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# *Lao People's Democratic Republic*

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|---|---|
| Total population | 5.62 million[a] |
| Rural population as a percentage of total population | 69% |
| GDP per capita | USD 678[a] |
| Literacy rate | 85%[a] |
| Teledensity | 28%[b] |
| Telephone lines per 100 inhabitants | 2.59[b] |
| Cellphone subscribers per 100 inhabitants | 25.4[b] |
| Computers per 100 inhabitants | 1.7[c] |
| Internet users per 100 inhabitants | 1.77[d] |
| Internet hosts per 10,000 inhabitants | 0.022%[d] |
| Internet cafes per 10,000 inhabitants | 0.71%[d] |
| Number of websites in Lao languages | 297[d] |
| Number of websites in English | 660[d] |
| National transmission backbone | 155 Mbps[d] |
| International bandwidth | 1 Gbps[d] |

(Sources: [a]Ministry of Planning and Cooperation 2007; [b]National Post and Telecom Authority 2007; [c]NAST 2007; [d]Lao National Internet Committee 2007)

## OVERVIEW

Lao People's Democratic Republic (PDR) is a small, landlocked country in Indochina, with China, Cambodia, Vietnam, Myanmar, and Thailand as its neighbours. A large part of the country is mountainous and forested and the country has an abundance of natural resources. The majority (73 percent) of the country's 5.62 million people (as of 2005) live in the rural areas. About 40 percent of households have no access to electricity, almost 50 percent have access to electricity through the national grid, and another 10 percent use generators or car batteries to generate electricity.

Twenty-three percent of the population has never been to school and 47 percent have left school. About 30 percent of women, compared to about 16 percent of men, have never been to school. About 16 percent of students have completed primary school, 6 percent have completed lower secondary school, and 5 percent have completed upper secondary school. The literacy rate is 85 percent.

There have been positive gains in national development in Lao PDR with the implementation of the 2006–2007 Socio Economic Development Plan, the second Annual Plan under the 6th Five Year Plan (2006–2010). Policies supporting broader economic development have been extensively implemented, including reduction of the electricity tariff for irrigation. These policies have increased production, improved services, and enabled the monetary system to function more smoothly, thereby attracting more domestic and foreign investment. The Gross Domestic Product (GDP) in 2006–2007 increased by 8 percent and the average GDP per capita reached LAK 6.56 million or USD 678. The economic structure is gradually being industrialized and modernized, with the share of agriculture-forestry decreasing from 43.5 percent of GDP in 2005–2006 to 40.9 percent of the GDP in 2006–2007, and the share of industry increasing from 30.5 percent to 33.1 percent. The share of the service sector remained the same at 26 percent of the GDP.

## TECHNOLOGY INFRASTRUCTURE

Lao PDR does not yet have a National Information Infrastructure (NII), making planning and development difficult to coordinate. Telecom operators and Internet service providers (ISPs) build and use their own network infrastructure. There are five telecom operators and 12 ISPs. The number of telecom operators and ISPs has not changed since 2005 because new licences will not be issued until 2009.

Among the telecom operators, Enterprise Telecom of Laos (ETL) has installed the most extensive infrastructure: 3,969 kilometres of fibre optic cables throughout the country, 400 mobile base stations covering all 139 districts, 550 home location registers, 40 general portal radio service base stations, 450 intelligent networks to support the prepaid system, and 29,000 Public Switched Telephone Network (PSTN) lines with 39 sites serving four provinces. ETL also has fibre optic connections to China, Thailand, and Vietnam.

The Lao Asia Telecom Enterprise (LAT) has installed around 500 kilometres of fibre optic cable from the capital city Vientiane to the four provinces in the north. Eight provinces in the south are sharing the ETL fibre connection while the remaining three provinces are using very small aperture terminals (VSAT). The LAT has 173 Global System for Mobile communications (GSM) base stations covering 88 district offices. There are 10,000 PSTN lines in 17 sites serving seven provinces. The LAT also has a fibre optic connection to Vietnam.

The Lao Telecom Company (LTC) has installed around 1,000 kilometres of fibre optic cables connecting three provinces in the north and five provinces in the south. It has around 500 mobile base stations covering all 139 districts and 120,000 PSTN line capacities with 49 sites covering all 16 provinces of Laos. However, the LTC has only microwave and satellite connecting to Thailand. It operates the IPSTAR service, a broadband connection through satellite with a capacity of 250 Kbps to 2 Mbps.

The Lao Millicom Company (TIGO) is leasing fibre optic lines from ETL and LTC to connect to their mobile base station in the province, and it uses microwave for the interconnection of its mobile base station in Vientiane. Recently, TIGO introduced the Enhanced Data Rates for GSM Evolution (EDGE) system, which allows its mobile phone customers to connect to the Internet. The company is also installing Worldwide Interoperability for Microwave Access (WiMAX) base stations in Vientiane.

Lao Sky Telecom has invested around USD 5 million to establish a Code Division Multiple Access (CDMA) network in Vientiane, which it hopes to launch at the end of 2008. The company also has a fibre optic connection to Thailand.

Among the ISPs, it seems that only Planet Online Company has its own network infrastructure. It has set up a WiMAX hotspot in Vientiane and some provincial cities, and it is using the ETL and SKY gateway to connect to the Internet backbone. Planet is also planning to invest around USD 5 million to establish WiMAX base stations in Vientiane and three big provinces.

The government is building its own network infrastructure consisting of 100 kilometres of fibre optic cables to connect 130 government offices in Vientiane, 10 WiMAX base stations to connect 250 offices in Vientiane, and one WiMAX base station in each of 16 provinces to connect 160 offices (100 offices in one province) by the end of 2008.

## KEY INSTITUTIONS AND ORGANIZATIONS DEALING WITH ICT

Under the National Authority for Science and Technology (NAST) established on 24 December 2007 is the Department of Information Technology, which is tasked with formulating and implementing IT policies and strategies.

The Department of Telecom and Internet, which is in charge of overall administration and development of telecoms and the Internet in Lao PDR, is under the National Post and Telecom Authority (NPTA) established on 22 October 2007.

The minister of Post and Telecom chairs the Lao National Internet Committee (LANIC), which is in charge of Internet management and development, including the operation of the national Internet gateway, Internet exchange point, and country code top level domain name. The committee's deputy chair is the vice-chair of the NAST and its members are the directors general of the Ministry of Defense, Ministry of Public Security, and Ministry of Information and Culture.

## ICT AND ICT-RELATED INDUSTRIES

Currently there are 1,597,276 landline and mobile phone subscribers, or 28 telephone units per 100 persons. This teledensity indicates rapid growth, as it is much higher than the government target of 15 telephones per 100 persons. There are 145,857 PSTN subscribers, almost the same number as in 2006 (145,792 subscribers). But the number of GSM subscribers increased by 55 percent from 776,236 in 2006 to 1,401,419 in 2007, while the number of CDMA subscribers increased by 28 percent from 14,152 in 2006 to 50,000 in 2007. The rapid growth is due to the affordable price of mobile handsets from China, as well as the intense competition among mobile phone operators.

There are 1,283 dial-up Internet subscribers, 2,820 ADSL Internet subscribers, 198 satellite Internet subscribers (IPSTAR), and 33 leased line Internet subscribers. ETL also provides mobile Internet access via GPRS to around 20,000 customers. TIGO provides mobile Internet access via EDGE network to approximately 50,000 customers. Planet ISP provides Internet access via its wireless network in Vientiane to around 2,000 permanent customers.

There are around 400 Internet cafés in Vientiane and around 600 Internet cafés nationwide. Most Internet cafés have 10–20 PCs and cater mostly to young people who like to play online games and engage in online chatting. Some hotels, guesthouses, restaurants, and travel companies also provide Internet access as an additional service.

A 2007 government information and communication technology (ICT) survey of 25 government offices in Vientiane established a ratio of about two government officers per one computer. Sixteen ministry offices have set up a Local Area Network and 1,832 personal computers (PCs) are connected

to the Internet. Most of the ministries have Internet access via the national e-government infrastructure, with around 2,000 government staff accessing the Internet daily. Some ministries are almost totally computerized, such as the Bank of Lao headquarters with 300 PCs for around 350 employees (85 percent) and the Ministry of Foreign Affairs with 600 PCs for around 800 employees (75 percent). On the other hand, the Ministry of Public Security headquarters has only 60 PCs for 500 employees (12 percent) and the Ministry of Information and Culture has 155 PCs for 500 employees (31 percent).

Only 3 percent of companies (3,910 out of 126,913) use computers to enhance their business. The level of computer utilization also varies among different business sectors, with science and technology companies, education companies, electronic and electric companies, finance and accounting companies, construction companies, and service companies utilizing computers more than others. Agricultural companies use computers the least. Only 0.9 percent of companies has Internet access, while only 0.3 percent has a website.

Among NGOs, 3.8 percent (397 out of 10,434) use computers, 0.9 percent has Internet access, and 0.2 percent has a website. The academic institutions use ICT facilities. The National University of Laos (NUOL) has 1,000 PCs for 10,000 enrolees, while other technical colleges have three to five computer labs with 30 PCs in each lab. In primary schools there is very little use of ICT facilities, which are usually reserved for administrators and teachers' use only.

Out of the total 126,913 enterprises throughout the country, only 0.7 percent (872 entities) is engaged in ICT-related businesses. But the number of ICT-related businesses increased four-fold from 103 in 2000 to 513 companies in 2005. In 2006 196 new companies were registered. More and more ICT businesses are being set up and the total will probably reach more than 1,000 in 2008. Most of these businesses are small, with an investment of less than USD 10,000 in the case of computer retail and repair shops. Only 74 companies (8.4 percent) have an investment of more than USD 100,000. The biggest investors are the telecom operators, with an investment of more than USD five million each. The ISPs rank 2nd with an investment of more than USD 200,000.

The ICT companies employ 3,688 employees or 1.1 percent of the total work force in the country. The average is 4.2 persons per company, except for the telecoms operators, which employ more than 100 persons each, and the ISPs, which have more than 10 employees.

Most ICT companies are focused on the domestic market, with only four companies engaged in export. The main areas of business are computer reselling (both hardware and software), training, consultation (solution and application), and service operators (telecom and Internet). There are currently no big investments in manufacturing and production due to the following reasons:

- While there are incentives for foreign investment, there are no specific incentives for local ICT companies. For example, the Department of Tax considers computers to be the same as television equipment, which is sometimes taxed up to 60 percent.
- The road and railway system is inadequate for transporting goods. In addition, the electric current fluctuates, causing damage to electronic equipment.
- There is lack of skilled labour. Few people have a background in electronics.
- The purchasing power of the local population is low. The average income is only USD 780 per year, while a computer costs between USD 500 and USD 2,000.

## KEY ICT POLICIES, THRUSTS, AND PROGRAMS

Recognizing ICT as an increasingly crucial tool for achieving socio-economic development, the Government of Lao PDR has recently endorsed the National ICT Policy submitted by the NAST. This policy document aims to ensure that the necessary institutional, human capacity, sectoral conditions, and legal frameworks are in place for leveraging and applying ICT as a means for helping Lao PDR advance from the status of least developed country (LDC) by 2020 through sustainable and equitable development.

The government aims to bring the country into the information age by increasing general access to ICT by providing modern telecommunications infrastructure and computer networks, fostering enterprise and industry, promoting research and development (R&D) in ICT, and developing the necessary human resources and institutional capacities. Accordingly, nine priority areas have been identified: infrastructure and access; enterprise and industry; R&D; applications; human resource development; legal framework; awareness; poverty alleviation; and standardization and localization.

The Department of Information Technology is developing the ICT Master Plan for 2008–2015. The ICT Master Plan will define overall ICT goals and strategies and it will be used as the basis for drawing up ICT sub-master plans for each ministry, as well as master plans for some key focus areas, such as an e-Government Master Plan, e-Commerce Master Plan, and e-Education Master Plan.

## National e-Government Project

In November 2006, the government of Lao PDR allocated USD 35 million from a Chinese concession loan for the implementation of phase one of the National e-Government Project. The NAST has been authorized to cooperate with Alcatel Shanghai Bell Co., LTD in the two-year project implementation from November 2007 to November 2009.

The National e-Government Project aims to foster collaboration among government institutions to ensure efficient and effective delivery of public services and to enable the government to be more responsive to the needs of citizens and the business community. A special focus is making government services more accessible to citizens in the rural areas. The project has the following components:

1. Establish the e-government info-communication infrastructure consisting of:
   - An IP backbone with a 2.5 Gbps capacity to connect the national e-government centre to the telecom operators and some major ministries (i.e. the Prime Minister's Office, Ministry of Defense, Ministry of Finance, and Ministry of Public Security).
   - A fibre optic link to 50 ministries in Vientiane and ADSL cable connection for 75 other government offices.
   - 10 WiMAX base stations covering 20 square kilometres of Vientiane municipality and connecting to 250 government offices.
   - A fibre optic link to 16 provincial governor's offices and 16 e-government provincial centres.
   - One WiMAX base station in each provincial capital city to connect to 10 government offices in each province.
2. Acquire IT computing equipment for government organizations, including:
   - A National e-Government Centre with three computer training laboratories (with 30 PCs per lab), a network operation centre, and a national data centre.
   - An e-Government Provincial Centre in each of the 16 provinces to house a computer training room (with 10 PCs), an Internet room (10 PCs), a network room (for WiMAX), and some public service rooms.
   - IT facilities for each of the 126 ministry offices in Vientiane, including one server, 10 PCs, a teleconference room, and a local area network connected to the national e-government infrastructure.
   - IT facilities for the district and provincial department offices (200 offices) consisting of three PCs and one printer connected via a LAN and connected to the national e-government infrastructure.
3. Develop e-government applications that are appropriate, cost-effective, and based on standards of interoperability. The seven key applications under the National e-Government Project are the e-archive, e-register, e-document, e-map, e-learning and a teleconference system, and a national portal.
4. Enhance human resource development through training programs for ICT specialists, ICT engineers, content providers, and endusers. The targets are to train 40 ICT engineers, 300 ICT engineers from various ministries, and 1,500 government personnel from various organizations.

## Rural Telecentres

The Information Technology Research Institute of the NAST, in collaboration with National Informatics Centre of India, has just set up 10 rural telecentres (RTCs) in seven provinces of Lao PDR. The RTCs are a means to utilize ICTs to raise the socio-economic conditions of the people of Lao PDR, particularly those in remote areas along the Mekong River. Aside from connecting the rural communities to the rest of the country and the world, the RTCs should help the concerned provincial governments plan and implement ICT-supported citizen-centric applications.

One RTC was installed in each of Luang Prabang, Xayabury, Vientiane Province, Khammuane, Savannakhet, Saravane, and Champasack and three RTCs in the capital Vientiane (i.e. one RTC each at the Ministry of Public Health, Ministry of Agriculture, and Rural Development Authority Office). Each RTC is equipped with a server, five computers, a scanner, a laser printer, a Web camera, and broadband Internet connection.

To ensure the sustainable operation of the RTC, a Steering Committee and district implementation committee have been established. The Steering Committee consists of representatives of the NAST, Ministry of Agriculture, Ministry of Public Health, Rural Development Authority, and Office of the Provincial Governor. The RTC district implementation committee consists of the representative of the district governor's office, agriculture district office, health district office, and rural development district office. This committee will closely monitor the setting up of the RTCs. The district committee will also be responsible for evolving guidelines that will ensure the accessibility of the RTC to all citizens, promote the RTC in the community, and provide for the management of the village community portal, content management, and updating and maintenance to ensure the sustainable operation of the RTC. Appropriate training programmes will be conducted for RTC service providers and users. It is recognized that for the RTC to work for the people in the district, community-based ICT development should be implemented.

## LEGAL AND REGULATORY ENVIRONMENT FOR ICT DEVELOPMENT

Existing laws and regulations in Lao PDR deal mainly with telecoms and the Internet. These laws include the Telecommunication Law of 2001, the Prime Minister's regulation for Internet users and service providers issued in 2000, a regulation by the Ministry of Information and Culture on Internet content issued in 2001, and a regulation of the Ministry of Public Security on Internet security and violence issued in 2002.

The Department of Information Technology has formulated a draft e-commerce law with assistance from the World Bank. Once passed, the law is expected to foster the growth of e-commerce and link Lao PDR to the region.

The Department of Telecommunication and Internet is formulating regulations in connection with the establishment of the national Internet Gateway. But some experts have suggested that one national gateway may limit Internet development in the country, and it will be difficult to ensure fair competition between those who will operate the gateway and those who will provide the service through the gateway.

There are plans to formulate and enact a legal framework against cybercrimes, a consumer protection act, and a legal framework to protect and encourage the creation of intellectual property.

## DIGITAL CONTENT

As of the end of 2007, there were 106 websites registered under the domain name gov.la and 92 websites registered under the domain name com.la. The latter figure represents only 363 companies or 0.3 percent of the 126,913 companies with websites, because most of the companies would like to have websites with just a .com domain name as this is thought to be more international. There are 27 websites registered under the domain name org.la, 16 websites under net.la, 44 websites under edu.la, and 12 websites under info.la.

The biggest and most popular information providers are still the press organizations with daily online newspapers such as:

- www.vientianetimes.org.la — a government-owned newspaper in English;
- www.pasaxon.org.la — a government-owned newspaper in Lao;
- www.lerenovateur.org.la — a government-owned newspaper in French;
- www.lnr.org.la — the Lao National Radio providing content in Lao, English, French, and the Mong language;
- www.kpl.net.la — the state news agency providing daily news in both Lao and English; and
- www.vientianemai.net — a government-owned newspaper providing daily news in both Lao and English.

Other noteworthy websites are:

- www.health.gov.la — a bilingual (Lao and English) website on health-related information by the Ministry of Public Health with support from the World Bank under the Water and Sanitation Program.
- www.laotrade.gov.la — a bilingual (Lao and English) website to promote trade. It is supervised by the Ministry of Industry and Commerce.
- www.talad.gov.la — which provides information on market prices of agricultural products that farmers can use to determine where to sell their products, and which citizens can use to find out which market is selling a product that they need.
- www.sumson.gov.la — which contains information on the activities of the 10 RTCs. The website also provides information about community development, healthcare, agriculture, education, the environment, and the like.

However, in general, there is a need for more digital content in Lao PDR, and for regular updating of online content.

## ONLINE SERVICE

It seems that the tourism sector is the most active provider of online services. The four- and five-star hotels have their own websites through which online reservations can be made, while tour and travel companies provide online booking services. Some handicraft shops and textile factories also provide online ordering services. However, there is as yet no online payment system in Lao PDR.

Under the National e-Government Project, government organizations are expected to provide for e-applications and the following online services are to be launched:

- e-Portal to provide a unique access point via the Internet to all government information and e-services. The e-portal will improve the existing national portal www.laopdr.gov.la.
- e-Registration, a Web-based application in both Lao and English. In the first phase, each organization will design its own template for citizens to fill in and submit online via the organization's website. The second phase will focus on providing for interaction and integration solutions.
- e-Documents system, which consists of two components: establishing the information management system and

instituting a system for use of electronic signatures and system verification.
- e-Map for storing and managing maps and statistical data.

The Ministry of Finance is also developing the e-revenue system and the Ministry of Foreign Affairs is developing the e-visa system.

## ICT-RELATED EDUCATION AND CAPACITY-BUILDING PROGRAM

The government is highly committed to improving the IT capability of employees. The present approach is 'Training the Trainers' whereby a selected number of officers undergo training in computer-related courses, and they in turn are expected to train their colleagues.

ICT education is highlighted in the National ICT Policy in terms of the following goals:

- Development of a world-class curriculum for Bachelor and Master's degrees in computer science/engineering and other ICT-related degrees;
- Promotion of the integration and teaching of Free and Open Source Software (FOSS) in computer science/engineering curricula;
- Application of ICT in the Ministry of Education's five main programs: *(i)* pre-school and general education; *(ii)* non-formal education; *(iii)* teacher training; *(iv)* vocational and higher education; and *(v)* administration and management;
- Provision of computer labs and Internet connectivity at all levels of the education system, beginning at the higher levels of education and leading to the integration of ICT in the teaching and learning process in all schools;
- Provision of the infrastructure necessary for school administration and for ICT training in teacher retraining programs;
- Re-training for civil servants;
- Promotion of lifelong learning and e-education or distance education;
- Establishment of a certification and accreditation system to ensure high standards of education and training; and
- In the rural and remote areas, piloting of telecentre programs to ensure opportunities for ICT-enabled learning for the most underserved and those without ready access to education.

The NUOL is the main institution tasked with developing human resources for the ICT field. The NUOL Department of IT and Computers is offering a five-year Bachelor's degree in IT that has produced around 50 computer programmers every year since 2003. The Department of Electronic and Telecommunication Engineering offers special IT courses, such as an IT bridging course for those who have already obtained a diploma in other engineering specializations. The IT bridging course has graduated around 40 computer engineers annually since 2005. However, the number of IT graduates is still very low relative to the demand for skilled personnel. For example, the National e-Government Project requires 300 computer network and hardware engineers and 600 computer application engineers for 2007–2009.

Foreign assistance is being provided to enable Lao students to study ICT-related fields abroad. The government of India has a scholarship for 30 Lao students to complete a Master of Computer Applications program in India for a period of three years (2006–2008). The government of Australia has been providing undergraduate and graduate scholarships in ICT programs since 2000 to two persons per year. The number of scholars was increased to six in 2007 and then to 10 in 2008. The Government of Japan has been providing undergraduate and graduate ICT education scholarships since 2002 to five persons per year. The Association of Southeast Asian Nations (ASEAN), Canada, China, the EU, and the US also provide ICT education scholarships to one or two persons per year.

In general, it is necessary for Lao PDR to have an ICT human resource development master plan at the national level that includes both formal and non-formal ICT education, skills required for the traditional and the new economy, youth and women empowerment, and distance education. Therefore the NAST, together with the Ministry of Education, is now formulating an ICT human resources master plan that highlights the following:

For formal education:

- Establishing an education network as part of the NII to provide educational services and learning opportunities to all;
- Promoting e-learning to supplement the education and learning opportunities in the provinces;
- Review and strengthening of computer-related subjects in school curricula;
- Computer training for schoolteachers; and
- Provision of school information infrastructure, including a telecommunication network, computer facilities, stable electricity, basic educational software and content, and Internet access.

For non-formal education:

- Using ICT to upgrade workers, unemployed youth, and women;
- e-Learning for lifelong learning; and
- Development of ICT professionals and re-training of the existing workforce in ICT

For higher education:

- Establishing a higher education institute specializing in ICT and software engineering;
- Helping government agencies set up their management information systems as well as agency-specific software systems;
- Acquiring and producing educational software and digital content;
- Conducting R&D in ICT applications for distance learning;
- Encouraging private sector participation in computer training programs in schools;
- Promoting a voluntary support system to assist schools in ICT integration; and
- Making necessary arrangements for data compatibility and standards.

## ICT RESEARCH AND DEVELOPMENT

In December 2007, the Lao government established the Information Technology Research Institute under the NAST to guide the country's ICT research, development, training, promotion, and service agenda. The Institute has three main centres conducting ICT-related research. The Network Centre is responsible for the construction, development, and operation of the national e-government infrastructure, government Internet access, and the country code top-level domain name. The Network Centre also conducts research on network security and public key infrastructure. The Research, Development and Training Centre is responsible for technology transfer and dissemination of technology applications to society. It focuses on Lao localization, e-government applications, e-learning applications, and ICT skills testing and accreditation. The National Data Centre is responsible for the construction, development and operation of the national portal, e-government service centre, and community telecentres. Its main research focus is building e-content with system security.

The IT Research Institute evolved from the IT Centre whose capacity in R&D was developed through its four-year involvement (from 2003 to 2006) in the PAN Localization Project supported by International Development Research Centre (IDRC) of Canada. The Project enabled IT Centre staff to undergo technical training and undertake joint or collaborative research with other countries implementing it. The key outcomes of the PAN Localization Project for Laos are the following:

- Systematic study of the Lao language structure
- Development of tools and utilities to enhance IT in Lao, such as Lao fonts, Lao keyboard drivers, Lao ASCII to Unicode converters, Lao line breaking utility, Lao sorting utility, Laopad (a localized version of Note Pad), and Lao OCR
- Research papers on Lao language information processing
- Research products such as free publication of research software on CD-ROMs and the project website (www.laol10n.info.la)
- Various workshops and seminars
- The transfer of technical know-how to many students and other local developers through various technical training programs and the project work itself
- Extensive practice in collaborative R&D

The NUOL is also conducting various research activities on such topics as problems of meteorological characteristics and communication reception in Laos; the relationship between broadcasting signals and rain characteristics in Laos; the design of the transmission line simulator, a pattern recognition approach to segmentation with application to continuous Lao recognition, online freestyle handwritten Lao character recognition using feature tree; and a QoS-based routing algorithm with crankback ability.

## OPEN SOURCE INITIATIVES

Interest in open source is increasing slowly in Lao PDR. The open source movement in the country was started by Anousak Souphavanh, a Lao programmer who has worked on localizing OpenOffice and Linux, Mozilla products, Unicode font, keyboard drivers, and others.

The NAST is undertaking work on Ubuntu and Suse, GNOME Desktop, KDE Desktop, Debian as Kernel OS, Open Office.org applications, Mozilla's Thunderbird and Firefox, Joomla and Drupal as CMS Web commerce applications, Quantum Geographic Information System (QGIS) and other open source applications. It also held a workshop on open source in March 2008.

Lao open source advocates collaborate in regional software localization efforts and cooperate with universities to support localization. Translating open source software to Lao is a particularly important endeavour.

## CHALLENGES AND OPPORTUNITIES

It is now relatively easier for Lao people to have access to computers and the Internet. Local businesses are using computers and the Internet not only to find information but also

## Schoolnet Program

In July 2007–July 2008, US-based non-government organization (NGO) World Links for Development, Jhai Foundation, and the Lao Ministry of Education agreed to implement the World Links Program in Lao PDR as part of a World Bank–Japan Social Development Fund ASEAN SchoolNet Project Grant. The overall goal of the program was to provide selected secondary schools and the Ministry of Education with sustainable solutions for mobilizing necessary technologies, skills, and educational resources to prepare students and teachers to enter the Information Age.

The program set up computer labs with Internet connections in 10 secondary schools. Training workshops in computer literacy and teaching and learning with computers and the Internet were held for 30 teachers of various subject areas (e.g. mathematics, science, history) from the 10 schools.

(Source: Ministry of Education 2007)

to find more business opportunities (i.e. clients, suppliers, and business partners). Because of the improved telecommunication infrastructure that allows for a reliable Internet connection, some business organizations can host their own websites and email servers and manage their own information systems. Some end users in Laos also have experience in online shopping and they want to set up online stores.

The government of Lao PDR is aware of the role of ICT in industrialization and modernization, as well as in improving the quality of government service and administration. This is why it is undertaking the National e-Government Project.

However, Lao PDR needs to build the necessary national information infrastructure, increase investment in the ICT sector, develop skilled human resources, and engage in more IT R&D. Private investment in the country is currently confined to telecom services and IT training. The production of low-technology IT goods like IT entertainment goods, IT components like passive and electro-mechanical components, and IT enabled services is worth exploring. There is also a need to develop the public's awareness and understanding of the role of ICT in development. Awareness programs for various sectors should be considered.

An adequate supply of trained human resources is needed not only to generate locally relevant content and ensure effective use of ICTs, but also to enable the country to participate in IT-enabled services. For this reason, a greater investment in IT human resource development in Lao PDR is vital.

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