社会開発調査部報告書

# THE STUDY ON [illegible] IN [illegible]

## FINAL REPORT (SUPPORTING)

NOVEMBER 2002



JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.

INFOCOM RESEARCH, INC.

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

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

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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).

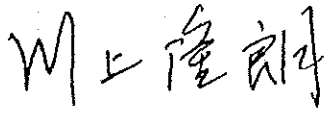
JICA dispatched a study team headed by Dr. Tomotaka TANIGUCHI of Nippon Koei Co., Ltd. organized by Nippon Koei Co., Ltd. and InfoCom Research, Inc. to Lao P.D.R. three times from October 2001 to November 2002.

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

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
# (SUPPORTING)

## CONTENTS

# *SUPPORTING FOR ICT DEVELOPMENT*

# Supporting for ICT Development

## 1. Networked Readiness: A Guideline for Developing Countries[1]

| | Telecom Infrastructure | Internet Availability | Internet Affordability |
|---|---|---|---|
| Stage 1 | Access to telecommunications infrastructure is very poor. (Roughly: There are very few shared facilities for telecommunications access. Telephone penetration is very low, with a teledensity of less than 2 mainlines per 100 people. Mobile wireless penetration is below 0.5% of the population. No cable services are available.) | There are no Internet Service Providers (ISPs) offering local dial-up access. There is no public Internet access. Businesses are unable to lease dedicated lines from the local telephone operator, or there is a multi-year wait to do so. | Most users are charged long distance or international rates for dial-up access. ISP rates are so high that few individuals can afford Internet access. |
| Stage 2 | A small minority in the community has good access to the telecommunications network, but most of community does not.<br><br>(Roughly: Teledensity is between 2 and 8 mainlines per 100 people. Mobile wireless penetration is between 0.5% and 3%. Cable penetration is below 5% of all households in the community.) | A limited number of Internet Service Providers offers local dial-up access. There are more than 1,000,000 inhabitants per local ISP. Some providers offer only e-mail services. There are limited opportunities for public Internet access. Users often have difficulty establishing a dial-up connection to a local ISP. There is no competition in commercial leased line provision. Businesses may only lease lines from a single telephone operator. | Rates for local telephone calls are high enough to discourage extensive Internet use via local ISPs, even among most who can afford Internet access. Local access solutions exist, but rates for ISP services are high enough to discourage extensive Internet use. The lack of competition in the provision of commercial leased lines is reflected in prohibitively or very high leasing fees. |
| Stage 3 | A sizeable portion of the community has good access to telephone services. Growth in mobile wireless telephony is accelerating. (Roughly: Teledensity is between 8 and 40 mainlines per 100 people. Mobile wireless penetration is between 3% and 14%. Between 5 and 10% of households in the community subscribe to cable services.) | There are between 500,000 and 1,000,000 inhabitants per local ISP. ISPs provide full Internet access. Subscribers may have some options between various Internet service packages. There are some opportunities for public Internet access. It is normally possible for users to establish a dial-up connection to a local ISP, except during peak hours. One or two private providers leased lines to businesses. | Telephone charges for Internet access reflect emerging competition in the telecoms market, yet they are high enough to discourage extensive use by some users. Internet access is priced within reach of the majority of citizens. Competition in leased line provision for businesses has been introduced, and prices are falling but are still high. |
| Stage 4 | There is widespread access to telecommunications and network services. (Roughly: There is high teledensity of 40 mainlines or more per 100 people. Penetration of mobile wireless telephony is high and growing, with at least 14% of the community subscribing. Cable penetration is high, at 10% of households or higher.) | There are more than two local ISPs per 1,000,000 inhabitants. Higher bandwidth solutions such as DSL(digital subscriber line) and cable modem access are available. Most customers can tailor services to meet different demands for speed, service, security, quality and cost. ISPs provide web hosting services to their subscribers. There are adequate opportunities for public Internet access for those without access at home, school or work. Users are able to establish a dial-up connection to a local ISP on a reliable basis.<br><br>Multiple private providers leased lines to businesses. Wireless solutions may be available in addition to fixed line solutions. | Prices for telephone usage are set competitively and are affordable for nearly all citizens. Flat rate pricing may be in effect for local telephone calls. Prices for Internet access are set competitively and are affordable for nearly all citizens. Flat rate pricing may be available. Free ISP services may be available, particularly in communities with time-metered pricing of local phone calls.<br><br>Higher bandwidth solutions such as DSL services and cable modem access are priced competitively, which may include tiered pricing based on speed of access or usage-based pricing based on total volume. "Always-on" connections are available without time-metered pricing. Pricing for leased business lines is set in a competitive environment featuring multiple vendors. |

[1] Center for International Development (CID) at Harvard University created the guideline.

| | Network Speed and Quality | Hardware and Software | Service and Support |
|---|---|---|---|
| Stage 1 | Fewer than half of all domestic telephone calls are successful. For voice telephony, sound quality is often not acceptable for regular conversation. More than 100 faults are reported per year for each 100 telephone mainlines. No services beyond limited electronic mail □capabilities are sup-ported by the local telecommunications □infrastructure. Large businesses which want access must link their □networks directly to infrastructure backbone outside their community. | There are no distribution/sales points for ICT hardware/software within the community. ICT hardware and software are too expensive for all but large businesses and a small minority of citizens and small and medium-sized businesses. | Telephone mainlines take at least four years to be installed from the time their orders are placed. It takes over six months for reported mainline problems to be resolved, if ever. Very few or no software developers, programmers or computer technicians are present in the community. |
| Stage 2 | 50-70% of domestic telephone calls are successful. Dropped connections are frequent and extremely disruptive. For voice telephony, sound □quality is acceptable for regular conversation. Between 50 and 100 □faults are reported per year for each 100 mainlines. The telecommunications infrastructure in most areas of the community supports dial-up modem transfer speeds of 9.6 Kbps or less. Some areas may support speeds of 14.4 Kbps.Large businesses and ISPs can link their networks to a local infrastructure backbone, but backbone □capacity is frequently inadequate to support user demands. Packet loss is significant and regularly disruptive for any online activities. | Some off-the-shelf hardware and software solutions are available locally, but there are none or very few in the native language of the community. Basic hardware and software are affordable for some citizens and small and medium-sized businesses. | Mainlines take at least six months for installation. It takes over one month for reported mainline problems to be resolved. Providers pay no explicit attention to customer service. A small community of software developers, web designers, network □administrators and other technical personnel exists. |
| Stage 3 | 70-90% of domestic telephone calls are successful. Connections are dropped with noticeable frequency and are somewhat sruptive.Fewer than 50 faults are reported per year for each 100 mainlines. Users have access to dial-up modem transfer speeds of up to 28.8 Kbps. Leased lines with transfer speeds of up to 64 Kbps are widely available for businesses and ISPs. Limited higher-speed lines are available in some areas. Backbone facilities serving the community are usually sufficient, although regular peak demand periods result in slower network response times. Packet loss by the network may occur but is not generally disruptive. | Most IT products are sourced from abroad, but there is a strong and growing localization industry to adapt products to local needs. Some software appropriate to local needs and languages is available. A variety of hardware and software solutions are available and affordable to most small and medium-sized businesses, as well as many individuals. | Mainlines take at least one month to be installed. It takes over one week for reported mainline problems to be resolved. There is a growing customer service ethic among service and support providers, although it is not a priority for most. Some ICT maintenance and technical support services are available. A nascent software industry is present in the community, and there is a growing number of hardware technicians, web designers and network administrators. |
| Stage 4 | Dropped connections are fairly infrequent and not a major isruption. Over 90% of domestic telephone calls placed are successful. Fewer than 10 faults are reported per year for each 100 mainlines. There is widespread access to dial-up modem transfer speeds up to 56 Kbps, with some access to high speed solutions<br><br>such as DSL, cable modems and wireless media. High speed services of 1.5 Mbps are common, with higher speeds available in some areas. Adequate backbone capacity exists to support community needs without significant transmission delays except during infrequent periods of high demand. Packet loss by the network is below 10%. | A vibrant marketplace exists for software and hardware with a competitive retail and wholesale market for these products. Hardware and software appropriate to local needs and languages are widely<br><br>available and affordable. | Mainline installation is usually completed within a few days. Service providers can be contacted in a number of ways (e-mail, telephone,<br><br>mail). Reported problems are usually resolved within 48 hours. Online help is available and may allow for immediate resolution. Customer service is considered a source of competitive advantage for the service provider. ICT maintenance and technical support are widely available. A competitive and sophisticated web design market exists, incorporating the latest development technology. |

| | Schools' Access to ICTs | Enhancing with ICTs | Developing the ICT Workforce |
|---|---|---|---|
| Stage 1 | There are no computers in schools. | Computers are not used by any teachers or students. | Training opportunities for programming, maintenance, support, Web design and other ICT professions are virtually non-existent. |
| Stage 2 | Where there are ICTs in schools, it is primarily at the university level, and there are generally fewer than five computers in a school or faculty. Access to the computer(s) is limited to computer teachers and/or administrators. Computers tend to be older generation models, such as stand-alone 486 PCs or the equivalent. Where there are multiple computers installed, they are not networked. Use of the computer(s) is limited to electronic documents that are available on the hard drive or diskettes. There may be connectivity for store-and-forward e-mail. | Only a few teachers use computers in a very limited fashion. Teachers' basic computer literacy involves skills such as use of the keyboard and mouse, a basic understanding of the computer's operating system, manipulation of files, and cutting and pasting. Computers are mainly used at the university level. | There are limited opportunities for training in ICT skills development. |
| Stage 3 | Computers can be found at the university level as well as in primary and secondary schools. Up to 10 to 15 computers can be found in laboratories for classroom group work, with about four students per computer. Computer labs are generally only open for computer studies during the day and closed after school, or may be open to teachers for class preparation but closed to students. Computers tend to be older generation models, such as 486 PCs or higher, and they may be networked with a file and mail server. There may be an internal Local Area Network (L AN) in place. If there are multiple computer labs, they may be connected through the school network. Where there are stand-alone PCs, they may have a limited CD-ROM library. The networked lab achieves connectivity through a dial-up connection to the Internet, which supports limited World Wide Web access. | Teachers and students use computers to support traditional work and study. Teachers who use computers are generally proficient with word processing applications and may access information offline from CD-ROMs. They may employ computers in some basic drill-and-practice lessons. In some cases, teachers access and organize information from the World Wide Web in their work, share information using e-mail, and create information in electronic format to share with others both inside and outside the school. | Technical classes and programs on ICT-related subjects are available from a variety of public and private centers. Some limited online access to training is available. Some employers offer training in the use of information and communication technologies to their employees. |
| Stage 4 | Most schools at all educational levels have access to computers. There may be a number of computer labs in each school, and computers may be found in the classroom. In some cases, students and teachers may have individual laptop computers. Computer labs are open to students and reserved for subject matter classes to use, and are open after school hours. The lab may be open to the community and other schools after school and on weekends. There may be an internal Web server on the school network N computers as well as other devices are connected to the network. Classrooms may be wired and connected to the school's Wide Area Network (WAN). Clusters of schools may be connected to a regional WAN to share electronic resources. A national school network may be in place. Connectivity may be obtained through a leased line or wireless connection with at least 64 to 128 Kbps of dedicated access. | Information and communication technologies are fully integrated into the curricula, are used in the classroom and are essential to the learning process. The curricula may feature collaborative, project-based learning activities that enable students to use the Internet and advanced software skills to work with other students and teachers in their school, outside their community and internationally. Teachers are well-trained in methods for incorporating computers and ICTs into their instruction and curricula. | There are many technical schools with specialized curricula in information and communication technologies and computer science. There are a variety of training opportunities relating to information and communication technologies available through vendor certification programs, employers, educational institutions, private training centers and distance learning courses. Online resources and courses are widely available for the development of technical skills. |

| | People's and Organizations Online | Locally Relevant Content | ICTs in Everyday Life | ICTs in the Workplace |
|---|---|---|---|---|
| Stage 1 | Most of the population has never heard of the Internet. Less than 0.05% of the population has used the Internet at any time during the past three months. No business entity in the community has a registered Internet domain name. | No websites exist providing information on local topics. Few or no websites are available in local languages or a dominant Web language spoken locally. | Members of the community do not normally employ information and communication technologies in their daily lives. Most social communication is paper based and/or oral. | Employees have limited access to telephones. A small minority of business and government offices have at most a few computers, none of which are networked. Most business communication takes place in person or by mail. A small number of businesses use telephone and fax. |
| Stage 2 | Much of the population has never heard of the Internet, and most people do not know anyone who has ever used it. Less than 0.5% of the population has used the Internet recently, and few are regular users. Some local businesses and institutions have registered domain names. There are fewer than two of these domains per 1000 inhabitants. There is no advertising in traditional media for online companies or resources. | Few websites covering local topics exist, and most of them are created and hosted outside the community. Some websites are available in local languages or a dominant Web language spoken locally. There is little use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs. | Information and communication technologies (telephones, fax machines, pagers, computers) are used to a limited degree by some members of the community. Public telephones are available in some parts of the community and are used regularly b y many community members. Personal computers with e-mail capability are made publicly available by some businesses, but most users are from outside the community (e.g. tourists and visiting businesspeople). | Organizations achieve sporadic efficiency gains through limited deployment of ICT systems in their internal workings. Some employees have access to telephones. Few offices have computers that are networked for internal file sharing and basic enterprise applications. In offices where there are computers, only some employees use them for their work, though not for electronic communications. |
| Stage 3 | Most of the population has heard of the Internet, although few have used it. Less than 10% of the population uses the Internet regularly. The overwhelming majority of Internet users are males between the ages of 10 and 35. The number of registered domains locally is at least 2 per 1000 people. Advertising in traditional media for online companies or resources is infrequent. | Some local websites are available, though most carry static content and are updated infrequent-ly. Websites carry diverse types of information relevant to different groups within the community. Many websites are available in local languages or a dominant Web language spoken locally. There is some use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs. There are opportunities for Web-related training, although they may be expensive and accessible only in certain areas. | Public telephones may be found in most parts of the community and are heavily used. Some members of the community have Internet access at home. Growing numbers of community members use telecenters, cybercafes and other businesses that offer computer use and online services to the public for | Organizations achieve some efficiency gains through some degree of deployment of ICT systems in their internal workings. Many computers in business offices are internally networked for data processing, management reporting, and other enterprise applications. Some employees conduct research and business transactions over the Web, though most often they use a shared workstation to do so. Some employees use e-mail for internal communications. |
| Stage 4 | Most of the population is interested in using the Internet and knows others who do. At least 10% of the population accesses the Internet with some regularity. Males between the ages of 10 and 35 no longer represent the overwhelming majority of Internet users. The number of registered local domains is at least 20 per 1,000 population. Advertising in traditional media for online companies or resources is fairly common. | Many websites provide dynamic information on local topics and are updated at least several times per week. Local content is generated by citizens at all levels of society, including websites and online bulletin-board systems, Usenet groups, newsletters, and/or listservs. A significant amount of information is avail-able through websites in local languages or a dominant Web language spoken locally. Many affordable opportunities exist for Web-related training. | Many members of the community use information and communication technologies (wireless phones, digital assistants, pagers, personal computers) to assist in their personal lives. Many members of the community use information and communication technologies for household commerce (online shopping, banking, investing) and for a variety of social and commercial interactions with other people (including bartering, consumer-to-consumer trade, online chat). Citizens without access through home, school or work use a variety of public and private Internet access option. | Organizations achieve major efficiency gains through widespread deployment of ICT systems in their internal processes. Computers in offices are fully networked. Different office locations are connected to each other through external networks. These net-works may extend nationally or internationally. Most employees have Internet access from their own workstations. Most employees have their own e-mail accounts for internal and external communications. Workers commonly list their e-mail and web-site addresses on their business cards. |

| | ICT Employment Opportunities | BtoC Electronic Commerce | BtoB Electronic Commerce | e-Government |
|---|---|---|---|---|
| Stage 1 | Few, if any, local businesses hire workers on the basis of their technical background. | No businesses in the community operate websites. There is little awareness of online business, and all dealings between businesses and consumers consist of oral and/or paper-based transactions. | Businesses have few sources of market information. The efficiency of most B2B interactions is hampered by this lack of transparency, as are prospects for new business opportunities. B2B transactions are carried out in person or remotely through paper-based transactions. | No government resources are online. There is no awareness of online government, and all dealings between government and citizens or businesses are in person or paper-based. There is limited information available by phone. |
| Stage 2 | Although there are some employment opportunities that call for technical skills, most workers with ICT experience either must leave the community to find employment or are unable to find work in their field. | Some local businesses operate websites. The basic information they provide is static and infrequently updated. Some businesses accept orders placed by telephone or fax. Some businesses distribute hard-copy catalogs for remote browsing of goods and services. | B2B interactions remain inefficient with little transparency. Faxes and telephones are commonly used to facilitate orders or for remote client support, although some paper-based transaction (e.g. signature) is required. | A few governmental websites exist, providing basic information, often directed at parties outside of the community. This information is static and infrequently updated. Some limited interaction with the government is possible by telephone or fax. The government distributes some information about services, procedures, rights and responsibilities in hard copy. |
| Stage 3 | Technical skills in the community are becoming a source of competitive advantage and are beginning to attract investment and employment opportunities by companies from outside the community. | Many businesses post key information on websites. Information is often not kept current and relevant. Websites provide information on goods and services for sale. Purchases take place primarily in person, by fax or by telephone, though electronic mail may expedite the process. Some businesses may have introduced online ordering. | The deployment of electronic systems has increased efficiency and transparency and lowered transaction costs in B2B interactions. Some B2B transactions are supported by electronic systems (e.g. proprietary systems and databases), but some paper-based trans-action (e.g. signature) is usually required at some point. Electronic B2B transactions are a small percentage of overall B2B commerce. | Some governmental agencies post key information on websites, including directories of services, hours of operation, and download-able forms. Information is often not kept current and relevant. Transactions take place primarily in person, by fax or by telephone, though electronic mail may expedite the process. The government manages relationships with some contractors and suppliers online or with other electronic mediation. |
| Stage 4 | A significant number of employees in the community require technical skills to perform their jobs. A sizeable portion of the community's economy is based on the management of and trade in information, employing a large number of Oknowledge workers.O Information and communication technologies are considered central to the strategies of many organizations. | Many businesses in the community have incorporated the World Wide Web into their sales, marketing, and customer service systems. The total volume of online retail is a noticeable component of the community's commercial activity, as may be evidenced by advertisements for commercial websites in traditional media and other indicators. | Many efficiencies in B2B transactions are apparent as a result of the deployment of electronic systems. These efficiencies have changed market structures and redefined industry practices. Many businesses have incorporated the Web into sales, procurement and inventory management. Some transactions occur online over automated, fully-integrated systems. Order processing and delivery may be executed electronically and monitored through online tracking systems. Overall levels of electronic B2B transactions are a noticeable and growing percentage of total B2B transactions within the community. | All governmental agencies post key information on websites and some have incorporated the Web into their strategy for interaction with the public. Interactive government websites allow the public to conduct transactions (e.g. apply for permits, pay taxes) online. Much government procurement and many interactions with suppliers take place online or with other electronic mediation. |

| | Telecommunications Regulation | ICT Trade Policy |
|---|---|---|
| Stage 1 | There are no plans for the liberalization of the community's telecommunications sector. There are no regulatory provisions which promote universal access to telecommunications services. All services are provided by a single operator, whether private or state-owned. Voice and data service offerings are limited. | Trade in equipment for information and communication technologies is impeded by high tariffs and other restrictions, including cumbersome technical standards or licensing requirements.<br>Service sectors are not open to trade, creating a barrier for electronic commerce and the building and operation of ICT networks.<br>Domestic regulations may create de facto trade barriers for ICT use.<br>There is little or no foreign direct investment. |
| Stage 2 | Plans for the liberalization of telecommunications services are in place or are being formulated.<br>Provisions for universal access to services have been established, though they are ineffective. | Trade barriers for ICT equipment have been reduced, but are still relatively high. There has been some opening in service sectors related to electronic commerce and ICT networks.<br>Foreign direct investment is allowed in network sectors under certain conditions. |
| Stage 3 | Plans for the liberalization of the telecommunications sector are in place and are being implemented. Progress is being made in achieving universal access, but there are many hurdles in implementation.<br>Services such as data, paging and mobile telephony are available from competing private providers. Alternative carriers compete for private network services, leased lines and other telecommunications services for businesses.<br>Incumbent provider networks are being opened to competition through interconnection and/or unbundling obligations. | Trade in ICT equipment is not restricted through unnecessary standards or licensing requirements, and tariffs are low and uniform.<br>The community has at least temporarily agreed not to apply disproportionate tariffs on electronically delivered products. There has been significant opening in services that facilitate electronic commerce and building and operations of ICT networks, but some restrictions remain.<br>Foreign direct investment in the ICT sector is encouraged with some restrictions. |
| Stage 4 | The telecommunications sector has been liberalized, with a regulatory regime in place to promote open competition. Regulation is effective in promoting universal access. An independent regulatory body sets and enforces telecommunications regulations. Citizens and businesses have a number of options for their telecommunications and data services.<br>Incumbent networks have been opened to competitors, and new competing carriers are taking advantage of these arrangements to offer services. There is vibrant competition among mobile wireless providers. Spectrum has been allocated consistently with international standards, and licensing arrangements encourage new market entrants. The provision of value-added services such as broadband Internet is recognized as a source of competitive advantage. | If tariffs exist on ICT goods, they are low and uniform.<br>Trade in services is fully liberalized, including services delivered electronically.<br>The community has explicitly affirmed that it will not apply disproportionate tariffs on electronically delivered products. Foreign investment in the ICT sector is encouraged and subject to few or no restrictions. |

## 2. Hardware and software being used at the Government of Lao P.D.R.

| | **Hardware** | | |
|---|---|---|---|
| | No. of PC | No. of Network (No. of PC in Network) | No. of Printer |
| MOC | 15 | - | 10 |
| MOE | 163 | 1(9) | 110 |
| MOFA | 94 | 1(41) | NA |
| MCTPC | 95 | 1(NA) | 79 |
| MIC | 20 | 1(20) | 7 |
| NSC | 37 | 1(33) | 14 |
| NOUL | 23 | 1(23) | 3 |

Source: STEA

| | **Software** | | |
|---|---|---|---|
| | OS | Applications | Database |
| MOC | Windows 95/98 | MS Office | MS Access |
| MOE | Windows 2000/NT | MS Office 2000 | File Maker |
| MOFA | UNIX/Window2000 | MS Office 2000 | MS Access |
| MCTPC | Windows 2000/NT | MS Office 2000 | MAP info |
| MIC | Windows 2000/NT | MS Office 2000 | MS Access |
| NSC | Windows NT | MS Office 2000 | SQL server |
| NOUL | Windows NT | MS Office 2000<br>Maple, Matlab,<br>Visual Basic,<br>Visual C+ etc | MS Access |

Source: STEA

**3. Actions to be taken by MCTPC and other ministries for ICT development in each indicator of Readiness of the Networked World: A Guide for Developing Countries.**

| Name of indicators | Present situation (in Vientiane) | Actions to be taken by MCTPC or telecom sector | Actions to be taken by other ministries |
|---|---|---|---|
| *Telecom Infrastructure* | STAGE 2 - 3 | • To promote installation of fixed telephone and mobile telephone | NA |
| *Internet Availability* | STAGE 2 | • To promote ISP to increase number of ISP users<br>• To regulate ISP to provide better service to their ISP user<br>• To promote ISP to increase or expand dial-up access points in local cites<br>• To promote Internet Cafe | NA |
| *Internet Affordability* | STAGE 2 | • To supervise ISP to provide service at proper service charge | NA |
| *Speed & Quality* | STAGE 2 | • To establish dairy maintenance and operation system to provide better quality service<br>• To expand capacity of backbone, access line and switching | NA |
| *Hardware & Software* | STAGE 2 | NA | • To set standard of hardware and software<br>• To exempt sales tax and import tax on imported hardware and software<br>• To stimulate local |

| | | | |
|---|---|---|---|
| | | | market of PC and software at trade show or exhibition such as PC and Software Show |
| *School Access* | **STAGE 2** | • To provide incentive and priority to install Internet access and telephone to educational institute such as school and medical institution such as hospital, clinic and health center | • To provide PC and software for educational institute such as school at free or affordable price. |
| *Enchanting Education through ICT* | **STAGE 2** | NA | • To train teacher to improve his/her ICT literacy<br>• To promote creators to create quality educational materials |
| *Developing ICT workforce* | **STAGE 2** | • To provide ICT training at TCTI | • To promote ICT education at high school and vocational school<br>• To provide subsidiary to people who learn ICT at private school |
| *People & Organizations on line* | **STAGE 1** | • To promote ICT literacy to the public through various media | • To promote ICT literacy to the public through various media |
| *Local contents* | **STAGE 1** | NA | • To promote creators to create quality contents |
| *ICT in dairy life* | **STAGE 2** | • To promote ICT's (including telephone, fax and so forth) benefits | • To promote ICT's benefit in each sector or how ICT being used |
| *ICT in workplace* | **STAGE 2** | NA | • To provide incentive such as better salary for ICT engineers or technicians |

| | | | |
|---|---|---|---|
| *ICT Employment Opportunity* | STAGE 2 | NA | • To promote local need of ICT employment |
| *B to C* | STAGE 2 | • To formulate ICT legislation to increase credibility of e-Commerce<br>• To enact security policy of network to ensure e-Commerce | • To promote SME or individual to use PC and software<br>• To promote SME or individuals to access to the Internet |
| *B to B* | STAGE 1 | • To formulate ICT legislation to increase credibility of e-Commerce<br>• To enact security policy of network to ensure e-Commerce | • To promote SME to use PC and software<br>• To promote SME to access to the Internet<br>• To educate SME to establish own website with own domain name<br>• To establish portal site for SME (already exist) |
| *e-Government* | STAGE 2 | • To establish website for public<br>• To keep improving and updating contents and systems<br>• To develop appropriate e-Government applications through the Internet | • To establish website for public<br>• To keep improving and updating contents and systems<br>• To develop appropriate e-Government applications through the Internet |
| *Telecom Policy* | STAGE 2 | • To promote liberalization in telecom sector | NA |
| *Trade Policy* | STAGE 2 | NA | • To exempt import tax on PC and software<br>• To eliminate trade barriers of ICT related items |

## 4. ICT Development Scenario in Vientiane Municipality

There exists ICT development in Vientiane Municipality as shown in Fig. 3.3 Networked Readiness in Vientiane Municipality. In 2002, the area covers approximately 70% of teledensity of the nation and that category of Telecommunications Infrastructure stays between STAGE 2 and STAGE 3,[2] which indicates that there are enough potential to development ICT based on the existing telecommunications infrastructure. Most of economic activities, large size business and public and private educational institutions locate in the area. There already exist the fundamental factors and environment to develop ICT in Vientiane Municipality. In Lao P.D.R., there is no other area but Vientiane Municipality to develop ICT. ICT development in Lao P.D.R. depends on ICT development in Vientiane Municipality. Based on forecasted teledensity and penetration rate of mobile phone in 2005, 2010, and 2015, the Study Team figured out ICT development in Vientiane Municipality in 2005, 2010, and 2015.

### (1) ICT Development in 2005

The potential for ICT development in Vientiane Municipality in 2005 is shown in Fig. 3.7. In Vientiane Municipality, teledensity is expected to exceed its critical mass point of 10 lines per 100 people before 2005. In 2005, teledensity of fixed phone is forecasted 15 lines per 100 people and penetration rate of mobile phone is forecasted 11.41 % of the populations are at STAGE 3. Other indicators, Internet Availability, Internet Affordability, Speed and Quality, Hardware and Software, School Access, Enchanting Education through ICT, ICT Employment Opportunity, and e-Government will reach STAGE 3. Other indicators will stay between STAGE 2 to 3. After the City Link, high speed optic fiber network around Vientiane Municipality will be on operation and ADSL will be introduced, ICT development in Vientiane Municipality will be accelerated.

### (2) ICT Development in 2010

The potential for ICT development in Vientiane Municipality in 2010 is shown in Fig. 3.8. In 2010, teledensity of fixed phone is forecasted 19.6 line per 100 people and penetration rate of mobile phone is forecasted 21.28 % of the population are about to

[2] In 2002, teledensity of fixed phone is forecasted 3.34 lines per 100 people and penetration rate of mobile phone is forecasted 4.6 % of the population reached mid of STAGE 2.

reach STAGE 3. Due to increase of income and increasing number of telephone and the Internet access, Internet access and PC will become affordable. ADSL will become popular, which will make BtoC popular. For 5 years from 2005 to 2010, there will be a leap of ICT development due to the City Link and broadband technology, ADSL. Other indicators, Internet Availability, Internet Affordability, Speed and Quality, Hardware and Software, School Access, Enchanting Education through ICT, ICT in Workplace, ICT Employment Opportunity, BtoC, BtoB and e-Government will stay between STAGE 3 and STAGE 4.

(3) ICT Development in 2015

Fig.3.9 shows the potential for ICT development in Vientiane Municipality in 2015. In 2015, teledensity of fixed phone is forecasted 24.5 line per 100 people and penetration rate of mobile phone is forecasted 41.58 % of the population are mid at STAGE 3. Due to increase of income and increasing number of telephone and the Internet access, Internet access and PC will become more affordable. ADSL will become more popular. Other indicators, Internet Availability, Internet Affordability, Speed and Quality, Hardware and Software, School Access, Enchanting Education through ICT, ICT Employment Opportunity, BtoC, BtoB and e-Government, Telecommunications Policy, and Trade Policy will reach STAGE 4. The development will depend on how both telecommunications policy and trade policy will be formulated to promote ICT development in term of SMEs promotion, privatization and liberalization of telecommunications market.

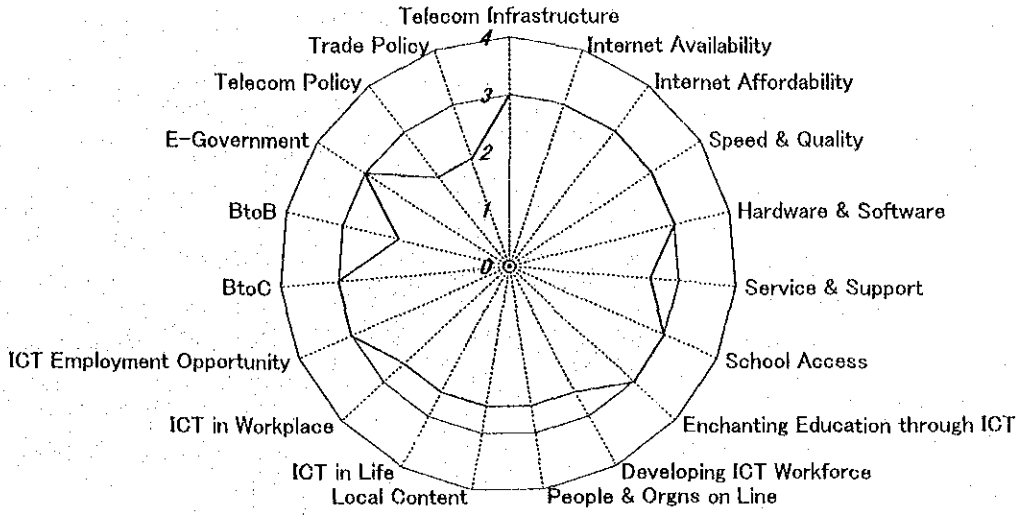



**Fig.3.7 Potential for ICT Development in Vientiane Municipality in 2005**

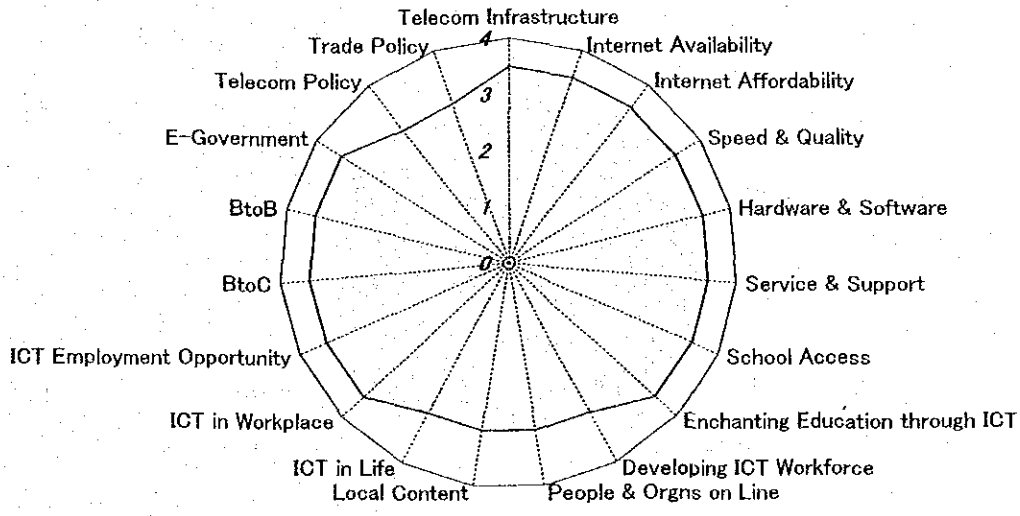



**Fig.3.8 Potential for ICT Development in Vientiane Municipality in 2010**

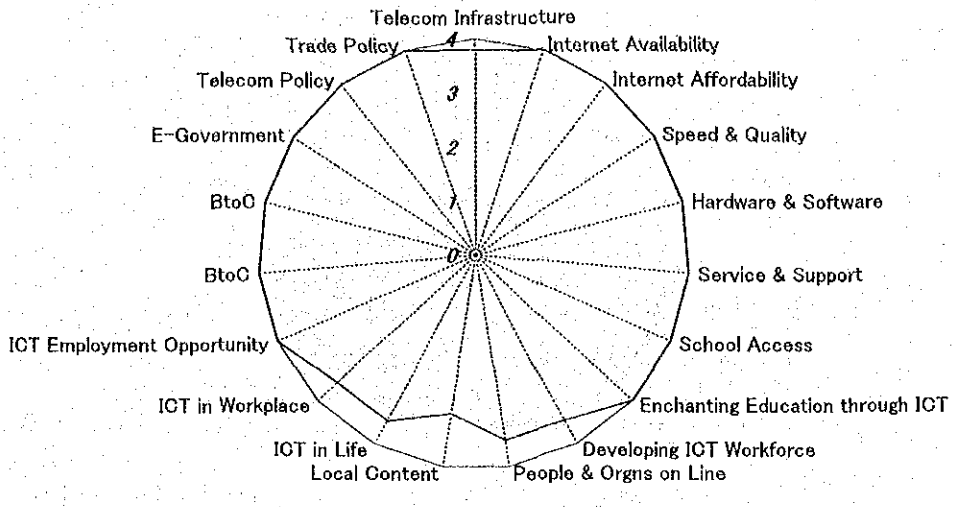



**Fig.3.9 Potential for ICT Development in Vientiane Municipality in 2015**

## 5. STEA's role to develop ICT in Lao P.D.R. and outline of IT Master Plan

STEA is in charge of ICT development in Lao P.D.R.. It is important to understand STEA's role and outline of IT master plan 1996 in order to estimate ICT applications and demand which will be created in future in accordance with development of ICT human resource and telecommunications infrastructure.

STEA was established in 1985 by Prime Minister's Office to determine and administer policies in the area of science, technology, and the environment. STEA was given approval by the Prime Minister's Office (No.237/PMO) to implement the overall policy for monitoring and controlling Information Technology (IT) in Lao P.D.R. in February 12, 1996.

The draft of IT Master Plan was consisted following 5 parts;

1) Introduction

The objective of the master plan was to prepare the government and society in Lao P.D.R. for the 21st century through Information Technology (IT), by building and developing the IT industries "into one of spearheaded industries of the country". The general idea was to introduce "information culture" and shift to an "information society."

2) Development and Building of IT Infrastructure

IT infrastructure has two aspects; human resource development and telecommunications infrastructure. Developing and building of such IT infrastructure was proposed to be achieved through the followings;

Education and training on IT,

Research and development of IT,

Developing IT industry, and

Building and developing database communications networks

According to the plan for the telecommunications infrastructure, increase of telecommunications capacities to meet all ICT demands. "By the year 2000, it is expected that all major demands on data communication in different speed to various areas in Lao P.D.R. will be met."

3) Information Technology Application

The followings considered as IT applications;

Building a national database system and computerizing State management,

IT application in national defense and security,

Building commercial and market information networks,

IT applications in the modernization of production and business industries, and

IT application in health care, culture and society.

4) Policies for Encouraging IT Development

Policies to encourage IT Development as follows;

Policies on Standards and Integrated Open Systems,

Policies and measures in regard to the building of the IT infrastructure,

Policies and incentives for education and training to increase human resources,

Policies and measures for the development of computerized information systems,

Policies for foreign investment and technology transfers,

Policies on assisting and mobilizing capital for IT development, and,

Legislation on protecting intellectual properties in the field of IT development

5) Main Projects

Proposed Projects. STEA proposed to formulate "Lao National Plan on Information Technology: Mater Plan Up to Year 2000" called IT Master Plan. STEA proposed IT Master Plan in which followings proposed ICT projects are listed in Table below.

**Table Proposed ICT Projects in 1996**

| Project | Category of e-Government | Responsible Ministry/Agency |
|---|---|---|
| National Data Communication Network | Inter-G, BtoG, and CtoG | Ministry of Communication |
| National System of Database and Information System (Government network) | Inter-G | STEA |
| • Financial Information System<br>• State treasury information system<br>• Tax and Customs clearance compensation system | In-G, Inter-G<br>In-G, Inter-G<br>Inter-G, BtoG | Ministry of Finance |
| • Modernization of Banking System<br>• Banking database system<br>• National and international electric compensation system | Inter-G, BtoG<br>BtoG<br>Inter-G, BtoG | National Bank |

| | | |
|---|---|---|
| Information for Economic Planning and Investment | In-G, Inter-G | National Planning Committee |
| National Statistics Information System | In-G, Inter-G | National Statistics Centre |
| Geographical-remote sensing information on natural resources and environment | In-G | STEA |
| Commercial and Market Information System | In-G, Inter-G, BtoG, CtoG | Ministry of Commerce |
| • Foreign Affairs Management System<br>• Data Link to embassies<br>• Passport and Visa issue management | In-G, Inter-G<br>In-G<br>In-G, BtoG, CtoG | Ministry of Foreign Affairs |
| Immigration and Population Information System | In-G, BtoG, CtoG | Ministry of Internal Affairs |
| Health Information System | In-G, BtoG | Ministry of Health |
| New Information System (Lao Press Agency) | BtoG, CtoG | Ministry of Information and Culture |
| Nampapa Integrated Information System | In-G, BtoG | Lao Water Authority |
| EDL Integrated Information System | In-G, BtoG, CtoG | Electricity of Laos |
| Vehicle Information Management | In-G, BtoG, CtoG | MCTPC |
| State Management System | In-G, Inter-G | Prime Minister's Office |

## 6. Formulation of ICT development

It is very difficult not only to understand ICT development but also explain ICT development to anyone with less ICT literacy. In order to understand and/or explain ICT development to the others in rather simple way, the Study Team made a formulation consists of 6 mandatory elements to develop ICT. Those 6 mandatory elements to develop ICT as follows;

- **Human Resources (HR)**

  = to improve ICT literacy of users, train ICT engineers, capacity building for government officials.

- **Computer & Software (CS)**

  = affordability of Hardware and software (Price including import tax of hardware and software, availability of locally made hardware and software etc)

- **Communication & Network (CN)**

  = Telecommunication Infrastructure (Multimedia platform; telephone, mobile phone, facsimile, telex, television, radio, satellite transmission, the Internet access in term of accessibility, availability, affordability)

- **Information & Contents (IC)**

  = There are many kinds of forms of information and contents exchanged and/or stored on the multimedia platform. Based on dynamic domestic business economic activity, those information and contents should build database and keep them updated without stopping. If there is not enough information and contents in society, the government needs to promote contents development and to demonstrate any of e-Government applications to use ICT to provide better public services.

- **Infrastructure (I)**

  = Basic social infrastructure including transportation and utilities such as road and electricity.

- **ICT Policy (P)**

  = with sharing common vision of ICT development, to integrate efforts of government, business sector, and academic to develop ICT and accelerate ICT development, to set direction to develop ICT. Strong coordination body on ICT issues among the government is mandate.

Using the above 6 elements, the simple formulation to figure out ICT Development is formulated as follows;

**ICT Development = (I + CS × HR × IC) × CN × P**

Then, from the formulation, Computerization and ICT are figured out as follows;

**Computerization= CS×HR×IC**

**ICT= (I + CS×HR×IC) ×CN = ICT Applications**

If any of those elements are nothing or nearly equal to 0 (Zero), there is no ICT Development will occur or even if it occurs, the speed is very slow. However, with dramatically increasing of some of elements, ICT Development will be dramatically increase using advantage of multiplications (x). In contrary to the negative estimation, that also indicates possibility that if telecommunications infrastructure will be improved, ICT Development will be doubled or tripled, development speed will be doubled or tripled. That will also encourage MCTPC to develop telecommunications infrastructure as their first priority and proves that telecommunications infrastructure development will boost not only ICT Development but also economic activities in Lao P.D.R.. Economic activities and ICT development will grow synergistically in Lao P.D.R.. In addition, MCTPC has supervise social infrastructure development beside telecommunications such as transportation and construction of which know-how is very important to build her telecommunications infrastructure on which ICT will be fostered.

As it is necessary to stress that only the government can promote any of those 6 elements directly and indirectly through policy making process and regulations, especially, formulation of National Information Infrastructure (NII) or ICT policy, strong coordination body on ICT issues among governmental ministries and agencies is required. In addition, responsibility of MCTPC in ICT development is not limited to development of telecommunications infrastructure because it is required that. MCTPC should be in charge of supporting role to promote to develop ICT in Lao P.D.R., to implement ICT applications such as e-Government in cooperation with other ministry and agencies such as STEA.

# *SUPPORTING FOR TELECOMMUNICATIONS DEMAND FORECAST*

# Supporting for Telecommunications Demand Forecast

## 1 Overview of the Telecommunications and ICT Demand in Lao P.D.R.

### 1.1 Backgrounds for Telecommunications Demand Consideration

(1) Movement of Telecommunications Services in the World
(Refer to Appendix 1)

ITU "World Telecommunication Development Report 2002" notices that there are three distinguished features in a telecommunications sector in the World. These three trends are:

1) Mobile overtaking fixed,
2) Data overtaking voice, and
3) Developing markets overtaking developed ones.

The major new phenomena in LDCs in the telecommunications sector are particularly described below as a background for telecommunications demand consideration in Lao P.D.R.

a) Rapid expansion of telecommunication sector at second half of the 1990s

Looking at the fixed main lines and personal computers penetration, the growth in these items between 1991 and 2001 was relatively steady expansion per year in Asian countries (growth rate by country is obviously different), but the growth in Cellular subscribers and Internet hosts between 1995 and 2001 except Lao P.D.R., Cambodia and Myanmar are boosted per year comparing the previous half of the 1990s. However, these lagging countries are following this trend after 1999.

b) Mobile overtaking fixed telephone subscribers

By the end of 2001, inhabitants of Philippines, Thailand and Cambodia had more mobile than fixed telephone subscribers. In Indonesia, Lao P.D.R. as well as Vietnam, mobile is increasing telephone access in a short period. It is predicted that mobile telephone subscribers will surpass fixed-line subscribers in near future. It is evidently saying that growth of mobile telephone in Asian countries is strong tendency.

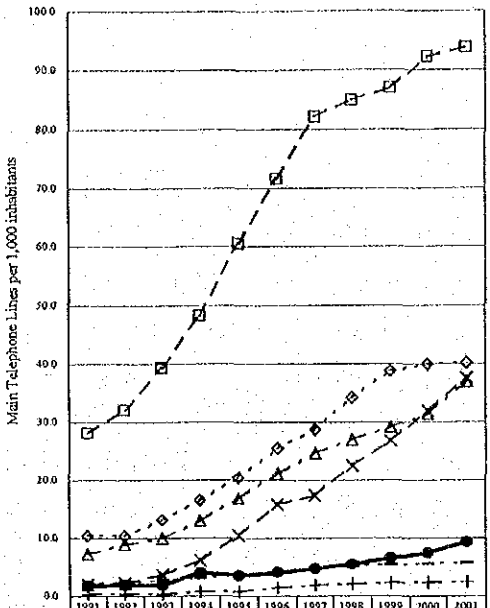
There are two main reasons for its expansion in developing countries. Firstly: the advent of mobile networks gave developing countries a much more cost-effective method of increasing telephone access, as shown by the

much steeper trend lines for 2000 than 1990. Some countries were able to expand teledensity despite falling GDP per capita. Secondly, the ability of a country to grow its mobile network to the point where it overtakes the fixed-line network is not a function of its wealth. Nor is it a function of geography, as every region now has a number of countries where mobile has already overtaken fixed lines.

c) Data overtaking Voice Communication in Telecommunication Sector

At the second half of 1990s, the Internet grew in significance at the countries of Thailand, Philippines and Indonesia. On the other hand, Internet access in Lao P.D.R., Cambodia, Myanmar and Vietnam is not popular among inhabitants. In Asian countries, volume of data transmitted worldwide has not been exceeded the volume of voice traffic. This tendency would be implemented at the stage of personal computer era in these countries.

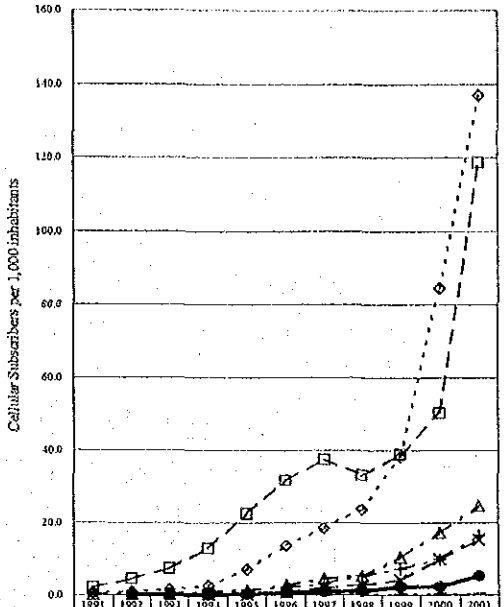
The following figures 1.1 to 1.4 show the tendency of fixed main lines, cellular subscribers, personal computers and Internet during 1991 to 2001 in the selected Asian countries.




| | 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 | 3.1 | 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 | 4.8 | 5.3 | 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 | 23.5 | 28.7 | 34.2 | 38.8 | 40.0 | 40.2 |
| Thailand | 28.2 | 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 | 2.7 | 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"

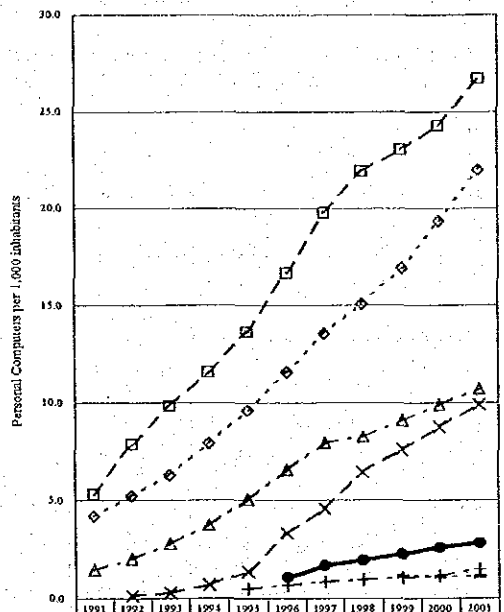
Fig. 1.1 Main Telephone Lines per 1,000 inhabitants in Asian Countries




| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cambodia | | | 0.5 | 1.0 | 1.4 | 2.2 | 3.2 | 5.1 | 7.3 | 10.0 | 16.6 |
| Indonesia | 0.1 | 0.2 | 0.3 | 0.4 | 1.1 | 2.8 | 4.5 | 3.2 | 10.6 | 17.3 | 24.7 |
| Lao | | 0.1 | 0.1 | 0.1 | 0.3 | 0.8 | 1.0 | 1.2 | 2.3 | 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 | 137.0 |
| Thailand | 2.2 | 4.5 | 7.3 | 13.0 | 22.6 | 31.7 | 37.5 | 34.3 | 39.0 | 50.4 | 118.7 |
| Viet Nam | | | 0.1 | 0.2 | 0.3 | 0.9 | 2.1 | 2.9 | 4.2 | 9.9 | 15.4 |

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

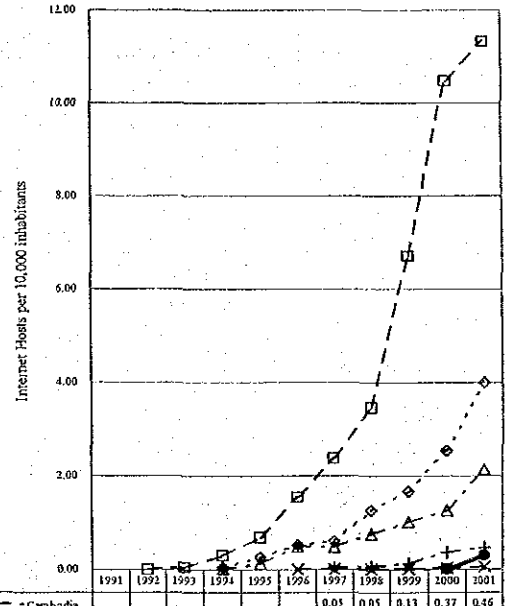
Fig. 1.2 Cellular Subscribers per 1,000 inhabitants in Asian Countries




| | 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 | 6.6 | 7.9 | 8.2 | 9.1 | 9.9 | 10.7 |
| Lao | | | | | | 1.1 | 1.7 | 1.9 | 2.3 | 2.6 | 2.8 |
| Myanmar | ... | | | | | | | | 1.1 | 1.1 | 1.1 |
| Philippines | 4.1 | 5.2 | 6.3 | 7.9 | 9.6 | 11.5 | 13.6 | 15.1 | 16.9 | 19.3 | 22.0 |
| Thailand | 5.3 | 7.9 | 9.8 | 11.6 | 13.6 | 16.7 | 19.8 | 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. 1.3 Personal Computer 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 | 0.19 |
| Myanmar | | | | | | | | 0.00 | 0.00 | 0.00 | |
| Philippines | | | | 0.05 | 0.26 | 0.52 | 0.60 | 1.16 | 1.66 | 2.54 | 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. 1.4 Internet Hosts per 10,000 inhabitants in Asian Countries

(2) Recent Telecommunications Services in Selected Asian Countries

a) Total Telephone Teledensity (Fixed-line+Mobile) and GDP per Capita

The relation between Telephone Density (fixed) and GDP per capita in selected Asian countries is shown in Table below. The relation of the higher Fixed Telephone Density with the higher GNP per capita can be identified except Vietnam. 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 (Thailand, Philippines and Cambodia). Thus, the methodology used to construct Table 1.1 uses changes in ranking for 'total teledensity', that is the sum of fixed-lines and mobile subscribers per 100 inhabitants, as the measure of comparative performance. Ranking of Vietnam, Indonesia, Lao and Cambodia by fixed teledensity is different with the ranking classified by Total Teledensity. This disorder is caused by the mobile telephone penetration, which is not always responded by the level of GDP per capita. Cambodia as a good example is able to expand teledensity despite falling GDP per capita.

**Table 1.1 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

b) Telephone Service Disparity (main lines) in Selected Asian Countries

According to the experiences of the neighboring countries of Lao P.D.R., the disparity of telephone services within the country is very high, and it indicates more than 7 times except Malaysia in 1998 (see Table 1.2). This disparity is gradually shrinking due to the rapid introduction of mobile telephone at the outside of primary city in the country. This disparity was drastically shrunken from 10.2 point (1998) to 5.9 point (2000) in the case of Philippines.

**Table 1.2 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

c) Comparison of Current Telecommunications Services in Selected Asian Countries

In developing countries, growth rate of mobile telephones diffusion is much higher than that of fixed telephone since its introduction. In Cambodia, particularly, mobile telephone diffusion ratio is quite high in last 5 years interval comparing to other Asian countries (annual 58.6% during 1995-99, 35.8% during 99-2001) and mobile teledensity (0.81) is much higher than fixed telephone density (0.25) in 1999. Surprisingly, this mobile to fixed ratio becomes 1.70 to 0.25 in 2001 comparing with 0.81 and 0.25 in 1999. Ratio of mobile subscribers to total subscribers is steadily growing at each year. In selected Asian countries, Cambodia is the highest ratio of mobile telephone as 87 percent of total subscribers in its country. Generally speaking, mobile telephone users increase much higher pace in the developing countries where the telephone line network and capacity has not

been well developed (also, refer to Fig. 1.2)

**Table 1.3 Telecommunications Density by Type of Services in Selected Countries**

| Selected Asian Countries | | Density | | | | Per 100 households (upper1999 figure, lower 2001figure) |
|---|---|---|---|---|---|---|
| | | Per 100 population | | | | |
| | | *Telecommunications (upper:1999 figure, lower:2001figure)* | | *Internet (upper:1999 figure, lower:2001figure)* | | |
| | | Telephone Lines | Mobile Telephone | Users | Hosts | PCs |
| Indonesia | (1999) | | | | | |
| | (2001) | 3.7 (15.8%) | 2.5 (71.2%) | 1.86 | 0.021 | 1.07 |
| Thailand | (1999) | | | | | |
| | (2001) | 9.4 ( 9.4%) | 11.9 (34.1%) | 5.56 | 0.113 | 2.67 |
| Malaysia | (1999) | | | | | |
| | (2001) | 19.9 ( 6.0%) | 30.0 (38.6%) | 23.95 | 0.311 | 12.61 |
| Philippines | (1999) | | | | | |
| | (2001) | 4.0 (14.0%) | 13.7 (66.6%) | 2.59 | 0.040 | 2.20 |
| Singapore | (1999) | | | | | |
| | (2001) | 47.2 ( 5.3%) | 69.2 (45.0%) | 36.30 | 4.792 | 50.83 |
| Cambodia | (1999) | | | | | |
| | (2001) | 0.25 (25.6%) | 1.70 (58.5%) | 0.07 | 0.005 | 0.15 |
| Lao P.D.R. | (1999) | | | | | |
| | (2001) | 0.93 (21.2%) | 0.52 (63.6%) | 0.17 | 0.003 | 0.28 |
| Average in Low Income Countries | | | | | | |
| | | 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 2002

**Table 1.4 Mobile Telephone Ratio to Total Telephone Subscribers in Selected Countries**

| Selected Asian Countries | | Fixed Telephone Lines and Mobile Telephone Subscribers: Unit: thousand | | | As % of total telephone subscribers (mobile) |
|---|---|---|---|---|---|
| | | Fixed Telephone Lines | Mobile Subscribers | Total | |
| Indonesia | (1999) | | | | |
| | (2001) | 7,949.3 | 5,303.0 | 13,252.2 | 40.0 |
| Thailand | (1999) | | | | |
| | (2001) | 5,973.5 | 7,550.0 | 13,523.5 | 55.8 |
| Malaysia | (1999) | | | | |
| | (2001) | 4,738.0 | 7,128.0 | 11,866.0 | 60.0 |
| Philippines | (1999) | | | | |
| | (2001) | 3,100.0 | 10,568.0 | 13,668.0 | 77.3 |
| Singapore | (1999) | | | | |
| | (2001) | 1,948.5 | 2,858.8 | 4,807.3 | 59.5 |
| Cambodia | (1999) | | | | |
| | (2001) | 33.5 | 223.5 | 257.0 | 87.0 |
| Lao P.D.R. | (1999) | | | | |
| | (2001) | 52.6 | 29.5 | 82.2 | 36.0 |
| Low Income Countries *1 | | | | | |
| | | 70,794.4 | 23,092.7 | 93,792.0 | 24.6 |

Note:*1: China moved to Lower Middle Income Category in 2001 from Low Income Category in 1999.
Source: ITU, World Telecommunication Indicators, March 2001 and ITU, World Telecommunication Development Report, March 2002

(3) Telecommunications Services in Lao P.D.R.

The fixed telephone density reported by MCTPC was a 0.41 in 1996 and it increased over two times to 0.93 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. Remarkably, the mobile subscribers grew from 3,790 in 1996 to 29,545 at the end of 2001. At 2001, mobile subscribers accounted for nearly 40 percent of the total telephone subscribers in this country and become 0.55 teledensity comparing with the fixed teledensity of 0.91. Furthermore, there is a contract plan, which shows additional 45,000 units of mobile services in near future in Lao P.D.R. The mobile coverage are now extended rapidly and this could be a boost to telecommunication access within and among city areas.

Vientiane municipality occupies around 60 percent of total fixed 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. Presently, these telephone services are even limited within a part of provincial capital areas.

Fixed teledensity has been increasing from 0.41 in 1996 to 0.91 in 2001. Total teledensity has been growing higher comparing the fixed one from 0.49 to 1.46 teledensity during the same period due to the rapid increase of mobile subscribers at recent years. However, fixed and total teledensity in Lao P.D.R. are still below the average of low-income countries, such as 2.90 fixed teledensity and 3.85 total teledensity in 2001.

A major development of the local city area network is now undertaking by German Aid project. A local city area network as the RUTEL radio system has been constructing for expansion of the telephone services in local city areas for a maximum of 320 subscribers connected over 28 TDMA channels to a base station. The subscriber terminals are connected by a directional radio link to the base station. As of 2000, 40 percent of district local city area was connected with more than 1,000 main lines (Phases I to III). By 2004, this project will connect up to 75 percent of all district local city areas (up to Phases IV) assisting the local area socio-economic activities. However, in terms of teledensity, Vientiane has 4.5 main lines per 100 population, urban areas except Vientiane have 1.3 lines, and local city areas have only 0.02 lines.

**Table 1.5 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** |
| Telex | 60 | 60 | 58 | n.a | 46 | 46 |
| Internet Subscribers | --- | --- | --- | n.a | 2,610 | n.a. |
| 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)

## 1.2 Telecommunications Demand Studies in Lao P.D.R.

There are two telecommunications mater plan studies which were calculated the demand of fixed telephone main lines in the country. The first study was conducted by DETECON under the name of the Long-Term Plan. This plan covered up to the year of 2010. This guided the preparation of the Telecom II project. The second study was organized by ITU and reported at 1996 under the name of Lao Telecom 2000 Development Plan in which demand target year was 2005. It should be noted that telecommunications demand studies in these two reports were only for forecasting the numbers of fixed main lines in Lao P.D.R. In addition, latest ITU projection figures in selected Asian counties shown in 2002 ITU Report are summarized in the Table below.

(1) The Long-Term Plan (1990 DETECON Study)

Demand forecast done by the 1990 DETECON (The Long-Term Plan) was 44,800 as the total telephone main line demand for the year 2000 based on the projection of GDP per Capita at US$1,000 in the year 2010 (2.4 main stations per 100 population). Also, the Long-Term Plan noticed that the density would reach 1.0 main line per 100 population when the GDP reached about US$ 425 per capita.

(2) Lao Telecom 2000 Development Plan (1996 ITU Study)

Demand forecast done by the 1996 ITU (Lao Telecom 2000 Plan) had been also calculated. Based on the 1990 DETECON demand methodology with population growth adjustments. The reduction of the growth rate from 2.9 percent to 2.6 percent for the country (estimated growth rate between 1985 Census and 1994 current figure) had been taken into account when the future density figures were calculated in the regression forecast methodology. In addition, the report noted that fixed telephone line demand would be stimulated by the reduction of per line cost due to the price elasticity factor.

Comparison of demand results by two studies is shown in Table below:

**Table 1.6 Comparison of the 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)

Again, 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 mainly generates at outside of city center (suburban residents) and rural areas. Thus, the total numbers 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 5.1)

(3) ITU "The 2002 World Telecommunication Development Report: Reinventing Telecoms"

The projections of the year of 2005 regarding to fixed main telephone lines, total and per 100 inhabitants, and mobile subscribers, total and per 100 inhabitants for the year of 2005 are studied in this Report. The results of ITU projection for selected countries are shown in table below. Among these counties, fixed main telephone lines density in Thailand, Malaysia and Cambodia are expected to be declined up to 2005. On the other hand, mobile subscribers per 100 inhabitants are expected to be growing up to 2005 with high growth rate.

**Table 1.7 Projection of Fixed and Mobile Telephone Subscribers in Selected Asian Countries by ITU Report**

| Selected Asian Countries | 2005 Telecommunications Projection | | | | | |
|---|---|---|---|---|---|---|
| | Fixed Telephone Lines | | | Mobile Telephone Subscribers | | |
| | Total ('000) | Per 100 inhabitants | | Total ('000) | 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 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

## 1.3 Telecommunications Demand Survey Results

(1) Survey Structure

The telecommunications demand survey designed and tested the Demand Survey questionnaire that consists of two different forms, one for Institution (58 key questions) and the other for household (47 main questions), formulated to estimate the overall telecom demand in Lao P.D.R. The questionnaire structure is shown in Figure below:

a) Present type of telecommunication services infrastructure;

b) Present condition of telecommunication use and means;

c) Needs and issues for telecommunication service improvement; and

d) Needs for future telecommunication services, such as Internet & Leased lines.

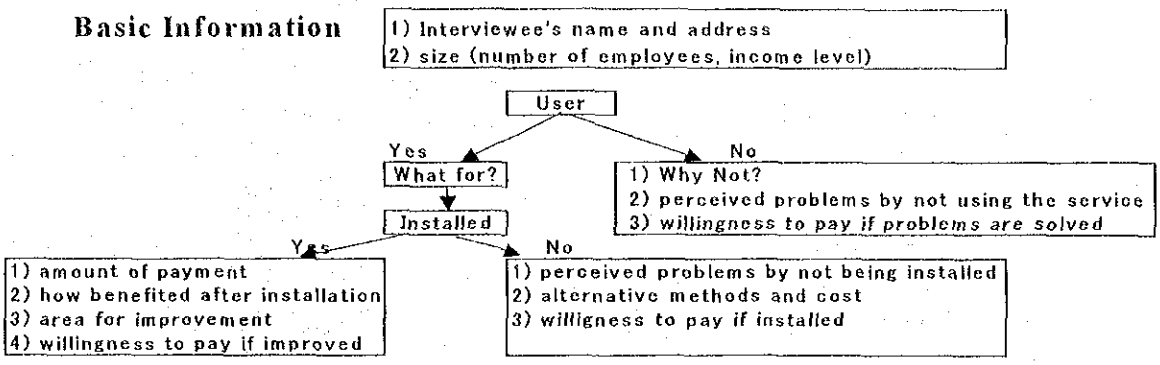



**Fig. 1.5 Basic Structure of Demand Survey Questionnaires**

(2) Survey Areas

According to the high potentialities of socio-economic development in the future, the following survey areas were selected for analyzing future telecommunications demand. In addition, a few rural district centers were also selected to measure the telecommunication demand in terms of the BHN consideration.

A1. Luangphrabang city area (as a major international tourist spots)

A2. Vientiane capital area (as a capital city and highly urbanized area)

A3. Savannakhet city area (as a center city of central region and future international cross-border area)

A4. Pakse city area (as a city of south region and advanced agricultural area)

A5. Selected rural district centers nearby above four (4) city areas.

(3) Number of Survey Sampling

Main target groups of the survey were households and institutions in the Lao P.D.R., mainly in Vientiane, Luangphrabang, Savannakhet and Champasack provinces.

**Table 1.8 The Survey Sample by Province**

| Provincial Areas | Characteristics | Telecom Density | No. of Sample |
|---|---|---|---|
| **1. Luangphrabang** | | | |
| 1)Luangphrabang city | Tourism, Commercial | High | 75 |
| 2)Ngoi | Remote area | Low | |
| **2. Vientiane** | | | |
| 1)Vientiane municipality | Capital | High | 75 |
| 2)Vangvieng | Tourism | Low | |
| **3. Savannakhet** | | | |
| 1)Savannakhet city | Industry/factory | High | 75 |
| 2)Atsphangthong | Agro-industry | Low | |
| **4. Champasack (Pakse)** | | | |
| 1)Pakse | Commerce, Agro-industry | Low | 75 |
| 2)Lao Ngam | Remote area | Low | |
| **Total** | | | **300** |

(4) Survey Results

a) Telephone Users

The survey showed that 89 percent of the total interviewees used telephone services but only 29 percent of them had telephone lines at home. Another small percentage (11percent) did not use telephone at all.

**Table 1.9 Classification of Telephone Users**

| Classification | Frequency | Percent (%) |
|---|---|---|
| **Users of telephone** | 273 | 89 |
| ▪ Users with lines at home | 138 | 29 |
| ▪ Users without lines | 135 | 61 |
| **Non-users of telephone** | 27 | 11 |
| Total | 300 | 100 |

b) Telephone Bills (US$1=9,500Kips)

The averaged monthly telephone bill for all telephone users surveyed was about 609,000 Kips (US$64.1), 180,000 Kips ($18.9) for the household and 1,039,000 Kips ($109.4) for the institution.

**Table 1.10 Average Monthly Telephone Bills**

| Users | Averaged bill | Measurement |
|---|---|---|
| Household | 180,000 | Kips per month |
| Institution | 1,039,000 | Kips per month |
| Average | 609,000 | Kips per month |

c) The major call destinations

There are three main call destinations:

Local: Within each province (Vientiane, Luangphrabang, Savannakhet, Pakse)

Long distance: Between provinces, mostly between Vientiane, Luangphrabang, Savannakhet, Khammouan, Champasack (Pakse).

International: Mainly, Thailand, China, Vietnam, USA, France, Canada, etc.

d) Benefits and problems in using telephone

Benefits

The overall benefits of using the telephone included (1) easy communications with clients, partners, friends or relatives (88% of the total users connected to the telephone), (2) communications and transportation cost saving (82%), (3) ability to make emergency calls (72%), (4) wider access to information (64%) and (5) greater opportunities for acquiring new customers and business partners (64%).

**Table 1.11 Benefits of Using Telephone**

| No. | Benefits of telephone | Frequency | Percent (%) |
|---|---|---|---|
| 1 | **Became easier to communicate with business partners/customers, and friends/relatives** | **121** | **88** |
| 2 | Made new business contact and/or customers | 88 | 64 |
| 3 | **Became easier to make emergency calls** | **99** | **72** |
| 4 | Easier and wider access to information | 88 | 64 |
| 5 | Became easier to exchange documents by fax | 57 | 41 |
| 6 | **Saved telecommunication and transportation fee** | **113** | **82** |
| 7 | Improved the quality of your business/service | 66 | 48 |
| 8 | More enjoyment in life | 35 | 25 |
| 9 | Specify if there is any other | 0 | - |
| | Maximum frequency and percentage per question | 138 | 100 |

Major problems in using the telephone

Major hindrance in using telephones mainly related to low telephone service capacity and poor quality. The survey statistics indicate that "telephones are often not working or being engaged" was the biggest issue (47.8% of the respondents), followed by slow repair (34.1%) and noise (30.4%).

**Table 1.12 Major Problems in Using Telephones**

| No. | Main problems of using telephone | Frequency | Percent (%) |
|---|---|---|---|
| 1 | Telephones are often not working or being engaged | 66 | 48 |
| 2 | Slow repair | 47 | 34 |
| 3 | There are a few public telephones | 12 | 9 |
| 4 | Noise | 42 | 30 |
| 5 | Specify if there are other problems | 32 | 23 |
| | Maximum frequency and percentage per question | 138 | 100 |

e) Willingness to pay extra if the above problems are solved

The telephone users were willing to pay extra about 38,500 Kips ($4.1) in average per month if the above listed problems were solved (12,000 Kips ($1.3) for household and 65,000 Kips ($6.8) for the institution).

f) Subscription of extra telephone lines

The survey outcomes indicated that more than 87 percent (or 95 households) of unconnected household telephone users (109 households) want to have telephones installed at home in near future. About 77 percent (84 households) of them also look for public telephones to be installed nearby to their houses.

Around 47 percent of the organizations interviewed (or 56 units out of 120 samples) wanted to subscribe new extra telephone lines, averaged 2 lines per institutional unit.

Majority (68%) of those who did not use telephone (27 households) also wanted to have fixed telephones at home and public telephones nearby in the near future.

g) Reasons for not having telephone in general

Those respondents who did not have telephone lines at home accounted for 54 percent (or 162 units) of the total respondents (300). These households were not connected to the telephone line because there were no telephone lines available nearby or it was too expensive to set up a telephone. Some

others interviewees replied that they did not really need to use telephone yet.

h) Problems caused by not using telephone

Causing problems by not using telephone services, most of the respondents faced problems with making business contacts, personal communications, exchange of necessary information, potential losses of business opportunities as well as making an emergency call.

i) Mobile Telephone

From 300 units surveyed only 56 (or 19%) had mobile telephones (12 for the household and 44 for the institution). The averaged monthly mobile telephone bill was about 370,500 Kips ($39.0), of which about 161,000 Kips ($16.9) for household and 580,000 Kips ($61.0) for organization.

j) Advantages of mobile telephone

The statistics of the survey showed that application of digital telephone is more useful than the fixed telephone because it provides quicker access to people and information without geographical and time limitations. It also helps improve business performance and it is useful when fixed telephone is not working.

k) Problems of Mobile Telephone

Main problems of mobile telephone included factors, such as small service area, noise distraction and often being busy or engaged.

If the above problems are solved the mobile users are able to pay extra 96,000 Kips ($10.1) in average per month (24,000 Kips ($2.5) for household and 168,000 Kips ($17.7) for institution).

l) Non-Mobile Telephone Users

The survey results show that 244 out of 300 respondents had no mobile telephones because of the following reasons:

The mobile telephone service was not available in the areas,

The telephone was too expensive,

The coverage of the service was too narrow,

No need yet, and

Not enough budget.

m) Internet

Internet users

The survey outputs indicate that only 40 out of 300 respondents (or 13%) used Internet whereas 260 interviewees (or 87%) were not regular Internet users. Furthermore, many of them did not use Internet because they have no idea what the Internet is. In addition, they did not really need the Internet by its nature of personal use or for business and service purposes. On the other hand, Internet service fees were too expensive according to the interviewees.

Purposes of using Internet

Main objectives of using the Internet are to e-mail to someone (friends, relatives, business partners, customers and so on), enjoy oneself, chat with someone and transfer or download data, access to information worldwide.

The household users Internet about 2 days per week and paid 41,000 Kips ($4.3) per month while the institutional players accessed more than 4 days per week and paid about 924,000 Kips ($97.3) in average.

Main Internet Service includes Laotel (72% of the total subscribers), Globcom, Globnet, Golfnet, Internet café, Laonet and WVL Public Mail Box/WL Lao.

Benefits of Internet

Most of interviewees mentioned that key advantages of using the Internet are that it provides cost saving, encourages personal contacts with friends, relatives and business people, supports quick access to information or global reach, makes the life more enjoyable, enriches knowledge. In addition, it also enables frequent contacts with business associates or customers and opened up opportunities for building relationships with new business associates and customers.

The internet also promises a wide range of future business applications, such as online advertising, acquiring new business associates and customers on Web, sharing information and data with customers and business partners, conducting e-commerce operations and sharing data and information within the organization via Intranet.

Problems of Using Internet

The common problems of using Internet were slow access, low work performance or often being engaged, low security and difficulty in making long distance call to access the ISP.

Extra Payment for better service

Many Internet users are prepared to pay extra in average about 6,000 Kips ($0.6) for household users and 67,000 Kips ($7.0) for institutional users per month.