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## Japan

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### Introduction

The chapter on Japan in the 2005/2006 edition of *Digital Review of Asia Pacific* began with the slightly optimistic observation that the country might at last be emerging from more than a decade of economic stagnation. Since that chapter was written, the Japanese economy has continued on a long and slow recovery. The Cabinet Office Monthly Report for September 2006 described exports, imports, housing construction and public investment as 'flat'. However, corporate profits have been showing a year-on-year increase for 16 consecutive quarters, with the information, communication and electronics industries generally strong over this period. Real growth in 2005 was 2.7 per cent. Real GDP grew at an average of roughly 1 per cent yearly in the 1990s, compared to growth during the 1980s boom of about 4 per cent per year. The Japanese economy, the second largest in the world, is still not the driving force it once was, but we can hope that it is on the road to a sustained period of growth and prosperity (Japan Cabinet Office 2006).

All of the economic trends in the information and communications technology (ICT) industry for the first quarter of 2006 are positive. Shipments are generally up, prices are falling slightly although average household expenditure is increasing, and within the ICT industry, employment is increasing and salaries rising. The presence of the ICT industry has continued to increase and its impact on the Japanese economy as a whole is becoming greater. The last cycle of ICT growth that peaked during the period 2004–05 was based on increased ICT-related investment by corporations, as well as increasing and maturing use of the Internet and mobile phones by ordinary users. The growth cycle underway in the third quarter of 2006 is being

Population	128.08 million (ITU Database 2005)
GDP per capita	USD 35,756.532 (IMF Country statistics 2005)
Key economic sectors	Manufacturing, Services, Real Estate (MIC 2003)
Computers per 100 inhabitants	54.15 (2005, ITU Database)
Fixed-line telephones per 100 inhabitants	45.89 (ITU Database 2005)
Mobile phone subscribers per 100 inhabitants	73.97 (ITU Database 2005)
Internet users per 100 inhabitants	50.20 (ITU Database 2005)
Domain names registered under .jp	801,997 (JPRS 2006, March)
Broadband penetration rate per 100 inhabitants	19.0 (OECD, 2006 June)
Internet domestic bandwidth	139.2 Gbps (Monthly average, May 2006, MIC)
Internet international bandwidth	68.5 Gbps (Monthly average, May 2006, MIC)

Notes: MIC is the Ministry of Internal Affairs and Communications. JPRS is the Japan Registry Services Co., Ltd.

driven particularly by demand for digital home appliances, although Internet and mobile communications remain strong in both business and home sectors, as does general growth in ICT production.

The ICT sector has been important to the recovery that has taken hold of the economy over the last few years. Information and communication devices and services are becoming pervasive in society. Mobile phones are near ubiquitous, and wired broadband is available in more than 50 per cent of households. Broadband, particularly technologies like Wi-Fi which is used in almost half of all broadband households, is changing the way people get their news and entertainment, as well as how they communicate and share information and ideas. With the pervasiveness of ICTs in Japanese society, we see a new phase in government policy shepherding the creation of a ubiquitous network society.

### Technology infrastructure

#### Telecommunications and Internet

Broadband services in Japan are well known to be among the cheapest and fastest in the world. Open access policies have given rise to a very competitive broadband industry providing cheap, high-speed and innovative services that are available in most regions of the country. However, even after this success, the Ministry of Internal Affairs and Communications (MIC) is concerned that the market could be turning to favor the incumbent telecommunications operator, NTT.

Liberalization of the Japanese telecommunications market began in 1984, and since that time, government policy has focused on introducing competition and reducing NTT's market power. Styles of regulation have changed over the years, but NTT still remains the dominant provider in most telecommunications sector markets. After 22 years of competition, the two NTT local companies, NTT East and NTT West, still hold over 91 per cent of contracts for subscriber telephones. The NTT companies handle approximately 75 per cent of all domestic calls. In the mobile phone market NTT DoCoMo is the leading provider with over 53 per cent of handset contracts. Only the broadband market is different—it is highly competitive.

The Japanese broadband market has been built around an open access regime where competitive providers have been able to use essential elements of NTT's network, particularly low-cost access to copper lines to homes and metropolitan fibre connections running between NTT exchanges and to other locations. These elements have been the basic building blocks of the networks of competitive ADSL providers. In less than four years, the number of broadband users has grown from 0.5 million in June 2002 to over 23 million at the end of March 2006. Over 14.5 million subscribe to ADSL service, and almost 5.5 million to fibre-to-the-home (FTTH). There are more FTTH subscribers in Japan than in all other countries combined. Cable TV companies provide broadband Internet to over 3.3 million users. Half of Japan's 46 million households subscribe to broadband service (Japan Statistics Bureau 2006).

The number of new FTTH subscribers (820,000 in all) during the 1st quarter of 2006 was the highest ever. As the overall increase in new broadband subscriptions was 930,000 for the quarter, FTTH is driving continued growth. The monthly increase of FTTH subscriptions has exceeded that of ADSL subscribers in each quarter since the 1st quarter of 2005. There were less than 37,000 new ADSL subscribers during the first three months of 2006, and in Tokyo and Osaka, the largest metropolitan areas, the number of ADSL subscriptions dropped as people switched to fibre.

The trend towards more FTTH subscribers brings with it some policy concerns. In the ADSL market the NTT group of companies provides 40 per cent of lines; in the FTTH market, they control 64 per cent of lines and their share is increasing as more people take up fibre. MIC wants the migration from ADSL to FTTH services to happen, but is concerned that while the majority of users migrating service to NTT FTTH are NTT ADSL subscribers, users of other ADSL providers are also migrating to NTT at faster rates than to the fibre services provided by other operators. If this migration pattern continues, the combined NTT companies may achieve the same level of market power in FTTH as they have in the Public Switched Telephone Network (PSTN). Thus, there is a risk of losing the powerful competition that has emerged in the ADSL market.

With the convergence of fixed and mobile, and convergence of communications and broadcasting underway, concern about the NTT group's ongoing market dominance will be the subject of ongoing MIC competition reviews.

## Broadband and broadcasting

All large broadband providers have begun video broadcasting services. Yahoo!BB, NTT and KDDI offer video download services for movies and television programmes, as well as live streaming television. For competitive reasons, and to ensure transmission quality, many of these services are available only to subscribers and downloads are kept within the company's network and control. Usen, the third largest FTTH provider, offers video services to its subscribers in this way, but also offers a free video broadcast service called Gyao, which is available to any Japanese Internet user.

People need to register to watch Gyao programming. The business model also dictates that the subscriber must be in Japan as Gyao finances its service through targeted advertising. Gyao programming includes movies, TV programmes, music and sports events, with live baseball proving popular. In August 2006, Gyao had 11 million registered users and total viewing hours exceeded 18 million. Advertising revenue has grown more slowly than expected, and Usen is struggling with JPY 160 billion (about USD 1.3 billion) in interest-bearing liabilities. However, Usen expects to see a profit on a monthly basis before the end of 2006.

## Fixed-line phones, broadband and voice over IP (VoIP)

Fixed-line phone service covers 100 per cent of the Japanese population and both the number of customers and revenues are decreasing as people switch to newer and cheaper IP telephony services, or simply to mobile service.

There are three classes of IP-based telephony service currently in use in Japan: an IP exchange service known as OAB/J IP telephony which has a guaranteed quality of service, 050 IP telephony with no guaranteed quality of service, and pure IP telephony such as Skype and similar services.

050 IP telephony is a service provided by an ISP in which the customer receives service via a broadband connection and VoIP adapter, and a telephone number with the prefix 050. Voice traffic in 050 IP telephony routes over a broadband connection and the ISP's network, and sometimes over the public Internet, and the quality of calls may vary depending on other traffic. 050 service might not include access to emergency calls and some other PSTN features.

OAB/J IP telephony is the potential replacement for traditional fixed-line phone. OAB/J stands for the standard geographic prefix (for example, 03 for Tokyo), which will only be assigned

to an IP telephony service that achieves the same quality of service and features as an ordinary fixed-line telephone. To get 0AB/J IP telephony, customers need broadband access and a VoIP adapter. Unlike 050 IP telephony, 0AB/J IP is provided by a network provider that underlies the user's ISP access network and the voice traffic of 0AB/J is routed through a managed network that provides the same quality of service as the standard PSTN telephone.

While the number of customers of standard fixed-line telephone is decreasing, the numbers of 050 and 0AB/J customers are increasing. In December 2003, there were 4.3 million IP telephony customers. The number more than doubled over two years, reaching 10 million in December 2005. As of March 2006, the standard PSTN telephone service had 50.6 million subscribers, 050 IP telephony had 10 million and 0AB/J IP telephony 1.4 million subscribers. Almost half of 050 subscribers are Yahoo!BB customers, although Yahoo!BB's share has declined over the past four quarters from over 55 per cent, while NTT's share has increased over the same period from 19 per cent to over 25 per cent. 0AB/J IP numbers tend to be used by FTTH customers, and during the first quarter of 2006, NTT East and West's share of 0AB/J IP numbers increased by 6.4 per cent to 69 per cent.

## Mobile phones

Although the mobile phone subscription base is still growing, its growth has slowed significantly as the penetration rate has reached over 75 per cent of the population. As of September 2006, the total number of mobile phone subscribers was 93,812,400 and the number of personal handy phone system (PHS) subscribers was 4,879,500. The number of mobile phone subscribers increased only by 4.78 million or 5 per cent over the past 12 months (Telecommunications Carriers Association 2007).

The monthly average revenue per user (ARPU) for Japanese mobile subscribers is still probably the highest in the world, although it is decreasing steadily. In the 3rd Quarter of 2005, DoCoMo's 3G subscribers spent JPY 9,050/month (about USD 74/month) and 2G subscribers JPY 6,140 (about USD 50). The combined 2G/3G ARPU is JPY 7,050 (about USD 57.78). KDDI's combined 3G and 2G ARPU is JPY 7,190 (about USD 58.92), although its 3G subscribers spent an average of JPY 9,990 (about USD 81.87). These figures are going downwards due to the steady decline in prices for voice calls and increased competition as rapid growth in the number of users has slowed. Profit margins are much slimmer than in the past, although Japan still has some of the world's highest mobile call rates.

More than 80 million (that is, 81,346,000) mobile phones are able to use IP packet services, over 80 million have cameras, and approximately 57.2 million are 3G. The average turnover in

phone handsets is about once per 12–18 months, and 16.2 million new phones were bought between April and July 2006. This high turnover of handsets is a good indicator that new services requiring the functionality of new phones have the opportunity to quickly achieve acceptable market penetration.

Willcom's PHS network coverage is almost nationwide, focusing on providing data access at speeds ranging from 64 Kbps to 402 Kbps rather than voice. Willcom's data services are significantly cheaper than those provided by 3G operators. Its network has better coverage and transmission speeds are more reliable. Willcom's service is popular with people who need reliable Internet access anywhere and at anytime.

Softbank is best known in Japan for revolutionizing the broadband ADSL market in 2002 through a price-slashing business strategy and introduction of new high-speed services. In 2005, Softbank received a license and spectrum to operate 3G services as part of a policy initiative to introduce new operators to the mobile market. Softbank had been widely expected to begin its new mobile service in mid-2007 with the same low-price and innovative service approach it used in the broadband sector four years earlier. The license was for W-CDMA, but Softbank had been testing handover between this 3G service to Wi-Fi and to Mobile WiMax. However, following Softbank's takeover of Vodafone for USD 15.5 billion, the new spectrum was returned to MIC and these technical innovations have been delayed. The high cost of acquiring Vodafone and the need to run an established network and provide service to existing customers has changed Softbank's business plan. Thus, the company's entry to the mobile market has not yet brought the much hoped for severe price competition.

Number portability was introduced on 24 October 2006 and the three major providers spent the earlier part of 2006 gearing up for the challenge. The total cost of switching providers is around JPY 5,000 (about USD 40.98). However, the three companies have introduced various discounts and offers to encourage users to switch. All have revamped their handset line-up: NTT DoCoMo introduced 14 new handsets in early October; KDDI announced 12 new models in August; and Softbank came out with 13 models in September.

Information provided by MIC flagged one problem facing number portability: 72 per cent of mobile phone users have never changed their phone e-mail addresses. This could be a barrier to change because e-mail addresses are not portable between providers. Downloaded content, such as ringtones, also cannot be transferred over to a new provider. On the other hand, reports in the Japanese media indicate that 10 million users have expressed interest in changing providers.

The potential for higher customer turnover should increase competition and trigger changes in market share. Softbank in particular is looking to number portability to boost its share of the market and has launched a series of new services linking

its mobile customers to Yahoo! brand products and services. Through this linkage, Softbank is able to offer news, stock price information, some games and other content free of charge, unlike DoCoMo and KDDI where such services are subscription-based. However, an aggressive marketing campaign by Softbank in the lead-up to the launch of number portability may have violated laws prohibiting misleading advertising. KDDI filed a complaint about the advertisements with the Fair Trade Commission. Softbank's situation worsened when a systems error struck shortly after number portability began. System errors, customer complaints and the bad press that followed the misleading advertising campaign made number portability a setback rather than an opportunity for Softbank.

Until new services and price plans firm up, industry analysts expect KDDI's AU service, known for a range of music services not available from DoCoMo or Softbank, to gain the most customers in the early days of number portability.

### Next generation networks

In 2004, the two leading telecommunications operators, NTT and KDDI, announced their intention to migrate from traditional PTSN phone networks to next generation network (NGN)

technology. The migration will take place gradually. NTT began an NGN field trial in 2006 to demonstrate and verify the new network technology and its interoperability with other network operators and service providers. The company expects 30 million customers to subscribe to NGN services by 2012.

However, there are a number of potential policy concerns regarding NGN, particularly open access to NTT's infrastructure and interconnection with other operators. Operators other than NTT are not as positive about building NGN infrastructure and are concerned about whether the new infrastructure will be open to them and on what terms.

## Key government institutions dealing with ICTs

As ICTs become common in all aspects of Japanese society, all branches of the government are involved to some degree in ICT policy formulation or implementation. Some of the key institutions are described below.

The IT Strategic Headquarters, established under the Cabinet and chaired by the Prime Minister aims to provide the necessary coordination among government agencies concerned with IT-related policy.

### Mobile broadcasting

Phones capable of receiving high-quality digital TV broadcasts are the latest trend in mobile technologies. Japanese terrestrial digital broadcasts divide one channel into 13 segments—12 segments for high definition television (HDTV) and one segment for use by mobile devices. The mobile broadcast feature is known as 'one-seg' (one segment). The service provides high-quality digital images on small screens. Service officially began on 1 April 2006. Six hundred thousand one-seg phones were sold in the first three months of service. They receive ordinary digital TV broadcasts and are proving popular not only for niche viewing, such as horseracing, but also for general news, weather and some sports broadcasts. Marketing for Vodafone's first one-seg handset was targeted at the start of the 2006 World Cup.

Broadcasters cannot produce programmes especially for phones until after broadcasting deregulation in 2008, and the networks are using the period until then to develop new business and advertising income models that are different from those for terrestrial broadcasting. New regulations may also change the copyright structure: at present actors and producers receive no royalties for this new type of distribution. Organizers of major events may also try to sell broadcasting rights for one-seg.

To build an industry capable of demanding that new types of content be produced for it, and to compete with terrestrial broadcasters for rights to high-interest events, industry analysts say 20–30 million one-seg handsets will need to be in use by the time deregulation occurs in 2008. However, NTT DoCoCom's first one-seg phone, the P901iTV, was recalled after a few months of operation for a software upgrade to prevent people receiving TV broadcasts after they had quit DoCoMo service. The handset, which is rumoured to have cost DoCoMo as much as JPY 60,000 each but was heavily discounted to retailers for as little as JPY 20,000 to encourage initial sales, could continue to receive TV broadcasts after customers cancelled their subscription to DoCoMo. Apparently 20,000 people bought the phone and then immediately cancelled their DoCoMo service, taking advantage of the software glitch to use the phone as a low-cost mobile digital television.

One-seg is also used in car navigation systems and some PCs have one-seg tuners built in. Tuners are also available on USB devices. Japanese mobile music and video players that can display one-seg broadcasts are being sold, and the one-seg feature is something not even Apple's iPod can match.

The Ministry of Internal Affairs and Communications (MIC) has the overarching role both in policymaking and regulation of the telecommunications industry.

The Ministry of Economy, Trade and Industry (METI) is responsible for the information economy, information services industry, information security and ICT development for small and medium-sized enterprises, in keeping with its mission of industry development.

The National Information Security Center (NISC), which was established in April 2005 under the Prime Minister's Cabinet, formulates and implements information security policy within the government in a coordinated and uniform manner. NISC has responsibilities in planning and policy, international coordination, intra-government information security, critical infrastructure protection and incident response.

## Enabling policies and programmes

The Japanese government's current ICT policy can be traced to the e-Japan Strategy published by the IT Strategic Headquarters in 2001. Over the last five years, the Japanese government has gradually changed focus from the development of ubiquitous broadband infrastructure to the exploitation of the infrastructure to achieve social and economic benefits.

It is widely understood that the government has a firm commitment to achieving nationwide broadband infrastructure. While this is true, the role of the government has been limited to strategic oversight, and funding and actual deployment of infrastructure is the responsibility of the private sector. In the e-Japan Priority Policy Program 2006, the role of government is summarized as pointing to the future direction that Japan should take, to push deregulation and market competition forward, to motivate the private sector, to provide a minimum level of investment as well as safeguards against the digital divide, to ensure safety and security, and to optimize the operation of the government and public sector. With a few exceptions in research and development and infrastructure development in rural and remote areas, the government has not directly funded broadband take-up.

The e-Japan Strategy adopted in January 2001 sought to transform Japan into the 'most advanced IT nation within five years'. The Strategy was access- and infrastructure-oriented, although it did mention priority areas other than infrastructure, such as electronic commerce, human resource development and electronic government. Target figures (always-on Internet access to all citizens, high-speed Internet access for at least 30 million households and ultra-high-speed Internet access for 10 million households) were set for broadband penetration. The rapid take-up of ADSL service was attributed to open access policies regarding NTT's copper infrastructure, which resulted in the budget ADSL service of Yahoo!BB.

As it became clear that the objectives of the 2001 e-Japan Strategy were being met, e-Japan Strategy II was adopted in July 2003 to create an 'energetic, worry-free, exciting and convenient' society using information technology. Through e-Japan Strategy II, the government put more emphasis on the exploitation of the broadband infrastructure, focusing on seven areas: health, food, lifestyle, SME financing, knowledge, employment and public administration. In addition, the new Strategy aimed to further develop network infrastructure that could meet the demands of the coming information society. Among the key concepts introduced were ubiquitous network, security and reliability, and research and development in information technology.

Thus, another notable development during this period was the publication by MIC in December 2004 of the u-Japan policy. Unlike e-Japan, u-Japan is a ministerial policy, which means it has less impact beyond the ministry itself and it may be interpreted as a set of action plans that should be put into a Priority Policy Program. MIC made 'ubiquitous networks' the focus of the Japanese government's contribution to the Tunis Phase of the UN World Summit on the Information Society (WSIS).

e-Japan Strategy II also revamped relevant ICT laws, regulations and policy guidelines to ensure that unnecessary or outdated legal and administrative barriers did not hinder the growth of the ICT sector and use of ICTs. The reforms undertaken at this time were extensive, and new legislation has been unnecessary in the past 2–3 years.

Every year since 2003, the IT Policy Headquarters has updated the Priority Policy Program, which outlines the action plans of each government agency to achieve the objectives set forth in the e-Japan Strategy. In January 2006, the IT Strategic Headquarters made another policy move: it published the New IT Reform Strategy, the national strategy for 2006–10. The highlight of the Strategy is structural reform of the government and of the Japanese social and economic systems, while addressing user and citizen concerns such as accessibility, the digital divide, and security and safety, and emphasizing international contributions and competitiveness.

In line with the New IT Reform Strategy, MIC published a new set of policy priorities in August 2006, called the Next Generation Broadband Strategy 2010. MIC aims to bridge the remaining digital divide between urban and rural areas. By 2010, 100 per cent of Japanese local communities (cities, towns and villages) will be covered by broadband access and 90 per cent of Japanese households will be covered by ultra-high-speed broadband access.

Unlike the previous strategies which focused more or less on the technology, the New IT Reform Strategy aims more to achieve social reform based on the benefits of ICT. The Strategy seeks solutions to the problems Japan is facing now, such as the

aging of society, revitalization of the economy and improvement of national competitiveness.

## Intellectual property rights

In 2003, the Prime Minister convened a Strategic Council on Intellectual Property to discuss policy to strategically protect and utilize the results of intellectual activity, such as scholarly research and creative activity, thus enhancing the international competitiveness of Japanese industries. The Council published a national plan on intellectual property, called the Strategic Program for the Creation, Protection and Exploitation of Intellectual Property, which resulted in the enactment of the Basic Law on Intellectual Property of 2003.

The Strategic Council on Intellectual Property was later replaced by the Intellectual Property Policy Headquarters, which was established under the Cabinet. Every year the Policy Headquarters publishes an Intellectual Property Strategic Program that outlines action plans for each government agency to implement in the next fiscal year. In 2006, the following actions were identified to facilitate the development and distribution of digital content:

- Promotion of broadcast via IP multicast;
- Development of content protection systems with due consideration to users;
- Promotion of content delivery via the Internet;
- Content creation based on the reuse of existing content;
- Establishment of a content business market on the Internet;
- Network for information appliances; and
- Development of a rights management mechanism suitable for the distribution of broadband and digital content.

With regard to local language and culture, the Strategic Program also identifies the protection of the typeface design of computer fonts as an area that needs policy attention. Under the current interpretation of the copyright law, typeface design was considered to be out of the scope of intellectual property protection. The Strategic Program calls for the government to consider how to protect typeface design and take appropriate measures when necessary.

## Digital content and life online

According to the Digital Content Association of Japan (DCAj), the Japanese media and content industry, which includes broadcast, sell video, film, music, video games, books, journals, and newspapers and other publication, had an estimated volume of

JPY 13,681 billion in 2005 (about USD 112 billion), including JPY 2,527 billion (about USD 20 billion) for digital content.

### Online music

Music sales have been shrinking since 2001. In 2005, the total sale of music content was JPY 614 billion (about USD 5 billion), which represents only 80 per cent of the sales in 2001. CDs and DVDs are selling less. On the other hand, online distribution of music via mobile phone and the Internet keeps growing. For example, mobile operator KDDI launched a full track download service in 2004, making over 110,000 songs available and selling 30 million downloads in December 2005. However, these and other new online sales outlets are not adequate to offset losses made by traditional brick-and-mortar music retailers.

The music industry argues that illegal music sharing by peer-to-peer applications, such as Winny, contributes to the loss of music sales. However, an empirical survey (Tanaka 2004) shows that there seem to be no positive correlations between the decrease in music sales and peer-to-peer file sharing, which nullifies the music industry’s argument. During the first nine months of 2005, mobile music sales in Japan reached JPY 26 billion (about USD 213 million), accounting for 96 per cent of Japan’s total digital sales.

Although online music sales were not unpopular in Japan, Apple’s iTunes Music Store came to the Japanese market late. iTunes Music Store was first launched in the United States in April 2003, and rapidly expanded to some 20 countries worldwide. But the service did not reach Japan until August 2005, two years and four months later. The launch of the service was delayed due to negotiations with Japanese content holders. Interestingly, one of the biggest music labels in Japan, Sony Music Entertainment (SME), has not joined the iTunes service; it has its own channel for online music distribution called ‘bitmusic’.

### Social networking services (SNS)

It is not yet clear what people are using broadband for, but the recent popularity of social networking services is a significant broadband phenomenon. An OECD report (2006) quotes data from Technorati, an online blogging information company, indicating that 21 per cent of the blogs worldwide that Technorati tracks are based in Japan. According to a report by MIC (2005), the net number of Japanese blog users was estimated to be 1.65 million at the end of March 2005, of which 950,000 (57.6 per cent) are active users.

Social networking services (SNS) have grown rapidly since the MIC report was published. The biggest SNS in Japan, called ‘mixi’, had more than 5.7 million registered users when it made an initial public offering on the Tokyo Stock Exchange

'MOTHERS' in September 2006. The service had only 300,000 registered users a year-and-a-half ago. Mixi is an invitation-only service: to join you must be invited by someone who is already a member. Members provide online diaries, photo albums, shared bookmarks and customized news, as well as basic SNS functions such as personal profiles and testimonials, online communities and bulletin boards that help users connect to other users. Mixi earns about 80 per cent of its revenue from advertising carried on the site.

There are over 5,000 smaller SNS sites typically with 100–1,000 members. They are usually constructed around open source SNS software 'Open PNE', and are managed by individuals or small groups and some specialized small companies. These smaller SNS services can grow into very tight-knit communities. Furthermore, discussions among the millions of SNS users and the ideas they express are having a significant influence on Japanese society.

### Online gaming

The popularity of online games has also been enabled by broadband. In mid-2006, there were an estimated 28 million online game players in Japan. Among heavy gamers, the MMORPG (Massively-Multiplayer Online Role-Playing Game) *Final Fantasy 11* is one of the most popular games with over half a million registered players and as many as 170,000 simultaneous users. Hangame, Japan's largest Internet game portal company, provides more than 150 kinds of online multiplayer games. The portal is modelled on its parent company NHN Corporation's successful operation in Korea. In September 2006, Hangame had 17 million registered players and could handle a maximum of 125,000 concurrent users, over 200 million page views a day, and e-mail from 200,000 registered users daily. Hangame describes itself as an online gaming community.

Portable games machines remain extremely popular and these are also increasingly network-enabled, either to connect between players' machines directly or to online game portals like Hangame. Nintendo DS has sold about 16 million units since it was launched at the end of 2004. A Wi-Fi connection function was introduced at the end of 2005 and the service has reached 1.3 million users and provided over 40 million game sessions since its launch.

## Education and human resource development

Although as a whole, Japan has been able to produce a sufficient number of ICT professionals, there has been some mismatch

between what universities have offered students in terms of ICT education and the ICT skills that the private sector expects from young university graduates. Japanese universities tend to educate students as generalists rather than as specialists and university graduates usually need to spend a considerable amount of time in re-training to acquire practical skills and knowledge after getting a job. *Nikkei Computer*, a major computer magazine for business readers, reported in December 2005 that only 37.3 per cent of some 2,300 ICT professionals surveyed by the magazine said they acquired their professional knowledge from university education and 26.5 per cent said they learned on their own. This finding points to a significant gap between the skills universities equip graduates with and the needs of industry. In June 2005, a report published by the Japan Federation of Economic Organization (Keidanren) (2005) pointed out that the gap between universities and business was even wider in the training of highly skilled ICT professionals, and called for joint efforts among the government, industry and universities to improve the situation.

Another challenge facing the ICT sector is that computing and technology subjects are becoming less popular with university entrants. In April 2006, *Nikkei Business Online* reported that the Department of Electronics and Computer Engineering, which used to be the most competitive department at the University of Tokyo, was ranked one of the least popular departments by prospective students. According to *Mainichi Communication* (2006), 6 per cent of students in 2002 wanted to find a job in the ICT sector, but in 2006, interest in ICT dropped to 4.1 per cent.

The Japanese government, industry and universities are working to improve the education and training of ICT professionals. METI has implemented a number of policy measures, including a certification programme for IT Coordinators; the 'Exploratory Software Project', which is an awards programme for university students and young engineers; and the Skill Standards for IT Professionals (ITSS), which aims to set standards for the required level of competence of ICT professionals and which is expected to affect course design in ICT education in universities. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has been working with Keidanren since April 2006 on a programme to train 'Advanced IT Specialists'. As of September 2006, six accredited universities have joined this programme (*Mainichi Communication* 2006).

Human resource development in the ICT field is currently in a weak position, but the government, industry and universities are well aware of the nature of the problem and have made a number of efforts together to improve the situation. It is hoped that these improvements will pay off in the longer term.

## Research and development initiatives

R&D initiatives are being undertaken by the government, private sector and academia. Among the government agencies, MIC has the most direct and comprehensive R&D programme for ICT. It provides funding for qualified projects in the following thematic areas: universal communications technology, new generation network technology, and security and safety technology. The National Institute of Information and Communication Technology (NICT), under the auspices of MIC, operates the Japan Gigabit Network (JGN), a nationwide IP network test bed.

The private sector and universities are also active in R&D activities. Building research capacity among young researchers and students is becoming a concern. One notable initiative in this regard is the Exploratory Software Project led by the Information Technology Promotion Agency (IPA). The programme aims to nurture the next generation of talented programmers and entrepreneurs.

## Conclusion

With the Japanese economy at last emerging from more than a decade of stagnation, it is interesting and almost ironic that broadband, one of the great successes of recent years, may be taking a step backwards. There are indications that consumers in Japan’s dynamic and competitive broadband market are beginning to favour NTT, the old incumbent operator, over the new players. This appears to be occurring naturally through consumer choice, not abuse of market power or unfair competition. It is too soon to tell if this is just an early trend in the development of the FTTH and advanced broadband market. Other providers may soon begin to gain subscribers at NTT’s expense. Or it might be a more permanent trend that will require some intervention from the Ministry of Internal Affairs and Communications.

Throughout the history of telecommunications, Japan has been able to learn from and adapt successful policy strategies from overseas to suit the local market’s needs. Now Japan is a world leader in broadband and she has to make her own rules

to meet new demands. How Japan meets these challenges should be explored in future editions of the *Digital Review of Asia Pacific*.

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