

Chapter 15

Asia and the Pacific

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THE ASIA CRISIS AND INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

The current 'Asia Crisis' has had a negative impact on economic and social life in most of Southeast and East Asia. It has jeopardized the human development gains made in the health and education sectors in recent years. It has also brought to the fore new concerns relating to ethnic tensions, social unrest, an increased lack of peace and security, women's rights, poor health conditions and hunger as countries slip into rampant unemployment and inflation pushes millions of households back into poverty.

Despite the crisis, the use of electronic media, telecommunications and Internet are continuing to increase throughout the region as a result of globalization. Governments and business are expanding their activities in radio and television, satellite broadcasting, telecommunications and digital production, while individuals and organizations are making their own decisions about investing in various information technologies.

The prognosis is that bandwidth and new communications technologies are becoming cheaper as governments gradually liberalize their telecommunications sectors. Consequently, the foundation for distance education and open-learning systems in the 21st century will already be in place, and within the next two decades even remote Asian villages will be linked to the global communications network. Electronic communication and programmes brought via networked media systems and instructional technology in community centres and Internet kiosks will be the new channels for educating, informing and training those in the rural and urban areas.

Since 1997, Bhutan, Papua New Guinea, Laos, Cambodia, and Viet Nam have been wired into the Internet for the first time. Apart from Myanmar, most countries in the region now have some form of presence in this global network. Nevertheless, with the

Box 15.1 → India

India has been the largest democracy in the world since its independence in 1947. Today it is a country undergoing a massive transition with far-reaching consequences not only for its more than 900 million citizens, but for the entire globe. After a delay of nearly three years, and mired in litigation and controversy for over a year, the long-awaited ISP Policy has been announced and the process of issuing licenses has begun with gusto.

On 22 November 1998, Prime Minister Atal Bihari Vajpayee inaugurated SatyamOnline, the first private-sector Internet access service in Hyderabad, and at the same time the first phase of the Hi-Tec City project near Hyderabad. The highlight of the ISP policy is that licences will be issued for 15 years and there will be no licence fee or any limit on the number of licences awarded.

The railways, state electricity boards and the National Power Grid Corporation are all allowed to provide Internet backbone services. ISPs can set up their own international gateways but require a security clearance from an inter-ministerial committee. The norms for security clearance have not yet been worked out. Foreign equity of up to 49% in an ISP is permitted. Several large Indian industrial groups such as the Ambanis, Hinduja Mittals, Modis, Nandas, and Rais are reportedly undertaking ISP feasibility studies. India currently has an installed base of only 2 million PCs and less than 500,000 Internet users. The demand for PCs and Internet connections is expected to increase significantly due to the new services being launched.

While Internet is not new in the country thanks to the efforts of the Education Research Network (ERNET) and UNDP, it has been limited to those associated with educational institutes or R&D organizations. Previously, access was highly controlled and restricted, which limited its reach. In August 1995, Videsh Sanchar Nigam Limited (VSNL), a public-sector undertaking and the international telecom carrier, launched the first public Internet service in six major cities, which has today expanded to 42 cities and is expected to reach 70 cities by year-end. There is also a move to enable routing of calls at local-call rates from any of the 800 cities that have STD/ISD (long-distance calling) capability. Instead of setting up a local point of presence (POPs) in all cities, calls to the number

17222 will be directed to the closest Internet POP at no additional charge.

In the first year, 50,000 customers went online on VSNL's Gateway Internet Access Service (GIAS) and today the number exceeds 150,000. New Delhi and Mumbai (Bombay) constitute half the customers. The target is to reach one million users by the year 2000, but that seems unlikely even with the entry of private ISPs. One of the major factors limiting the expansion of Internet in the country is poor infrastructure, with problems such as the non-availability of telephone lines and an overloading of telephone circuits that were designed for voice communication. To partially overcome this problem, VSNL has installed routers at various telephone exchanges and linked them on dedicated 2Mbps circuits, thus bypassing the congestion. In the last five years the Department of Telecommunications (DoT) has successfully undertaken a mammoth job of converting telephone exchanges to digital/electronic exchanges and shifting to an optical fibre backbone. This has resulted in very good quality and stable connections, and a huge number of new phone connections. However, many more connections will be needed as India has achieved a teledensity of only 1%.

One of the greatest challenges India now faces is to improve penetration and broaden the access base. If the target of one million Internet subscribers is to be achieved, the entire infrastructure, especially data communication and telecommunications, will need to be overhauled. Another challenge in the short term will be a lack of expertise and talented workforce to handle ISP operations. A sizeable number of people are attracted to the field by world-wide growth figures and are thus jumping onto the ISP bandwagon, but they are often unfamiliar with the dynamics of the business.

India's software business, which relies heavily on computer networks for international operations, is reportedly poised to attain revenues of \$6,000 million by the turn of the century. Exports would account for about \$4,000 million of the total. Improved availability of the Internet will have a very positive impact on the software industry.

SUCHIT NANDA

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exception of Japan, it is still too early to consider these developments in terms of an 'Asian Internet'. The installation of such a network throughout the region will depend on a number of factors: the regulatory approaches of governments, the number of Internet Service Providers (ISP) or web hosts and approaches to providing infrastructure. The only constant is that every country in the region carries out these activities differently and is at a different stage of development.

Consider these examples. In Singapore, one of the most 'wired' countries in the region, there are only three ISPs, yet across the water in the Philippines there is a more relaxed approach to regulation that has spawned some 145 ISPs and countless walk-in access centres. In Cambodia, the government has allowed the two ISPs to offer a full range of Internet services and has no plans to censor content, but over the border in Viet Nam the authorities have implemented a firewall that intentionally blocks access to selected sites and unintentionally has caused numerous others to become unavailable because of technical problems. Further to the North, Laos has only just allowed its citizens to access the web after first experimenting with an e-mail-only connection. In the Himalayas, Nepal has a burgeoning Internet industry and some interesting local content programmes, while near-neighbour Bhutan is implementing an internal system – intranet – with only e-mail access to the outside world. In Mongolia, the locals are using their high levels of literacy and technical education to create an innovative network using whatever means possible: satellite, xDSL modems, radio modem and some creative fund-raising schemes. The list goes on throughout the region.

This same diversity is present when it comes to telecommunications, broadcasting and print media, and runs parallel to developments for the Internet. The Singapore government, for example, owns the two broadcasting companies, the Television Corporation of Singapore and Singapore Television. Competition is limited in telecommunications, which is dominated by

Singapore Telecom, and there is only one print media outlet, the Singapore Press Holdings. By contrast, in the Philippines there are some 17 newspaper organizations, more than 100 television stations, and telecommunications have been opened up to foreign competition. Laos and Viet Nam, which have tried to prevent the inflow of certain content from the Internet, have similar policies for broadcasting and other media, whereas Mongolia opened up its media just before the arrival of the Internet – with the result that there are a flourishing number of print publications and satellite television channels now available in many parts of the country.

Despite this diversity, it is possible to categorize many of the countries into three broad groups. At one end are those that are moving to some form of broadband access and encouraging the use of high-bandwidth applications such as interactive multimedia and e-commerce. Included in this group would be Japan, Singapore, Australia, New Zealand, Taiwan (China), the Republic of Korea and increasingly, Malaysia. A second tier of countries have a well-established presence on the Internet and a diversified number of access providers, content providers and users. This group would include the Philippines, Indonesia, Thailand, Sri Lanka, China, India, Pakistan and Nepal. Finally, there are those countries that have only recently joined the Internet community. These third-tier countries have a very limited number of ISPs, few examples of local content, and access is confined to one or perhaps two main cities rather than throughout the country. Included in this group are Viet Nam, Bhutan, Laos, Papua New Guinea (PNG) and Cambodia.

Existing media structures, broadcasting facilities, telecommunications infrastructures and regulatory environments tend to conform to this classification of Internet connectivity. Nevertheless, some countries do not fit neatly into one of the three tiers, and even when they do, diversity is still the key feature, with each country taking its own culturally specific route to enter the information age.

INFORMATION AND COMMUNICATION TECHNOLOGY: INFRASTRUCTURE AND USE

The first tier: the newcomers

It is not surprising that countries only recently connected to the Internet have governments that have also taken a cautious approach to liberalizing their media and telecommunications sectors. Viet Nam, Bhutan, Laos, Papua New Guinea and Cambodia are all characterized by monopoly telecommunications carriers, low telephone densities, and government regulators who take a dim view of foreign ownership and outside influences. Because of this strict regulatory regime, there have been no private sector initiatives to connect to the Internet until recently. Even the academic sector – one of the catalysts for Internet access in the West and more developed Asian countries – has been slow to act. By contrast, the development sector has been very active. Four of the five countries mentioned – Viet Nam, Bhutan, Laos and Cambodia – all received support to connect to the Internet from Canada's International Development Research Center (IDRC) under a programme called Pan Asia Networking (PAN). The programme was launched in 1994 to promote South-South and North-South

Internet networking. In the case of Papua New Guinea, the government started by opening up Internet access provision to the private sector.

The most recent entrant to the Internet, Bhutan, is not surprisingly the country that is perhaps the least open to the outside world. Bhutan has long had a policy of limiting tourism and has only allowed television transmission since 1997. The adoption of Internet is following this cautious approach, with the first connections allowing only e-mail access to the outside world and web access restricted to local sites. The Ministry of Planning's figures put the number of personal computers in the country at 4,000, 80% of which are in Thimphu. All telecommunications services in Bhutan are operated and maintained by the Ministry of Communications' Division of Telecommunications. The current telecommunication network is digital and is capable of supporting data communications and other non-voice services without major problems.

Laos also took a tentative approach to the Internet and started with e-mail-only services. More recently, GlobeNet, a subsidiary of Philippines-based satellite provider Globecom, has started to provide full Internet access in conjunction with the Ministry of Information and Culture. The information technology

Table 15.1 → Tier 1 (sample): newcomers to the Internet, 1997–1998

Country	GDP per capita in \$, 1995	Estimated population, in millions, 1998	Main telephone lines per 100 inh., 1996	No. ISPs	Estim. no. of Internet users	No. of fixed-line telecom providers
Viet Nam	270	77.9	1.6	4	11,000	2
Cambodia	130	10.8	0.1	2	2,000	1
Bhutan	166	1.9	1.0	1	na	1
PNG	1,083	4.6	1.1	5	3,000	1
Laos	359	5.3	0.6	2	1,000	1

Source: United Nations Population Division and Statistics Division; ITU, *International Telecommunication Indicators*, 1998.

(IT) industry in Laos lags behind most Southeast Asian countries because of neglect and the effects of previous Western sanctions against communist bloc countries. A massive effort in training and in technology transfer is needed to develop a self-sustainable Laotian IT industry. Although such help is readily available in the Lao expatriate and resident IT communities, it does not seem to be readily accessed. There has been some urgency for Laos to adopt some effective means of mass communication, particularly as the offices of the Association of South-east Asian Nations (ASEAN) have adopted the Internet as the standard means of communication.

In Cambodia, Viet Nam and Papua New Guinea, the governments have been more accepting of the Internet, allowing full access to the outside world. Nevertheless each of the countries has a limited number of Internet service providers and coverage.

Full Internet services arrived in Cambodia in May 1997 with the establishment of CamNet, a joint venture between the Ministry of Posts and Telecommunications of Cambodia (MPTC) and IDRC. Shortly after, a second ISP, Big Pond Cambodia, a subsidiary of the Australian carrier Telstra in co-operation with MPTC, entered the market. As part of the license agreement with Telstra, MPTC is not allowing new ISP players until 2002. MPTC is both the telecommunications operator and the regulatory body. At present, there are no specific laws in the country relating to the Internet. The number of users hooked up to the two main e-mail-only servers, Open Forum Information Exchange and WorldMail, is low, numbering about 2,000. However, like other countries in the region, walk-in access centres are becoming a feature and will allow more widespread use in future. CamNet operates two public Internet centres, one to serve Cambodian research organizations and another aimed at expatriates and tourists. CamNet is working with various Cambodian organizations to publish their own material on the Internet. The Open Forum and Lidee Khmer, an association of Khmer professionals

supporting Cambodian research and development, are spearheading attempts to create a unified system of Khmer coding that will allow the use of Khmer characters on computers (see Box 3.1).

Viet Nam first allowed commercial Internet services in late 1997, following more than eighteen months of indecision. An Internet Steering Committee has been set up, headed by the Minister of Science, Technology and Environment and representatives from the Ministries of Security, Culture and Information, Education and Training as well as the Directorate General of Posts and Telecommunications. Four companies were awarded licences to become Internet Service Providers: NetNam, Viet Nam Data Communications (VDC), Financing and Promoting Technology (FTP) Corporation and the Saigon Post Company. The ISPs must go through the monopoly gateway operator, VDC (a subsidiary of the country's monopoly carrier VNPT) for international connections and are not allowed to lease their own lines. A PAN project is also currently underway to help develop Vietnamese content and is being co-ordinated by NetNam in collaboration with organisations such as the National Centre for Scientific and Technological Information and Documentation (NACESTID) and the Ministry of Culture and Information. Like other countries in Asia, a significant problem in presenting local information on the world wide web is the lack of a unified coding standard for the local character set. NetNam has designed a utility that recognizes the various codes in use to display Vietnamese text. The utility can detect the six (out of about ten) most common formats that are in use.

In Papua New Guinea, government-owned Telikom PNG has a monopoly on telecommunications services in the country until 2002. Its network is made up of a series of microwave links with about 100 repeater stations throughout the country. In many areas, the final link is provided by High Frequency (HF) radio which can be unreliable for data transmission. Internet and telecommunications services

Box 15.2 → Pacific Islands

The Pacific Islands offer a complete contrast to the vast majority of Asian countries. Despite high levels of aid, the Pacific Islands region has experienced low growth and economic stagnation. This problem is attributed to high population growth, rural-urban migration, the restricted economic conditions of atoll life combined with the need to import a large number of goods and, finally, to high vulnerability to natural and economic disasters. Government is the major customer, employer and supplier of services in the islands, maintaining in many cases a monopoly. Given the unique geographical dispersion of these countries, Information and Communication Technologies, particularly telecommunications, offer a real opportunity to diminish the adverse effects of isolation. The physical infrastructure for

telecommunications seems well established. Three satellites can be accessed from every country (PeaceSat, Intelsat 174 and Intelsat 180), while other systems, such as telex and data transmission, cover only some of them. With the exception of emerging arrangements in mobile markets, telecommunications services are provided under state monopoly. But operations seem often to be inefficient. Coverage is poor in remote areas and consumer dissatisfaction is high. Teledensities (telephone lines per 100 inhabitants) are relatively low, with large differences between urban and rural areas. For instance, the figures for rural and urban teledensities are 0.09% and 7% in Tonga, while they are 18% and 27% in the Cook Islands. Fax, paging, cellular and Internet services have been introduced in the major urban centres.

Table 15.2 → Information and communication technologies in the Pacific Islands

Country	GDP per capita in \$, 1995	Estimated population, in thousands, 1998	Main telephone lines per 100 inh., 1996	Estim. no. of Internet hosts/100 inh., 1996	No. of radio receivers/1,000 inh., 1995	No. of television receivers/1,000 inh., 1995	Local TV, 1997	Local radio, 1997	Internet access, 1997
Cook Islands	5,432	19(b)	na	na	705	184	Yes	Yes	Yes
Federated States of Micronesia	2,104	106(c)	6.5	0.03	na	na	Yes	Yes	Yes
Fiji	2,593	823	8.8	0.01	612	18	Yes	Yes	Yes
Kiribati	654	77.6(c)	na	–	212	9	Yes	Yes	No
Nauru	na	10	na	na	580	na	Yes	Yes	Yes
Niue	na	2.3	na	na	564	na	Yes	Yes	Yes
Palau	6,417	17(a)	na	na	na	na	Yes	Yes	Yes
Marshall Islands	1,649	63	5.9	na	na	na	Yes	Yes	Yes
Samoa	1,106	170	5.0	na	485	41	Yes	Yes	Yes
Solomon Islands	686	416	1.8	0.04	122	6	No	Yes	Yes
Tokelau	na	1.5	na	–	610	na	No	No	Yes
Tonga	1,787	97(c)	7.9	0.01	571	16	Yes	Yes	Yes
Tuvalu	na	9.7(c)	na	na	320	na	No	Yes	No
Vanuatu	1,289	183	2.6	0.0	296	13	Yes	Yes	Yes

(a) Data refer to 1990.

(b) Data refer to 1991.

(c) Data refer to 1994.

Source: United Nations Population Division and Statistics Division. ITU. *International Telecommunication Indicators*, 1998. Parsons Galloway Foundation. *Pacific Island Involvement in the Global Information Infrastructure*. Final Report submitted to the Forum Secretariat. May 1998.

E-mail services are popular with business customers and the extended family networks resulting from significant population movements.

Every Pacific Island country receives international radio. Some of them also have local radio stations. Most countries produce local television content, although in many countries this is limited to a few hours per day. The penetration rate for personal computers may vary between 1 and 30 personal computers per 1,000 inhabitants, with the exception of Niue, which has almost reached a rate of 80/1,000. There are no statistics for Fiji, the Federated States of Micronesia, Nauru and Palau. The University of the South Pacific provides distance education services using dedicated leased lines. Additional sites are planned in Kiribati and Samoa. But the limited communication infrastructure means that visual content cannot be distributed. Pacific Islands consumers pay high prices for international and domestic phone services,

leased lines and Integrated Services Digital Network (ISDN) services. The monopoly situation and/or the small margins impose prices which are 25% to 58% higher than those prevailing in other environments.

There is an overwhelming consensus in multilateral agencies and regional political groupings to endorse liberalization of telecommunications in order to attain better pricing, service quality and access. Benefits would extend to both public and private institutions as well as the general public. Sixteen independent states located in the Pacific Ocean are grouped in the South Pacific Forum, an intergovernmental organization which includes the thirteen island states described in this box in addition to Australia, New Zealand and Papua-New Guinea. In addition to the regular budget made up of assessed contributions, eight developed countries and the European Union provide funding for operational assistance.

are controlled by the government policy regulatory authority, PangTel. The government is currently looking into content regulation but as yet has not formulated a policy. Full Internet services began in PNG in April 1997 with the licensing of five Internet services providers, all of whom operate from the capital, Port Moresby. Tiare, a subsidiary of Telekom PNG, is licensed to operate the country's only Internet gateway, also in Port Moresby, which is linked via satellite to AT&T in Sydney. Tiare is also planning to improve the Internet backbone in the country by upgrading links between Port Moresby, Lae, Mt. Hagen and Rabaul. The number of users is estimated to be from 2,000 to 3,000. One of the largest potential user communities for Internet is within the university sector. The University of Papua New Guinea (UPNG) and the University of Technology have recently commissioned fibre-optic campus networks that support Internet/Intranet services. In 1998, IDRC and the South Pacific Centre for Communication and Information in

Development at the UPNG launched a project to establish a country-level information server that will carry PNG content from many PNG partner institutions.

The second tier: countries with rapidly improving infrastructure

The second tier of countries contains those where infrastructure has begun to move out of one or two major cities and into rural areas. In this group, competition has started to emerge in media and telecommunications, and local content is becoming a reality.

One country that has recently made the transition from state-controlled and restricted media, broadcasting and information technology to a more liberalized communications policy is Mongolia. While infrastructure in rural areas is still limited and competition in telecommunications not quite a reality, the country has made great strides in providing information technology to its people in recent years. In 1990, Mongolia switched from a communist state-

controlled economy to a democratic, market-based economy. Since then, the government has liberalized many sectors of the economy including data communications and the media. For a country that until recently had a heavily regulated media, the number of publications and available television stations in the country in 1999 is quite extraordinary. In information technology as well Mongolia has made great progress in catching up with other countries in the region. At the end of 1996, through assistance from IDRC's PAN programme and a government loan, the local networking company Datacom Ltd set up a satellite earth station and initiated the country's first Internet connection. Since then, a number of projects have seen Internet's reach extend in terms of coverage, usage and the amount of local content. For example, Datacom has been connecting Mongolian institutes and universities to the Internet through high speed radio modem links. Secondary schools are also being connected via satellite, with support from an IDRC grant. Part of this project will be an Educational Web Centre and an experimental information broadcasting network for provincial schools.

The Philippines and Thailand are examples of other countries that have a wide range of projects that aim to make greater use of information technology and to expand its reach to the general population. However, each country is achieving this end by different means. In the Philippines, where there has been a very open media sector and a dynamic private sector, it is not surprising that the government has taken a hands-off approach to the Internet. As a result, the private sector is the dominant force when it comes to providing Internet access, and unlike many countries in the region, it has been given a relatively free hand in establishing services and initiating international connections. The result is some 145 Internet access providers, many of which have country-wide points of presence, a burgeoning array of cheap, walk-in access centres, and some vibrant local content. This situation mirrors what can be seen in the print,

broadcasting and telecommunications industries. There are 45 private telecommunications organizations as opposed to 7 public organizations; 86 private television stations compared with 33 government-owned stations; 466 commercial radio stations; and more than 20 daily newspapers.

The Philippines came to the Internet by a traditional route, with the initial connection being a product of the academic sector. The country's first Internet network, PHNET, was initiated in 1994 by the Department of Science and Technology and a consortium of Philippine universities and institutions. It is still the main academic backbone in the country and most recently is proposing to expand its coverage to 2,000 schools by the end of 2000. The resulting network will become the Philippine Science Academic and Research Network (RP-SARNET). In the long run, Internet in the Philippines is expected to be structured around several national backbones – one for government, one for schools and one commercial – each of which will be connected to the other.

In Thailand, the government has played a more direct role in providing access to information technologies within the country. National IT initiatives are formulated within the IT-2000 plan, which was put forward by the National IT Committee and approved by the National Economic and Social Development Board as part of its eighth national development plan. The three broad aims of IT-2000 are to build an equitable national infrastructure, invest in people and enhance government services and the information industry. National projects such as the academic Internet backbone, a government information network, and a proposed Thailand Software Park are all part of the IT-2000 plan.

Similarly, the government dominates Thailand's broadcasting industry, controlling nearly all radio and television stations, while telecommunications is split between two main government carriers (Telephone Organization of Thailand (TOT) and Communication Authority of Thailand (CAT)) and two private carriers

Table 15.3 → Tier 2 (sample): countries with rapidly improving infrastructure

Country	GDP per capita in \$, 1995	Estimated population in millions, 1998	Main telephone lines per 100 inh., 1996	Telecom organizations	No. ISPs	Private TV stations	Govt. TV stations	Private radio stations	Govt. radio stations
Bangladesh	280	114.0	0.3	7	12	–	2	–	9
Indonesia	1,019	206.5	2.1	11	47	5	13	–	189
Nepal	203	23.2	0.5	1	3	–	4	–	7
Philippines	1,093	72.2	2.5	52	145	86	33	466	33
Sri Lanka	716	18.5	1.4	6	8	6	2	5	1
Thailand	2,896	59.6	7.0	18	16	1	10	–	477
Pakistan	504	147.8	1.8	1	50	10	6	3	24

Source: United Nations Population Division and Statistics Division; ITU, *International Telecommunication Indicators*, 1998.

(Thai Telephone and Telecommunications (TT&T) and Telecom Asia). The monarchy also plays a major part in the country's development, and in accordance with a long historical tradition a number of IT projects have been initiated by the king and other members of the royal family.

Indonesia has traditionally also taken a government-led approach to communications, but has suffered most from the economic crisis owing to internal political unrest and a devastated economy. Extending telecommunications to all 27 provinces and each main island is a daunting task, yet one which Indonesia has traditionally embraced as a means of creating national cohesion. This recognition of the need for communications for development and modernization occurred more than twenty years ago, in 1976, with the launch of Indonesia's domestic satellite, PALAPA. Indonesia's national information infrastructure is being created under a programme known as Nusantara 21 which calls for all major islands and cities to be linked either by submarine and terrestrial cable, or by satellite, by the year 2001. However, the current economic crisis has added a level of uncertainty to this project and to many government and business initiatives. The education sector in Indonesia is active in information technology and has suffered less from the economic fallout. More than half of the country's universities are connected to the Internet exchange of the Institute of Technology Bandung, which is connected via a 1.55 Mb/s link to the Asia Pacific A13 backbone.

Despite government backing for Internet and other information technologies, the second-tier countries are still held back to varying degrees by regulatory provisions. These provisions are designed to protect monopoly telecommunications interests and lessen government fears about the impact of the Internet and other outside media. This approach can be seen in countries as diverse as Nepal, Bangladesh, Pakistan, India, China and Sri Lanka. In nearly all of these cases, Internet access must go through a monopoly carrier or designated gateway, resulting in increased costs to both ISPs and, ultimately, users. The situation is compounded by the lack of telephone lines that can be supplied by monopoly providers. For example, in Bangladesh, a country with only 0.4 telephone lines per hundred people, ISP networks are saturated due to a lack of access lines – and this is in the capital city, Dhaka. Trying to provide services to most remote villages is presently impossible owing to a lack of infrastructure. Even where infrastructure exists, government departments can be very reluctant to allow its use. A fibre-optic communications network owned and run by the Bangladesh state railway has been viewed by some ISPs as a possible means of gaining widespread connectivity. The transmission lines run alongside the major rail corridors and connect most major centres in the country, but its capacity is underutilized. However, the railway authority has been reluctant to let others use its dormant capacity. The regulatory situation in Bangladesh is a grey area, with no licensing document

or fee structure yet available for ISPs. A similar situation exists for electronic and print media, where existing laws are so outdated that they are irrelevant.

In Sri Lanka, the government imposes a licence fee of Rs3 million, which ensures that ISPs are operated only by large organizations. Many local observers have suggested that this prevents smaller niche players from providing services, many of whom would be able to start in smaller areas that are ignored by the larger organizations. There are currently eight licensed Internet Service providers in Sri Lanka and many more value-added resellers, although with only an estimated 12,000 users by June 1998.

Despite these regulatory impositions, there are signs that countries in this second category are gradually liberalizing telecommunications, broadcasting, and media – albeit slower than many in the private sector would like. In Nepal, for example, the government has recently allowed the private sector to operate its own satellite facilities rather than go through the monopoly provider, Nepal Telecommunications Corporation (NTC). This follows the setting up of an independent regulator, the Nepal Telecommunication Authority (NTA), in April 1998. One of the first decisions of the NTA was to open the market for very small aperture terminal (VSAT) satellite facilities, which will allow ISPs to obtain their own international bandwidth at a cost well below that offered by NTC. The regulator has indicated that other aspects of telecommunications will also be opened up to competition in the next two years, although there is no indication that broadcasting will also be liberalized. Nepal's four television stations and seven radio stations are all government-owned. By contrast, the Internet in Nepal was first introduced by the private sector, in 1993, and has flourished without any sort of public assistance. While there are only three ISPs, there are literally hundreds of walk-in access centres, a pattern that has previously been established for telephone and fax services, where Public Call Offices (PCOs) offer walk-in services. A group of more than

30 Nepali research organizations is also networking together to provide local research and development information on NepalNet, a PAN project.

In most of the countries mentioned, there are indications that telecommunications and the media are slowly being liberalized, with governments in the process of overhauling their regulatory structures to make way for the new information environment. A brief look at some countries provides an example. In Bangladesh, control over regulatory matters was recently moved away from the state-controlled Bangladesh Telephone and Telegraph Board (BTTB); China has recently restructured and merged its regulatory environment; India has removed the monopoly for providing Internet services enjoyed by the state-owned carrier, VSNL; Pakistan is privatizing its telecommunications carrier, and the list goes on. While some governments are slower than many in the private sector would like, the momentum to liberalize will certainly continue, in a manner deemed appropriate by each country.

The third tier: the broadband users

It is not surprising that those countries moving to broadband infrastructure based on technologies such as ATM (asynchronous transfer mode) networks – which allow for the convergence of voice, data, video, and Internet – are also moving at a more rapid rate towards the full deregulation of the media, telecommunications, and the Internet. The economies in this category – Australia, New Zealand, Singapore, Malaysia, Hong Kong, South Korea, and Japan – are also the most developed and prosperous in the region and have well-developed infrastructures and well-educated technical work forces. Each of these countries is also vying to become a regional hub for broadcasting and information technology, a fact which seems to further encourage liberalization and investment in infrastructure and services.

In recent years, Japan, Australia, and New Zealand have opened up their markets for telecom-

Table 15.4 → Tier 3 (sample): broadband users

Country	GDP per capita in \$, 1995	Estimated population, in millions 1998	Main telephone lines per 100 inh., 1996	No. ISPs	Estimated no. Internet hosts per 100 inh.
Australia	20,046	18.4	51.9	600	3.8
Singapore	25,581	3.5	51.3	3	2.0
Taiwan (China)	na	na	46.6	>50	na
Korea, Rep. of	9,736	46.1	43.0	>20	0.3
Japan	41,718	125.9	48.9	2,600	0.8
Malaysia	4,313	21.4	18.3	7	0.2

Source: United Nations Population Division and Statistics Division; ITU, *International Telecommunication Indicators*, 1998.

munications services, while in Singapore, Malaysia, Taiwan (China), Hong Kong and the Republic of Korea this process is well underway and in some cases has been accelerated. In terms of Internet access, Japan, Australia and New Zealand are all in the top tier of nations globally. When the ratio of host computers is compared to GDP, New Zealand is the second most wired nation in the world, behind Finland. The New Zealand city of Wellington, according to the January 1998 survey by United States-based Network Wizards, is the world's most Internet-connected city, with 4,702 Internet-connected computers per 100,000 people. In Australia, according to the latest figures from the Bureau of Statistics, almost a third of Australian adults, or 4.2 million people, use the Internet, while the number of households with access to the Internet increased by 46% last year to almost 1.25 million (18% of households), giving it one of the highest Internet penetration rates in the world. This increase is backed up by the number of Internet hosts, which has been consistently among the top five nations, even though the population base is a mere 18 million.

In Japan, there were some 2,600 registered ISPs and 13 million users as of October 1998. In the year 2000 the number of users is expected to rise to 20 million. One feature of the Internet in Japan has been its spread into virtually all areas of the country-side through a multitude of small niche-market providers. Similarly, Japan's media and telecommunications industries are notable for the array of choices and the number of small players. For example, there are 121 daily newspapers in circulation as well as

291 community papers and 528 town papers, while in telecommunications there are some 4,726 providers of varying sizes and descriptions.

In Singapore, Malaysia, Taiwan (China) and the Republic of Korea the government has historically taken a prominent role in guiding the use and spread of broadcasting and media for both political and economic reasons. The introduction of Internet has followed this pattern, although there are increasing signs that these governments recognize the need to open up more than in the past. Nevertheless, the public sector is still instrumental in propelling these countries towards an information society. For example, Malaysia has made a number of well-publicized initiatives aimed at placing itself at the forefront of the global information economy, particularly through its Multimedia Super Corridor (MSC) project. The MSC is Malaysia's hope for becoming a knowledge-based society having developed country status by the year 2020. MSC incorporates two 'smart cities', an advanced telecommunications infrastructure and seven flagship application areas in government, education, medicine, finance, manufacturing, R&D and marketing. As part of its efforts to attract electronic commerce projects to the MSC, it is in the process of introducing cyberlaws that aim to create a regulatory framework for information and e-commerce services. Malaysia has approximately 205,000 Internet users. In addition to a number of national telecommunications backbones, many of the individual state governments are implementing their own networking projects, some of which involve extensive physical

infrastructure, while others are more content-based web projects.

Malaysia has partially deregulated its media and telecommunications industries but government influence is still strongly felt in all sectors. In telecommunications, deregulation has been limited to a handful of large players, while in broadcasting a number of private radio and television stations have emerged, although the government stations are still in the majority. In 1996, Malaysia launched its own satellite, the Malaysian East Asian Satellite (MEASAT). Malaysians can receive satellite transmissions only through this domestic service, rather than from other sources as an open policy would permit.

In Singapore, 'IT 2000: a vision of an intelligent island' is a masterplan for the introduction of IT into every aspect of Singaporean society. Initiatives such as the Singapore ONE broadband network are part of IT 2000 and are aimed at turning the country into an IT and broadcasting hub. The backbone of this network uses state-of-the-art asynchronous transfer mode (ATM) switches connected via fibre optic trunks that thread through the central business districts and residential neighbourhoods. Access to the network for individual users will be via asymmetric digital subscriber line (ADSL) modems and hybrid fibre-coaxial (HFC) cable modems, both of which can deliver Internet access at bandwidths of 2 Mbps or better. Once implemented, the network will be available to 90% of all homes. The total number of Internet users in 1998 was estimated at more than 400,000. In keeping with its approach to media in general, the government of Singapore has taken a hands-on approach to the regulation of Internet content. The Singapore Broadcasting Authority (SBA) regulates both ISPs and Internet Content Providers through the Internet Class Licence Scheme, which requires all providers and resellers to follow the SBA's Internet Code of Practice. Under the obligations of the code, Internet access providers are required to deny access to sites that have been prohibited by SBA.

In the Republic of Korea, the IT and electronics industries have been a successful part of the economy with many large high-tech manufacturers and exporters. The government is also involved in building capacity through the Korea Information Infrastructure (KII). The KII is intended as a broadband infrastructure and comprises two networks: a public network for the private sector and a government network for government or public institutions. The Ministry of Communications and Information plans to put this broadband infrastructure in place by 2010 through a combination of private and public sector investment. The number of Internet users was 2.5 million at the end of 1997. In advertising, there are approximately ten active companies and many others preparing to enter online activities. In publishing, book stores are opening cyber facilities, while data communications companies are also opening cyber bookstores as part of cyber shopping-mall initiatives. In the media, 'Internet only' journals that do not publish regular paper journals are also beginning to appear.

Basic telecommunications infrastructure in Taiwan (China) is well advanced and dominated by Chunghwa Telecom Co., which is in the process of being privatized. There are over 9 million telephone sets, extensive microwave radio relay trunk systems on the east and west coasts for domestic connections, satellite earth stations and submarine cables to Japan, Philippines, Guam, Singapore, Hong Kong, Indonesia, Australia, the Middle East and Western Europe. Currently, there are over 500,000 users from around 400 academic institutions, colleges and universities in the island who benefit from the Taiwan Academic Network's free services to promote academic research. The island's National Information Infrastructure (NII) plan was introduced in 1994 with the following priorities: network construction, education and training, electronic government, electronic commerce, social welfare, lifelong learning, Chinese cultural relic online, the study and revision of related laws and regulations and internationalization of Chinese networks.

The more economically developed countries are also at the forefront of changes in library culture. Today, libraries must redefine their roles if they are to survive and prosper in the new age of information-based societies. The dramatic capacity increase of digital media, the convergence of telecommunication and broadcasting, and the availability of information resources accessible through the Internet have driven home the realization that libraries must reposition themselves. The new vision sees libraries as part of networked environments, and the promotion of IT is an integral part of library services in meeting the changing information needs of users. Thus, the focus has been on developing the digital library, which includes identifying repositories of multimedia digital information resources and integrating the country's libraries and knowledge-based institutions through networking; establishing information resource networks or 'libraries without walls'; creating local content or databases – text (reports, publications, bibliographic databases), audio, video, maps, pictures, graphics – in digitized form, using image processing and character recognition among the technologies employed; making information resources accessible on the Internet; marketing library services through web pages; and providing Internet facilities and stimulating an Internet culture among the public.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE RELATED TO ICT

While this chapter suggests that countries in the region are marked by diversity and cannot be covered by broad generalizations, some specific activities are more regional in nature. Satellite television is one of the obvious areas of regional activity and its reach and influence has been dramatic. In recent years a large number of local, regional and multinational satellite television companies have been set up in Asia. Prominent among these is Hong Kong-based Star TV, which

beams programmes to 220 million households in the Asia-Pacific region. Increasingly, many of the programmes and channels are localized and broadcast in a variety of Asian languages. However, the use of such regional services varies from country to country, with some, such as India and Japan, welcome foreign programmes while others, including China, Malaysia and Singapore, restrict the entry of foreign programming.

In terms of telecommunications, satellite facilities are also providing regional coverage, most notably through regional systems such as AsiaSat, Apstar, as well as through international systems such as PanAmSat, Intelsat and the forthcoming Iridium and similar low-earth orbit (LEO) schemes. Taiwan (China) and Singapore have also co-operated to launch the ST-1 telecommunications satellite in 1998. Telecommunications networks using fibre-optic cable are also coming to the fore. Prominent among these are Fiber Optic Link around the Globe (FLAG), which links the rest of the world with countries including Korea, Singapore, Hong Kong and China, and SEA-ME-WE 3, which in Asia connects Singapore, Australia, Korea and Japan. Another regional telecommunications project known as ACASIA comes from ASEAN countries. It is aimed at providing multinational corporations with cross-country private network services.

Development agencies have been instrumental in helping developing countries in Asia adopt information technologies. IDRC's PAN programme, mentioned earlier, promotes South-South and North-South Internet linkages, while the UNDP also implements numerous technical co-operation programmes throughout the region. The UNDP's Asia Pacific Development Information Programme (APDIP) based in Kuala Lumpur, Malaysia, promotes the use of IT in the region and also focuses on Internet governance issues.

Another regional body involved with Internet governance and infrastructure issues is the Singapore-

Box 15.3 → China

China, officially the People's Republic of China, is the world's third largest country by area and the largest by population. Covering a total area of 9,596,960 square kilometres, China encompasses a diversity of landscapes extending from the Tibetan Plateau at the southwest extremity to the deserts in the Mongolian borderland of north central China and to the sub-tropical fertile plains of the Canton Delta to the south.

By the end of 1997, China had a population of 1,236.26 million (excluding the Hong Kong Special Administrative Region and Macau), comprising 56 ethnic groups. China's population density (126 people per square kilometre according to a 1995 sample survey) is relatively high. Distribution, however, is uneven: the coastal areas in the east are densely populated, with more than 400 people per square kilometre, while the plateau areas in the west are sparsely populated, with fewer than 10 people per square kilometre.

Telecommunication is one of the fastest growing industries in China. In 1997, aggregate postal and telecommunications volume totalled 177,900 million yuan, a 33.3% increase over 1995. Telephone lines have been increasing at an annual rate of 41.5% per year for the past seven years. Domestic and international telecommunication services are increasingly available for private use. By the end of 1997, the number of telephone lines had expanded to 120 million, with 9.55 telephones per hundred persons. The domestic system serves principal cities, industrial centres, most townships and is fast reaching villages. By 1997, 55.6% of China's villages were connected to the public telephone system. All cities above the county level in China now have programme-controlled telephones, and China ranks second in the world in the scale of its telephone network. By 1997, 14 inter-provincial fibre-optic trunk lines had been installed, while mobile communication networks and international services have been expanding rapidly.

The Chinese government encourages the development of Chinese software and formatted fonts facilitate the use of Chinese characters for digital communication. It is estimated that Internet users in China will exceed 2 million by the end of 1998 and reach 5 million in the year 2000. Yet considering China's population of 1.2 billion, the percentage of people accessing the Internet is and will be very small. For the whole nation to become 'wired', the geographic, professional, gender and economic obstacles to accessing the Internet would need to be addressed.

In China, major metropolitan cities and economically more advanced regions tend to have the best network facilities

and therefore it is not surprising that most Internet users are based in Beijing, Shanghai and Guangzhou. Beijing also has the most ISPs. Ordinary people are still not very aware of the Internet, and current users are mostly in computer-related professions or have higher education qualifications. The average user is young – 80% are between 21 and 35 – and 88% of Internet users in China are male.

Placing great emphasis on the strategic importance of information/communication technologies to the modernization of China's economy, the Chinese government has made it a priority to build the national information infrastructure (NII), especially national economic computer network projects in the country's Ninth Five-Year Construction Plan (1996–2000). The government supports the expansion of Internet into China, though it maintains close control over content. While foreign ownership of any Chinese telecommunications and information infrastructure is strictly prohibited, the government actively seeks foreign investments to fund the rapid development of China's information infrastructure. The four major Internet backbone networks are all government sponsored and must use China Telecom links to connect to Internet sites in other countries. All ISPs must register with the police.

On 1 February 1996, the State Council issued Decree No.195, 'The Temporary Provisions of Internet Administration of the Computer Information Communication network of the P.R.China'. This mandated that the four established Internet networks – ChinaNet, CHINAGBN, CERnet and CASnet – should be separately administered by the Ministry of Posts and Telecommunications, the Ministry of Electronics Industry, the State Committee of Education, and the Science Institute of China.

In June 1998, the government restructured its information and telecommunications authorities. The Ministry of Information Industry (MII) was established by merging the Ministry of Electronic Industry and the Ministry of Post and Telecommunications. The new ministry is responsible for invigorating the manufacture of information products, telecommunications and software; formulating sectoral programmes, policies and legal codes; mapping out an overall plan for telecommunications trunk networks (including local and long-distance telecommunications networks), broadcast and television networks (including radio and cable television networks), and special-use telecommunications networks for military and other departments.

LI ZHANG

(excerpted from The Pan Asia Networking Yearbook, 1998)

based Asia Pacific Networking Group (APNG), which is dedicated to the advancement of networking infrastructure and the research and development of all associated enabling technologies. APNG has spun off several other Asian Pacific organisations such as the Asia Pacific Network Information Centre for Asian Policy and Legal Group (APPLe); the Asia Pacific Internet Association (APIA), and the annual Asia Pacific Regional Internet Conference on Operational Technologies (APRICOT).

A lesser-known agency is the Commission on Science and Technology for Sustainable Development in the South (COMSATS). Initiated in 1989 by Nobel laureate Professor Abdus-Salam, COMSATS is based in Islamabad, Pakistan and links thirteen centres of excellence in countries of the South as well as having significant networking facilities in Pakistan. COMSATS plans to computerize data related to science and technology for its twenty member countries, and has recently started an IT Training Institute in Islamabad.

MOVING TOWARDS AN INFORMATION SOCIETY

This chapter has highlighted the developments and applications in information technology in the Asia Pacific. In particular we have tried to show the extent of diversity in the region, where each country is adopting information technology in its own way and at a separate pace. At one end of the scale are countries that are only now joining the global information networks that will become prevalent in the next millennium, while at the other are those that are already seeing the convergence of their media, telecommunications, broadcasting, and information networks. As we have seen, new media and regulatory structures often take shape from existing patterns of media adoption.

At the opening of the 7th Annual Conference of the Asian Media Information and Communication Centre in May 1998, UNESCO's representative Mr Claude Ondobo observed that in education,

information technologies must better respond to the different learning and training needs of society; in culture, multimedia technologies must promote cultural and linguistic pluralism; and in science, information highways must improve both access to scientific information and the sharing of research facilities on a large scale and in a more interactive way. This Asia-Pacific ICT report card seems to demonstrate these ICT goals.

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