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Indonesia

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Overview

Indonesia's population of 222 million, the fourth largest in the world, are scattered in more than 17,504 islands (7,387 named; 10,117 unnamed). Thus, the Indonesian government, through Presidential Decree No. 6 issued in 2001 and titled 'Information and Communication Technology (ICT) Development and Usability in Indonesia', has asserted the need to make optimal use of ICTs to reach the Indonesian public and to unify the nation.

However, although it is expanding, teledensity in Indonesia is still not enough to serve the entire population. Fixed telephone line teledensity is 14 million lines or about six lines for every 100 citizens. Mobile phone teledensity is higher at 66.5 million active numbers or 30 numbers for every 100 citizens in mid-2006. The average annual growth rate of mobile phone teledensity from 1999 to 2005 is 63.7 per cent.

According to the 2005 National Social Economic Survey conducted by the National Statistics Bureau, 7.7 million of 58.8 million households (13.11 per cent) have a telephone. Of this total, 6.6 million are located in urban areas. About 11.7 million households (19.9 per cent), 9 million of which are in the urban areas, have mobile phones. About 2.2 million households, or 3.68 per cent of the total 58.8 million households, have computers; 2 million of these households are located in the city. For every 100 households with a computer, only 27 have an Internet connection.

According to the Directorate General of Post and Telecommunication (Postel), there were about 25 million Internet users (about 11 persons for every 100 citizens) in Indonesia in 2006. However, the number of Internet subscribers is only 6 million,

Total population	222 million (2006)
GDP per capita	USD 1,663/year (IDR 15 million/year)
Key economic sectors	Manufacturing, Trade and Agriculture
Computers per 100 inhabitants	2
Fixed-line telephones per 100 inhabitants	6
Mobile phone subscribers per 100 inhabitants	30
Internet users per 100 inhabitants	11
Domain names registered under .id	32,849
Broadband subscribers per 100 inhabitants	0.2
Internet domestic bandwidth	Peak 1.46 Gbps (end 2006)
Internet international bandwidth	Peak 4 Gbps (end 2006)

suggesting that most people access the Internet at work or at Internet kiosks. Between 2000 and 2004, only 6 million people (or 2.7 persons for every 100 citizens) used the Internet. Internet penetration increased when the government officially liberalized 2.4 GHz of wireless technology in January 2005. Private non-commercial use of the 2.4 GHz frequency without a license is allowed. However, operators must register with Postel, which will check whether the equipment used is standard. Internet service providers (ISPs) use the 2.4 GHz frequency not only as a last-mile infrastructure but also as a backbone network to haul Internet traffic over large distances.

ICT penetration increased further with the opening of cyber-café's or Internet kiosks (locally known as *warung Internet* or *warnet*) in many Indonesian cities. There are about 4,000 *warnet* around the country, each with an average of 10 computers that can be used by turns for 12 hours (at an average of two hours per user).

The Indonesian Telecommunications Regulatory Body (*Badan Regulasi Telekomunikasi Indonesia*—BRTI) was formed in December 2003, which demonstrates the government's willingness to put in place the appropriate regulations to improve telecommunications infrastructure and services. Efforts to lower the cost of telecommunication and Internet bandwidth in Indonesia are being pursued. There is also a plan for fibre optic backbone development and the promotion of healthy competition among telecommunication businesses. These are expected to make quality ICT services available to all Indonesian citizens at an affordable cost.

Technology infrastructure

PT Telekomunikasi Indonesia (Telkom) launched the Telkom-2 satellite in November 2005. However, three to six more satellites with a 24-transponder capacity are still needed to connect every Indonesian region, consisting of about 43,000 villages, in one telecommunication infrastructure network, assuming a 64 Kbps connection (two voice channels and 32 Kbps Internet) for every village. PT Telkom is now preparing for the operation of the Telkom-3 satellite in 2009.

In February 2006, the government chose three telecommunication operators to provide 3G telecommunication services via a tender process. In October 2003, two other operators were granted a license to provide 3G services: PT Natrindo Telepon Selular (Natrindo) and Hutchison CP Telecommunications (formerly Cyber Access Communications). Two of the new operators, Telkomsel and Excelcomindo (XL), have built 3G infrastructure in several big cities. As of October 2006, XL estimated about 18,000 customers actively using 3G services. Telkomsel says there are 240,000 customers registered as 3G users. Telkomsel, which has the biggest cellular phone market share in Indonesia, has allocated about USD 300 million to build its 3G network. XL has allocated about USD 50–100 million while Indosat is ready to invest USD 200–300 million.

Currently under discussion is unified access licensing for telecommunication services. This means that the 'frequency used right fee' (*Biaya Hak Penggunaan—BHP*) between fixed wireless access (FWA), cellular and data communication operator, and fibre optic will be the same, which in turn means lower prices as competition among operators becomes more intense.

According to Onno Purbo, an Indonesian ICT expert, the cost of Internet bandwidth in Indonesia nowadays is about USD 3,000 per Mbps per month. Postel puts the bandwidth cost at around USD 5.07 per 100 Kbps. The Indonesia ISP Association states that the cost for 1 Mbps of bandwidth taken from satellites in other countries is around USD 3,000–4,000, while it costs up to USD 6,000 from local operators. The biggest component of Internet bandwidth pricing in Indonesia is the fee for the international backbone connection and local backbone access to the local Network Access Provider (NAP) network. This accounts for 60–80 per cent of the monthly income of ISPs. Although theoretically ISPs can use other NAPs, including those in other countries, which are cheaper, government regulation limits ISPs to purchasing bandwidth only from the local NAP.

Recently, there has been some discussion of Dirjen Postel allowing a minimum international bandwidth service application in implementing NAP service. The international bandwidth price can be reduced if the NAP operator can bargain with the foreign hub owner to get a cheaper price. To get that bargaining

position, the NAP operator must purchase at least 45 Mbps of international bandwidth.

The fibre optic network for the national Internet backbone is only 12,000 kilometres, according to the Department of Communication and ICT. At least 35,000 kilometres of fibre optic network is needed to serve all islands in Indonesia. The government has announced a fibre optic network development project called Palapa Ring, which is estimated to cost USD 500 million to USD 1 billion. Palapa Ring is a 25,000-kilometre undersea cable network in an integrated ring shape spread out from Sumatra to West Papua. Every ring will transmit broadband access of about 300–10,000 Gbps. It is hoped that the Palapa Ring backbone network will significantly lower telecommunication and Internet costs. Sofyan Djilil, the Communication and ICT Minister, is aiming to make the Internet fee in Indonesia as cheap as in Singapore by mid-2007.

There are two national interconnections—Indonesia Internet exchange (IIX) and National Interconnection Exchange (NICE). Thus, inter-ISP traffic in Indonesia is no longer dependent on the international Internet interconnection.

According to the Association of Wireless-LAN Internet Indonesia (IndoWLI), the use of the 2.4 GHz frequency in 2006 was higher by 70 per cent compared to 2005 when the license for this frequency had just been released. However, according to IndoWLI, more than 50 per cent of 2.4 GHz users, which include government institutions and state-owned corporations, have violated regulations, using power beyond the maximum limit, using uncertified radio and refusing frequency arrangement by community.

The government and the Indonesia Telecommunication Regulatory Body BRTI are still deciding the frequency allocation for Broadband Wireless Access (BWA), also known as WiMax. Fearing interference, PT Telkom, one of Indonesia's satellite operators, is not in favour of a 3.5 GHz frequency for BWA. They say that 3.4 GHz is suitable only for satellite in S-Band and extended C-Band because Indonesia has a tropical climate with high rainfall. Indonesia is an archipelago, which makes satellite necessary for telecommunication.

On the other hand, the Indonesia Broadband Wireless Association (Abwindo) and all WiMax vendors are asking for a 3.5 GHz frequency because based on economies of scale, it will be cheaper to develop WiMax at 3.5 GHz than on the alternative frequency of 5.8 GHz (as in the US). The WiMax Forum is already issuing certification for equipment designed for a frequency of 3.5 GHz. WiMax with a 50 km reach is expected to be in position to substitute the Digital Subscriber Line (DSL) once a 3.5 GHz frequency is assigned by Postel.

The government is studying the feasibility of making the 3.5 GHz frequency available for both WiMax and satellite. If an agreement is not reached, the government will uphold satellite as the primary occupant of the 3.5 GHz frequency and relocate BWA to another frequency. If this happens, BWA operators will expect the government to provide compensation, such as investment cost compensation for the BWA infrastructure acquired for the 3.5 GHz frequency.

ICT and ICT-related industries

The Indonesian ICT market sector grew by 22.1 per cent in 2005 to about USD 1.7 billion. Of this about USD 0.5–0.75 billion came from the banking sector. The following sectors comprised the Indonesian ICT industry in 2006: 50 middle and large-scale computer companies, 5,000 computer assemblers, 154 middle and large software companies, 214 small software companies, 12 telecommunication tools companies and 150 animation companies.

The software companies are concentrated in Jakarta, Bandung, Surabaya and Medan. Some of the software products are finance applications, geographical information systems (GIS), inventory systems, executive information systems, office automation, animation, multimedia presentation, intranet/Internet, integrated LAN-WAN, and consultancy services. According to the General Directorate of Intellectual Property Rights, 133 applications for software copyright were made between 2002 and 2005. But as of August 2006, 104 software copyright were registered, suggesting that appreciation for IPR is a recent development.

ISPs comprise another ICT industry. As of 2005, 232 ISPs were registered with the Ditjen Postel (up from 50 in 1999). Several are members of the Indonesia Internet Service Providers Association (*Asosiasi Penyelenggara Jaringan Internet Indonesia*—APJII) which was founded in May 1996 and which has successfully campaigned for a national interconnection among ISPs in Indonesia to enable users to communicate easily regardless of the ISP, and at a lower price.

Internet kiosks, of which there are more than 2,500 not counting Internet kiosks managed by schools and universities, comprise a segment of the ICT industry in Indonesia. According to a study conducted by ICT Watch in September 2003, in general, Internet kiosks are not really profitable. To acquire an Internet backbone lane, an Internet kiosk needs at least 35 separate connections (hops). To have a proper bandwidth, an Internet kiosk needs to pay about IDR 4 million (about USD 453) a month. So only Internet kiosks with a minimum of 10–20 PCs

charging about IDR 3,000–5,000 (USD 0.3–0.5) per hour and located around a campus, tend to be profitable. Many Internet kiosks are either just a hobby or are subsidized by another business of the owners. Internet kiosks face other problems, such as the high cost of Internet bandwidth, extortion, and pornography and other cyber crimes.

According to the Department of Communication and ICT, the level of PC ownership in Indonesia is very low at five million units for about 220 million citizens. On the other hand, the Indonesian Computer Business Association (*Asosiasi Pengusaha Komputer Indonesia*—APKOMINDO) states that PC sales have grown 20 per cent annually. In 2005, PC sales reached 1.2 million units; the projection for 2006 was 1.44 million units. Sixty-five per cent of the total PCs bought consists of local PCs; the rest are imported. The corporate sector is the biggest consumer, accounting for 30–35 per cent of the total market segment. Government accounts for 25 per cent of consumers; the retail sector and households comprise 10–15 per cent, while the educational institutions account for the rest. IDC research, on the other hand, states that the small and medium-sized enterprise (SME) sector is the biggest PC consumer with 34 per cent of the market share, followed by big companies, government, households and educational institutions.

Key ICT institutions

Several institutions and organizations are responsible for ICT development in Indonesia. They can be classified into three: regulator, industry and civil society. Coordination among the three groups is crucial to the development of ICT in the country.

National ICT Council

Indonesian President Susilo Bambang Yudhoyono officially declared the formation of the National Information Communication and Technology Council on 11 November 2006. Its task is to formulate general policies and set the direction of strategic development using ICT. It is also responsible for coordinating the ICT development efforts of local and central government agencies, state-owned and private companies, ICT communities, entrepreneurs, professional institutes and the general public. The Council has authority over the implementation of ICT programmes across departments.

The Council has three years to accomplish its mission. President Susilo Bambang Yudhoyono himself heads the Steering Committee, with the Coordinating Economic Minister

as head deputy. The Chairman on Duty is the Minister of ICT. Ten ministers or ministerial-level officers comprise the Council membership. There is also an Implementation Team which includes the Minister of ICT as *ex-officio* chairman and ICT experts as members. The Advisory Team consists of the Rectors of the Bandung Institute of Technology, University of Indonesia, Sepuluh November Institute of Technology and Gadjah Mada University. The Partner Team consists of all active participants in the ICT industry.

Regulator/Government agencies

Dirjen Postel (www.postel.go.id), along with the Indonesia Telecommunication Regulatory Body, is responsible for formulating and implementing ICT regulations and for standardizing the technical aspect of the telecommunication industry. Dirjen Postel includes the Directorate of Telecommunication, Directorate of Radio Frequency Spectrum Satellite Orbit, Directorate of Post and Telecommunication Standardize, and Directorate of International Post and Telecommunication Institutional.

The Indonesia Telecommunication Regulatory Body BRTI (www.brti.or.id) is an independent regulatory body that aims to protect the interest of telecommunication users and to foster competition in the telecommunication industry. It coordinates with Postel and reports to the Minister of Communication and ICT.

The Ministry of Research and Technology (*Kementerian Riset dan Teknologi*) (www.ristek.go.id) has as one of its programmes the expansion of ICT infrastructure to foster economic activity. The priority areas include telecommunication development, Internet services, energy-saving and low-priced computers, digital technology and open source applications.

Finally, the Indonesia Security Incident Responses Team on Internet Infrastructure (ID-SIRTII) is tasked with ensuring network safety and security in accordance with Indonesian law. The team includes representatives of the Central Bank, academe, ICT experts and law enforcement. The team is also expected to assist the Minister of Communication and Information Technology in discharging the planning, coordinating, supervising and controlling functions of ID-SIRTII.

Industry/Business

The Indonesia Infocomm Society (*Masyarakat Telematika—MASTEL*) (www.mastel.or.id) is a non-profit institution that functions as a bridge between government and ICT industries. Focusing on telecommunication, multimedia and information technology, MASTEL has the support of about 12 associations

in the ICT sector. It has 63 company members, about 215 individual members, 27 not-for-profit organization members and 14 special members.

The Indonesia Information Technology Federation (*Federasi Teknologi Informasi Indonesia—FTII*) (www.ftii.or.id) consists of several associations in ICT-related and other fields striving for industrial development and the expansion and integration of information technology applications.

The Indonesia ISP Association APJII (www.apjii.or.id) is the umbrella organization of several ISPs. It aims to develop the Internet network in Indonesia through affordable Internet service fees, management of the Indonesia-Network Information Center (ID-NIC) and Indonesia Internet eXchange (IIX), and negotiation of the telecommunication service infrastructure fees. APJII also provides Network Information Resources (NIR) to its members, gives advice to government, and organizes seminars and training programmes.

Civil society/Consumer groups

The Air Putih Foundation (Air Putih) (www.airputih.or.id) started out as a group of humanitarian volunteers with knowledge of ICTs who wanted to open communication lines to Nangroe Aceh Darrusalam which became isolated after the 2004 tsunami. It now serves as an ICT Emergency Response Team mediating and accelerating the distribution of information for disaster management.

The Indonesia Telecommunication Users Group (IDTUG) (www.idtug.net) is an independent organization serving as a bridge between consumers, operators and government and advocating for better telecommunication services in Indonesia. IDTUG is affiliated with the International Telecommunications Users Group (INTUG) based in Belgium.

The Center for ICT Studies Foundation (www.ictwatch.com) is involved in humanitarian programmes in the ICT field, such as the Society Self-supporting Computer Laboratory for middle-to-low-income groups and Internet-based health campaigns. Also known as ICT Watch, the foundation undertakes communication programmes and research about the state of ICT4D in Indonesia.

The following organizations are also involved in the development of ICT in Indonesia:

- ICT Business Software Association of Indonesia (ASPILUKI—*Asosiasi Piranti Lunak Telematika Indonesia*).
- Business Computer Association of Indonesia (APKOMINDO—*Asosiasi Pengusaha Komputer Indonesia*).

- Higher Education on Information Technology and Computer Association (APTIKOM—*Asosiasi Perguruan Tinggi Informatika dan Komputer*).
- Internet Kiosk Association of Indonesia (AWARI—*Asosiasi Warung Internet Indonesia*).
- Wireless LAN Internet Association of Indonesia (IndoWLI—*Indonesia Wireless LAN Internet*).
- Cellular Provider Association of Indonesia (ATSI—*Asosiasi Telepon Selular Indonesia*).
- Broadband Wireless Association of Indonesia (ABWINDO—*Asosiasi Broadband Wireless Indonesia*).
- Satellite Association of Indonesia (ASSI—*Asosiasi Satelit Indonesia*).
- Telephone Kiosk Association of Indonesia (APWI—*Asosiasi Pengusaha Warung Telepon Indonesia*).
- Association of Telecommunication National Company Association (APNATEL—*Asosiasi Perusahaan Nasional Telekomunikasi*).
- Association of Community of Internet Center (APW Komitel—*Asosiasi Pengusaha Warnet Komunitas Telematika*).

Enabling policies and programmes

National information system

The development of the National Information System (*Sistem Informasi Nasional*—Sisfonas) was started in 2002 and is expected to reach completion in 2010. Under the system, the Department of Communication and ICT, through its Universal Service Obligation (USO) programme, aims to provide between 2006 and 2010 telecommunication services to 43,000 villages that are not yet reached by the telecommunication network. A comprehensive Sisfonas blueprint has been drawn up and it is expected to become the main standard in the business world. Thus, one of the main concerns among ICT experts is interoperability of government business processes, work schemes, content management, document management, information standards, back office applications, language, search engines, payment gateway, knowledge management and information scheme analysis.

e-Indonesia initiatives 2006

The May 2006 e-Indonesia Initiative Conference organized by the Indonesia ICT Institute, National Planning Body, and Department of Communication and ICT brought together in Bandung 500 academics, practitioners, government officials,

IT observers and entrepreneurs. Among the conference recommendations to the government are:

- Encourage initiative and leadership in the development of inexpensive ICT infrastructure.
- Create the position of Chief Information Officer (CIO) in government institutions.
- Establish the single identity policy as soon as possible.
- Coordinate regulation functions of the Department of Communication and ICT and the Ministry of Research and Technology.
- Develop local human resources, especially for the Department of Communication and ICT, Department of National Education, Department of Labour and Ministry of Research and Technology.

Bandung High Tech Valley (BHTV)

The Bandung High Tech Valley (BHTV) is an initiative to foster technology-based businesses and industries in the Bandung region, which extends beyond Bandung city (the capital of West-Java, Indonesia) to the greater Bandung area. The BHTV initiative originated from the Ministry of Industry and Trade as a means to increase electronics exports. It was started in 1986 but was forgotten when Indonesia faced an economic crisis in 1997. It was subsequently restarted by some people in the Bandung Technology Institute (ITB).

BHTV has most of the ingredients for a successful technology area:

- During the Dutch occupation, Bandung was designed to host many government supporting institutions, including research centres. This is why many government agencies (especially those related to technology) have their headquarters in Bandung.
- Bandung is considered as a 'student city': many students from various parts of Indonesia are studying in Bandung.
- Universities operate technology research centres in Bandung.
- Bandung is known as a centre for the traditional and modern arts. Many musicians, bands, painters and other artists come from Bandung.

According to Budi Rahardjo, one of the BHTV founders, the only ingredient that is missing in Bandung is a technology-based multinational company that will attract and keep talented people (science and engineering graduates) in the region. Current BHTV initiatives are focused on helping small technology companies to start in Bandung and attracting multinational companies to

invest in research and development in the region. A BHTV expo in which 70 companies participated was held in 2004. On 10 February 2006, the BHTV Foundation was established by four ITB faculty members to further oversee the development of BHTV.

Indonesian Higher Education Network (INHERENT)

The Indonesian Higher Education Network (INHERENT) aims to connect 32 institutions of higher education in Indonesia as part of a distance education programme. To establish a reliable connection among the universities, PT Telekomunikasi Indonesia (Telkom) built and maintained the backbone infrastructure for the 'Smart Campus' programme. Universities in the network receive a grant of more than IDR 500 million (USD 50,000) for network support from Ditjen Dikti. Universities serving as network hubs receive assistance in the form of equipment worth IDR 2 billion (USD 200,000). The university that is selected to develop e-learning content and the digital library could get a IDR 2.5 billion (USD 250,000) fund.

The long-term goal is to make all of the 200 universities in Indonesia part of INHERENT. However, different universities enjoy different connection speeds. In Java the connection uses a STM-1 infrastructure that provides 155 Mbps. In outer Java the connection speed is 8 Mbps. For Papua and Moluccas the connection speed is only 2 Mbps due to infrastructure limitations.

Digital content initiatives

There are about 20,000 third-level domains under the country code Top Level Domain (cc-TLD).id. About 1,000 new domain names are registered every month.

The Department of Communication and ICT has published guidelines for central and local government institutions regarding digital content distribution through the Internet. These include the Government Infrastructure Development Portal Guidance, Making Local Government Website Guidance, Management of Electronic Document System Guidance and Compose e-Government Development Master Plan Guidance. According to the Department of Communication and ICT, about 48 per cent of the 472 provinces and regencies/cities have a website.

A national magazine, *Warta Ekonomi*, gives an e-Government Award annually to government institutions that are evaluated on the following criteria: change process, leadership, e-government investment strategy, coordination with other parties and focus on social services. Websites are also evaluated in terms of design, content, accessibility and responsiveness. The 2005 winners, the fourth set since the contest was established, were the following: Yogyakarta—www.jogja.go.id (Regency/City

Administration), East Java—www.jatim.go.id (Province Administration), Department of Public Works—www.pu.go.id (Department), and Institution of National Survey and Mapping Coordination—www.bakosurtanal.go.id (Non-Department Government Institution).

The Indonesia ICT Institute also publishes infometric rankings of government websites using size, links and Web impact as criteria. The top 10 government websites are: DKI Jakarta Province website (www.jakarta.go.id), Surabaya City Administration—East Java (www.surabaya.go.id), East Java Province (www.jatim.go.id), Bali Province (www.bali.go.id), Indonesian Bank (www.bi.go.id), Department of Industry and Commerce (www.dprin.go.id), Bantul Regency Administration—Yogyakarta (www.bantul.go.id) and West Kalimantan Province (www.kalbar.go.id).

The national portal, www.indonesia.go.id, is managed by the Office of the Secretary of State and the Department of Communication and ICT. President Susilo Bambang Yudhoyono also has an official website, www.presidensby.info, which is managed by the Office of the Presidential Spokesperson and an independent editorial team. There is some debate among ICT experts about 'PresidenSBY' as the website's name (some think it is not formal enough for a presidential website) and the domain '.info' (the official state domain name is '.gov.id'). The website contains information on the agenda and activities of the President. It has an English-language section and provides information services through SMS, audio streaming, podcast feed and syndicated news through RSS. Launched in February 2006, the website cost IDR 84 million (USD 8,400) to put up; its monthly maintenance costs amount to IDR 42 million (USD 4,200).

Online services

Many online services are available to the Indonesian public. One of these is e-banking services such as those provided for BCA clients (www.klikbca.com) and Bank Mandiri (www.bankmandiri.co.id). Some universities, such as Bina Nusantara University (www.binus.ac.id), use integrated virtual management systems and online study materials. There are also many e-commerce websites, including computer store websites like Bhinneka (www.bhinneka.com) and tourist service websites like Indo.com (www.indo.com). Airline tickets can be bought online from Air Asia (www.airasia.com) and Adam Air (www.flyadamair.com).

Also available is a Yellow Pages service on the Internet (www.yellowpages.co.id), as well as various online media services such as Detikcom (www.detik.com), Kompas (www.kompas.com) and Bisnis Indonesia (www.bisnis.co.id).

Tax directorate serves tax payers better through IT

The Tax Information System (*Sistim Informasi Pajak—SIP*), which has been operational since 1990, is the 'oldest' IT application of the Directorate General of Tax. The plan is to gradually reduce and then replace this SIP application with the Integrated Tax Application System (*Sistim Aplikasi Pajak Terpadu—SAPT*) under the Directorate General of Tax Information System (*Sistim Informasi Direktorat Jenderal Pajak—SIDJP*). SAPT will be used by the Tax Area Office to handle large tax obligators (or large tax payers locally known as *Wajib Pajak Besar*). SIDJP will be used by the Tax Area Bureau to handle tax obligators such as state-owned corporations, foreign institutions or expatriates, foreign investment and company exchange. Both the SAPT and SIDJP are already being used in Jakarta.

According to KlikPajak.com, the Directorate General of Tax's information portal is very useful, providing an early warning service to tax obligators who have not paid their taxes or posted a Tax Payment Announcement Mail after specific dates. Other applications are an e-filing and e-registration application. Both of those applications also connect to SAPT, SIDJP and SIP through software bridges.

The use of IT by the Directorate General of Tax has already increased tax income collection. According to Taxation Director General Hadi Purnomo, the total income tax collected between 2001 (when the Directorate started using the Internet) and 2004 reached about IDR 660 quintillion, which is more than the total income tax of IDR 600 quintillion collected over 30 years before the Directorate started using the Internet.

IT applications at the Directorate include Yearly Announcement Mail (*Surat Pemberitahuan Tahunan—SPT*) with Tax Obligator ID Number (*Nomor Pokok Wajib Pajak—NPWP*) and online tax obligator registration (e-Registration or e-Reg). Taxes can be paid through any payment channel, including e-banking. Thus, tax payers now enjoy the benefits of e-government, such as better service and information available 24 hours a day seven days a week. Hadi said that with IT, tax evasion is easier to detect and the taxation process is simpler, quicker and cheaper.

Open source and open content initiatives

Open source movement

The Indonesian Go Open Source! (IGOS) movement was launched on 30 June 2004 by the Ministry of Research and Technology, Ministry of Communication and Information Technology, Ministry of Justice and Human Rights and Ministry of National Education. It aims to:

- Promote the use of Open Source Software (OSS) in Indonesia;
- Prepare guidelines for the development and use of OSS in Indonesia;
- Establish a training centre, competency centre and open source-based business incubator centre in Indonesia; and
- Improve the government and society's ability, creativity and participation in the use of OSS.

Some of the open source applications developed by the Indonesian ICT community are Windows in Indonesian language (*Windows Bahasa Indonesia—WinBi*), BlankOn Linux Distro, IGOS Desktop and Application System and *Waroeng* IGOS for Internet Kiosk Client-Server Application.

Computer knowledge for free

IlmuKomputer.Com (IKC), which means computer knowledge, is a website that contains free material and lectures on computer technology in Bahasa. Free materials with Open License Content are available and ready to download in PDF and CD-ROM format. Established on 17 April 2003, IKC received a World Summit on the Information Society (WSIS) award as one of 'The 21 Continental Best Practice Examples in the e-Learning Category.'

IKC materials were written by hundreds of volunteer contributors from cities in Indonesia and abroad. The materials include tutorial/lecture materials, translations, reviews and various practical advice. Online consultations are also available through Yahoo Messenger and virtual seminars.

Blogs

Enda Nasution, who is known as the Father of Indonesian bloggers, estimates that there are currently 70,000–90,000 Indonesian blogs. Indonesian blogger communities may be built around a geographic area; an example is the Loenpia.net community for bloggers from Semarang (Central Java). Other blogger communities have members from a wider area, such as the BlogFam.com community.

In Indonesia, it is not only the young people who keep blogs. Prominent senior people who are known bloggers are former World Marketing Association President Hermawan Kartajaya, Minister of Defence Juwono Sudarsono and IT journalist Budi Putra. Books about blog-making techniques have been published and mainstream online media group detikINET (www.detikinet.com) frequently gather the blogger community to hold discussions or training sessions on how to make blogs for students, teachers, housewives and even activists.

A thousand books for the blind

The Thousand Books Project, spearheaded by the Mitra Netra Foundation (www.mitrانetra.or.id), is an opportunity for volunteers to transform popular books in Indonesia into e-books that can be read by blind people through the Mitra Netra intranet. To date, more than 280 people have joined the project. They encode the books on their own and then send the files by e-mail or post service to Mitra Netra which then edits the files and posts them on the Mitra Netra intranet. Blind people are able to 'read' the e-books using screen reader software. The Mitra Netra website contains a list of the available e-books, as well as books that are still being re-encoded. Volunteers include people from outside Indonesia.

National computer camp for the blind

On 23 November 2006, a competition titled 'The First National Computer Camp for the Blind' was organized by Yayasan Mitra Netra to encourage blind people to make use of computers. As many as 100 people with sight disability competed in poetry writing using Microsoft Word, calculating profit and loss using Microsoft Excel and browsing the Internet. Contestants used notebooks in which a screen reader software called Job Access with Speech (JAWS) was installed.

Education and capacity building

One of the obstacles to the success of the e-government initiatives in Indonesia is the lack of human resources adequately trained in the use of IT. Data from the Re-Registration of Government Employees in 2003 conducted by the National Government Employee Body show that only 27 per cent of the 3.6 million government employees completed college and 55.8 per cent of the total are 40–56 years old. This profile suggests a lack of skills necessary for IT-based government work as well as a lack of willingness to adopt IT-based changes.

According to the Human Resources Blue Book published in October 2003 by the Bandung Technology Institute and the

Department of Industry and Commerce, by 2010 Indonesia will need about 327,813 personnel for the ICT industry. Around 32.5 million personnel are needed to support public services and other industries by 2008, according to the Department of Communication and ICT. However, based on calculations by the ICT and Computer Higher Education Association (APTIKOM), there are only 20,000 ICT graduates every year.

To address the need for trained ICT personnel, some ICT-related industry associations have formed the Indonesia National Work Competence Standard (*Standar Kompetensi Kerja Nasional Indonesia*—SKKNI) which lists 27 competencies for computer operators and 91 competencies for programmers.

Several educational institutions provide capacity building for ICT human resources. According to the latest research conducted by Tempo Data Research and Analysis, the top 10 universities with ICT programmes in 2006 are:

1. Bandung Technology Institute—Bandung (www.itb.ac.id)
2. Bina Nusantara University—Jakarta (www.binus.ac.id)
3. Gunadarma University—Jakarta (www.gunadarma.ac.id)
4. University of Indonesia—Jakarta (www.ui.ac.id)
5. 10 November Technology Institute—Surabaya (www.its.ac.id)
6. University of Gadjah Mada—Yogyakarta (www.ugm.ac.id)
7. Tarumanegara University—Jakarta (www.untar.ac.id)
8. Trisakti University—Jakarta (www.trisakti.ac.id)
9. Telkom Technology College—Bandung (www.stttelkom.ac.id)
10. Pelita Harapan University—Jakarta (www.uph.edu)

At its November 2006 National Congress, the Association of Higher Education on Information Technology and Computers APTIKOM in Bandung declared its support for the implementation of the e-Learning Joint Content Programme in 2007. The academic institutions that are members of APTIKOM are requested to offer online a minimum of one subject worth three credits as part of the e-learning programme. This means that students of one university can enrol in the online courses offered by other universities.

Research and development

VoIP is a main focus of ICT research and development in Indonesia. ICT Center, Jakarta (www.ictcenter.net) successfully piloted the use of Maverick VoIP with a group of vocational high schoolteachers. The technology will soon be implemented

Multichannel learning by Bina Nusantara University

Bina Nusantara University (UBiNus) (www.binus.ac.id) in Jakarta combines on-campus and off-campus course delivery methods in a programme called Multi Channel Learning (MCL). First implemented in 2002, the MCL programme offers 13 sessions in one semester, of which four are delivered via e-learning mode. Around 78 per cent of UBiNus courses can be accessed through the Internet (*e-Indonesia Magazine*, January 2006).

The MCL programme uses a learning management system (LMS) developed by UBiNus. Free Internet services are given to students living within a 5 km radius of the campus. There are hotspots at the Syahdan and Anggrek campuses providing a wireless connection to students with the appropriate PDAs or notebook computers. Classrooms are equipped with an LCD projector and a multimedia computer that is connected to the Internet.

On 25 July 2006, UBiNus signed a memorandum of understanding with the Department of Communication and ICT for the development and implementation of strategic communication and information technology for national development.

in more than 4,000 schools. Maverick VoIP technology can be used free of charge and interconnects easily with government and private telecommunication networks, whether fixed phone or mobile phone.

The liberalization of the 2.4 GHz band for Wi-Fi in 2005 stimulated the spread of VoIP activity. The liberalization of the 2.4 GHz band was the result of concerted efforts by the Indonesian ICT community, especially those who joined the mailing-list indowli@yahoo.com. An innovation by the mailing-list moderators is the '*wajanbolic*' and '*pancibolic*' technology, a 2.4 GHz antenna made out of a wok or cooking pan and which can provide connection speeds of 11–54 Mbps within a 3–4 kilometre radius at a cost of only IDR 350,000 (USD 35). Using RT/RW-net technology, or metro LAN, households

can connect at a speed of 100 Mbps Fast Ethernet for only IDR 200,000 (USD 20). With Wi-Fi, 24 hours of Internet access costs only about IDR 350,000 (USD 35) every month.

Several other R&D efforts in Indonesia are directed at making ICTs more accessible to rural communities. An example is the award-winning e-Pabelan telecentre.

Challenges

Given the size of the Indonesian population and the relatively low ICT penetration rate at present, it is clear that Indonesia can become a huge market for ICTs in the future. For the moment, however, it ranks 60th among 65 countries in the 2005 e-Readiness Rankings published by the Economist Intelligence

Observing the price of chilli at the e-Pabelan telecentre

The National Development Planning Board (*Badan Perencanaan Pembangunan Nasional—Bappenas*), in coordination with UNDP, has put up six telecentres under the Partnership for e-Prosperity for the Poor (PePP) programme. One of the six, the telecentre in Pabelan, received the APEC Digital Opportunity Center (ADOC) Award for ICT Best Practice for Bridging the Digital Divide category in Taipei in July 2006. The e-Pabelan telecentre project, as it is called, bested similar programmes in Chile, the Philippines, Peru and Vietnam.

The e-Pabelan telecentre, which opened on 23 April 2004, is a 7 x 12 metre house providing Internet facilities for farmers. At the start of the project, 10 farmer groups of 15–25 farmers each used the Internet for two hours every day for 10 days. The farmers gathered information on the plant diseases that were afflicting their crops. The chilli farmers in Pabelan II orchard, Pabelan village, Mungkid sub-district, Magelang regency, Central Java used the Internet to find information on the market price of chilli. Armed with this information, they no longer get cheated by middlemen. The farmers also get online information on seeds, planting techniques, pests and pesticides and fertilizers.

The Islamic boarding students, called *santri*, of Pondok Pesantren Pabelan also make use of the telecentre. The facility charges the general public a fee of IDR 3,000/hour (USD 3) while farmers pay only IDR 1,000/hour (USD 1). Using the telecentre as a 'workshop', one *santri* won second place in a computer application competition by Microsoft and earned a training slot in South Korea.

Unit. Indonesia was ranked lowest in terms of the legal and policy environment and social and cultural environment.

The lack of appropriate legal and policy controls is underlined further by Indonesia's having been identified as one of three countries with the highest piracy rates in 2005 in a piracy study published by BSA and IDC Global Software. The 2005 piracy rate was 87 per cent, lower by only 1 per cent than the 2003 piracy rating. According to BSA, piracy is most rampant in the business sector, especially among small and medium-sized enterprises (SMEs). The Indonesian government estimates a financial loss of around USD 280 million (about USD 31,758) every year because of piracy. Because of the weakness of law enforcement against piracy, Indonesia has been included in the United States Trade Representative (USTR) priority watch list, hampering trade with the US and making Indonesia vulnerable to sanctions from the World Trade Organization (WTO).

While it may not be fair to ask ICT producers and vendors to sell their products at prices lower than the prevailing price in developed country markets, the fact is that the purchasing power parity in Indonesia is much lower compared with that in developed countries. Thus, one finds that even in Internet kiosks, violations of intellectual property rights, such as use of pirated software are rampant. One reason is that the price of 10 sets of software, for use in an Internet kiosk equipped with 10 computers, could be as high as the price of the computers themselves.

The Indonesian government recognizes that Internet kiosks play an important role in promoting the benefits of using the Internet to the public. Presidential Decree No. 6 Year 2001, on ICT Development and Usability in Indonesia, points out that Internet kiosks could broaden the range and content of public information services, including medical and education services, serve as a public service centre in cities and villages, and provide e-commerce services for small and middle enterprises. One solution to software piracy in Internet kiosks is use of open source software. However, it is not easy to change the behaviour of businessmen and their customers.

The government continues to work towards increasing teledensity in Indonesia. At the Indonesia Infrastructure Conference and Exhibition (IICE) held in November 2006, the Department of Communication and ICT optimistically projected growth of telecommunication teledensity by as much as 20.1 per cent for fixed-lines, 26.7 per cent for mobile phones, 30.8 per cent for Internet use and 71 per cent for bandwidth by 2010. Clearly, much work needs to be done by government, the business community, academe and the ICT community in Indonesia for these projections to be realized.

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