Internet on the Mekong: Lao PDR Case Study

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This report was written by Michael Minges and Vanessa Gray of the International Telecommunication Union (ITU). Tim Kelly provided valuable comments. Nathalie Delmas formatted the report. It is based on research carried out from 5 – 8 November 2001 as well as articles and reports noted in the document. The assistance of Lao Telecom, particularly Somchit Leuangvansay and Bounthone Phounsavath, was indispensable and highly appreciated. We would also like to thank Peter Loone (PlaNet Online) and Gi-Soon Song (Center for Development Research, ZEF) for their extensive and valuable comments on the draft version of this report.

Equally, the report would not have been possible without the cooperation of the many Lao organizations who offered their time to the report's authors. The report is one of a series of case studies examining the Internet in South East Asia carried out in 2001. Additional information is available on the ITU's Internet Case Study web page at http://www.itu.int/ITU-D/ict/cs/.

The report may not necessarily reflect the opinions of the ITU, its members or the government of the Lao People's Democratic Republic.

The title refers to the Mekong River, which runs almost the entire length of Lao.

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1. Country background

1.1 The only landlocked South East Asian nation

The Lao People's Democratic Republic (Lao PDR, or Laos), with an area of 236'800 square kilometres, is South East Asia's only landlocked country. Lao PDR is situated in the centre of the Indochina Peninsula. It is bordered by China to the north, Vietnam to the east, Cambodia to the south, Thailand to the west and Myanmar to the northwest. Some 70 per cent of the country is composed of mountains and high plateaux. The plains region is situated along the Mekong River, which runs through 1'898 kilometres of Lao territory. Situated between the Tropic of Cancer and the Equator, Laos has a tropical climate. Administratively, the country is divided into 18 provinces, 142 districts, and 10'912 villages.

Figure 1.1: Map of Laos

Source: The World Factbook.

1.2 Growing too fast?

Laos had a population of 5.2 million at mid-year 2000 with an annual population growth of 2.8 per cent. At this rate, the Lao population would double by 2025, posing, according to one commentator, *"serious threats to Government efforts to raise the living conditions of the Lao people."*[1] Families are large, with the average household composed of six persons. Several hundred thousand Laotians live abroad, part of an exodus following the change of government in 1975.[2] The majority of the population, around 85 per cent, lives in rural areas. At 22 people per square kilometre, Laos has the lowest population density in Asia. Its capital, Vientiane, is home to some 598'000 inhabitants. The country is young, with 94 per cent of the population under 29 years.

The 1995 population census recorded 48 different ethnic groups in Laos. The major one is the *Lao Loum* who live in the lowlands and the Mekong river valley and who make up about 68 per cent of the population. The *Lao Theung*, who are believed to be Laos' first inhabitants, make up about 22 per cent of the population and live in the mountainous region. Most of the *Lao Soung*, who make up about ten per cent of the population, are nomadic and often live in very remote areas, especially the highlands, above 1'000 meters. Lao culture has been influenced by Thailand, Cambodia and Vietnam and the *Lao Loum* share many similarities with the Thai. The official language is Lao as spoken in the capital but there are many different dialects. Most are related to Thai, which is also widely understood. As a former French colony, some people–generally the older generation–speak French. English is increasingly emerging as the second language, particularly among the young. Theravada Buddhism is the

Table 1.1: Population indicators

Item	2000
Population (million)	5.2
Population growth rate (%)	2.8
Rural population (%)	85
Households (thousands)	849
Average household size	6.1
Average life expectancy at birth (years)	54.7
Age Distribution:	
Below 15 years (%)	44
15-29 years (%)	50
30 years and older (%)	6

Source: National Statistical Centre.

religion of the majority of Laotians. Some tribes practice animism.

1.3 Agriculture is king

With an annual per capita income of US$ 290 (2000), Laos is one of the region's poorest nations and is classified by the United Nations as a Least Developed Country (LDC). Most people survive on subsistence agriculture. Around 39 per cent of the population lives in poverty. The Lao economy is mainly based on agriculture, which employs over half of the work force and contributes over 50 per cent of Gross Domestic Product (GDP).

The Laotian economy has traditionally been based on state planning and control. In 1986, the government launched its New Economic Mechanism (NEM), aiming to create a more market-oriented economy by emphasizing privatization, promoting international trade and creating a stable environment for foreign investment. Between 1992 and 1997 the economy grew by an average of seven per cent a year. Laos was affected by the Asian financial crisis, which started next door, in Thailand in July 1997. The devaluation of the Thai baht, led to a depreciation of the Lao currency, the kip, to one-tenth its pre-crisis value and inflation rose drastically. Inflation hit over 100 per cent in 1999 but dropped to 24 per cent in 2000 and continues to stabilize. While the economy started to recover in 1999, the overall situation remains fragile and the country's ability to recover from the crisis will also depend on Thailand's economy. Eighty-four per cent of Laos' imports (1998) go to Thailand. Thailand also represents a large hydroelectric market and a drop in energy demand from the Thai side has caused a major loss of export revenue. Thailand is also the biggest foreign investor in Laos, including in the telecommunications sector.

Laos has great hydroelectric potential and could expand this sector. Other major exports include textiles, wood and forest products, agricultural products, coffee, tea, minerals, and handicrafts. In 2000, exports accounted for US$ 393 million, 22 per cent of GDP. Nonetheless, Laos imports more than it exports and in 1999 ran a trade deficit of US$ 214 million.

The country depends upon foreign assistance to carry out its development objectives and reduce poverty. A major development goal is exiting the ranks of the LDCs by the conservative date of 2020. In 1997 foreign aid accounted for 38 per cent of the government's budget and in 1999 foreign aid per capita stood at US$ 58.

1.4 Raising literacy

Laos ranks 131st out of 162 on the United Nations Development Programme's (UNDP) Human Development Index (HDI). This places the country towards the top of the "low human development" category. The HDI is composed of a basket of indicators including life expectancy at birth, adult literacy, school enrolment and GDP per capita (measured in Purchasing Power Parity). Lao PDR ranks lowest among South East Asian Nations (see Table 1.2). Its major weakness is the low adult literacy rate

Table 1.2: Human Development Indicators

Lao PDR compared to selected South East Asian countries, 1999

HDI Rank	Country	Life expectancy at birth (years)	Adult literacy rate (%)	Combined school gross enrolment ratio (%)	GDP Per Capita (PPP US$)
26	Singapore	77.4	92.1	75	20'767
56	Malaysia	72.2	87.0	66	8'209
66	Thailand	69.9	95.3	60	6'132
70	Philippines	69.0	95.1	82	3'805
101	Viet Nam	67.8	93.1	67	1'860
102	Indonesia	65.8	86.3	65	2'857
118	Myanmar	56.0	84.4	55	1'027
121	Cambodia	56.4	68.2	62	1'361
131	**Lao PDR**	**53.1**	**47.3**	**58**	**1'471**

Source: ITU adapted from UNDP.

that is reported by UNDP as 47.3 per cent for 1999. This diverges from national statistics from the 1995 population census where the adult literacy rate in Laos was reported at 60 per cent. A recent government report claims that literacy had risen to 70 per cent by 2000.[3] Furthermore national statistics base the literacy rate on the respondent's ability to read and write Lao. This may result in distorted results since only 53 per cent of the population is ethnically Lao.

1.5 Recent history

The first Laotian state, the Kingdom of *Lane Xang* ("million elephants") was founded in 1353. It existed until the beginning of the 18th century, when it was divided between three separate dynasties and ruled by the Siamese (Thai). In 1893, Laos became a French protectorate. Although there was a strong nationalist movement before and during World War II (when the country was occupied by the Japanese), France regained control over Laos. In July 1949 Laos obtained semi-autonomy within the French Indochina Union. An independence movement from Vietnam, the Viet Minh, backed by the national resistance movement, the *Pathet Lao* ("Land of Laos"), moved into parts of central Laos and civil war broke out. The French eventually acknowledged the independence of Laos and the Kingdom of Laos gained full sovereignty in 1954. National conflicts between different forces led to further internal struggles. In 1961 these forces agreed to a cease-fire and the establishment of a coalition government. However soon after, Laos became embroiled in the Cold War and drawn into the US-Vietnam war. Laos sustained some of the heaviest bombing of the 20th century as US forces sought to destroy parts of the Ho Chi Minh Trail that passed through the eastern part of the country. Another terrible legacy of the war is that more than 25 years later, some 50 per cent of Laotian territory contains unexploded ordnance. In December 1975 the monarchy was abolished and the Lao People's Democratic Republic established under the rule of the Pathet Lao party. Lao adopted its first constitution in 1991. In 1997, Lao PDR joined the Association of Southeast Asian Nations (ASEAN).

[1] "Lao population set to double in one generation." *Vientiane Times*. 9 – 12 November 2001.

[2] According to the US government, some ten per cent of the Laotian population sought refugee status since 1975, including 250'000 who have settled in the United States. See U.S. Department of State. "Background Note: Laos". www.state.gov/r/pa/bgn/index.cfm?docid=2770. According to a Thai newspaper article, 56'384 Lao workers have registered with labour authorities in Thailand and this is believed to be only a fraction of the total number of Laotians living in that country. See Penchan Charoensutthipan. "Aliens flustered as employers refuse to pay for registration." *Bangkok Post*. 23 October 2001. www.bangkokpost.net/231001_News/23Oct2001_news09.html

[3] Lao PDR Government. *Interim Poverty Reduction Strategy Paper*. 20 March 2001. www.imf.org/external/np/prsp/2001/lao/01/index.htm.

2. Telecommunications in Laos

Lao PDR has made a number of changes to the structure of its telecommunication sector over the last decade. This includes introducing private investment through a joint venture (1994) as well as separating posts from telecommunications (1995). A new telecommunication law was passed in 2001 and will soon be implemented. At least in theory, the sector has been open to competition since the beginning of November 2001. However these changes have not typically been the result of a transparent timetable. Today the telecommunications sector seems trapped in a web of tension between development assistance bodies, private investors, inter-ministerial rivalry and state planners. Reconciling these forces will be a major challenge. The nation also faces immense technical and commercial challenges in expanding telecommunications. Most of the population resides in rural areas, transport and electrical infrastructure are scarce and incomes are low. The traditional money earner for the industry, international telephone calls, is under mounting pressure globally and local tariffs have not kept up with the recent pace of inflation and currency devaluation.

2.1 The Ministry in charge

The **Ministry of Communication, Transport, Post and Construction** (MCTPC), with a staff of around 300, is responsible for telecommunication policy and regulation. The *Department of Posts and Telecommunications* (with a staff of 22) is the functional unit within MCTPC whose tasks include frequency management, telecom and post policy, long term development strategy, licensing and regulation. MCTPC has an annual budget allocated by the government. The German development bank, KfW, is one of a number of bodies involved in advising the government on the establishment of a regulatory authority.[4]

Telecommunication development has been guided by Master Plans. Detecon, the consulting arm of Deutsche Telekom, developed the Master Plan covering the period 1990-2000. The Japanese International Cooperation Agency (JICA) is developing a new Master Plan, covering the period 2003-2015.

2.2 ETL revival

Until 1993, the Enterprise of Post and Telecommunications Lao (EPTL) was the 100 per cent government owned organization responsible for operating telecommunications in the country. In 1994, a joint venture was established between the government and a Thai company, Shinawatra International Public Company Limited, called Lao Shinawatra Telecom Company Ltd (LST) to operate telecom services (telecom project Phase III). It should be noted that this was not the first example of private investment in the telecom sector. In 1990, Telstra of Australia installed and operated an international gateway with satellite connectivity to Intelsat. This so-called Business Cooperation Contract, following a model common in Vietnam, was for a term of ten years and has expired.

In 1995, EPTL was divided into Enterprise of Post Lao (EPL), responsible for postal services and **Enterprise of Telecommunication Lao** (ETL), responsible for telecommunications.

In 1996, ETL and LST were merged to form **Lao Telecommunications Company Limited** (LTC, or LaoTel) with the government owning 51 per cent and Shinawatra owning 49 per cent. LaoTel was granted a concession of 25 years with five-year exclusivity (through October 2001).

Meanwhile the Japanese government had provided infrastructure grants and

loans in the 1990s. These included local and transit exchanges as well as the international gateway. Under its official development assistance policy, Japanese aid is not available for private companies such as LTC. Therefore a way had to be found to regularize this situation. So ETL was resurrected in August 2000 and the Japanese supplied assets transferred to it. As a result, LaoTel ended up leasing certain network elements needed for its service provision such as the international gateway. With the expiration of LaoTel's exclusivity in October 2001, the way is now open for ETL to enter the sector as a telecom service provider. ETL plans to provide fixed telephone lines, mobile GSM and VoIP services in 2002.

Millicom International Cellular SA, a Luxembourg-headquartered international mobile investor, with operations in a number of countries including Cambodia and Vietnam, announced in June 2000 that it had approval (in the form of an MOU) to obtain a mobile cellular license upon the ending of the exclusivity of LaoTel's license.[5] In January 2002 Millicom was awarded a GSM 900 and 1800 license. It will provide mobile services in a joint venture with the government and is expected to launch in the second half of 2002.[6]

2.3 Building the PSTN

Laos has made impressive strides during the 1990s in boosting its fixed telephone network. Annual growth averaged 20 per cent a year between 1991-2000, the 3rd highest in the South East Asia region. As a result the number of fixed telephone lines in service grew from 7'270 in 1991 to 47'810 in September 2001. Fixed teledensity rose from 0.17 to 0.89 per 100 inhabitants and is poised to break one sometime in 2002. The local exchange network is completely digital.

A microwave backbone running the length of the country from north to south was completed in 1994. It is starting to show its age and is having difficulty handling the increased growth of the telecommunication network. Due to a lack of electricity, solar energy or gasoline generators power parts of the backbone but in some places, the solar storage units are losing capacity. There is one fibre-optic junction. It runs from east to west from the Vietnamese border (via Khamkeut in Bolikhamxay province) to Vientiane, and is part of the regional CSC (China-Singapore Cable) network, planned by the Asian Development Bank. The idea of installing a fibre optic network along the highway that would run most of the length of the country has been planned by ETL. Lao Telecom has also petitioned the government to allow it to use satellite technology for nationwide communications.

2.4 Who wants a telephone?

Universal telephone service—where almost every family has a telephone—is still a long way off for Laos. It is estimated that fewer than four per cent of Laotian households currently have a telephone. Less than half of Laos' districts (58 out of 142) have fixed telephone services and only urban areas in half of the provinces are covered by a mobile cellular signal.

There is no specific plan for developing universal access to telecommunications. The telecommunication Master Plan established targets but there was no clear link between these targets and explicit mechanisms for achieving them. Of course the fact that the government owns half of LaoTel suggests that it can exert its goals into network rollout. The MCTPC has set a target of teledensity of three by 2005, but again there is no clear mechanism of how this will be reached. It is interesting to note that according to official reports less than 6'000 people were on the waiting list for a fixed telephone line at the end of 2000. This suggests that 87 per cent of all expressed demand for telephone service in the country is met. Taken at face value, one could argue that demand for telephone service in Laos is almost satisfied. However this does not factor in people that could not afford telephone service or just assume service cannot be obtained because they live in areas without electricity or telecommunication infrastructure. One estimate puts 'hidden' demand at 35'000.

It seems that affordability is only partly a barrier to access. The connection charge for the fixed telephone network is just Kip 300'000 (US$ 38). This amount is equivalent to roughly 13 per cent of household yearly consumption expenditure.[7] Though this seems large, it is a one-time investment to get connected to the network and is far below the actual cost of providing service. After that, monthly expenditures for phone service seem manageable for wealthier households. For example the monthly telephone fee plus 100 minutes of local telephone calls (Kip 15'000 + 4'500 = 19'500) is equal to 10.3 per cent of average monthly household consumption. It should be noted that the average household already spends 10.6 per cent of its income on transport and communications. Furthermore, there is a difference in consumption between urban and rural households. For the average urban household, monthly telephone service would amount to about six per cent of consumption. Thus there are at least 135'000 urban households that could afford telephone service yet only around 33'500 had service at September 2001. Though more work is needed in analysing telecommunication demand in the country, there appears to be a mismatch between supply and demand.

One means of promoting wider access is through public payphones. LaoTel installs card phones since there are no coins in circulation. These are being upgraded to magnetic smart cards. At September 2001, there were 312 card phones in the country, more than double the amount three years earlier. The close community structure in Laos also lends itself to telephone sharing and those with phones will often let neighbours use them (typically for a fee of between Kip 1'000 – 2'000 per minute). This may explain why compared to other developing countries we find few public phone centers. Also, public phone centers can only operate under ETL's or LaoTel's license.

The role that prepaid mobile has played in other countries for enhancing telecom access has not yet been fully exploited in Lao PDR. Prepaid service was only launched in 2000, and is more than three times more expensive per minute than subscription mobile service (800 kip per minute, or about US$ 0.8 per minute). It seems certain that new companies planning to enter the mobile market will launch with prepaid services. If mobile coverage can also be extended, this could mean a big boost to telecom access.

With 83 per cent of its population residing outside urban areas, rural telecommunication development is an important challenge for Laos. LaoTel has a Rural Telecom Networks project with four phases. The technology is based on radio links from towns with telephone exchanges to villages. The first three phases, covering the period 1994-2001, saw the installation of 1'224 lines. The fourth phase, covering 2001-2004, will install an additional 856 lines.

The Asia Cellular Satellite Company (ACeS) has been lobbying the government to operate in Laos.[8] This pan-regional geo-mobile satellite system covers all of South East Asia and works with a small antenna attached to a dual mode (satellite / GSM) mobile handset. It seems especially appropriate in Laos where large parts of the country are inaccessible by roads and lack electricity or telecommunication infrastructure.

2.5 International makes the money

Laos is typical of many developing countries where international calls have been used to keep local service affordable. The country has some of the highest international tariffs in the world as well as some of the cheapest local ones. A one-minute call to the United States costs US$ 1.90 whereas a local call costs less than one US cent. International services accounted for 50 per cent of LaoTel's revenues in 2000. This situation is probably untenable. Although LaoTel currently has a monopoly on overseas calls, this may soon end as ETL and perhaps others are expected to enter the

Table 2.1: Telephone tariffs 2001

Item	Kip	US$
Telephone connection	300'000	38
Monthly subscription	10'000	1.27
Local call (per minute)	45	0.6 US cent

Source: LaoTel.

market. Furthermore indirect competition is having an impact on international revenues. This includes growing incoming traffic as well as refile.[9] Another development is Voice over Internet Protocol (VoIP). Though technically illegal for anyone to provide besides LaoTel and ETL, VoIP is openly offered in many Internet cafés. In addition, ETL plans to launch an international VoIP service.

Being landlocked, Lao PDR relies heavily on satellite technology for international traffic. It uses an Intelsat Standard A earth station donated by the Japanese. An earth station installed by Telstra in 1990 under a ten-year so-called Business Cooperation Contract is no longer in use. There are also radio and fibre optic links across the border to Thailand and Vietnam.

2.6 Mobile potential

An AMPS analogue cellular network was launched in 1993 serving Vientiane and a year later a GSM 900 network was introduced (December 1994). The AMPS network has since been shut down. The GSM network is now available in nine of the country's eighteen provinces. As coverage is usually available only in the largest town of the province and does not fully extend down the nation's main highway, it is estimated that less than ten per cent of the population is covered by a mobile signal.

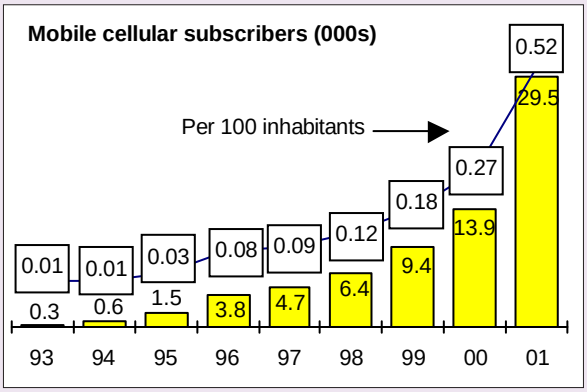
Despite eight years of mobile cellular, Lao PDR has not yet experienced a wireless boom to the same extent as other developing nations. For example, neighbour Cambodia, with roughly the same per capita income, launched mobile about the same time as Laos. Yet Cambodia now has twice the mobile penetration of Laos. At September 2001, mobile subscribers accounted for one third of the total telephone subscribers in Laos and mobile density was a mere 0.25 per cent.

There are several possible explanations. Laos was the last country in the region to introduce competition in the mobile sector. It also only recently launched prepaid (2000). Some argue that the country's economic and geographic situation work against wide mobile penetration. Incomes are low, the vast majority of inhabitants are rural and much of the terrain is mountainous. The relevance of these factors will become more known over the next year with two new mobile networks set to launch (ETL; Millicom).

Perhaps in anticipation of mobile competition, LaoTel has been actively building out the mobile network over the last year. The number of subscribers grew by 75 per cent between January and September 2001, significantly above the annual average growth of 44 per cent a year between 1997-2000. One factor has been the start of the M-Phone prepaid service. Launched in 2000, there were 5'402 prepaid subscribers at September 2001, accounting for 21 per cent of all mobile cellular subscribers.

Some Laotians already benefit from a sort of indirect mobile competition. Those living along the 1'835 long kilometer border with Thailand can receive cellular signals from Thai mobile operators. For example, various parts of Vientiane are within range of Thai mobile networks.

Figure 2.1: Mobile cellular growth



Source: ITU adapted from LaoTel.

Laotians with business interests in Thailand have been known to take out Thai mobile subscriptions. Laos is also losing out on roaming revenues as it has few agreements with mobile operators in other countries. Some foreigners in Laos thus connect to Thai networks to make roaming calls.

Box 2.1: Mass Media

Lao PDR's mass media is undeveloped. This is due to its late start, the difficulty of delivering newspapers over few roads, inaccessibility of electronic media, the low literacy rate as well as government ownership of all media. The Ministry of Information and Culture is responsible for policy and regulation in the sector. The first newspaper was launched in August 1950. Today there are two major Laotian dailies—*People's Daily* (Pasason) and *New Vientiane* (Vientiane Mai)—with a combined print run of around 15'000 copies. There is also an English language bi-weekly, the *Vientiane Times* (3'000 copies) and a weekly French paper, *Rénovateur* (1'000 copies). News kiosks are rare and foreign newspapers and magazines are virtually unobtainable. The foreign language papers as well as the Lao News Agency (Khaosan Pathet Lao, KPL) have web sites.[10]

Radio broadcasting started in 1960. There are two national channels and 20 provincial stations broadcasting over AM and FM bands. Radio covers around 65 per cent of the population. According to the National Statistical Centre, 52 per cent of Laotian households had a radio in 1997. Radio is a key source of news and information due to its comparatively wide coverage, the relatively low cost of a radio receiver and the fact that radio can reach illiterate sections of the population.

Television broadcasting started in May 1993. Like radio, there are two national channels broadcast over 27 nationwide stations. Terrestrial coverage is around 40 per cent of the population. Some 30 per cent of households had a television in 1997. In frontier regions, channel availability is supplemented from cross-border television signals. For example, three Thai television stations can be received in Vientiane. A growing number of Laotians are turning to satellite television. Thailand's UBC pay Direct-to-Home service is available in parts of Laos. A Chinese cable TV operator has also been licensed in Vientiane and was recently granted a ten year nation-wide concession.

Videos and VCDs do good business in Lao, since the last cinemas closed a few years ago. Thai cinemas have been a beneficiary with some Laotians hopping across the border to watch a movie. Some 20 per cent of Laotian homes had a video recorder in 1997, a high proportion considering the relatively low level of incomes.

[4] See "Advising the state on setting up regulatory authorities" on the KfW web site at www.kfw.de/en/entwicklungszusammenarbeit/news38/archive86/onfocus67/public-pri.jsp

[5] Millicom. "Millicom Received Approval in Principle for the License to Provide Nationwide Cellular Telephony in Laos." *Press Release*. 23 June 2000.

[6] http://micc.client.shareholder.com/news/20020124-70740.cfm.

[7] Average monthly household consumption was Kip 189'319 in 1997/98 the latest year for which data is available. This and other data used to calculate affordability come from National Statistical Centre. *The Households of Lao PDR*. December 1999.

[8] For more information see the AceS web site at www.acesinternational.com

[9] Refiling refers to an operator taking [refiling] its international traffic to/through a third country where lower charges apply for forwarding of traffic to its ultimate destination country.

[10] The Vientiane Times web site address is www.vientianetimes.la. Le Renovateur is hosted on the Laolink web site is: www.laolink.com/renovateur/renovat.htm. The KPL web site is at: http://asean.kplnet.net.

3. Laos Internet

The Lao People's Democratic Republic faces huge barriers in Internet access and use. First, since incomes are low, the price of the equipment needed to access the Internet is prohibitive. Second, even if Internet access was affordable, telecommunication infrastructure is lacking outside most urban areas. Third, due to both technical and motivational reasons, Laotian content is practically non-existent. Fourth, because of relatively low levels of literacy and educational attainment, awareness of the Internet is not high among most of the population.

Despite these barriers, there is a growing interest in the Internet among the educated and urban youth. One unique aspect of Lao is that due to the only recent opening of the national university (October 1996), most college educated citizens studied abroad. Many came into contact with the Internet during their overseas stay. They are multilingual and cosmopolitan and keen to stay in electronic contact with the world. Another factor raising awareness is that urban areas close to the Thai border are becoming familiar with the Internet through television advertising. Laotian secondary and post-secondary youth are also aware of the Internet. Many are learning English because of the large amount of content in that language. The number of Internet cafés is growing and while they first sprung up to serve tourists they are increasingly attracting curious Laotians.

The Laotian government has at times been suspicious about the potentially destabilizing influence of the Internet. This partly explains the Internet's delayed arrival in Lao PDR. On the other hand the government increasingly recognizes that Internet is important for development. The entry of Laos to the Association of South East Nations (ASEAN) in 1997 has also brought a boost to the Internet. ASEAN has a number of projects that call on its member countries to establish Internet connectivity, notably the e-ASEAN initiative <www.e-aseantf.org>.

3.1 Multiple initiatives

The history of the Internet in Lao is marked by different projects, driven by Lao expatriates, bi-lateral development assistance and commercial interests. These initiatives were often taken independently, with little coordination among them.

In 1994 Lao expatriates and others with an interest in the country set up an electronic bulletin board (Soc.Culture.Laos). They formed a group called LaoNet with the goal of establishing Internet connectivity in Lao. In December a member of LaoNet visited Vientiane and established a dial-up e-mail service from the National Polytechnic Institute to Washington DC. Financial problems and other obstacles led to the service being discontinued.

The Canadian International Development Research Centre (IDRC) launched a project in July 1996 through its Pan Asia Networking (PAN) initiative to provide e-mail connectivity in Laos. Working with the predecessor of the Science, Technology and Environment Agency (STEA), IDRC provided a grant to purchase the needed equipment. This e-mail service worked through a dial-up connection to a server in Singapore.[11]

Parallel to these efforts, a number of organizations were using Internet Service Providers (ISPs) in neighbouring Thailand. Although this involved long distance telephone calls, it served to illustrate the demand for the Internet. Some international

organizations were granted permission by the government to operate their own Very Small Aperture Terminal (VSAT) satellite connections to the Internet using the Société Internationale de Télécommunications Aéronautiques (SITA) network.

In August 1998, Globenet <www.laonet.net> established the first permanent Internet connection in Lao, using a satellite operating via the Philippines. Globenet, a company established by an American expatriate, obtained permission for the link from the Ministry of Information and Culture as part of a project to provide connectivity for the Lao news agency (Khaosan Pathet Lao, KPL).[12] Globenet also provide a broadband wireless service to almost 50 customers in Vientiane using BreezeNet equipment on the 2.4 Ghz frequency.

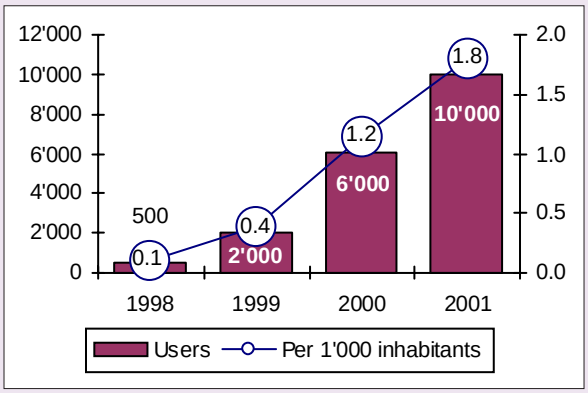
In January 1999 the Lao National Internet Committee (LaNIC) of the Prime Minister's office awarded ISP licenses to Globenet and PlaNet Computers <planet.laopdr.com>. PlaNet launched in February 1999 but was limited to only a few dial-up customers due to a lack of telephone lines. In 2001 PlaNet signed an agreement with ETL for 128 phone lines, and launched a full dial-up service in January 2002 using the CSC fibre-optic cable to Bangkok for backbone connectivity in partnership with ETL.

Although licensed by the MCTPC to do in 1997, the national telecommunication operator LaoTel <www.laotel.com> only launched its commercial Internet service in August 1999 under commercial pressure from Globenet and PlaNet Online. Its international connectivity was via a 64 kbps link to SingNet in Singapore.

3.2 The market today

There are three commercial ISPs operating today, PlaNet Online, LaoTel and GlobeNet. At September 2001, they had around 2'900 subscribers with LaoTel controlling around three quarters of the market. There are no

Figure 3.1: Internet users in Laos



Source: ITU estimates.

surveys regarding the number of Internet users in the country. Based on a multiplier of the number of subscribers, it is estimated that there were around 9'000 users in the country in September 2001. This results in a ratio of 1.63 Internet users for every 1'000 inhabitants of Laos. Put another way, the number Internet users has increased from one per 10'326 inhabitants in 1998 to one in 615 by September 2001.

Besides dial-up service provided by the three commercial ISPs, STEA also provides connectivity for eight government ministries. Some users still connect to Thai ISPs. International organizations with a waiver from the government can also establish Internet connectivity via their own VSAT links.

The only leased lines are those provided by GlobeNet's fixed wireless service. This utilizes microwave and is available in Vientiane. Speeds can go up to 444 kbps but are rarely above 33 kbps.

Approximately 60 Internet cafés operate in Laos, with about 45 of these situated in Vientiane. The combined computers available at cafés in Laos is estimated by an operator of a chain of five Internet cafés as being about 480 terminal nationwide. Considering

the amount of use each Internet café terminal receives, Internet cafés arguably provide more hours on the Internet than any other form of Internet access in Laos.

3.3 Who is in charge?

The Lao National Internet Committee (LANIC) was formed in 1998 to regulate and establish Internet policy for the nation. It was created based on an Internet Decree issued by the Prime Minister. The committee consists of the Ministry of Communication, Transportation, Posts and Construction (MCTPC); the Ministry of Information and Culture (MoIC); the Ministry of Interior; the Ministry of Foreign Affairs (MoFA) and STEA.

It was never clear if LaoTel's exclusivity included Internet services especially since GlobeNet and PlaNet obtained their license from LANIC. In any case this is no longer an issue as LaoTel's exclusivity ended in October 2001. It appears that LANIC is ready to grant a limited number of additional ISP licenses.

Internet cafés are theoretically supposed to be licensed. Most operate without a license but are tolerated. Few have occasionally been shut down for overtly providing IP Telephony. IP Telephony is illegal, except for licensed telecom providers. The MCTPC has indicated that if an IP Telephony service provider gets approval from LaoTel, then this would be acceptable.

The MoIC is theoretically responsible for approving content providers. However as there are so few Laotian sites it has not exercised this responsibility. The MoIC is equally responsible for content and access to pornographic and politically sensitive sites is meant to be blocked via a firewall.

3.4 How many gateways?

Up to now, ISPs have been allowed to provide their own international gateways. Each of the four Internet providers (three commercial and one government) has its own international connection (see Table 3.1). Since Laos is landlocked, connectivity is mostly via satellite. PlaNet/ETL, LaoTel and STEA have symmetrical connectivity while GlobeCom has more incoming bandwidth than outgoing. LaoTel was paying around US$ 3'100 per month for its international Internet bandwidth in November 2001.

The government is keen to merge all gateways into a single connection with a capacity of two Mbps. This 'One Gateway' project may be initially hosted and managed by STEA, then handed over to MCTPC under the new regulations. So far, little progress has been made in this area. One advantage might be to consolidate bandwidth requirements, thus theoretically obtaining cheaper prices. However, the main motive for the government seems to be the desire for control, both over content and potential revenue. It is alleged that firewalls are already in place thus restricting access to sensitive web sites. Disadvantages of the single gateway proposal would be a lack of redundancy as well as the inability of ISPs to plan their network growth and manage their quality of service and their expenses. In any case, STEA currently lacks sufficient technical staff to maintain the proposed gateway.

Table 3.1: Laos international Internet connectivity

November 2001

ISP	International Bandwidth (kbps)	Note
GlobeCom	640 in 220 out	Via Mabuhay Satellite
Lao Tel	512	Via SingNet
STEA	512	Via Thaicom
PlaNet/ETL	2'000*	Fibre opitc connection to Bangkok (CSC)
TOTAL	**1'664 in 1'244 out**	

Note: For PlaNet/ETL actual bandwidth in February 2002 was 256 kbps.
Source: ITU adapted from ISPs.

3.5 How much does it cost?

Dial-up Internet access tariffs are priced in United States dollars. Telephone usage charges also apply; they are 45 Kip per minute (34 US cents per hour). Table 3.2 shows dial-up Internet prices for LaoTel as well as the corresponding telephone usage charge. Unlimited dial-up packages are not currently available nor are pre-paid cards. Dial-up Internet pricing is relatively expensive for the South East Asia region with Lao having the second most expensive tariffs after Cambodia. Internet cafés in Lao were charging between 80 – 200 Kip per minute (US$ 0.55 – US$ 1.51 per hour) for Internet access in November 2001.

GlobeNet charges US$ 200 per month for its wireless solution. The advantage is that the service is flat fee so heavy users do not have to pay local telephone charges. A typical installation costs around US$ 2'500.

3.6 Laos or Los Angeles?

According to Network Solutions, STEA is the registrant for the 'la' domain name while SingNet, Singapore Telecom's ISP, is the technical contact. STEA has sold the rights to market (and sell) second level domain names on the .la ccTLD (country code Top Level Domain) to a company called Sterling, who are marketing it as "Los Angeles own domain" and selling each domain for US$ 100. Under the agreement with Sterling, STEA is meant to be set up and trained to sell third level domains on the .la ccTLD (ie, .com.la, .org.la, etc.). Although the deal was signed two years ago, STEA still has not sold or activated any third level domains. Also, despite Sterling having sold second level .la domains for US$ 200 more than twelve months ago, these domains are still not functioning and Sterling are now asking for renewals of US$ 100. The Prime Minister's Office and MCTPC are currently trying to regain full control of the .la ccTLD.

As a result, there are no known Laotian organizations that are using the '.la' domain name. There are about 50 sites for Lao companies and organizations using PlaNet's laopdr.com, laopdr.net and laopdr.org third level domain level service (i.e., www.beerlao.laopdr.com). Most other local sites use second level .com or .net domain names.

Table 3.2: Internet dial-up prices in Lao PDR

LaoTel, November 2001

Package	Hours included	Monthly ISP charge	Telephone usage charge	Total
Starter 1	6	$6.00	$2.04	$8.04
Casual 1	10	$12.00	$3.40	$15.40
Casual 2	15	$18.00	$5.11	$23.11
Pro 1	25	$26.00	$8.51	$34.51
Pro 2	35	$33.00	$11.91	$44.91
Busi Pro	50	$41.00	$17.02	$58.02

Note: Telephone usage charges converted to US$ at rate on 1 November 2001 (7'932 kip per US$).
Source: ITU adapted from LaoTel.

[11] Chin Saik Yoon. "PAN Laos: Connecting Vientiane to the Internet." *IDRC Reports*. 16 January 1998. http://www.idrc.ca/reports/read_article_english.cfm?article_num=179.

[12] For more on Globenet and early networking initiatives in Lao PDR see Paula Uimonen. "Connecting Laos: Notes from the Peripheries of Cyberspace." *Proceedings of the 9th Annual Conference of the Internet Society*. June 1999. http://www.isoc.org/inet99/3a/3a_2.htm.

[13] "dotLA Inc. to Register .la Top." 12 December 2000. http://asia.internet.com/asia-news/article/0,,161_675601,00.html.

4. Sector absorption

This study has analyzed Information and Communication Technology (ICT) developments in Laos by looking at the telecom and the Internet markets, including the infrastructure and the regulatory framework. Another way of looking at Internet developments is to focus on how it is being used. How do the different sectors of the government and the economy make use of the Internet? Making use of the Internet refers to two things. On the one hand, the Internet may be used as a direct tool, to facilitate administrative tasks, to communicate, or to research. As an indirect tool, the Internet may be used to promote the purpose of a sector, for example, through a web site or by providing or making use of a particular application. In both cases, the Internet may allow a government or the private sector to increase efficiency, provide new services and expand its activities.

Laos was one of the last South East Asian countries to adopt the Internet. Its recent introduction manifests itself in limited use of ICT. Government ministries make little use of the global network and the business sector has equally been slow to implement Internet related applications. There are several reasons, the most obvious one (but not necessarily the most obstructive) is the lack of infrastructure. Nonetheless, only a fraction of the existing PCs are actually connected to the Internet. Few government officials use the Internet and if they do, it is mainly to exchange e-mail. This means that the benefits of the Internet, where it is used, remain rather subtle (after all, e-mail is very similar to fax).

Which takes us to the second barrier to ICT development in Laos. It appears that there is an insufficient understanding of the benefits and the potential of the Internet. Although government officials agree that the Internet is important and needs to be expanded, there are no concrete plans for doing this. This lack of awareness applies to more sophisticated applications, as well as to basic applications that could help to facilitate many people's lives. One might think of applications for the rural population that could provide them with weather forecasts or agricultural market prices.

A third barrier to the development of the Internet in general and its use in different sectors in particular, is the lack of coordination between different government ministries and agencies. While different agencies and groups seem to be working on ICT related projects, there is no overall ICT Master Plan. It is not clear whether different interest groups are competing with each other or whether the government is facing a lack of communication. It is obvious, though, that the government needs to define and distribute responsibilities.

The above-mentioned barriers are characteristic for all sectors of the economy and help explain why so little sector absorption of the Internet has taken place.

4.1 E-government

One of the main barriers to Internet development in Laos is the lack of coordination. It is not quite clear which agency or ministry is in charge of ICT policies and there seems to be a shortage of communication between different parts of the government. Friction over the scope of responsibilities seems to exist especially between the Science, Technology and Environment Agency (STEA) and the Ministry of Communications, Transport, Posts and Construction (MCTPC).

In 1996 STEA was given the responsibility over IT and the mandate to prepare Laos for the 21st century. The "Lao National Plan on IT: Master Plan up to Year 2000", drafted by STEA,

called for a series of projects, including the computerization of the government. STEA was to develop different online applications for the general public, connect all ministries with each other, and develop uniform software standards to guarantee compatibility within the government. None of these plans have, however, materialized and while the Master Plan ended in 2000, there was no follow-up.[14]

Currently the MCTPC, together with the Japanese government, is working on a Telecommunication Master Plan that will cover the period up to 2015. One of the objectives of this plan, which will also cover IT policies, is to clarify the responsibilities within the government. According to the MCTPC it will be in charge of all ICT policies.

4.1.1 Government as a user

Government as a user covers the ways in which the administration uses ICT technologies internally to increase its efficiency. The Lao government does not extensively use the Internet or ICT in general. Although most ministries have some kind of computer network, they are very basic, allowing them to share printers and files. Not all ministries have Internet access and even the MCTPC is limited to seven Internet accounts. Most other ministries with Internet access have between 1-3 PCs, limiting access to the top administration. Consequently, only few government employees have their own e-mail account at work. Although most ministries are planning to set up their own web site, none of them are currently online. The Foreign Investment Management Committee, with assistance of the World Bank, have an investment portal which provides information for investors and online investment applications (www.invest. laopdr.org).

4.2 Education

4.2.1 The Ministry

The Ministry of Education (MoE) employs about 250 people in Vientiane and some 35 people in each of the 18 provinces (excluding teaching staff). There are plans to install an intranet as well as a Wide-Area-Network (WAN). This network would support a Management Information System (MIS) and increase overall efficiency, for example, by allowing officials to coordinate different tasks and projects. The Ministry has benefited from several foreign development projects, and donors provided most hardware. Between 1992-1998 the World Bank supplied the Ministry with personal computers and in 1999/2000, l'Agence de la Francophonie set up a basic intranet and provided technical assistance. Today the Ministry is partly interconnected and eleven provincial offices are able to dial-up to the head office in Vientiane and exchange information. There are some 140 PCs, of which 40 are Internet–compatible. Currently, the Ministry has three dial-up connections but it is hoping to eventually set up an Internet connection in every office (usually shared by between 3-5 people).

The MoE, as other ministries, has a 'top-to-bottom' approach to the development of the Internet and its potential applications. It will first try to develop ICT within the Ministry itself, then within the University and only then within the schools.

4.2.2 Primary and secondary schools

No public primary or secondary schools in Laos have access to the Internet. While the MoE plans to provide two secondary schools in each province with a computer and Internet access by the year 2005, they will primarily be provided to administrative staff. There are also plans to teach basic computer courses at the secondary level and some teachers from Laos will participate in training courses in Singapore and Malaysia. Currently, IT is not part of the national curriculum and if students want to learn how to use a computer or the Internet, they have to do so outside their class schedule.

Many involved in ICT in Laos see young people as the driving force

behind the Internet. While Internet cafés used to be mainly in 'tourist zones', this is no longer the case. Places with public Internet access are 'trendy' among urban youth. Equally popular are private training institutions. Here anyone can learn how to use PC applications, improve their typing skills, and advance their English—skills most often requested on the job market. These developments suggest that the educational system is not adapted to today's requirements and demand since important skills are being acquired outside the formal network.

There is a non-governmental organization (NGO) project providing ICT in a Laotian secondary school. This initiative involves Schools Online (a US non-profit organization), Jhai Foundation (composed of US Vietnam war veterans), and the local community of the village of Phon Song.[15] They are establishing an Internet Learning Centre at the local Phon Mee secondary school. A classroom has been renovated and PCs set up. Internet access will be provided once a telephone line is installed. Some 40 teachers and students have received training. In order to defray costs, the centre will be opened after school hours for public and business use.

4.2.3 University

Laos' first and only public university, the National University of the Lao PDR (NUOL), was set up in 1995. As opposed to many other countries, the academic sector in Laos has not been a driving force in ICT. NUOL has 11'740 students and 1'486 staff, 790 of which are teaching staff.[16] The Japanese government has funded a computer lab at NUOL that has around 20 PCs connected to a LAN and access to the Internet. The facility is located in the Faculty of Engineering and is primarily intended for their use. However, paying courses are also available to others. There are also a few other locations at the university with dial-up Internet access but these are mainly limited to faculty and staff and primarily used for administrative purposes.

4.2.4 IT training and manpower

Laos lacks qualified IT manpower. Most government and private sector IT staff studied abroad, with the help of foreign grants. Lao students continue to go to foreign universities in countries such as Australia, Malaysia and Singapore. Others get training within Laos, through the private sector, with several private colleges and companies offering specialized IT training courses. NUOL has introduced an undergraduate programme in Computer Science and recently graduated its first batch of students.

One of the country's most ambitious projects is the Cisco Network Academy Programme (CNAP).[17] Through CNAP, Cisco Systems, in cooperation with governments, the private sector and educational institutions, provides IT training in the area of computer networks. The project, which is currently discussed by Cisco, the Lao government, the UNDP and the university, would provide a useful source of training. It is not quite clear yet where the Academy would be hosted, but potential partners include NUOL and the Science, Technology and Environment Agency (STEA).

Table 4.1: Laos at school

Number of primary and secondary students and teachers, 2000

	Students	Teachers
Total	1'091'000	40'000
Primary level	831'000	28'000
Secondary and higher secondary level	260'000	12'000

Source: National Statistical Centre

4.3 Health

The country has difficulties providing basic health facilities to its citizens and Internet access is not a priority. A Local Area Network (LAN) for the Ministry of Health is being established. So far, with the help of the World

Table 4.2: Laos Health Facts

2000

Infant mortality rate (%)	8.7
Life expectancy at birth (years)	54.7
Number of hospitals	681
Number of health care centers	700
Number of doctors	1'517
Doctors to population ratio	1:3'427
Number of pharmacies	2016
Percentage of households more than 8 hours away from a hospital (1997/98)	8

Source: Ministry of Public Health and National Statistical Centre.

Health Organization, each of the Ministry's six departments has Internet access. Internet access is essentially limited to top management. The 200 Ministry's staff in the Vientiane head office has a total of 84 PCs, but not all are Internet compatible.

4.4 E-commerce

Laos faces several barriers in implementing e-commerce:

- Given the low number of Internet users, the local market for buying and selling online is limited.
- The national banking system is not adapted to commercial online transactions and none of the Lao banks provide credit cards.
- The country's infrastructure is not yet equipped to provide and support e-commerce applications.
- There is only a small private sector, both in the size of companies and in their share of the economy.
- There is not yet a legal framework for e-commerce with appropriate laws for the acceptance of electronic signatures, validity of electronic documents or definition of computer crime.

Apart from some hotels, few businesses have their own web sites. The Ministry of Commerce and Tourism (MoCT) started using the Internet only about four months ago. The Trade Promotion Centre (part of the MoCT) is currently developing a web site to promote Lao products. This will include a directory of trade companies as well as a database of export products. Eventually, this could develop into an e-commerce site.

Tourism has great potential as an e-commerce trendsetter for Laos. The number of tourists visiting Laos has been increasing around 20 per cent a year, from less than 10'000 in 1991 to over 700'000 in 2000. They spent US$ 113 million, contributing some 6.6 per cent to the country's Gross Domestic Product. Most overseas visitors come to Lao to learn more about the country—there are no beach resorts—and its unique clulture. Most likely there are the type of people that use the Internet, navigate Laotian web sites and book their holidays online; if they could. This might also reduce revenues lost to Thai and Vietnamese tour operators that have taken the opportunity and advertise side trips to Laos. Recognizing this potential, the Lao National Tourism Authority has established a web site <www.mekongcenter.com> with country information, a directory of tour operators, and hotel and restaurant information. It is one of the few government agencies with an online presence. The web site has been credited with helping to raise tourism revenue.[18]

[14] Boualoykhong Chansavat and Phet Sayo. E-readiness assessment in the Lao PDR. UNDP/UNV Vientiane, Lao PDR, 2001 at http://www.undplao.org/unv/pdf%20Reports/IT%20Assessment.pdf.

[15] For more information, see www.schoolsonline.org/whatwedo/laos.htm.

[16] E-readiness assessment in the Lao PDR, Prepared by Boualoykhong Chansavat and Phet Sayo, UNDP/UNV Vientiane, Loa PDR, 2001 at http://www.undplao.org/unv/pdf%20Reports/IT%20Assessment.pdf

[17] For more information on the CNAP, see http://www.cisco.com/warp/public/779/edu/academy/.

[18] A recent newspaper article quotes the Chief of the Vientiane Tourism Office as attributing the rise in tourism revenues to the government's tourism web site: "This is because we advertised our tourist spots on the Internet web-site of the National Tourism Authority." Phonsavanh Vongsay. "Tourist numbers on the rise." *Vientiane Times*. 6-8 November 2001.

5. Conclusions

5.1 State of the Internet

The Mosaic Group <www.agsd.com/gdi97/gdi97.html>, has developed a framework for characterizing the state of the Internet in a nation. They consider six dimensions, each of which has five ordinal values ranging from zero (non-existent) to four (highly developed). The dimensions are as follow:

- **pervasiveness:** a measure based on users per capita and the degree to which non-technicians are using the Internet.
- **geographic dispersion**: a measure of the concentration of the Internet within a nation, from none or a single city to nationwide availability.
- **sectoral absorption**: a measure of the degree of utilization of the Internet in the education, commercial, health care and public sectors.
- **connectivity infrastructure**: a measure based on international and intranational backbone bandwidth, exchange points, and last-mile access methods.
- **organizational infrastructure**: a measure based on the state of the ISP industry and market conditions.
- **sophistication of use**: a measure characterizing usage from conventional to highly sophisticated and driving innovation.

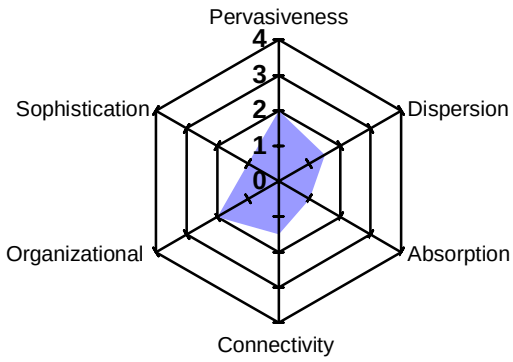
Lao PDR values for these dimensions are shown in Figure 5.1.

Pervasiveness is rated at level 2, Established. At September 2001, there were an estimated 9'000 Internet users in the country or 0.17 per cent of the population.

Geographic Dispersion is rated at level 1.5, between Single location and

Figure 5.1: State of the Internet in Laos

Dimension	Value
Pervasiveness	2
Geographic Dispersion	1.5
Sectoral Absorption	1
Connectivity Infrastructure	1.5
Organizational Infrastructure	2
Sophistication of Use	1
TOTAL	**9**



Note: The higher the value, the better. 0 = lowest, 4 = highest.
Source: ITU adapted from Mosaic Group methodology.

Moderately dispersed. There is only one Internet Point of Presence. Internet access is however available nationwide for the price of a local call. Nonetheless the low number of telephone lines and computers, particularly outside the capital, are serious barriers.

Sector Absorption is rated at level 1.0, Rare. This ranking is a function of the type of connectivity in education, government, health care and business. Although the national university has Internet access, accounts are very limited. Hardly any primary or secondary schools have Internet connections. Few government departments have web sites. Usage in the business sector is minimal.

The **Connectivity Infrastructure** is at level 1.5, between Thin and Expanded. International connectivity is 1.6 Mbps incoming and 1.2 Mbps outgoing. There is no nationwide Internet backbone nor is there a domestic Internet exchange. There are few leased lines in place and there is no ADSL or cable modem for broadband local access.

The **Organizational Infrastructure** is at level 2, Controlled. There are two operational ISPs. Entry into the ISP market is not possible at this time although it appears that may be changed soon.

Sophistication of Use is at level 1, Minimal. The most popular applications among most users appear to be e-mail, chat, Internet telephony and information retrieval. There are few local language web sites nor is there significant application development.

5.2 Recommendations

5.2.1 Making it Lao

Two intrinsically Laotian computer issues must be dealt with: its .LA domain name and standardization of the Lao font. Laos must regain its domain name. The story of how the .LA domain name ended up being administered by a US company based in Los Angeles is shrouded in mystery. But the fact remains that a country's Internet name is as much part of the nation as its flag or national anthem. Gaining control of the domain name is particularly important for the development of government web sites whose names should reflect where they are. A consultant should be hired to investigate the situation and propose solutions, in co-operation with the ITU and ICANN.

Although there is a domestic standard for the Lao font (around 80 per cent of the market uses Lao Font for Windows), it does not match international standards nor is it designed well for use on the Internet. Efforts should be made to make a common standard based on computer industry conventions.

5.2.2 Internet for Development

The international community is keen to reduce the Digital Divide. As a Least Developed Country (LDC), Laos could benefit from multilateral, bilateral, Non-Governmental Organization (NGO) and private sector ICT projects. The government should encourage the international community to help Laos improve its access to ICT. One step would be to elaborate an ICT sector strategy that outlines key areas of development that development agencies could assist with. For example, this might include connectivity in schools, a rural information project and e-government applications.

5.2.3 'NEM'ing the Internet

The New Economic Mechanism (NEM) introduced liberalization to the economy. This should now be applied to the Internet market. Now that the exclusivity period of Lao Telecommunication has ended (October 2001), the telecommunication and Internet market is theoretically open to competition. Indeed there are signs that this is happening. This process needs to be accelerated and made clear. Additional suppliers of telecommunication and Internet

infrastructure are badly needed since the existing level is so low and prices, for Internet access at least, are relatively high. It might be argued that a relatively small market like Laos cannot handle too many suppliers and that serious operators might be discouraged from investment if there are too many competitors. Another concern is that there is a risk of infrastructure duplication and thus possible waste of resources that could be used for other important activities. Possible solutions include extracting concrete infrastructure and universal access commitments in return for market exclusivities and encouraging operators to collaborate on major civil works projects (e.g., sharing backbones, etc.).

5.2.4 Universal access

A policy on universal access to the Internet needs to be formulated. Presently only a small number of Laotians have access to the Internet. Few people have or could afford dial-up Internet access. Internet access in schools is practically non-existent. There are a few Internet cafés in the large cities and they are mainly frequented by foreigners. They are also too expensive for the average Laotian.

One of the reasons for the lack of an Internet universal access policy is that the government has been hesitant to proliferate the Internet. While the Internet has some negative aspects, these are more than outweighed by the positive. Furthermore, the Internet can be used in a decisive way to alleviate some of Laos' development bottlenecks. Interestingly, the lack of access to information and knowledge was cited as a significant barrier to generating more income in villages.[19] The Internet could help to overcome that through its window to the world of information. Another way the Internet can help with development is to overcome the lack of road transport in Lao. While it is difficult to physically get newspapers and schoolbooks to rural communities, these items could be delivered via the Internet. The government should create a network of public Internet access points so that its citizens can access the information they need.

[19] National Statistical Centre. *The Households of Lao PDR*. December 1999.

Annex 1: List of meetings

No.	DATE	TIME	ORGANIZATION
1	05/11/01	09:00 am	Ministry of Communications Transport, Posts and Construction (MCTPC)
2	05/11/01	13:30 pm	Lao Telecommunications (Laotel)
3	06/11/01	09:00 am	UNDP Laos
4	06/11/01	10:30 am	National Statistical Center
5	06/11/01	02:00 pm	ETL, Engineer, Planning and Development Division
6	06/11/01	15:30 pm	JICA, Advisor to ETL
7	07/11/01	09:00 am	Science, Technology and Environment Agency (STEA)
8	07/11/01	10:00 am	Ministry of Health
9	07/11/01	11:00 am	Ministry of Commerce and Tourism
10	07/11/01	01:30 pm	GlobeNets (ISP)
11	08/11/01	08:00 am	Ministry of Education
12	08/11/01	11:30 am	Ministry of Information and Culture

Annex 2: Acronyms and abbreviations

ACSC	Asia Cellular Satellite Company
ASEAN	Association Of South East Asian Nations
ccTLD	Country code top-level domain
CNAP	Cisco Network Academy Programme
CSC	China-Singapore Cable (network)
EPL	Enterprise of Post Lao
EPTL	Entreprise of Post and Telecommunications Lao
ETL	Enterprise of Telecommunication Lao
GDP/GNP	Gross Domestic Product/Gross National Product
GSM	Global System for Mobile Communication
HDI	Human Development Index
ICT	Information and Communication Technology
IDRC	Canadian International Development Research Centre
ISP	Internet Service Provider
IT	Information Technology
kbps	Kilo bits per second
LAN	Local Area Network
LANIC	Lao National Internet Committee
Lao PDR	Lao People's Democratic Republic
LaoTel	Lao Telecommunications Company Limited
LDC	Least Developed Country
LST	Lao Shinawatra Telecom Company Ltd
MCTPC	Ministry of Communication, Transport, Post and Construction
MIS	Management Information System
MoCT	Ministry of Commerce and Tourism
MoE	Ministry of Education
MoIC	Ministry of Information and Culture
MOU	Memorandum of Understanding
NGO	Non-governmental organization
NUOL	National University of the Lao PDR
PAN	Pan Asia Networking
SITA	Société Internationale de Télécommunications Aéronautiques

STEA	Science, Technology and Environment Agency
UNDP	United Nations Development Programme
VoIP	Voice over Internet Protocol
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network

Annex 3: Useful links

Organization	Website
Telecom operator	
Lao Telecommunications (LaoTel)	www.laotel.com
ISPs	
GlobeNet	www.laonet.net
PlaNet Online	www.planetonline.laopdr.com
Mass media	
Vientiane Times	www.vientianetimes.com
Rénovateur	www.laolink.com/renovateur/renovat.htm
Lao News Agency (Khaosan Pathet Lao)	asean.kplnet.net
Academic	
SchoolsOnline Laos	www.schoolsonline.org/whatwedo/laos.htm#
Portals	
Vientiane Times	www.vientianetimes.com/Others.html
Lao Net	www.global.lao.net
Other	
Lao PDR Embassy to the United States of America	www.laoembassy.com
Lao PDR Permanent Mission the United Nations	www.un.int/lao
UNDP Lao	www.undplao.org
Lao National Tourism Authority	www.mekongcenter.com
Japan International Cooperation Agency (JICA) Laos	www.jica.laopdr.org/jicalaos.html

Annex 4: Framework dimensions

Table 1: Pervasiveness of the Internet	
Level 0	*Non-existent*: The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. There may be some Internet users in the country; however, they obtain a connection via an international telephone call to a foreign ISP.
Level 1	*Embryonic*: The ratio of users per capita is on the order of magnitude of less than one in a thousand (less than 0.1%).
Level 2	*Established*: The ratio of Internet users per capita is on the order of magnitude of at least one in a thousand (0.1% or greater).
Level 3	*Common*: The ratio of Internet users per capita is on the order of magnitude of at least one in a hundred (1% or greater).
Level 4	*Pervasive*: The Internet is pervasive. The ratio of Internet users per capita is on the order of magnitude of at least one in 10 (10% or greater).

Table 2: Geographic Dispersion of the Internet	
Level 0	*Non-existent*. The Internet does not exist in a viable form in this country. No computers with international IP connections are located within the country. A country may be using UUCP connections for email and USEnet.
Level 1	*Single location*: Internet points-of-presence are confined to one major population centre.
Level 2	*Moderately dispersed*: Internet points-of-presence are located in at least half of the first-tier political subdivisions of the country.
Level 3	*Highly dispersed*: Internet points-of-presence are located in at least three-quarters of the first-tier political subdivisions of the country.
Level 4	*Nationwide*: Internet points-of-presence are located in all first-tier political sub-divisions of the country. Rural dial-up access is publicly and commonly available and leased line connectivity is available.

Table 3a: Sectoral Use of the Internet			
Sector	**Rare**	**Moderate**	**Common**
Academic - primary and secondary schools, universities	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Commercial-businesses with > 100 employees	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers
Health-hospitals and clinics	>0-10% have leased-line Internet connectivity	10-90% have leased-line Internet connectivity	>90% have leased-line Internet connectivity
Public-top and second tier government entities	>0-10% have Internet servers	10-90% have Internet servers	>90% have Internet servers

Table 3b: The Sectoral Absorption of the Internet		
Sectoral point total	**Absorption dimension rating**	
0	Level 0	*Non-existent*
1-4	Level 1	*Rare*
5-7	Level 2	*Moderate*
8-9	Level 3	*Common*
10-12	Level 4	*Widely used*

Table 4: Connectivity Infrastructure of the Internet					
		Domestic backbone	**International Links**	**Internet Exchanges**	**Access Methods**
Level 0	*Non-existent*	None	None	None	None
Level 1	*Thin*	≤ 2 Mbps	? 128 Kbps	None	Modem
Level 2	*Expanded*	>2 – 200 Mbps	>128 kbps -- 45 Mbps	1	Modem 64 Kbps leased lines
Level 3	*Broad*	>200 Mbps -- 100 Gbps	>45 Mbps -- 10 Gbps	More than 1; Bilateral or Open	Modem > 64 Kbps leased lines
Level 4	*Immense*	> 100 Gbps	> 10 Gbps	Many; Both Bilateral and Open	< 90% modem > 64 Kbps leased lines

Table 5: The Organizational Infrastructure of the Internet	
Level 0	*None*: The Internet is not present in this country.
Level 1	*Single*: A single ISP has a monopoly in the Internet service provision market. This ISP is generally owned or significantly controlled by the government.
Level 2	*Controlled*: There are only a few ISPs because the market is closely controlled through high barriers to entry. All ISPs connect to the international Internet through a monopoly telecommunications service provider. The provision of domestic infrastructure is also a monopoly.
Level 3	*Competitive*: The Internet market is competitive and there are many ISPs due to low barriers to market entry. The provision of international links is a monopoly, but the provision of domestic infrastructure is open to competition, or vice versa.
Level 4	*Robust*: There is a rich service provision infrastructure. There are many ISPs and low barriers to market entry. International links and domestic infrastructure are open to competition. There are collaborative organizations and arrangements such as public exchanges, industry associations, and emergency response teams.

Table 6: The Sophistication of Use of the Internet	
Level 0	*None*: The Internet is not used, except by a very small fraction of the population that logs into foreign services.
Level 1	*Minimal*: The small user community struggles to employ the Internet in conventional, mainstream applications.
Level 2	*Conventional*: The user community changes established practices somewhat in response to or in order to accommodate the technology, but few established processes are changed dramatically. The Internet is used as a substitute or straight-forward enhancement for an existing process (e.g. e-mail vs. post). This is the first level at which we can say that the Internet has "taken hold" in a country.
Level 3	*Transforming*: The user community's use of the Internet results in new applications, or significant changes in existing processes and practices, although these innovations may not necessarily stretch the boundaries of the technology's capabilities. One strong indicator of business process re-engineeering to take advantage of the Internet, is that a significant number (over 5%) of Web sites, both government and business, are interactive.
Level 4	*Innovating*: The user community is discriminating and highly demanding. The user community is regularly applying, or seeking to apply the Internet in innovative ways that push the capabilities of the technology. The user community plays a significant role in driving the state-of-the-art and has a mutually beneficial and synergistic relationship with developers.

Annex 5: Bibliography

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