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MINISTRY OF SCIENCE, CULTURE, SPORTS AND EDUCATION
REPUBLIC OF THE PEOPLE'S DEMOCRATIC REPUBLIC

THE STUDY ON
ON
THE TELECOMMUNICATIONS DEVELOPMENT
IN
THE PEOPLE'S DEMOCRATIC REPUBLIC

FINAL REPORT
(SUMMARY)

NOVEMBER 2002

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MINISTRY OF COMMUNICATION, TRANSPORT, POST AND CONSTRUCTION
ENTERPRISE OF TELECOMMUNICATIONS LAO

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PREFACE

In response to a request from the Government of Lao People's Democratic Republic, the Government of Japan decided to conduct the Study on the Telecommunications Development in Lao People's Democratic Republic and entrusted the study to the Japan International Cooperation Agency (JICA).

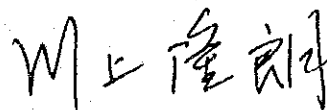
JICA dispatched a study team headed by Dr. Tomotaka TANIGUCHI of Nippon Koei Co., Ltd. organized by Nippon Koei Co., Ltd. and InfoCom Research, Inc. to Lao P.D.R. three times from October 2001 to November 2002.

The team held discussions with the officials concerned of the Government of Lao P.D.R., and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

I hope this report will contribute to the improvement of the situation of telecommunication services in Lao P.D.R. and to enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Lao P.D.R. for their close cooperation throughout the study.

November 2002



Takao KAWAKAMI

President

Japan International Cooperation Agency

November 2002

Mr. Takao Kawakami
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Mr. Kawakami,

Letter of Transmittal

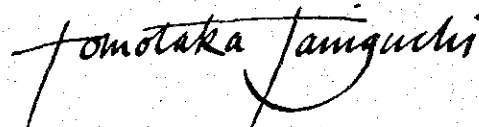
We are pleased to submit you the final report on the Study on The Telecommunications Development in Lao People's Democratic Republic.

This study was conducted by the joint venture of Nippon Koei Co., Ltd. and InfoCom Research, Inc. under a contract to JICA, during the period from October 2001 to November 2002. In conducting the study, we have formulated the Master Plan for the telecommunications development in Lao P.D.R. up to year 2015.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs and the Ministry of Public Management, Home Affairs, Posts and Telecommunications. We would also like to express our gratitude to the officials concerned of the Ministry of Communication, Transport, Post and Construction, the Enterprise of Telecommunications Lao and Embassy of Japan in Lao P.D.R. for their cooperation and assistance throughout our field survey.

Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



Tomotaka TANIGUCHI

Team Leader

The Study on The Telecommunications Development in
Lao People's Democratic Republic

Nippon Koei Co., Ltd.

**THE STUDY
ON
THE TELECOMMUNICATIONS DEVELOPMENT
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC**

**FINAL REPORT
(Summary)**

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CHAPTER 1

CONCLUSION AND RECOMMENDATION

CHAPTER 1 CONCLUSION AND RECOMMENDATION

1.1 Telecommunications Development Plan

This Master Plan Study aims at:

- (a) to formulate a master plan for telecommunications development in Lao P.D.R. up to the year 2015
- (b) to undertake technology transfer to counterpart personnel.

The Plan sets fixed telephone density from 0.86/100 people (the year 2001) to 5.69/100 people (the year 2015) as a target level, based on demand forecast which applies 7% of GDP growth rate as socio-economic development strategy for Lao P.D.R.

The result of demand forecast was 438,470 lines for fixed telephone and 662,416 lines for mobile in the year of 2015 which makes total of about 1.1 million lines.

1.2 Capital Expenditure for Development

The total capital expenditure (CAPEX) for the construction of the telecommunication system up to the year 2015 is \$452 million in the first scenario¹ while that in the second scenario² is \$405 million as indicated in the following tables.

¹ The first scenario is the case in which all the proposed investment is implemented from 2004 to 2015

² The second scenario assumes implementation of all the projects from 2004 to 2010 and part of the proposed projects with the highest priority from 2011 to 2015

Table 1.1 CAPEX (1st Scenario)

(Unit: Thousand US \$)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Swich	3,245	572	6,045	7,635	2,799	4,383	5,132	5,790	5,468	3,785	4,545	4,181	53,578
OSP	6,663	1,174	12,412	15,677	5,747	9,000	10,537	11,889	11,227	7,771	9,332	8,584	110,013
Transmission	21,735	11,490	1,839	1,839	1,839	1,839	1,839	9,690	9,690	9,690	9,690	9,690	90,870
IP	3,363	3,363	779	779	779	779	779	1,005	1,005	1,005	1,005	1,005	15,646
Rural	1,480	1,480	1,776	1,776	1,776	1,776	1,776	2,220	2,220	2,220	2,220	2,220	22,940
Subtotal	36,485	18,079	22,851	27,706	12,940	17,777	20,062	30,594	29,609	24,470	26,793	25,680	293,046
Mobile	14,580	13,851	11,664	5,103	11,664	5,832	8,748	14,580	14,580	5,103	29,160	24,057	158,922
Total	51,065	31,930	34,515	32,809	24,604	23,609	28,810	45,174	44,189	29,573	55,953	49,737	451,968

Table 1.2 CAPEX (2nd Scenario)

(Unit: Thousand US \$)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Swich	3,245	572	6,045	7,635	2,799	4,383	5,132	5,393	5,237	3,507	3,935	4,091	51,971
OSP	6,663	1,174	12,412	15,677	5,747	9,000	10,537	11,073	10,752	7,201	8,079	8,399	106,714
Transmission	21,735	11,490	1,839	1,839	1,839	1,839	1,839	1,971	1,971	1,971	1,971	1,971	52,275
IP	3,363	3,363	779	779	779	779	779	1,005	1,005	1,005	1,005	1,005	15,646
Rural	1,480	1,480	1,776	1,776	1,776	1,776	1,776	2,220	2,220	2,220	2,220	2,220	22,940
Subtotal	36,485	18,079	22,851	27,706	12,940	17,777	20,062	21,661	21,185	15,904	17,209	17,686	249,546
Mobile	14,580	13,851	11,664	5,103	11,664	5,832	8,748	14,333	14,148	4,888	27,598	22,863	155,272
Total	51,065	31,930	34,515	32,809	24,604	23,609	28,810	35,995	35,332	20,792	44,808	40,549	404,818

1.3 Financial and Economic Evaluation

The result of the financial and economic evaluation is summarized in the Table 1.3-1. Due to higher profitability of the mobile phones as explained by the price setting and lower investment cost, inclusion of the mobile phones in the business model relieves the financial constraints. With inclusion of the mobile phones, nearly three quarters of the investment is expected to be covered by earnings. On the other hand, without the mobile phones, only half of the investment is estimated to be covered by earnings unless the charges for the fixed phones are raised higher. The remaining portion of the investment is to be funded with long-term loan. From the economic point of view, the proposed telecommunication development is beneficial both with and without mobile phones.

Table 1.3-1 The Result of the Evaluation

	1 st scenario			2 nd scenario		
Assumption	All the proposed plan is to be carried out.			The lower priority projects from 2011 to 2015 are omitted from the first scenario. (Table 11.2 and Fig. 11.1)		
Targeted Subscribers	Fixed	Year	Subscribers	Fixed	Year	Subscribers
		2005	135,164		2005	Same as 1 st Scenario
		2010	278,199		2010	Same as 1 st Scenario
		2015	438,177		2015	427,727
	Mobile	2005	120,210	Mobile	2005	Same as 1 st Scenario
		2010	278,615		2010	Same as 1 st Scenario
		2015	662,410		2015	629,545
	Internet	2005	16,152	Internet	Same as Scenario 1	
		2010	42,409			
		2015	109,614			
CAPEX	Switch	\$54 million		Switch	\$52 million	
	OSP	\$110 million		OSP	\$107 million	
	Transmission	\$91 million		Transmission	\$52 million	
	IP	\$16 million		IP	\$16 million	
	Rural	\$23 million		Rural	\$23 million	
	Subtotal	\$293 million		Subtotal	\$250 million	
	Mobile	\$159 million		Mobile	\$155 million	
	Total	\$452 million		Total	\$405 million	
FIRR	with mobile phones	19.9%		with mobile phones	20.3%	
	without mobile phones	9.3%		without mobile phones	10.2%	
EIRR	with mobile phones	35.5%		with mobile phones	35.8%	
	without mobile phones	21.4%		without mobile phones	22.4%	
Estimated Required Long-term Loan	with mobile phones	\$113 million (cash shortage until 2007)		with mobile phones	\$111 million (cash shortage until 2007)	
	without mobile phones	\$131 million (cash shortage until 2011)		without mobile phones	\$113 million (cash shortage until 2010)	

1.4 Recommendation

Through the master plan study, the team has understood the actual situations of the present telecommunications sector. On the basis of experience, the team wishes to recommend the following activities to be tackled by MCTPC/ETL for further improvement and well maintenance of the telecommunications sector of the Lao P.D.R..

- 1) Setting up firm policy of telecommunications for clearly showing a direction of development
- 2) Installation of backbone network for fundamental solution to lead to ICT development
- 3) Consideration for transition to IP network to receive cost benefit
- 4) Consideration for rural communications with multi solutions to secure telecom access
- 5) Setting up strategy and organization for better operation and maintenance
- 6) Introduction of strategic human resource development

1.4.1 Setting up Firm Policy of Telecommunications

Following policies are essential for telecommunications development in Lao P.D.R..

Policy measures for promoting ICT introduction into the Lao P.D.R.

(1) Strengthening ICT promotion committee

It is necessary to strengthen the position of the Committee and to assign more experts as the Committee members. Furthermore, in order to get much cooperation and support from Ministries as well as the public, it shall be necessary to provide a legal foundation for the Committee such as, say, Basic ICT Promotion Act in which objectives and roles of the Committee must be defined explicitly and obligations of governmental offices must be clearly stated.

(2) Developing human resource by introducing National Test for Qualified ICT Professionals

In order to keep qualification of ICT experts, it shall be better to hold National Test for those who are going to be engaged in developing information systems as a profession.

(3) Providing a full support of the back-bone network by telecommunications sector

Since the transmission networks of the system must be operated and

maintained by operators most likely, the networks shall be better owned by the operators regardless of whoever will construct the networks. In another words, the networks must be better to be owned, operated, and maintained only by operators except mere experimental projects, which is rather temporary. It implies that operators should have a full responsibility to provide the network services.

(4) Liberalizing the one-gateway policy

The one-gateway policy depends on telecommunications policy towards liberalization. Only when all international gateway facilities are owned and operated only by ETL, then the one-gateway policy would be adopted. But since IP services via satellites shall be liberalized, there shall be other gateways to exist and to operate. This will be more practical and economical and will help telecommunications sector to develop.

(5) Protecting intellectual property rights and privacy as well as customers from offensive contents

Some measures of protecting copy rights and privacy as well as limiting children to access to offensive contents shall be required. There are those measures such as establishing Telecommunication Business Act to allow providers to refuse any offensive contents to transmit and regulating access to violent contents by scrambling.

Policy measures for liberalizing the telecommunications sector

(1) Regulating PSTN services of ETL and LTC

It is the most urgent issue to develop the telephone network to provide the services to the people at both urban and rural areas. Furthermore, the IP network will also be developed at the same time. The telecommunication sector has a lack of development finance and will depend on soft loans or grant of ODA. These imply that ETL must operate together with LTC until the back-bone network and nation-wide telephone service provision to be completed.

(2) Liberalizing mobile telephone services and IP related services

In order to protect the interest of customers, both service providers must be given license by MCTPC of the policy-maker and regulator. Concerning mobile telephone service, licensing with allotment of radio frequency must be issued, so that availability of radio frequency will limit the number of operators.

(3) *Securing to protect privacy and interest of customers*

It is quite important for them to keep privacy of customers as a business moral at first. Interconnection shall be also a very critical aspect of telecommunications businesses for customer's interest. Furthermore many new services will appear and old services may cease to provide. There will be a lot of complaints about quality of service, contract of new services, termination of old services and errors of billing and the like, so that there must be the Office of Complaints and Disputes in MCTPC to keep telecommunication businesses to be straighten up.

Policy measures for developing rural telephone as universal service

The universal service fund shall depend on contributions from ETL, LTC and other telecommunication service providers, and will be used for ETL and LTC to construct rural telephone services. Accurate cost estimation and calculation will be required to make use of the fund. It may also possible to ask for provincial offices or municipality to contribute to financing rural telephone services in their provinces.

Policy measures for improving tariff formation

(1) *Setting tariffs based on costs of the services*

Estimation and calculation of cost of services must be done as accurately as possible. It will be the base to determine retail tariff of each serviced for customers, namely, end users, as well as whole-sale tariff for other operators and service providers. This is quite urgent matter for operators and service providers to have reasonable and acceptable interconnection charges and to strengthen the revenue sources to run healthy business.

(2) *Rebalancing tariff structure*

Tariffs for local call service and long-distance call charge as well as monthly fixed charge are set so low that revenues from them share a smaller portion out of total revenue. Furthermore tariffs of international telephone services are given by hard currency, US\$, while tariffs of the domestic services are set by local currency, Kip, so that continuous devaluation of Kip may increase a divergence between tariffs for international telephone services and tariffs for the domestic telephone services. Therefore it is recommended to have rebalancing of tariffs as soon as possible.

(3) *Adopting a price-cap regulation*

As stated above, tariffs for telephone services in the Lao P.D.R. are given by double standards, Kip and US\$. In order to keep up with such a change with

a possibility of cost reduction efforts in management and technological development, it is better to recommend that the price-cap regulation will be adopted in stead of rate-of-return regulation under political pressure.

Policy measures for securing interconnection

(1) Securing interconnection by law

The requirements for negotiation and the public announcement of conditions as well as other related matters shall be explicitly stated in the Law. It is recommended to spell out the requirements for negotiation and the public announcement of conditions in Telecommunication Business Act.

(2) Setting rules and procedure for negotiation of interconnection

It is recommended to set rules and procedures to be open to the public by stating explicitly in such as Telecommunication Business Law.

(3) Establishing the committee for a dispute settlement

It is strongly recommended to spell out those rules and procedures of dispute settlements as well as the organization and conditions for appealing the dispute in Telecommunications Business Law.

1.4.2 Installation of Backbone Network to lead to ICT Development

MCTPC is recommended to the following procedure to develop ICT in cooperation with other ministries and governmental agencies.

(1) To set up taskforce specialize in ICT in MCTPC

(2) To draw up National Information Infrastructure (NII) including vision and concept and formulate ICT Master Plan, ICT legislation, ICT Human Resource Development Plan in cooperation with other ministries.

(3) To organize Application Committee consist of MCTPC, other ministries including academic and private sector to review contents, applications and multimedia plat form.

(4) MCTPC will make presentation of this Master Plan to show what kind of application will be implemented when in the Application Committee. MCTPC will arrange seminar for ICT related hardware manufacture, software developer to demonstrate latest ICT products.

(5) To gather proposals of ICT applications not only from other ministries but also from private sectors for the Application Committee to pre-qualify

(6) MCTPC will consider request or proposal as opinion from 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) To keep monitoring ICT development

In line with above procedure, following items are recommended to be implemented in terms of ICT development.

- (1) To keep increasing number of telephone lines and the Internet access by giving school and hospital and incentive and priority to install telephone and the Internet access.
- (2) To give incentive to ISP to increase the number of present access points in Vientiane, Savanakheth and Champasak. And to set up new additional access points in Luangpabang and Khammouane.
- (3) To promote ICT by demonstration of pilot project in cooperation with ETL and other ministries and governmental agencies to improve ICT literacy for the public which is equal to create new demand of telecommunications services.

1.4.3 Consideration for Transition to IP Network

Following transition to IP network is to be considered.

- (1) IP-based Network for 2002 to 2005
 - (a) Limited IP Access services in Vientiane

In Vientiane, broadband IP services are provided along with city links. City links consist of SDH equipment and optical fibers. The proposed IP network will provide an interface to the edge routers which are interconnected to the core routers at the center. Edge routers are located at the telecom offices where SDH equipment or SDH ADM(add drop multiplexer) equipment is located.

- (b) Wireless and ADSL for early users

Wireless and ADSL are used to connect users to the edge routers. As there are wireless access limitations and the subscriber loop which can be used as the access line is limited, these services are only provided in limited areas. Wireless LAN interface by IEEE 802.11b (10Mbps) may be adopted by public types of the services, but the service range is limited to several

hundred meters. ADSL is able to provide 1.5 Mbps to 8 Mbps which should be utilized in most of all the cases when high speed access is necessary.

(c) Introduction of Core and Edge Routers

To start IX and DNS services to the Lao P.D.R., several numbers of edge routers and core routers are introduced during this period. One of the core routers may work as the IX which interconnects ISPs. ISPs may use ADSL or a high speed wireless link to the edge routers.

(2) IP-based Network for 2006 to 2010

Routers can be used to configure leased lines, but the number of ports in routers is limited and hence it is not economical to configure the network only by routers. The team recommends ATM or MPLS that is useful for multiplex leased lines at various speeds.

With the widespread introduction of ADSL services in Vientiane, and limited introduction to the major cities, ADSL will become a well-known service for the Internet and will be applied for ICT services. The growing demand for high speed Internet access in Vientiane may cause an increase in the number of core and edge routers. Several core routers are interconnected. One of the core routers will work as the IX which interconnects ISPs.

(3) IP-based Network for 2011 to 2015

(a) High-speed access in Vientiane

IP and Internet services will become commonplace in Vientiane. The network may be used for many applications and a limited number of users are provided high-speed access through optical fibers. ADSL services are common to ordinal users who need speed higher than 1.5 Mbps. They may utilize ADSL services for voice services.

(b) Wireless and ADSL for all the provinces

Wireless access is provided to users in most of province centers by use of fiber backbone network and edge routers.

1.4.4 Consideration for Rural Communications

The practical classification for the implementation of the rural telecommunications is as follows:

(1) Where the power supply is available

The co-installation of telecommunications cable with power lines using the poles of power lines is recommended. If the plan of the installation of power

line is being planned in near future, this opportunity shall not be missed.

- (2) For the purpose of ensuring the least communication method, rural communications shall be fully utilized. Furthermore, rural communications or similar systems shall be expanded even in the future.
- (3) When the mobile telecommunications service area is being expanded along the road, the mobile terminals shall be installed as the fixed public telephones in the communities which are situated along the mobile telephone service areas.
- (4) Where the above proposing methods are practically impossible, through using the near-by tower of microwave transmission, D-MAS or similar systems shall be introduced.

1.4.5 Setting up Strategy and Organization for better O & M

- (1) Important items to offer the better services

- 1) Trouble clearing side

The target of trouble clearance time shall be set. Then adequate statistic shall be edited and compared with international trends, for example by referring ITU publications, so as to know own performance. Utilization of Transportation and Communication Training Institute (TCTI) should help to facilitate O&M activities in this connection.

- 2) Traffic management side

It is important to measure the carrying traffic of equipment periodically for switching network. This action is related with knowing of adequacy of the size of equipment and this will lead to the improvement of call complete rate resulting increased revenue.

- 3) Action to subscriber complain

Received complain shall be immediately tested, and be classified which section among outside plant, switching and transmission be informed for trouble clearance. At this instance, complain detail and test result shall be informed not verbally but in the form of written or recorded information to the alerted section.

The concerning section shall immediately tackle to the problem, and after clearance of trouble the cause of trouble shall be reported back to the test board. The staff of test board shall record the cause of trouble as well as the time of trouble recovery.

(2) Training of O&M staff

For the better performance of O&M, training shall be given the preference position in the whole organization activities.

There shall be not only courses for new technology but also courses for conventional system and equipment.

Shortage of instructors shall be resolved by the instructors who have received the training through the suppliers training courses.

Difficulty of foreign language should be solved by training of mother language instructors. These instructors first of all should be trained a foreign language. However, as not all manuals supplied to equipment sites can not be translated to Lao language, O&M staff should have foreign language skill such as English.

(3) Organization of Operation and Maintenance

Organization of Operation and Maintenance will consist of National center, Provincial centers, and Subcenters.

The National center will be located in Vientiane, and its function will be different from other centers and it will supervise the status of international and national networks through observing traffic flow and fault in the networks. This center will cooperate with Provincial centers for lessening the traffic overload or clearing major troubles in various part of the country.

1.4.6 Introduction of Strategic Human Resource Development

(1) Capacity Building of MCTPC Staff

In order to carry out the responsibility, Department of Post and Telecommunication (especially Division of Telecommunication and that of Radio Frequency) is requested to increase the number of staff. The strategy of enhancement of the staff in provinces is as follows:

a) Staff Distribution Plan

- Criteria for staff assignment in Provinces: 1 staff per 10,000 lines

- Target:

In 2005 Luangprabang(1), Khammuan(1), Savannakhet(2)

In 2010 Luangprabang(1), Khammuan(1), Savannakhet(3), and Champasak(2)

In 2015 Luangprabang(2), Vientiane(1), Khammuan(2),
Savannakhet(4), and Champasak (3)

b) Staff Nurturing Plan

- Short-term and mid-term curriculum
- Invitation of Candidates for transferring telecom section
- Implementation

(2) Enhancement strategy of Transportation and Communication Training Institute (TCTI)

From the year 2006, the demand for technical personnel will increase rapidly so the Transportation and Communication Training Institute (TCTI) shall enhance its supply capacity. The strategy to enhance TCTI is summarized as follows:

a) Short-term (to 2005)

- Enhancement of existing Courses: Completely carrying out the Curriculum
- Implementation of Trainer's training abroad
- To prioritize the enhancing courses: To enhance the practical training of outside plant will be recommended (including the equipment).

b) Mid-term (from 2006 to 2010)

- Establishment of new training courses to correspond to the technological changes: e.g. LAN, IP
- Installation of the training equipment
- Partial implementation of Trainer's Training in TCTI

c) Long-term (from 2011 to 2015)

- Full implementation of Trainer's Training in TCTI

In addition to above the targets, TCTI shall make effort to solidify its financial bases. Currently the financial resources of TCTI are Government Subsidy and Tuition Fees and the financial bases are weak. The short-term specialized training courses sponsored by LTC are carried out by the TCTI however such training courses haven't contributed to TCTI in financial aspect. TCTI shall make the provision of such short- and mid-term training be a financial resource subject to enhance the ability of training.

(3) Skill-up Training in ETL/LTC

In the short-term, ETL/LTC will provide the practical training for the newly employed personnel. In the mid- and long-term, the skill-up training for the employment shall be required. Since the number of training courses will be increased, out-sourcing of the training is recommended.

Additionally the training for the administrative personnel is rather weak so the enhancement of such training is required.

1.5 Priority Projects

On the basis of the Study, the team wishes to recommend the following activities to be tackled by MCTPC/ETL for further improvement and well maintenance of the telecommunications sector of the Lao P.D.R..

These recommendations are highly priority to be implemented in each phase of 2005, 2010 and 2015 for the consideration by MCTPC/ETL. Following Project Number. (P/J No.) is in line with the project number shown in transmission network as Fig.7.27, Fig. 7.28 and Fig. 7.29.

- (a) OFC network installation of P/J No.3, 6, 7, and 11 for the year by 2005
- (b) OFC network installation of P/J No.5, 6 and 23 for the year by 2010
- (c) OFC network installation of P/J No.18, 19, 20, 21, 24 and 25 for the year by 2015

1.5.1 OFC network installation of P/J No. 3, 6, 7, and 11 for the year by 2005

(1) General

This project is to install new optical fiber cables, switching equipment and outside plant in order to expand the network to borders in Cambodia and Myanmar.

In this period of year up to 2005, back bone network expansion to country borders and to provincial areas are basic concepts. The priority can be put to expansion of network to country borders in Cambodia and Myanmar as follows.

P/J No.	Route	Distance (km)
3	M. Pakse to M. Khong	108
6	M. Luangprabang to M. Xay	207
7	M. Xay to M. Luangnamtha	108
11	M. Luangnamtha to M. Huoixai	153

By project number 3, optical fiber cable from Pakse to Cambodian border along the road 13 is installed. The cable will be connected to Great Mekong Subregion Telecommunications Backbone Project network at a point of Lao and Cambodia border.

By project number 6, 7 and 11, optical fiber cable from Luangprabang to Huoixai where is a point of Myanmar border is installed. The cable will be also connected to Great Mekong Subregion Telecommunications Backbone Project networks.

After the completion of above projects, backbone route from northern border in Myanmar to southern border in Cambodia will be installed.

(2) Effect of the Project

This project will promote physical distribution along the optical fiber route due to the establishment of information access network with enough transmission capacity.

This route will make a part of a Greater Mekong Sub-region Telecommunications Backbone which will contribute to better information transmission among neighboring countries of Thailand, Cambodia, Vietnam, Myanmar and China.

(3) Project cost

For the establishment of the above new fiber optical network for fixed communications, following cost is approximately estimated. The cost includes equipment, installation and other miscellaneous materials.

13,000,000 USD

The above cost is about 27% of total capital expenditure of the year 2004 and 2005.

1.5.2 OFC network installation of P/J No.5, 6 and 23 for the year by 2010

(1) General

This project is on condition that all the planned networks up to year 2005 were completed to be installed. If remaining portion of network that could not be completed by the year 2005 still exist, the portion should be completed in the first place.

During the year from 2006 to 2010, following project numbers can be considered to be higher priority to implement. The reasons are that these optic fiber routes are access to neighboring countries like Thailand and Vietnam, by which economic activities will be expected to be promoted by better distribution of information. And one of these fiber routes contributes to form as a part of Greater Mekong Sub-region Telecommunications backbone.

P/J No.	Route	Distance (km)
5	M. Saravane to M. Samouay	108
6	M. Pakse to M. Phonthong	54
23	Xamneua to Vietnam border via Mei	108

The above project number 5 is a project which optical fiber is installed from M. Saravane in southern province to M. Samouay in Vietnam's border along the road 15.

The project number 6 is a project which optical fiber is installed from M. Pakse to M. Phonthong in border in Thailand.

The project number 23 is a project which optical fiber is installed from Xamneua to Vietnam's border via Mei along the road 6.

(2) Effect of the Project

These projects will be expected to promote physical distribution in those areas by which can create more opportunities to increase economic activities.

(3) Project cost

For the establishment of the above new fiber optical network for fixed communications, following cost is approximately estimated. The cost includes equipment, installation and other miscellaneous materials.

35,000,000 USD

The above cost is about 30% of total capital expenditure of the year 2006 and 2010.

1.5.3 OFC network installation of P/J No. 18, 19, 20, 21, 24 and 25 for the year by 2015

(1) General

Same as the above, these projects are on condition that all the planned networks up to year 2010 were completed to be installed. If remaining portion of network that could not be completed by the year 2010 still exist, the portion should be completed in the first place.

These projects are for to enrich the network in northwest region in Lao connected to Vientiane which is bordering on Thailand, and in northeast part adjacent to Vietnam as follows.

P/J No.	Route	Distance (km)
18	M. Xaignabouri to M. Boten via M. Paklay	180
19	M. Xanakham to Sylom	198
20	M. Hinheup to M. Viangkham	90
21	M. Paklay to Xanakham	36
24	M. Xam-Nua to M. Xam-Tai	108
25	M. Kham to M. Nonghet	45

(2) Effect of the Project

By establishing the above new route of network will promote physical distribution in the area.

(3) Project cost

For the establishment of the above new route, following cost is approximately estimated. The cost includes equipment, installation and other miscellaneous materials.

33,000,000 USD

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 South-East Asia's only land-locked country as well as the least populous country in Indochina Peninsula. The 1995 census population recorded a population 4.6 million, which is just under half that of Cambodia and less than ten percent of that of Myanmar, Thailand and Vietnam. Its total area of 236,800 km² makes it the second-smallest country between Cambodia and Vietnam, and less than half of Thailand and Myanmar. Some 70 percent of the country is composed of mountains and high plateau where elevations of below 200m account for only 16 percent of the total area

According to the rural characteristics classified by "The Government's Strategic Vision for the Agriculture Sector in December 1999", 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 (Table 2.1).

Table 2.1 Rural Area Classification

Flatland in the Mekong Corridor (Emerging Rural Market Economy)	Sloping Land (Subsistence Farming)
Some 20 percent of rural population belongs to territory along the Mekong Corridor.	The rest of rural population (80 %) resides the sloping and mountainous lands.
Basic educational health services are accessible to most of the population	Many areas still lack access to basic education and health services.
Most villages have all weather access to road transport and market. Increasing number of villages with access to electricity.	Poor and non-existent road linkages. Very limited electrification.
Adequate agriculture technology flows from regional markets	Very limited and non-existent agricultural technology flows.
Rural savings mobilization and agriculture lending mechanisms beginning to function.	Very limited and 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 of telecommunications services in this area.	Basic and minimum demand of 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 to satisfy at least three of five conditions; i.e., (i) there is a market, (ii) there is a road for motor vehicles for access, (iii) there is a district or provincial office; (iv) majority of households are electrified, and (v) there is tap water supplied to the majority of households.

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

Table 2.2 Major Urban Center Classification

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. But, value-added telecommunications services are strongly required for further activation of Lao economy.
Regional Centers/ Secondary Towns Khanthabuly, Luangphrabang, Pakse, Thakhek	20,000 to 60,000	Regional economic center; international transit; provincial government and administration; tourism	All basic services. But, expanding commercial and tourism industries require higher telecommunications service standard for their daily socio-economic activities.
Other Provincial Capitals 13 provincial capitals	4,000 to 20,000	Provincial government and administration; some transit	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, population of Lao P.D.R. projected to increase to 5.2 million at the year of 2000 with an annual population growth of 2.8 percent, 6.8 million in 2010 and 8.7 million in 2020. The urban population exceeds 50 percent in the four district of Vientiane city and in Pakse; it ranges from 28 percent to 50 percent mainly in the other towns in the Mekong Valley. 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. Over 70 percent of urban dwellings in the Mekong Valley and on Vientiane Plain are connected to the public electricity grid. However, most of the population resides in rural areas, transport and electrical infrastructure is scarce and incomes are very low.

2.2.2 State Planning Committee (SPC) Population Projection

According to the latest SPC population projection, National population will increase at 1.4 million and 2.1 million during 2000 to 2015 and 2000 to 2020, respectively. Future urban growth rate is always over the rural one in each 5-year interval. Adoption of a more market-based economic system encourages a re-alignment of sector shares. Growth of the service and industry sectors will mean growth in urban centers, requiring more telecommunications service investment in urban infrastructure.

Table 2.3 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 mill.	1.03 mill.	1.18 mill.	1.33 mill.	1.48 mill.
Rural	4.24 mill.	4.74 mill.	5.29 mill.	5.75 mill.	6.27 mill.
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 in the population growth rate from 2.5 % annum to 1.7 percent by 2020, reflecting a declining 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 Expenditure in Lao P.D.R.

With an annual per capita income of US\$ 350 (2000), Lao P.D.R. is one of the least developing countries in the region. Most people survive on subsistence agriculture. Around 39 percent of the people lives in poverty. The Lao economy is mainly based on agriculture; which employs over half of the work force and contributes over 50 percent of Gross Domestic Product (GDP).

By the 1997-98 Lao expenditure and consumption survey shows that per capita income is 4.5 times higher in Vientiane municipality (US\$ 437) than in Oudomxay (US\$ 98), and 2.3 times higher than the national average (US\$189). Xayabury and Champassack appear relatively well-off, with over US\$280. Vientiane and Borikhamxay provinces are exceeding the income of US\$ 210. 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 State Planning Committee (SPC) "Socio-Economic Development Strategy"

According to the SPC "Draft Socio-Economic Development Strategy for 2020, 2010 and Five years Socio-Economic Plan (2001-2005)", a GDP per capita will be at US\$ 700- 750 in 2010 and US\$ 1,200- 1.500 in 2020 (see Table below). In 2000, a GDP per capita was reported at US\$ 350 in Lao P.D.R. by SPC report. However, it is saying that a substantial GDP per capita would reach roughly twice (around US\$ 700 in 2000) of an official figure.

Table 2.4 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		2.4percent 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\$)	US\$ 500-550 (Y2005)	US\$ 700-750 (Y2010)	US\$ 1,200-1,500 (Y2020)
Objectives by interval	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - Increase of import-substitute productions. - Improvement of basic infrastructures: electricity, hydro-power, processing industry, special economic zones border trade zones. - Further serious opening up economic, trade and investment cooperation with foreign countries. 	<ul style="list-style-type: none"> - Increased GDP share for industry and service sectors
Telecommunications	- It is expected that Lao will reach 2.2 teledensity.		

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

Sector Projections to 2020

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

Table 2.5 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. In line with this policy, telecommunication sector in Lao P.D.R. was also privatized at the year of 1996 as a joint venture with Thai investor. However, this privatization policy in telecommunications sector has been revised due to the importance of a national telecommunications development strategy such as dissolving of the keen issues of digital divide among regions and/or frequent traffic congestion caused by a deficiency of nation-wide telecommunication facilities in Lao P.D.R.

The telephone density reported by MCTPC was a 0.41 in 1996 and it increased over two times to 0.91 in 2001 within five years. Also, number of the fixed telephone subscribers increased from 19,468 in 1996 to 48,557 in 2001. In Vientiane municipality, telephone density was five times higher at 3.4 (approx. 28,000 lines) than 0.65 in the country average in 1999 and there was a waiting list of 8,897 at the same year. Vientiane municipality occupies around 60 percent of total fixed telephone line capacity of Telecommunications services in Lao P.D.R. and 65 percent of total subscribers in the country in 2000. The second highest total number of subscribers is the province of Savannakhet with only 2,653 (8.3%) following with 1,573 (5.0%) of Luangphrabang province.

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, totaling 15,772 units. The GSM network is available in Vientiane and ten provincial capitals. Nearly 80 percent of 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 coverage can be extended this could be a big boost to telecom access. At 2001, mobile subscribers accounted for nearly 40 percent of the total telephone subscribers in Laos and mobile density becomes 0.55 comparing with the fixed teledensity of 0.91.

Internet users appeared in the official statistics from 2000, however, the Internet café has first seen in the year of 1997 and it increase in number these few years. Current statistics shows 2,610 in number, however, this figure does not include the people who visit the Internet café and hence more than 5,000 potential users will be existing and growing its number.

Table 2.6 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 (Sub/100pop)	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 table below. It is used to be a measure of fixed-line teledensity would have been a reliable measure of a country's progress. But, by 2000, the mobile network had grown to rival in many Asian countries and in some cases surpass the fixed-line network. Ranking by fixed teledensity is different with the ranking classified by Total Teledensity (Table 2.7). This disorder is caused by the mobile telephone penetration, which is not always responded by the level of GDP per capita.

Table 2.7 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 means 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 of telephone services within the Asian country is very high, and it indicates more than 7 times except Malaysia. Growth rate of mobile telephones diffusion is much higher than that of fixed telephone except Indonesia and Cambodia. In Cambodia, particularly, mobile telephone diffusion ratio is quite high in last 5 years interval comparing to other Asian countries (annual 76.3% during 1995-99). Mobile telephone users increase much higher pace in the developing countries where the telephone line network and capacity has not been well developed.

Table 2.8 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 2002

Table 2.9 Telecommunications Density by Type of Services in Selected Countries

Selected Asian Countries	Density				Per 100 households (1998: (upper)1999 figure, lower 2001 figure)
	Per 100 population				
	Telecommunications (upper:1999 figure, lower:2001 figure)		Internet (upper:1999 figure, lower:2001 figure)		
	Telephone Lines	Mobile Telephones	Users	Hosts	
Indonesia (1999) (2001)	2.9 (16.6%)	1.1 (80.2%)	0.43	0.001	0.91
	3.7 (15.8%)	2.5 (71.2%)	1.86	0.021	1.07
Thailand (1999) (2001)	8.6 (10.6%)	3.8 (15.9%)	1.31	0.066	2.27
	9.4 (9.4%)	11.9 (34.1%)	5.56	0.113	2.67
Malaysia (1999) (2001)	20.3 (7.4%)	13.7 (31.3%)	11.45	0.270	6.87
	19.9 (6.0%)	30.0 (38.6%)	23.95	0.311	12.61
Philippines (1999) (2001)	3.9 (19.7%)	3.8 (55.0%)	0.67	0.017	1.69
	4.0 (14.0%)	13.7 (66.6%)	2.59	0.040	2.20
Singapore (1999) (2001)	48.2 (7.1%)	41.9 (51.9%)	24.39	3.807	43.66
	47.2 (5.3%)	69.2 (45.0%)	36.30	4.792	50.83
Cambodia (1999) (2001)	0.25 (34.3%)	0.81 (58.6%)	0.04	0.001	0.12
	0.25 (25.6%)	1.70 (58.5%)	0.07	0.005	0.15
Lao P.D.R. (1999) (2001)	0.65 (20.1%)	0.17 (55.7%)	0.04	-----	0.23
	0.93 (21.2%)	0.52 (63.6%)	0.17	0.003	0.28
Average in Low Income Countries	4.3 (23.9%)	1.38 (86.9%)	0.38	0.004	0.71
	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