local hospitals through the high speed backbone.

d) e-Commerce

Many SMEs will own PCs and have Internet access in Vientiane Municipality. Many SMEs will have established their own web sites to promote their products and services and communicate with clients and customers by e-mail. e-Commerce will start expanding to local cities such as Luangprabang, Khammuane, Savannakhet and Champasak. B to C and B to B will start catching up in those local cities.

2) Telecommunications Infrastructure in 2010

The outlook for the telecommunications infrastructure in urban and rural areas in 2010 is shown below;

- Urban
  Internet users: 64,380(Dial up access lines: 2,650)
  International gateway (The Internet): 8 Mbps
  No. of ADSL users: 1,200
  Backbone Capacity to Luangprabang, Khammuane, Savannakhet and Champasak: 24Mbps to 56 Mbps
- Rural
  Increase access points to ISPs: Luangprabang, Khammuane, Savannakhet, Champasak, Oudomxay, Luangnamtha, Xayabury, Vientiane Province, Saravane. (approximately 1,100 dial up lines.)

(3) ICT Development in 2015

1) Outlook of ICT Development in 2015

Fig.3.6 shows the potential for ICT development in Lao P.D.R. in 2015.

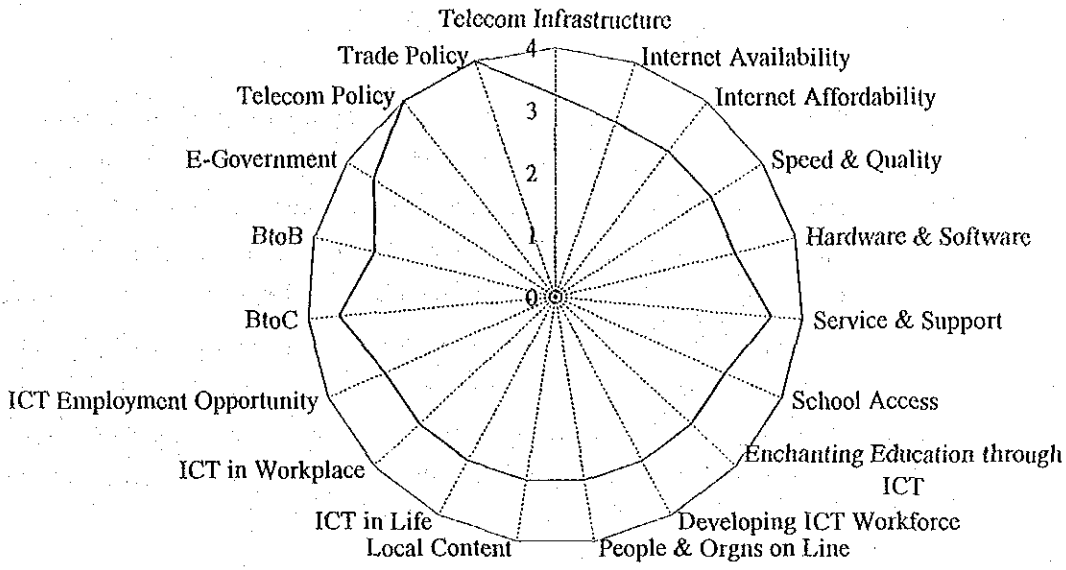


Fig.3.6 Potential for ICT Development in Lao P.D.R in 2015

In 2015, the teledensity of fixed phones is forecast to be 5.5 telephones per 100 inhabitants and the penetration rate of mobile phones is forecast at 5.5 % of the population. The Telecommunications Infrastructure indicator will be in the middle of STAGE 3. Most indicators are forecast to exceed STAGE 3 and lie between STAGE 3 to 4. However, the People and Organizations on Line, Local Content and B to B indicators will take some time to reach STAGE 4 because it depends on the size of domestic economic activities and the number of the Internet users. The Telecommunications Policy and Trade policy indicators are expected to reach STAGE 4 as well.

2) ICT Applications in 2015

a) e-Government application

One-stop e-Government services will be available. It will be necessary to increase the backbone capacity between Luangprabang, Khammuane, Savannakhet and Champasak and expand the network to secondary cities such as Luangprabang, Khammuane, Savannakhet, Champasak, Oudomxay, Luangnamtha, Xayabury, Vientiane Province, Saravane, Phonsaly, Bokeo, Houaphan, Xiengkhuang, Bilikhaxay, Sekong, Attapu, and Xaysomboun.

b) e-Education

e-Education will be regularly used at the vocational and high school level

in Veintiane, Luangprabang, Khammuane, Savannakhet and Champasak.

c) Telemedicine

The demand for advanced telemedicine applications will appear in 2015 in Vientiane. The demand for simple telemedicine applications such as tele-consultation and tele-pathology will appear in other secondary local cities such as Luangprabang, Khammuane, Savannakhet, Champasak, Oudomxay, Luangnamtha, Xayabury, Vientiane Province, Saravane, Phonsaly, Bokeo, Houaphan, Xiengkhuang, Bilikhaxay, Sekong, Attapu, and Xaysomboun. Host hospitals located in Vientiane, Luangprabang, Khammuane, Savannakhet and Champasak will provide medical consultancy to those local hospitals in secondary cities through the high speed backbone.

d) e-Commerce

Most SMEs own PCs and have Internet access in Vientiane Municipality, Luangprabang, Khammuane, Savannakhet and Champasak. Many SMEs will have established their own websites to promote their products and services and use e-mail for business. e-Commerce will start expanding to outlaying cities.

3) Telecommunications Infrastructure in 2015

The outlook for the telecommunications infrastructure in urban and rural areas in 2015 is shown below;

- Urban

  Internet users: 129,600(Dial up access lines: 4,350)
  International gateway (The Internet): 12 Mbps
  No. of ADSL users: 2,100
  Backbone Capacity to Luangprabang, Khammuane, Savannakhet and Champasak: 36Mbps to 80Mbps

- Rural

  Internet accessto ISPs: Luangprabang, Khammuane, Savannakhet, Champasak, Oudomxay, Luangnamtha, Xayabury, Vientiane Province, Saravane, Phonsaly, Bokeo, Houaphan, Xiengkhuang, Bilikhaxay, Sekong, Attapu, and Xaysomboun (approximately 2,150 dial up lines.)
  Introduction of ADSL: Luangprabang, Khammuane, Savannakhet, Champasak, Oudomxay, Luangnamtha, Xayabury, Vientiane Province, Saravane, Phonsaly, Bokeo, Houaphan, Xiengkhuang, Bilikhaxay, Sekong,

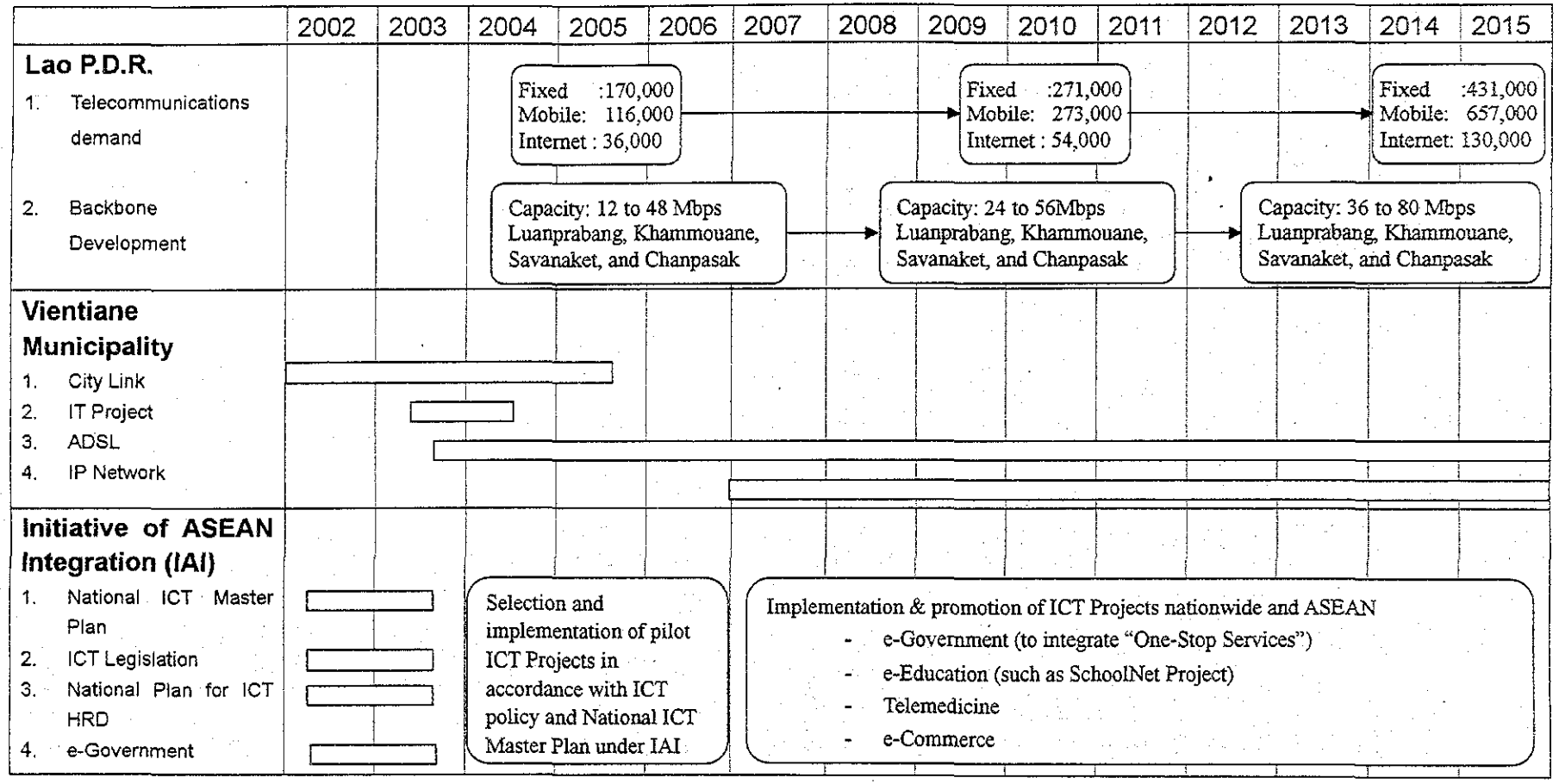
Attapu, and Xaysomboun

3.1.5 Milestones of ICT Development in the Telecommunications sector

Milestones of ICT Development in Lao P.D.R. from 2002 to 2015 are shown in Table 3.1. There will be significant progress in ICT development promoted through the various work Plans under the Initiative for ASEAN Integration (IAI) in the e-ASEAN framework of cooperation for Lao P.D.R. Specifically, the Work Plan to formulate Telecommunications framework, the National ICT Master Plans, the National Action Plan for ICT Human Resource Development (HRD), and the ICT Legislation, and e-Government from July 2002. If those specific programmes and projects to implement the Work Plan can be completed under the ASEAN IAI cooperation scheme, Lao P.D.R. will be ready to develop and adopt ICT and take part in developing and integrating a regional ICT framework in line with ICT development of the other ASEAN countries. Milestones will be considered below.

- Starting point (2004)
  Formulation of a National ICT Master Plan, ICT legislation, e-Government, and National ICT Human Resource Development under the Initiative for ASEAN Integration (IAI)
- Milestones
  IT Project in Vientiane (August, 2004)
  Completion of City Link (2005)
  Introduction of a broadband such as ADSL (2004-2005)
  Introduction of an IP Network (2007)

Table 3.1 Milestone of ICT Development in Lao P.D.R.



3.2 ICT Applications

3.2.1 Telemedicine

(1) Type of telemedicine applications

In general, there are three types of telemedicine, "Teleconsulatation", "e-Education for the medical field", and "Telecare". "Teleconsultation" is defined as applications and systems to improve the quality of medical treatment provided with the cooperation of remotely located medical personnel. "e-Education for medical fields" is designed to promote improvement of medical skills and knowledge through the presentation of medical papers over the Internet and implementation of international conferences via a videophone, teleconferencing, distance education systems and other network services. "Telecare" that provides patients with medical treatment by remote physician.

(2) Constraints to implementing telemedicine applications in Lao P.D.R.

Demand for telemedicine will increase to the extent that telecommunications development allows. However, at the moment, in the medical field in Lao P.D.R., the highest area of demand for telecommunications is for basic telephone service, this is especially true for clinics and hospitals in rural areas.[15] There is no doctors association in Lao P.D.R. nor any association or group that studies telemedicine in terms of technology, medical law, and human resource. Further, there is no medical college. Because of these factors it will take more time to introduce telemedicine applications. It is obvious that MCTPC's efforts for universal service will be a great contribution to improve the quality of service in the public health and medical sectors.

3.2.2 e-Education

(1) Outline of e-Education

e-Education will enable teaching by experienced teachers and lecturers on advanced ICT and other educational materials to be provided at training centers established in various parts of the country in real time or on demand.

(2) Constraints to the application of e-Education in Lao P.D.R.

Demand for and experimentation with e-Education, including distant leaning, will increase to the limits allowed by telecommunications development. The biggest

[15] Luangprabang District Hospital with 200 beds has only two telephone lines for their use and no public telephone. Installation of public telephones for patients is strongly requested to LTC Luangprabang Branch Office by the hospital.

constraint for the education sector is the lack of quality teachers with ICT literacy and insufficiency of education materials in Lao. It is obvious that MCTCP's efforts to give priority and incentive to the public educational institute to provide Internet access will improve the ICT literacy of students and teachers.

3.2.3 e-Government

(1) Outline of e-Government

According to OECD, "e-Government focuses on the use of new information and communications technology (ICT) by governments as applied to the full range of government functions. In particular, the networking potential offered by the Internet and related technologies has the potential to transform the structures and operations of government promote efficiency and transparency and provide better and quicker public service to the citizens." [16] In general, e-Government Applications are classified into four categories; Intra-ministry applications (In-G), Inter-Government applications (Inter-G), Business to Government applications (B to G), and Citizen to Government applications (C to G).

(2) Constraints to implementing e-Government in Lao P.D.R.

The Government of Lao P.D.R. has been trying to initiate ICT projects[17] since 1996. Most of the ministries have local area networks (LAN) and are trying to develop e-Government applications and B to G applications such as the website of the Ministry of Commerce for promotion of Lao trade products. Wireless Internet access of 11Mbps is provided by STEA. In order to provide and operate those services and applications, mainly the Internet, through ICT, the government should establish an electrical database, design the network configurations and train engineers and technicians for operation and maintenance of contents and applications. Those preparations need to be made under the responsibility of each ministry and governmental agency. MCTPC needs to facilitate the interfacing of other ministries, businesses, and citizens through available and applicable telecommunications infrastructure including leased lines, Internet access, high-speed IP networks and more. A consensus among all ministries and governmental agencies will be mandatory in order to initiate and develop e-Government applications, ICT policy, a National ICT Master Plan, and ICT legislation.Selection of each e-Government application will be made and implemented in accordance with ICT policy and a Master ICT Plan. Current

[16] Public Management Services (PUMA) Project on Impact of e-Government by OECD in January 2002.
[17] Please refer to the Proposed ICT Projects in 1996 attached to the supporting documents.

Internet provided by STEA is 11Mbps wireless, which is not enough capacity for the future. Therefore, in line with telecommunications infrastructure development, it is recommended that each ministry and governmental agencie use leased lines and IP networks.

3.2.4 e-Commerce

(1) Outline of e-Commerce

"e-Commerce" refers to "the conducting of commercial transactions (the exchange of merchandise, services, information, and/or money between suppliers and receivers for the commercial transfer of goods between economic entities) through electronic media using ICT, mainly, Internet technology.[18] In this sense, there exists very little e-Commerce activity in Lao P.D.R. However, under the e-ASEAN cooperation framework, regional-based e-Commerce is strongly promoted. In line with telecommunications infrastructure development, formulation of ICT legislation and ICT policy that promote e-Commerce, economic development will establish an environment in which e-Commerce will be more accepted in Lao P.D.R.

(2) Constraints to promoting e-Commerce in Lao P.D.R.

There are four constraints to promoting e-Commerce in Lao P.D.R., they are as follows:

- Insufficiet awareness of e-Commerce in term of business culture and technologies
- Lack of people and business organizations on line
- Unclear benefits of using e-Commerce
- No ICT policy to promote e-Commerce and no ICT legislation framework to secure credibility of e-Commerce

3.3 *Recommendations*

It is recommended that MCTPC take the following steps to develop ICT in cooperation with other ministries and governmental agencies.

3.3.1 Recommended Procedure for MCTPC to develop ICT

1) Set up a taskforce to specialize in ICT in MCTPC

2) Draw up a National Information Infrastructure (NII) including vision and

[18] "Size of Market Study for Electronic Commerce" by the Ministry of International Trade and Industry in March 1999.

concept and formulate an ICT Master Plan, ICT legislation and an ICT Human Resource Development Plan in cooperation with other ministries.

3) Organize an Application Committee to consist of MCTPC, other ministries including the academic and private sectors to review contents, applications and multimedia platforms.

4) MCTPC will make a presentation of this Master Plan to show what kind of application will be implemented in the Application Committee. MCTPC will arrange seminars for ICT related hardware manufactures and software developers to demonstrate the latest ICT products.

5) Gather proposals for ICT applications, not only from other ministries, but also from private sectors for the Application Committee to pre-qualify

6) MCTPC will consider requests or proposals from the demand side and MCTPC will consider accommodating and improving telecommunications infrastructure and network services.

7) MCTPC will coordinate implementation of those proposed ICT applications through the Application Committee.

8) Continue monitoring ICT development

3.3.2 Recommendations

1) To continue increasing the number of telephone lines and Internet access by giving schools and hospitals incentive to install telephones and Internet access.

2) To give incentive to ISPs to increase and set up access points in Luangprabang, Khammuane, Savannakhet and Champasak

3) To promote ICT by establishing pilot projects in cooperation with ETL and other ministries and governmental agencies to improve ICT literacy for the public (to create new demand for telecommunications services)

CHAPTER 4

TELECOMMUNICATIONS DEMAND FORECAST

CHAPTER 4 TELECOMMUNICATIONS DEMAND FORECAST

4.1 Movement of Telecommunications Services in Lao P.D.R.

The fixed telephone density reported by MCTPC was 0.41 telephones per 100 inhabitants in 1996 and it more than doubled within five years to 0.93 telephones per 100 inhabitants in 2001. The number of fixed telephone subscribers increased from 19,468 in 1996 to 48,557 in 2001. In 1999 in Vientiane municipality, telephone density was 3.4 telephones per 100 inhabitants (approx. 28,000 lines), five times higher than the country average of 0.65 telephones per 100 inhabitants. There was a waiting list of 8,897 the same year.

The mobile subscribers grew from 3,790 in 1996 to 29,545 at the end of 2001. In 2001, mobile subscribers accounted for nearly 40 percent of the total telephone subscribers in this country and mobile teledensity was 0.55 compared to fixed teledensity of 0.91.

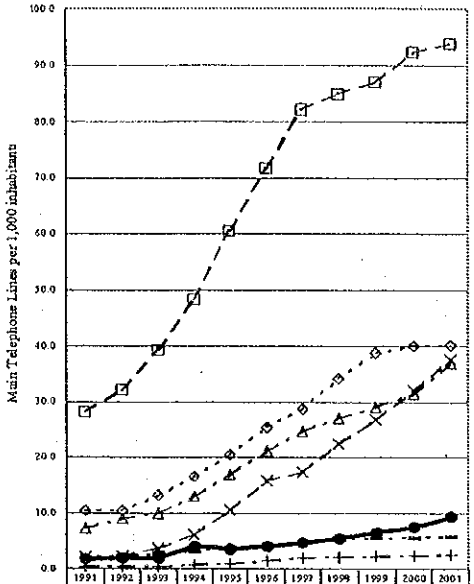
Vientiane municipality represents around 60 percent of the total fixed line capacity of Telecommunications services in Lao P.D.R. and 65 percent of the total subscribers in the country in 2000. The second highest total number of subscribers is in the province of Savannakhet with 2,653 (8.3%) followed by Luangphrabang province with 1,573 (5.0%).

Internet access is not popular among the inhabitants in Lao P.D.R., Cambodia, Myanmar or Vietnam. This would be improved when personal computers become common in these countries.

Table 4.1 Telecommunications Service in Lao P.D.R. (1996-2001)

	1996	1997	1998	1999	2000	2001
Number of Fixed Telephone Subscribers	19,468	24,553	28,472	34,493	40,853	48,557
Fixed Teledensity	0.41 (Sub/100pop)	0.48	0.55	0.65 (Vientiane:3.4)	**0.79**	**0.93**
Number of Mobile Telephone Subscribers	3,790	4,915	6,453	9,048	13,773	29,545
Mobile Density (Sub/100pop)	0.08	0.10	0.12	0.17	**0.27**	**0.55**
Number of Total Telephone Subscribers	23,258	29,468	34,925	43,541	54,626	78,102
Total Teledensity (Fixed+Mobile)	0.49	0.57	**0.67**	**0.82**	**1.06**	**1.46**
GDP per Capita (US$)	---	---	US$320	---	$350	

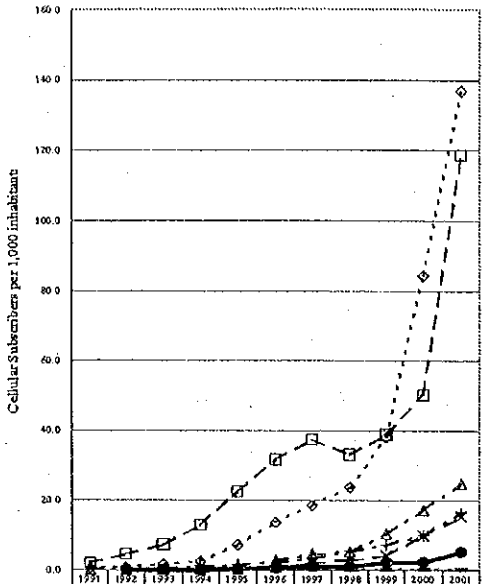
Note: Total Teledensity indicates the sum of fixed lines and mobile subscribers, per 100 inhabitants.
Source: LTC, MCTPC and SPC/NSC (GDP per Capita)



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cambodia	0.4	0.4	0.4	0.7	0.8	1.5	1.9	2.1	2.3	2.4	2.5
Indonesia	7.2	9.0	10.0	13.0	16.9	21.1	24.7	27.0	29.1	31.4	37.0
Lao	1.7	1.9	1.9	4.0	3.6	4.1	4.9	5.5	6.6	7.5	9.3
Myanmar	2.1	2.3	2.7	3.1	3.6	4.0	4.8	5.2	5.5	5.6	5.8
Philippines	10.4	10.4	13.2	16.6	20.5	25.5	28.7	34.2	38.8	40.6	40.2
Thailand	28.7	32.1	39.3	48.3	60.6	71.6	82.2	84.9	87.0	92.3	93.9
Viet Nam	2.0	2.2	3.7	6.1	10.5	15.8	17.4	22.5	26.8	31.9	37.6

Source: ITU, "Yearbook of Statistics, 1991~2000" &
"World Telecommunication Development Report 2002"

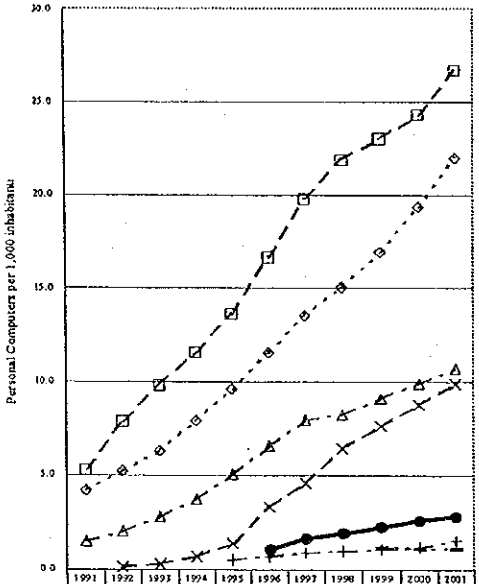
Fig. 4.1 Main Telephone Lines per 1,000 inhabitant in Asian Countries



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cambodia			0.5	1.0	1.4	2.2	3.2	5.4	7.3	100.	16.6
Indonesia	0.1	0.2	0.3	0.4	1.1	2.8	4.5	5.2	10.6	17.3	24.7
Lao		0.1	0.1	0.1	0.3	0.8	1.0	1.2	2.2	2.3	5.2
Myanmar					0.1	0.2	0.2	0.2	0.3	0.3	0.3
Philippines	0.6	0.9	1.6	2.6	7.2	13.7	18.6	23.8	38.3	84.4	133.0
Thailand	2.2	4.5	7.3	13.0	22.6	31.7	37.5	33.3	39.0	50.4	118.7
Viet Nam			0.1	0.2	0.3	0.9	2.1	2.9	4.2	9.7	15.4

Source: ITU, "Yearbook of Statistics, 1991~2000" &
"World Telecommunication Development Report 2002"

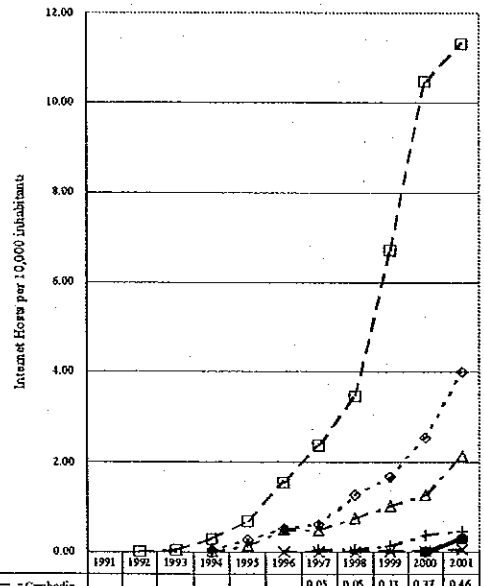
Fig. 4.2 Cellular Subscribers per 1,000 inhabitants in Asian Countries



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cambodia					0.5	0.7	0.9	1.0	1.1	1.1	1.5
Indonesia	1.4	2.0	2.8	3.7	5.0	6.5	7.9	8.2	9.1	9.9	16.7
Lao						1.1	1.7	1.9	2.3	2.6	2.8
Myanmar									1.1	1.1	1.1
Philippines	4.2	5.2	6.3	7.9	9.6	11.6	13.6	15.1	16.9	19.3	22.0
Thailand	5.3	7.9	9.8	11.6	13.6	16.7	19.9	21.9	23.0	24.3	26.7
Viet Nam		0.1	0.3	0.7	1.4	3.3	4.6	6.4	7.6	8.8	9.9

Source: ITU, "Yearbook of Statistics, 1991~2000" &
"World Telecommunication Development Report 2002"

Fig. 4.3 Personal Computers per 1,000 inhabitants in Asian Countries



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cambodia							0.05	0.05	0.13	0.37	0.46
Indonesia				0.01	0.12	0.48	0.48	0.75	1.01	1.26	2.13
Lao										0.01	0.29
Myanmar								0.00	0.00	0.00	
Philippines				0.05	0.26	0.52	0.60	1.26	1.66	2.56	4.00
Thailand		0.00	0.05	0.29	0.68	1.54	2.37	3.46	6.70	10.47	11.32
Viet Nam						0.00	0.00	0.00	0.02	0.02	0.06

Source: ITU, "Yearbook of Statistics, 1991~2000" &
"World Telecommunication Development Report 2002"

Fig. 4.4 Internet Hosts per 10,000 inhabitants in Asian Countries

4.2 Telecommunications Demand Studies in Lao P.D.R.

Demand forecast results done by the 1990 DETECON (The Long-Term Plan) and Lao Telecom 2000 Development Plan (1996 ITU Study) are shown in the Table below.

Table 4.2 Comparison of Fixed Telephone Demands projected by Previous Studies

Year	1993	1995	2000	2005	2010
Forecast by DETECON Report in 1990* (T.D.: Fixed Telephone Density)	21,300	26,200	44,800	89,000	182,000 (T.D. 2.4)
Forecast by ITU Report in 1996** (T.D.: Fixed Telephone Density)		21,098	51,018	101,950 (T.D.1.7)	---

* DETECON, "Long-term Development Plan", 1990

** ITU, "Telecom-2000 Development Plan", 1996. Figures indicated above are obtained by the equation: y= 15892 e ^(power) 0.1575x (y: number of demand, x: number of period from 1994)

It should be noted that above two macro demand forecasts do not include the mobile telephone demand and potential demand for fixed telephones in the country, which will be mainly generated outside of the city center (suburban residents) and rural areas. Thus, the total number of fixed telephone demand shown in Table above could be underestimated when it is compared with the results of our demand study (refer to Table 4.5)

The results of the ITU projection for selected countries are shown in the table below. Among these counties, main telephone lines density (fixed) in Thailand, Malaysia and Cambodia are expected to decline up to 2005. On the other hand, mobile subscribers per 100 inhabitants are expected to be increasing up to 2005 with a high growth rate.

Table 4.3 Projection of Fixed and Mobile Subscribers in Asian Countries (ITU)

Selected Asian Countries	2005 Telecommunications Projection					
	Main Telephone Lines			Mobile Subscribers		
	Total (x1000)	Per 100 inhabitants		Total (x1000)	Per 100 inhabitants	
	2005	2001	2005	2005	2001	2005
Indonesia	8,934	3.70	3.95	11,692	2.47	5.16
Thailand	6,300	9.39	8.82	63,573	11.87	88.95
Malaysia	4,876	19.91	17.24	15,508	29.95	54.82
Philippines	3,991	4.02	4.82	23,399	13.70	28.27
Cambodia	38	0.25	0.24	734	1.66	4.56
Lao P.D.R.	**64**	**0.93**	**1.00**	**213**	**0.52**	**3.32**
Low Income Countries	80,458	2.90	3.03	78,373	0.95	2.95

Note: The estimated number of lines in the year 2005 is a projection based on historical growth rates over the last four years. The estimated number of mobile subscribers for the year 2005 is generally based on the growth rate in 2001. The 2001 growth late is halved for each year to arrive at the forecast for 2005. In some cases values have been adjusted.

Source: ITU, World Telecommunication Development Report, March 2002

4.3 Method of Approach for Demand Forecast in Lao P.D.R.

The following three types of forecast methods, namely, Macro Demand Approach and two Micro Demand Approaches (Target Demand Approach and Socio-economic Demand Approach) have been studied for telecommunications demand in Lao P.D.R. The telecommunications demand was projected up to the year of 2015 in Lao P.D.R. using a Macro Demand Approach and a Target Demand Approach.

Macro Demand Forecast Methodology (Regression Model)

The following formulation of telecommunications demand (fixed telephone) is applied to forecast potential national telecommunications demand:

Total Telephone Demand in the country at year X =

[Number of Main Lines at year X] x (multiply)

[Coefficient Factor Z (Subject to: 1<Z)]

Coefficient Factor Z for Lao P.D.R. is derived from other developing countries' waiting applicants lists. Based on this assumption, the Coefficient Factor Z for Lao P.D.R. was set at the level of 1.30 similar to the coefficient index of Sri Lanka and Philippines.

Micro Demand Forecast Methodology

<Target Demand Approach>

The Macro Demand Approach followed by a regression analysis method can only estimate nation-wide telecommunications demand. It could not indicate telecommunications service demand by district level in Lao P.D.R. Thus, as a micro demand forecast method, district telecommunications demand was estimated for the year of 2015 as an example, according to a target telecommunications demand level by target teledensity scenario for the years of 2005, 2010 and 2015.

<Socio-economic Demand Approach>

Income distribution of households could be related to the demand level of telecommunications services. This tendency was valid in the period when the fixed-line telephone services were the only choice available.

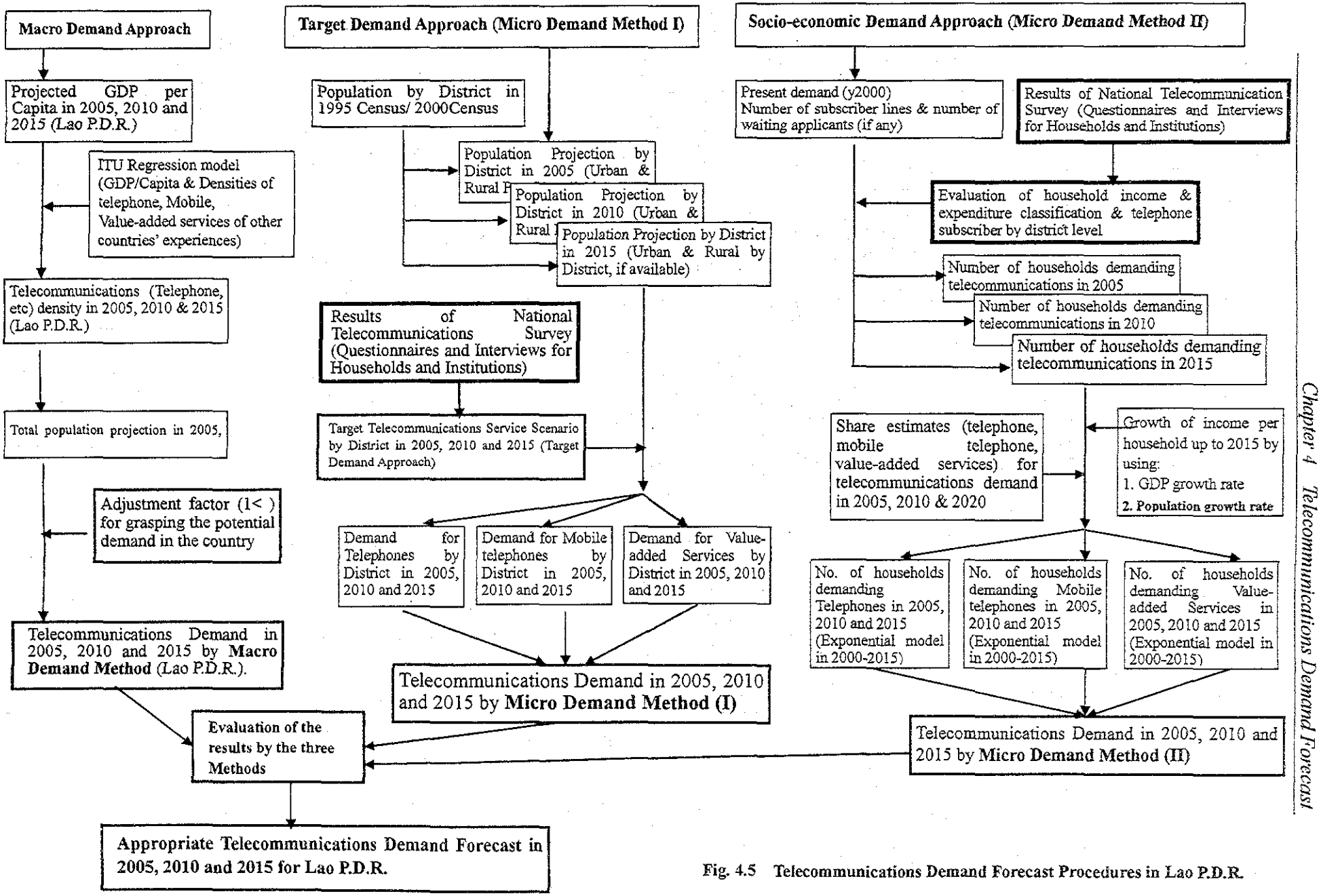


Fig. 4.5 Telecommunications Demand Forecast Procedures in Lao P.D.R.

4.4 Evaluation of Telecommunications Demand Forecast in Lao P.D.R.

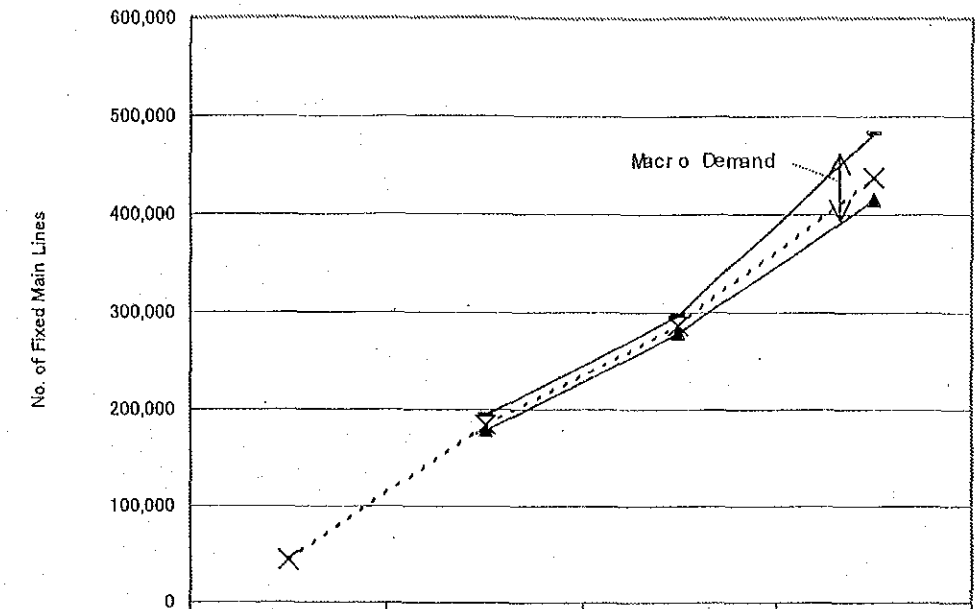
For finalizing the telecommunication demand calculation for Lao P.D.R., demand results obtained by the previous two forecast methodologies (macro and micro demand approaches) are compared.

Table 4.4 The Results of Telecommunication Demand Forecasts in 2005, 2010 and 2015

			2000/ 2001	2005		2010		2015	
				Low	High	Low	High	Low	High
Fixed-line Subscribers	Macro	*Regression*	47,887 (2000)	178,490	194,480	278,460	296,270	415,090	483,340
	Micro	*Target Setting*		184,012 (3.07)		286,287 (4.16)		438,470 (5.56)	
Cellular Mobile Subscribers	Macro	*Regression*	13,773 (2000) 29,545 (2001)	117,803	128,357	278,460	296,270	622,635	725,010
	Micro	*Target Setting*		120,209 (2.00)		278,616 (4.05)		662,416 (8.40)	
Total Telephone (Fixed + Mobile)	Macro	*Regression*	61,660	296,293	322,837	556,920	592,540	1,037,725	1,208,350
	Micro	*Target Setting*		304,221 (5.07)		564,527 (8.21)		1,100,885 (13.97)	
Internet Subscribers and Hosts with DN	Micro	*Proportion of Fixed-lines*	Subscribers	18,400		42,900		109,600	
	Micro	*Proportion of Fixed-lines*	Hosts	761		1,217		2,151	

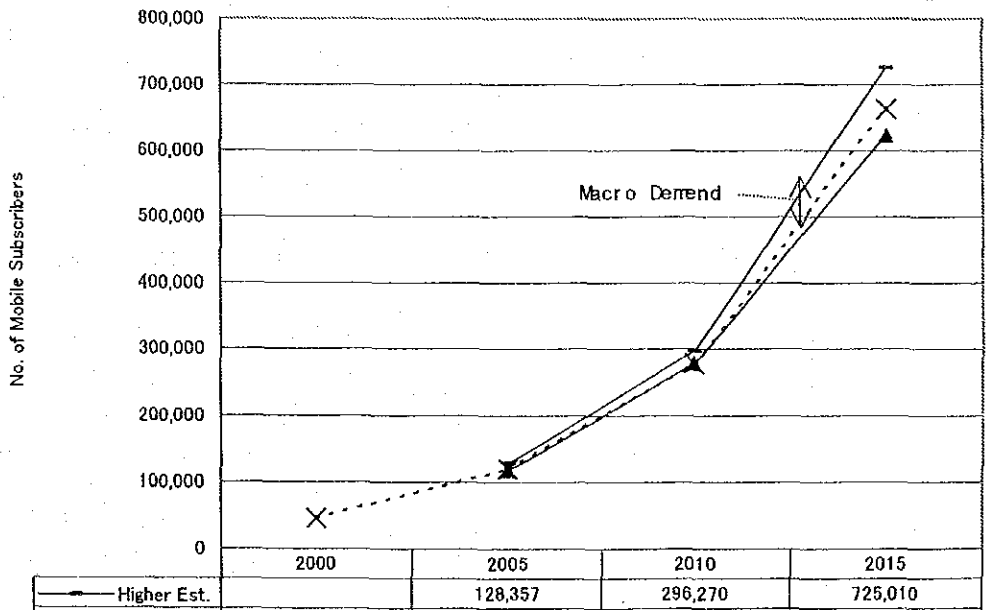
Note: Number in a parenthesis indicates teledensity in each target tear.
Source: JICA Study Team

Calculation results (approximate total = one million fixed-line and mobile telephone subscribers in 2015) obtained both by Macro and Micro approaches are quite large compared to the present subscriber numbers in Lao P.D.R. However, considering the recent telecommunication movement in the LDCs, particularly mobile telephone penetration, and the historical growth rate of the subscribers in Lao P.D.R. (Annual growth rate 20.1 % for fixed telephones and 50.8 % for mobile telephones from 1996 to 2001), the above results do not seem overly exaggerated.



	2000	2005	2010	2015
Higher Est.		194,480	296,270	483,340
Target	44,640	184,012	286,287	438,470
Lower Est.		178,490	278,460	415,090

Fig. 4.6 Comparing results of Macro Demand Approach with Micro Demand Approach (Fixed Main Lines)



	2000	2005	2010	2015
Higher Est.		128,357	296,270	725,010
Target	45,600	120,209	278,616	662,416
Lower Est.		117,803	278,460	622,635

Fig. 4.7 Comparing results of Macro Demand Approach with Micro Demand Approach (Mobile Subscribers)

In addition, it should be noted that telecommunications demand studies conducted

by DETECON (1990) and ITU (1996) are only for forecasting the fixed telephone lines for Lao P.D.R. Those two studies include neither the mobile telephone demand nor potential demand for fixed telephones in the country. Thus, the total telephone demand at the target year (e.g. the year of 2005) in this report could be quite large compared to the previous telephone demand forecasts due to the above reasons.

Table 4.5 Comparison of Results of Telecommunication Demand Forecasts by Previous Studies and the JICA Telecommunications Master Plan Study

		2000/ 2001	2005		2010		Remarks	
Forecast by DETECON Report in 1990 (Fixed Demand only)		44,800 (Forecasted)	**89,000 (Forecasted)**		**182,000 (T.D. 2.4) (Forecasted)**		Forecasting of Fixed Telephones Only	
Forecast by ITU Report in 1996 (Fixed Demand only)		51,018 (Forecasted)	**101,950 (T.D.1.7) (Forecasted)**				Forecasting of Fixed Telephones Only	
Forecast by ITU World Telecommunication Development Report, March 2002 (based on historical growth rates over last four years)		**Fixed Telephone Lines**	**64,000 (T.D.1.00)**				Forecasting by Historical Growth Rate over last 4 years	
		Cellular Mobile Subscribers	213,000 (T.D. 3.32)				Forecasting by Historical Growth Rate over last 4 years	
Total Telephone (Fixed + Mobile) by **2002 ITU** Forecasting			277,000 (T.D.4.32)					
Lao Telecommunications Development Study Report in 2002 by **JICA Study** Team								
Estimated GDP per capita (US$)			Low ($500)	High ($550)	Low ($700)	High ($750)	Low ($950)	High ($1,125)
Fixed main-line Subscribers	***By Regression (without Potential Demand)***	**47,887 (2000) (Actual)**	**137,300**	**149,600**	**214,200**	**227,900**	**319,300**	**371,800**
	With Potential Demand: Coefficient Number 1.3	Regression Figure multiplied by 1.3	178,490	194,480	278,460	296,270	415,090	483,340
Mobile Subscribers	*Regression (without Potential Demand)*	13,773 (2000) 29,545 (2001)	75,300	83,200	123,700	133,100	193,300	231,000
	With Potential Demand)		117,803	128,357	278,460	296,270	622,635	725,010
Total Telephones (Fixed + Mobile)	***By Regression (without Potential Demand)***	61,660 (2000) (Actual)	212,600	232,800	337,900	361,000	512,600	602,800
Total Telephones (Fixed + Mobile)	***With Potential Demand***	**61,660 (2000) (Actual**	**296,293**	**322,837**	**556,920**	**592,540**	**1,037,725**	**1,208,350**

Source: JICA Study Team