CHAPTER 1

The Accelerating IT Revolution: A Broadband-driven IT Renaissance

Introduction

The information and communications technology (IT) revolution, unfolding at a dizzying speed over the past several years, has generated particularly strong interest in Japan in 2000–01. Clearly positioning IT as an important strategic issue, the Japanese government is undertaking various programs to ensure its advance. Japanese society as a whole has strong expectations that IT, as the basis of development in the new century, will (1) spur reform of the nation's economic framework and bring greater efficiency to industry and (2) allow for diversification of people's lifestyles and enhance the convenience of their daily activities. We are moving closer to realizing an "advanced information and communications network society" in which information and knowledge are key sources of added value.

The central feature of IT as described in this White Paper, which covers 2000 through the early part of 2001, is the advent of a full-scale Broadband Era brought about by support for fiber-optic networks and the development of an environment that encourages competition. Indeed, the year 2001 can be considered "First Year of Broadband."

The Broadband Era is characterized by a qualitative change in Internet usage, allowing for (1) sending and receiving of any form of information quickly; (2) constant connection; and (3) connection via means other than PCs, such as cell phones and network-able home appliances. It is a time when all people in all situations will be able to use information.

This permeation of broadband and the Internet to the level of individual users means that ordinary people will be able to freely use a "limitless information space." This will bring about not only the changes already noted—improved business efficiency and the possibility of diverse lifestyles—but will also allow for a dramatic increase in individuals' intellectual activities; indeed, it holds the potential for cultural reform on a global scale. We believe that broadband and the Internet can be likened to the Renaissance originating in medieval Italy, in which a flowering in individual intellectual activity brought society out of the "Dark Ages" into human-centered modern civilization.

It is from this standpoint that the feature section of this *Information and Communications in Japan White Paper 2001*, the first in the new century, takes its theme, "The Accelerating IT Revolution: A Broadband-driven IT Renaissance." We will review the extent to which IT has permeated Japan's social and economic activity and analyze the development of broadband functionality for the Internet and the changes that this has brought about in the use of Internet content.

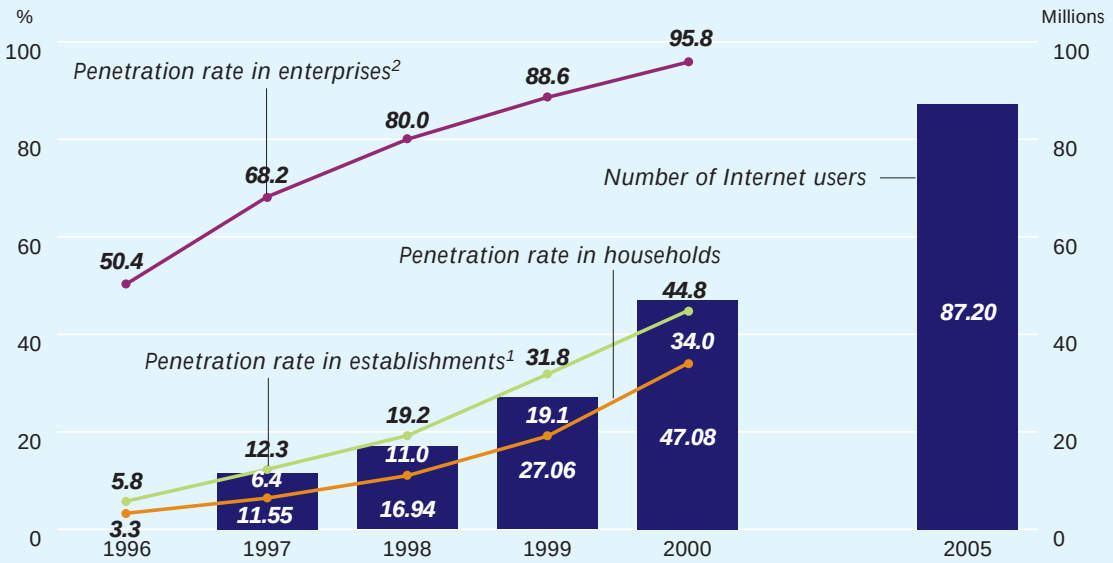
Broadband Development: the Basis of the IT Society Development

1 Rapid popularization of the Internet

1.1 Statistics on Internet usage

Internet usage in Japan has been increasing, with the number of users aged 15–79 reaching an estimated 47.08 million at the end of 2000, up 74.0% year over year (Exhibit 1, Note 1). Some 37.23 million of these users access the Internet via PC, while 23.64 million gain access via cell phones, the latter figure indicating that cell phones have been a prime factor in the surge in overall Internet usership since access via cell phone first became possible in February 1999. Some

Exhibit 1. Trends in Internet Usage



1. "Establishment" is defined as a single physical location (excluding postal services and communications business) with five employees or more where the economic activity is conducted. That is usually called a store, a factory, an office, or the like.
2. "Enterprise" refer to businesses (excluding agriculture, forestry, fisheries, and mining industries) with 300 employees or more.

Sources: *Survey of Info-communications Usage in Daily Life, Communications Usage Trend Survey*

Note 1. The method of estimating the number of Internet users in Japan at the end of 2000 was as follows. First the proportions of respondents to the mail-in *Survey of Info-communications Usage in Daily Life*, who used the Internet (whether as web surfers or e-mail users) via, respectively, (1) PC, (2) cell phone, PHS, or personal digital assistant, or (3) household game equipment or Internet connection device were calculated and adjusted for the nation's population mix. Each of the three ratios was multiplied by the number of people in Japan between 15 and 79 (inclusive) at the end of 2000: 103,510,000. After adjusting for people who accessed the Internet by more than one means, the three numbers were totaled, giving 47.08 million.

25.93 million users, more than half the total, indicate that they access the Internet "almost daily" from one type of terminal or another (Exhibit 2). An estimated 87.2 million Japanese will be accessing the Internet by 2005 (Note 2).

About half of residential PC Internet connections use ordinary phone lines, with the other half using ISDNs (128 Kbps) or faster circuits. As many as 12.0% of residential users who connect to the Internet via PC do so using FLET'S ISDN or broadband (Exhibit 3).

1.2 Internet connection services

The number of Internet service providers (ISPs) in Japan has grown along with the number of users, reaching 5,612 operators at the end of March 2001. The number of Type I telecommunications carriers (which own their own circuits) offering Internet connection services more than doubled during 2000, from 92 to 202, thanks to the fact that cable TV providers began offering such services during the year.

1.3 Internet usage around the world

Statistics compiled by NUA Ltd. indicate that as of November 2000 there was some 407.1 million Internet users worldwide. Twenty-one countries/territories accounted for over 25% of users, and Japan ranked 14th in number of users. Penetration rates were highest in Scandinavia and North America, but some Asian countries were also in the top grouping (Exhibit 4, Note 3).

2 Broadband access

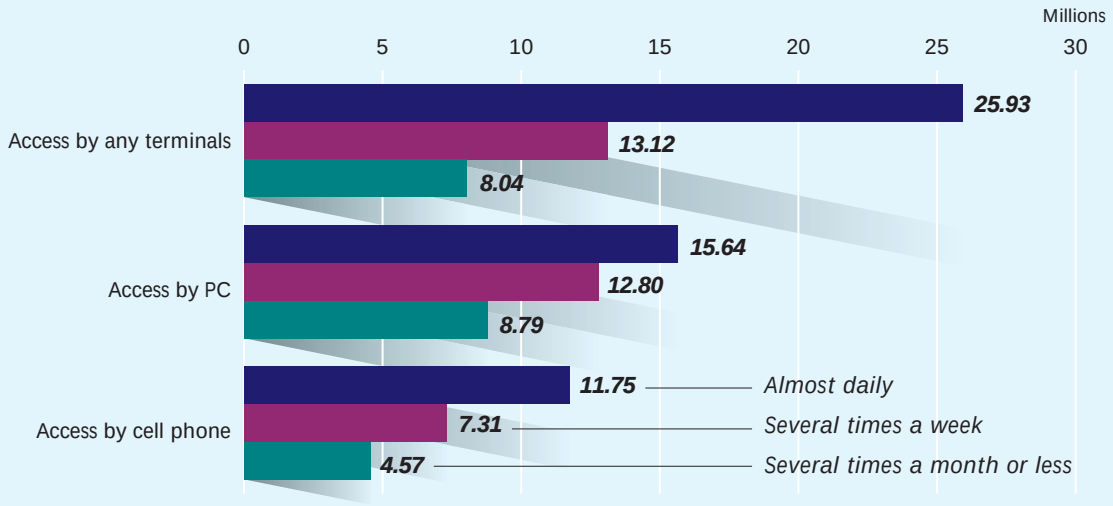
Broadband functionality has begun to be more fully incorporated into networks in Japan, a trend that allows 2001 to be designated "First Year of Broadband." In March 2000 there were only 211 subscriptions to DSL service; as of the end of April 2001 there were about 110,000. Between March 2000 and March 2001 the number of cable Internet subscriptions surged from 216,000 to 784,000 (Exhibit 5). Having begun testing 10-Mbps Fiber to the Home (FTTH) service in December 2000, NTT East and NTT West plan to offer commercial service in July 2001. Meanwhile, Usen Broadnetworks inaugurated 100-Mbps high-speed transmission service in the Tokyo metropolitan area in March.

In May 2001 NTT DoCoMo began testing its IMT 2000, third-generation mobile communications system, which will allow mobile communications Internet connection speeds to increase to 2 Mbps. New services are expected to become available in October.

Note 2. We assumed that respondents to the above-noted survey who indicated that they "want to use the Internet in the future" via a home PC or cell phone or PHS handset would begin to do so within the next 5 years. We also assumed that all students would be Internet users at school once the Internet was connected to all the nation's schools, and that all office workers would be using the Internet in 2005.

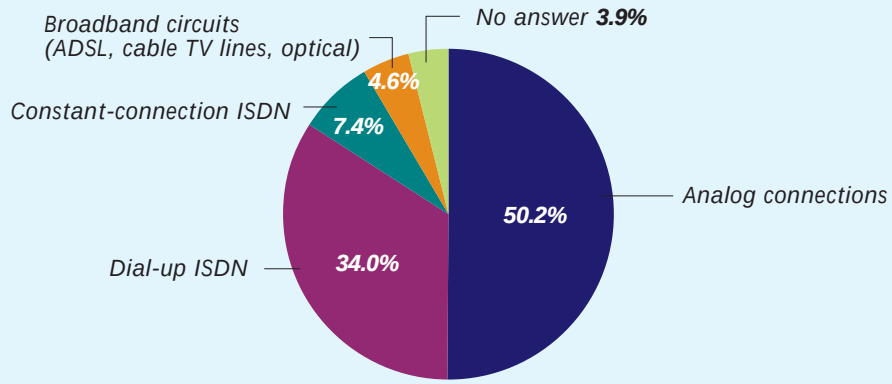
Note 3. The rate for Japan was found by dividing 47.08 million by the total population of 126.89 million as of the end of 2000 (*Population Projections for Japan (medium variant)*, National Institute of Population and Social Security Research). NUA gathers data from the data compilation agencies of the various countries. Comparisons should be made bearing in mind that the data from different countries are dated for different times.

Exhibit 2. Number of Individual Internet Users by Frequency of Usage



Source: *Survey of Info-communications Usage in Daily Life*

Exhibit 3. How PCs in Japanese Households Are Connected to the Internet



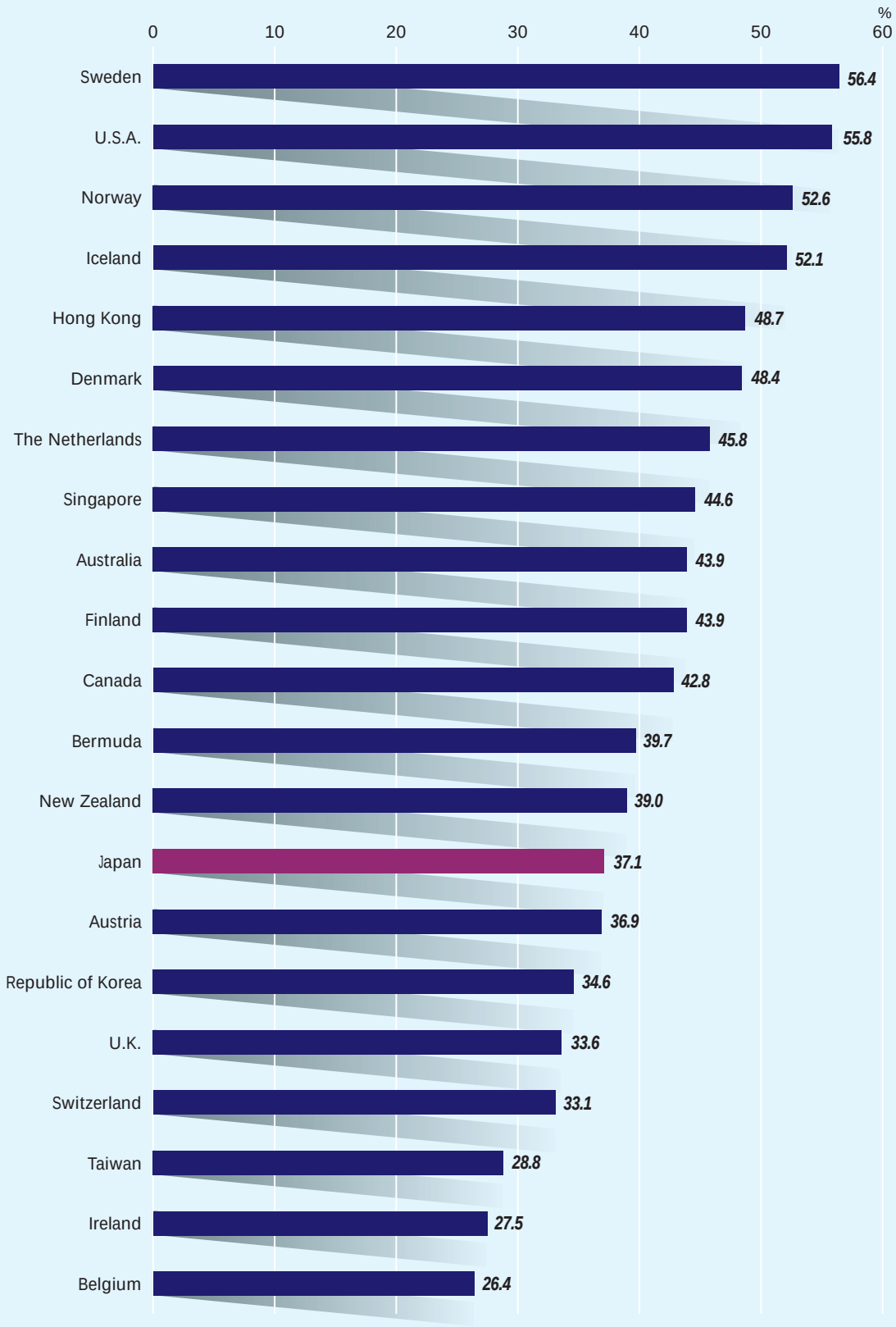
Notes: • Users who access the Internet using more than one type of circuit were assigned to the category of circuit with the largest capacity.
• The categories include the following specific types of circuits:
Analog connections: analog dialup circuits, cell phones (less than 64 Kbps)
ISDN dial-up: ISDN dial-up circuits (except constant connections), PHS (64–128 Kbps)
ISDN constant-connections: ISDN constant-connections (NTT East's and NTT West's FLET'S ISDN; 64–128 Kbps)
Broadband circuits: DSL, cable TV, FTTH, FWA, satellite Internet (over 128 Kbps)

Source: *Survey of Info-communications Usage in Daily Life*

The mail-in and web surveys cited in this White Paper

The mail-in survey was conducted to obtain basic data on Internet usage in the overall Japanese population. Thus, respondents were selected at random. In contrast, the web survey was conducted to determine trends among frequent Internet users. Respondents were therefore those who voluntarily accessed a survey made available on a website for survey.

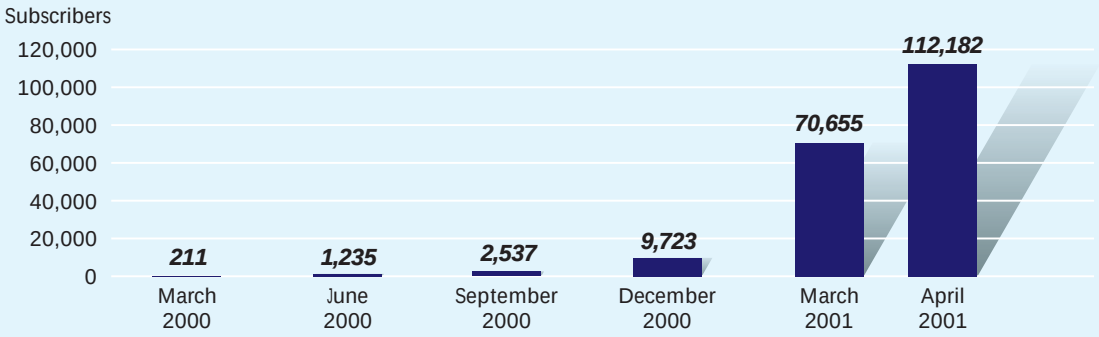
Exhibit 4. Internet Penetration Rate in Countries and Territories with Rates of at Least 25%



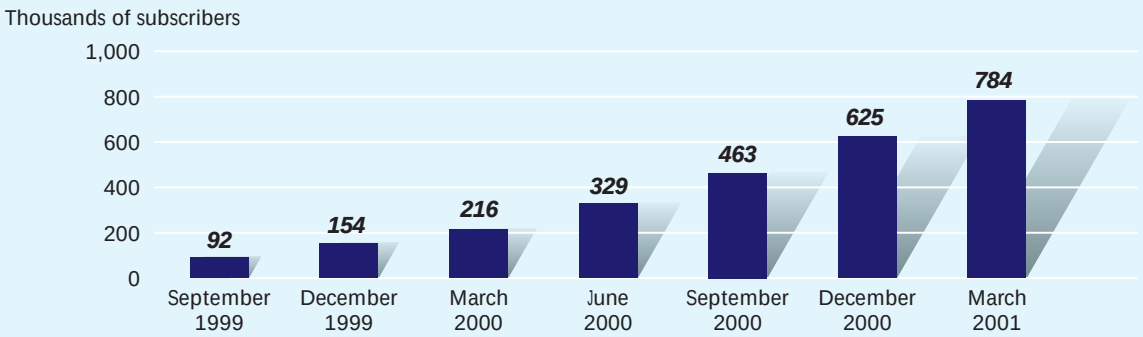
Note: The figure for Japan includes Internet usage via cell phone and PHS.
Sources: *Survey of Info-communications Usage in Daily Life;* NUA Ltd. (as of March 2001)

Exhibit 5. Number of Subscribers to Broadband Networks

1. DSL Subscribership



2. Cable Internet Subscribership



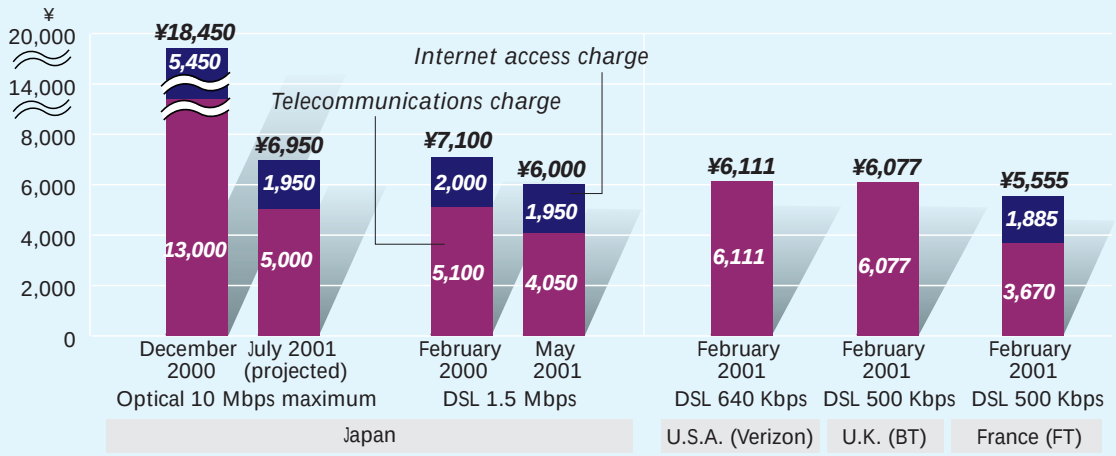
3 Increasing the speed of backbone circuits

With the number of Internet users surging, the use of constant connections increasing, and broadband functionality being added to access circuits, overall Internet traffic is forecast as rising sharply. This means that backbone circuits will have to be strengthened by (1) reducing costs associated with the high-speed dedicated circuits that make up the backbone and (2) dispersing IX and other traffic intersections in response to the changes in traffic structure that will accompany broadband functionality.

4 Growing availability of flat-rate service

With the growing availability and use of constant connections, ISPs have recognized the need for flat-rate Internet connection services. Such services, offered by DSL and cable Internet providers, among others, have been on the rise, with the monthly charge for constant-connection service (the total of flat-rate Internet connection charges and access circuit charges) downtrending to the point that it is comparable to that charged for analogous services in other major nations (Exhibit 6).

Exhibit 6. Charges for Constant-Connection Internet Service in Japan and Other Countries



Notes: • Some carriers require separate line charges.
• The charge for the FTTH (Fiber to the Home) fiber-optic service from July 2001 assumes the planned charge as of April 2000 of ¥5,000. Also, because the Internet access charge of the provider of Internet access service concerned was undecided at that time, the figure here assumes the same amount as for the DSL service shown in the diagram.
• The yen figures for other countries' charges are calculated from the following May 8 selling exchange rates: ¥122.35/US$1, ¥178.57/£1, ¥16.70/FFr1.
Source: MPHPT

5 IP v6 activities

Internet Protocol (IP) v6, the successor to IP v4, currently in effect, will result in a geometric expansion of Internet address space and enhanced functionality, including "Internet homes" and the use of the Internet for such appliances as air conditioners and microwave ovens.

6 Diversification of Internet connection terminals

Users can connect to the Internet in various ways, including cell phones. The huge year-over-year increase in Internet users in Japan as of the end of 2000 was due in part to ongoing growth in PC use but primarily to the 23.64 million user who were accessing the Internet via cell phone at that time (Exhibit 7). It is also interesting to note that Internet users who cannot handle a keyboard account for more than 75% of cell phone Internet usage; cell phones are evidently encouraging people who do not use PCs to log on to the Internet anyway.

7 Diversification of content; rising volume

The total accessible volume of information available on Internet from Japan (i.e., the total accessible data volume on sites with the .jp domain) amounted to 3,212 GB as of August 2000, up 1.7-fold year over year. Total graphics data and other large-volume files surged considerably (Exhibit 8).

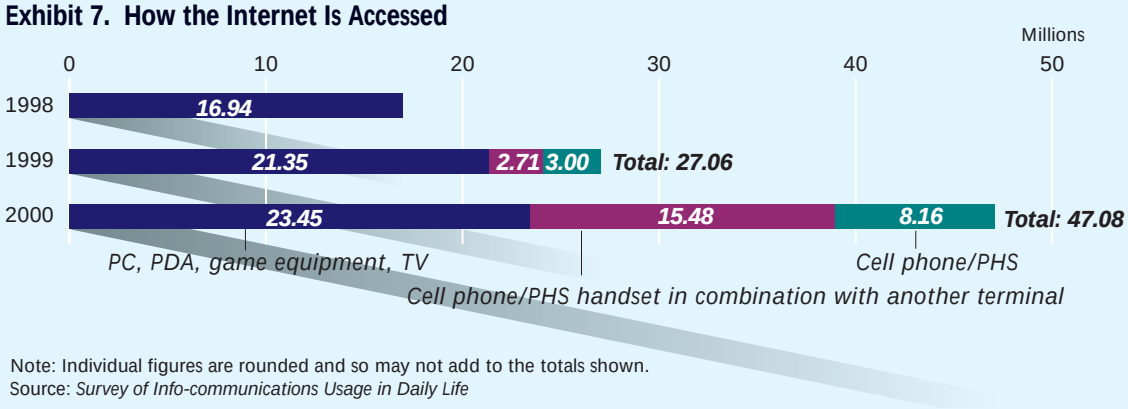
A mail-in survey indicates that e-mailing and seeking information from websites account for most (about 80%) of PC-mediated Internet use in Japan, but that such uses as

music and movie downloads and online shopping now account for as much 30% of usage, indicating that these latter uses are by now well established. A three-country comparison of the top-30 sites in terms of number of hits indicates that 80% of the top 30 in Japan are information search and information retrieval sites, such as general portal sites and ISP portal sites, whereas the ratios in the U.S. and Republic of Korea are only about 25% and 33%, respectively, with entertainment-type content sites, such as software-download sites, accounting for greater demand in these countries (Exhibit 9). We estimate that Internet usage will diversify along these lines in Japan as well, once broadband functionality becomes more common.

8 Convergence of telecommunications and broadcasting

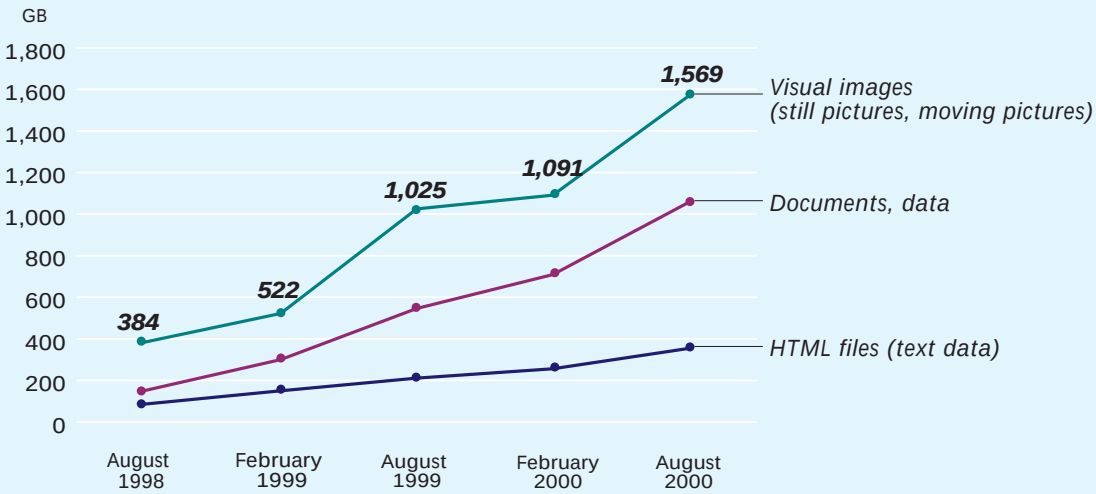
Telecommunications and broadcasting have begun to converge as a result of the rapid popularization of the Internet and advances in

Exhibit 7. How the Internet Is Accessed



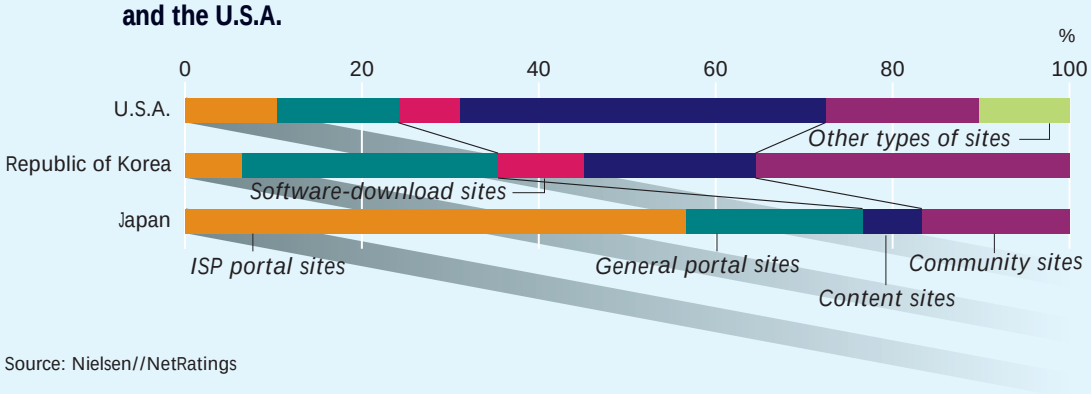
Note: Individual figures are rounded and so may not add to the totals shown.
Source: *Survey of Info-communications Usage in Daily Life*

Exhibit 8. Information Volume by File Type



Source: *Surveys 1–6 of WWW Content*, Institute for Posts and Telecommunications Policy, MPT (now the MPHPT)

Exhibit 9. Classification of the 30 Most-viewed Internet Sites in Japan, Republic of Korea, and the U.S.A.



Source: Nielsen//NetRatings

information and communications. In February 2000, the Discussion Group on Information and Communications Policy in the Era of Convergence of Telecommunications and Broadcasting (chaired by Professor Masao Horibe of Chuo University) of the Ministry of Posts and Telecommunications (MPT; now the MPHPT), recommended in its report entitled Toward the Healthy Development of Converged Telecommunications and Broadcasting Services that the government should work quickly and systematically on this issue. In response, the MPHPT has been working on the necessary systemic development, including the presentation of two pieces of draft legislation to the 151st session of the Diet (held in January to June, 2001): a Bill on Broadcasting Used for Telecommunications Services and a Bill on Promoting the Convergence of Telecommunications and Broadcasting (the latter passed on June 1, 2001).

9 Digital broadcasting

The first digital broadcasting in Japan occurred in 1996 when broadcasting via communications satellite was inaugurated. Since then, digital cable TV and digital broadcasting via broadcasting satellite have come into being, in 1998 and 2000, respectively. The future holds great promise for the full-scale popularization of such multifunctional digital broadcasting modalities as data broadcasting. Additionally, research in and systemic preparation for the introduction of digitized terrestrial broadcasting, a medium already familiar to the population, and 110 degrees east longitude communications satellite digital broadcasting are currently being undertaken.

10 Activities in other countries

Several other countries show fairly extensive penetration of broadband-access Internet services into ordinary households. For example, there are about 2.24 million contracts outstanding for cable Internet service in the U.S. and more than 2.54 million DSL subscrip-

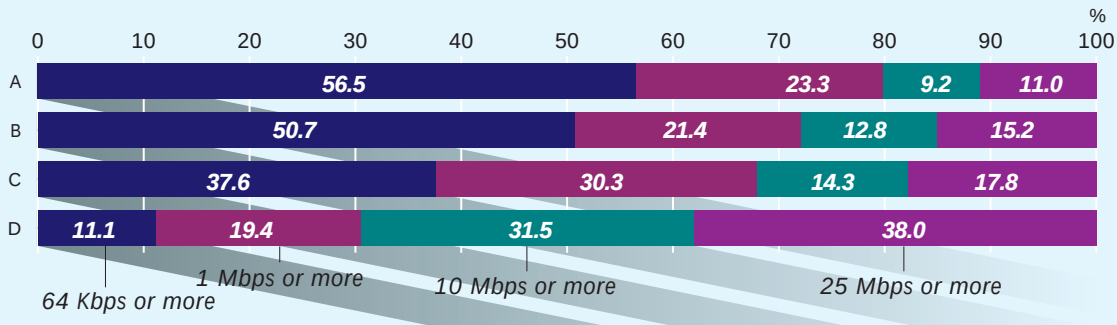
tions in Republic of Korea, as well as somewhat fewer than 1.32 million cable Internet users in that country. On the other hand, in Europe, with about 100,000 cable Internet contracts in force in France, 300,000 DSL contracts in Germany, and 33,000 DSL contracts in the U.K.

11 Network users in the Broadband Era

We conducted a survey of Internet users in an effort to get a composite picture of Internet users in the Broadband Era. One key finding was that users want faster access; about 70% of users with access speeds of at least 1 Mbps want a speed of at least 10 Mbps, and about 40% want a speed of at least 25 Mbps (Exhibit 10). Relatively high proportions of broadband users (vs. non-broadband users) both currently used the Internet to access entertainment content (such as Internet broadcasting, music downloads, and network games) and wished to do more of the same in the future (Exhibit 11). This response would indicate that experience with broadband connections generates the desire for a higher-speed access and will likely encourage the creation of faster, higher-capacity content services. Non-broadband users also indicated a strong desire to access entertainment content in the future, which would indicate that advances in broadband are bringing to the surface potential needs for content.

Between 80% and 90% of users accessing the Internet via high-speed (1–10 Mbps) circuits want constant-connection charges (including telecommunications and connection charges) to be at most ¥6,000/month. A high proportion of broadband users expressed a desire to access the Internet via portable notebook PCs and to be able to access the Internet indoors and out.

Exhibit 10. Desired Circuit Speeds, by Users' Existing Circuit Speed



A:	56 Kbps or lower, dial-up	non-constant-connection	non-broadband
B:	64 Kbps or higher, dial-up	non-constant-connection	non-broadband
C:	64 Kbps–1 Mbps (including flat-rate service)	constant-connection	non-broadband
D:	1 Mbps or greater (including flat-rate service)	constant-connection	broadband

Source: *Survey of Broadband Usage Trends*

Exhibit 11. Current Usage of Internet and Future Intentions (multiple answer)

Source: *Survey of Broadband Usage Trends*

IT-driven Economic Revitalization

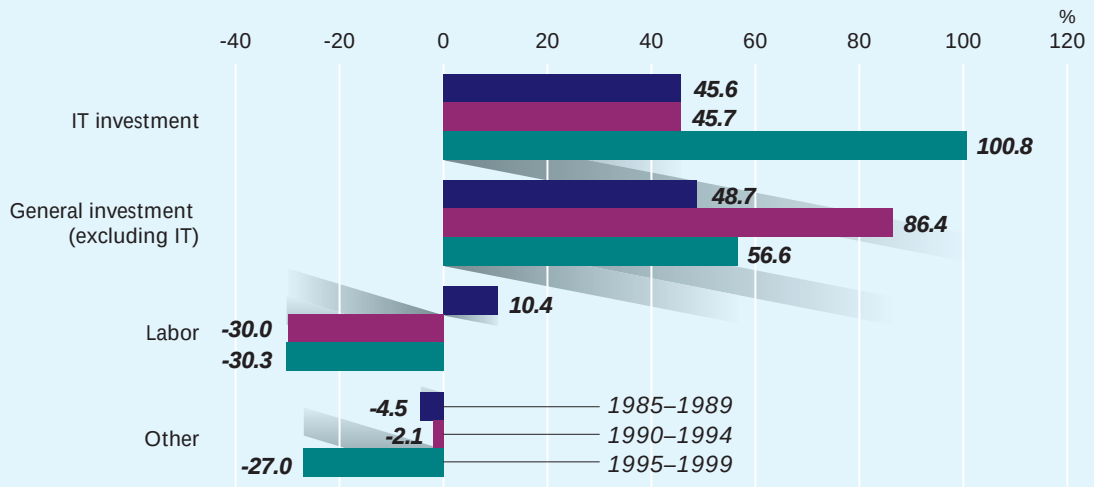
1 The impact of IT on the macroeconomy

Corporate IT investment in Japan surged in the 1980s with the installation of general-use computers, electronic data interchange systems, point-of-sale systems, and the like; slowed in the first half of the 1990s when companies curbed capital investment after the collapse of the economic bubble; and began expanding again in the latter half of the 1990s. To determine the extent to which corporate investment in IT has contributed to Japan's economic growth, we analyzed factors associated with IT investment, general investment (excluding IT), and labor since 1985 and estimated the contribution ratios of each (the contribution ratio for IT investment is the ratio of the economic growth rate attributable to IT capital accumulation over the period of time in question to the overall economic growth rate; the other contribution ratios are defined analogously) (Exhibit 12). The contribution ratio in 1995–99 amounted to 100.8%, double that of 1985–95, indicating the IT investment played a leading role in economic growth during the latter period.

2 Internet businesses

"Internet businesses" are broadly defined as such Internet-mediated business activities as e-commerce and industries related to individual and corporate Internet usage such as the manufacture and selling of PCs and other

Exhibit 12. Contribution Ratios of Various Factors to Economic Growth



Source: *Survey of IT Economic Analyses*, conducted by DO Research Institute Inc.

terminal equipment. Our survey and analysis of this market in 2000 indicated a scope of ¥47,803.1 billion, 2.26 times in value from the previous year (Exhibit 13).

3 E-commerce in the final consumption goods market

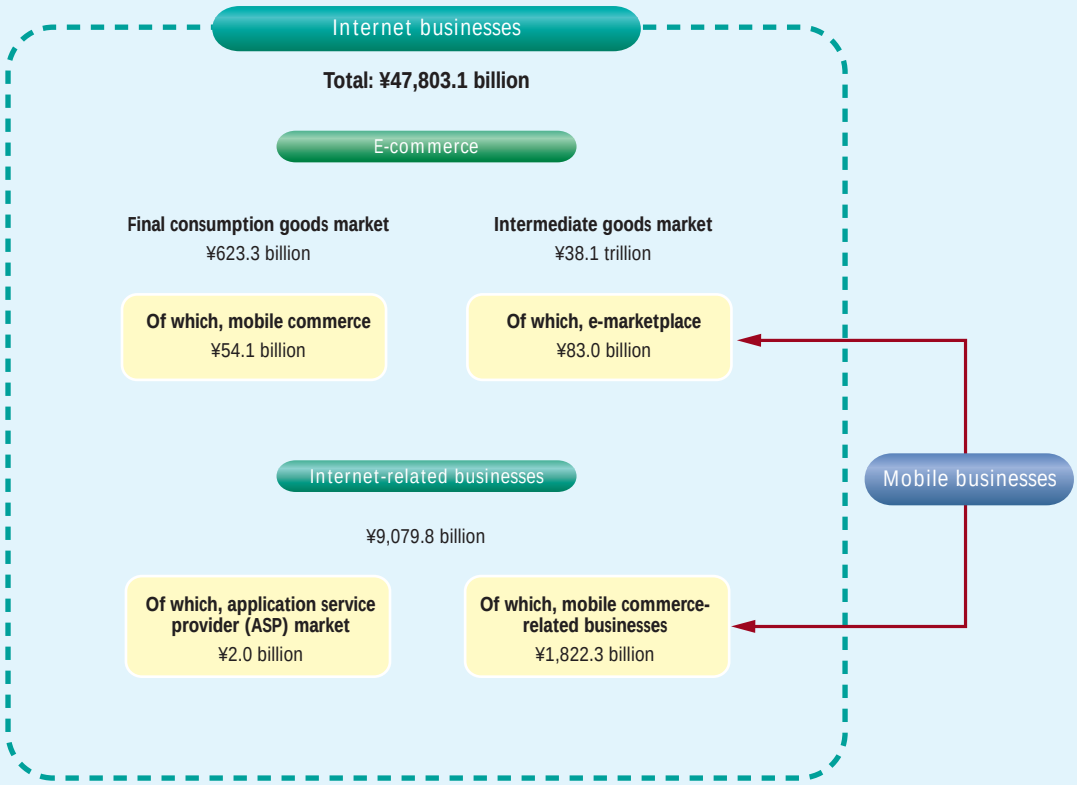
In 2000 the e-commerce market for final consumption goods amounted to ¥623.3 billion, up 78.1% year over year. We estimate a market worth ¥8 trillion in 2005 (Exhibit 14). The mobile commerce market amounted to ¥54.1 billion in fiscal 2000, an increase of more than 10-fold year over year, thanks to an explosion in Internet accesses via cell phone.

4 E-commerce in the intermediate goods market

The e-commerce market for intermediate goods amounted to ¥38.1 trillion in 2000, a 2.5-fold increase year over year. We estimate a market worth ¥98.9 trillion in 2005 (Exhibit 15). The new Internet-based "e-marketplace," where multiple selling and buying companies meet to do business, generated only ¥80 billion in business in 2000 but is expected to be worth about ¥16 trillion in 2005.

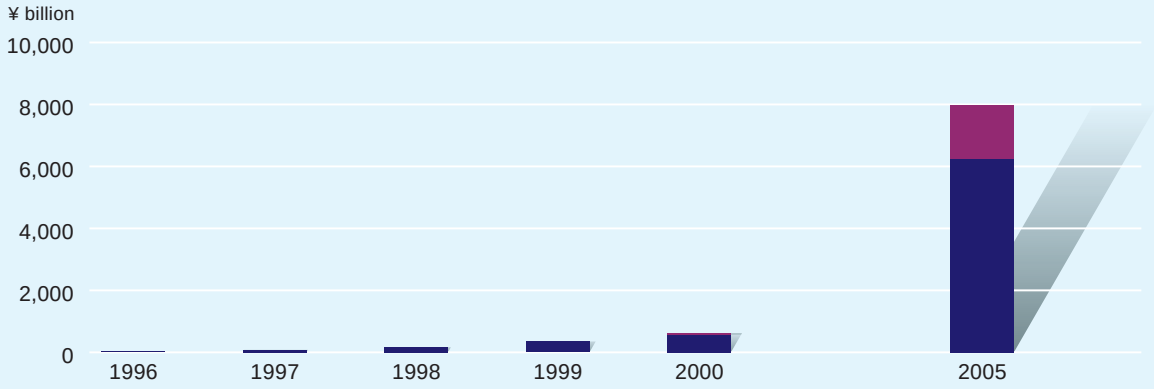
Electrical machinery and automobiles together accounted for a large proportion of e-commerce market for intermediate goods in 1999 and about 80% of the market in 2000, but the proportion is expected to drop to

Exhibit 13. Breakdown of the Internet and Mobile Telecommunications Markets



Source: *Survey of IT's Impact of on Industry*

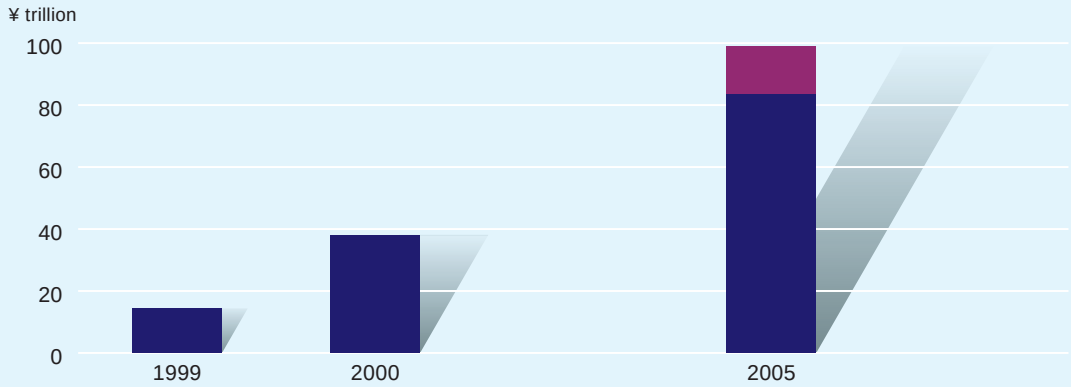
Exhibit 14. E-commerce Final Consumption Goods Market



	1996	1997	1998	1999	2000	2005
Final consumption goods market	28.5	81.8	166.5	350.0	623.3	7,965.2
Of which, mobile commerce	-	-	-	4.2	54.1	1,719.4

Source: *Survey of IT's Impact of on Industry*

Exhibit 15. E-commerce Intermediate-goods Market



	1999	2000	2005
Intermediate-goods market	14.4	38.1	98.9
Of which, e-market place	-	0.08	15.5

Source: *Survey of IT's Impact of on Industry*

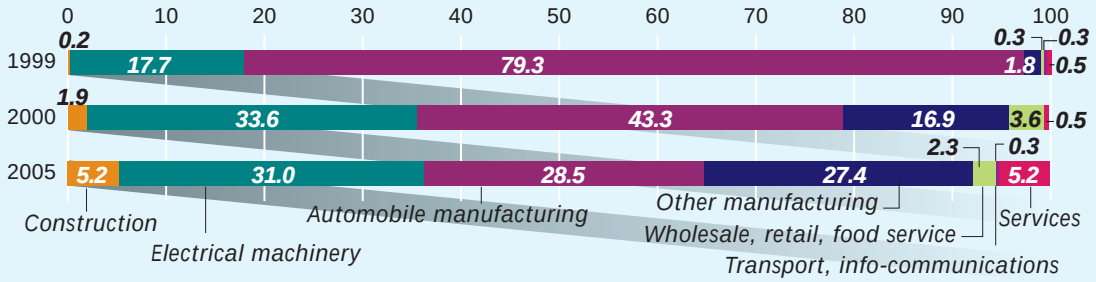
about 60% by 2005 as other industries expand their use of e-commerce (Exhibit 16).

5 Internet-related businesses

This market was worth ¥9,079.8 billion in 2000, up 42.0% year over year and is expected to be valued at ¥26,028.5 billion in 2005 (Exhibit 17). Within this large category, the mobile-related business market grew 10-fold in 2000, to ¥1,823.3 billion, thanks to the explosion in Internet usage via cell phone; a value of ¥4,599.7 billion is projected for 2005.

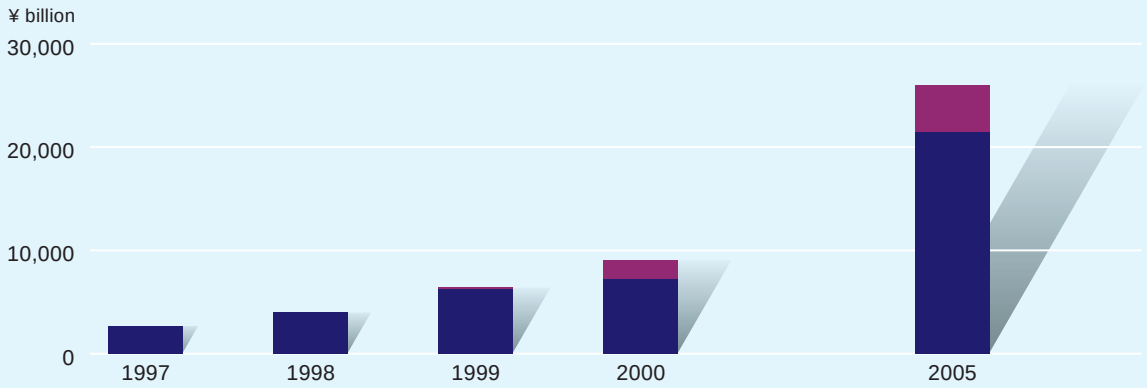
The market for terminal equipment used

Exhibit 16. Breakdown of Use of E-commerce in the Intermediate-goods Market by Sector



Source: *Survey of IT's Impact of on Industry*

Exhibit 17. Internet-related Business Market



	1997	1998	1999	2000	2005
Internet-related business market	2,666.1	3,987.4	6,395.8	9,079.8	26,028.5
Of which, mobile-related market	-	-	168.7	1,822.3	4,599.7

Source: *Survey of IT's Impact of on Industry*

to connect to the Internet (computers, etc.) accounted for 31.3% of the total Internet-related market, the largest subcategory, while the Internet construction-related market (management services needed for network construction and such hardware as servers and routers) was next, at 23.8% (Exhibit 18). Thus, the two categories together accounted for about 50% of the market.

The application service provider (ASP) market, in which general-use applications are provided via the Internet as a low-cost means of encouraging small businesses to add IT functionality to their operations, was worth only ¥2 billion in 2000, but is expected to grow to ¥97.5 billion by 2005. (This represents a subcategory within "Internet/intranet-related software" in Exhibit 18).

6 IT-generated changes in the structure of business activity

About 90% of Japanese companies had constructed LANs by 2000, and about 40% had

constructed intranets, indicating steady IT progress in the business world (Exhibit 19). Additionally, the use of advanced networks within companies, such as by installing customer relationship management (CRM) systems to improve client management and knowledge management systems to create more services, is an important factor in bolstering a company's competitiveness.

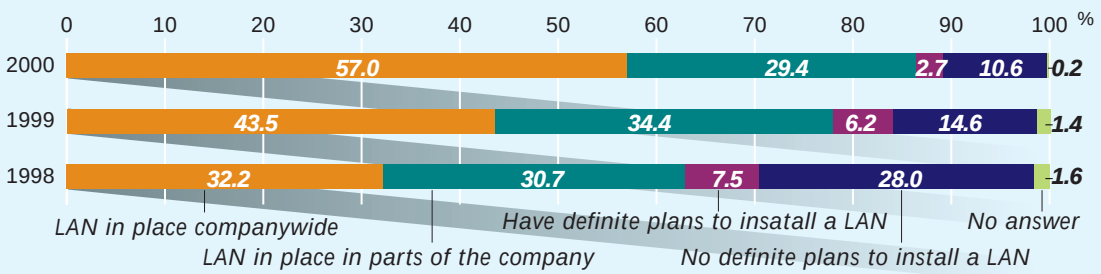
A survey of businesses on the costs vs. benefits of installing a LAN or intranet indicates that the larger the number of employees per terminal, the less likely that a benefit has appeared, with 73.1% of companies with five or more employees per terminal responding that no positive benefit has been achieved yet. One conclusion from this data would seem to be that a certain density of information intensification, in the form of a greater number of installed terminals, for example, would have to be achieved before any positive benefit of IT investment, such as an internal network, would become evident.

Exhibit 18. Breakdown of the Internet-related Business Market

	Size of market (¥ billion)	Share of total (%)	Year-over-year change (%)
Internet connection business	810.8	8.9	0.5
Internet terminals	2,838.9	31.3	6.1
Internet construction-related	2,161.0	23.8	23.3
Internet/intranet construction services	142.6	1.6	–
Internet/intranet-related software	144.4	1.6	–
Servers, routers, etc.	1,874.0	20.6	–
Internet peripheral businesses	1,446.8	15.9	45.6
Internet advertising	59.0	0.6	–
Internet funds settlement services	11.8	0.1	–
Telecommunications services	1,359.2	15.0	–
Distribution services	16.8	0.2	–
Mobile commerce–related businesses	1,822.3	20.1	980.2
Total	9,079.8	100.0	42.0

Sources: *Survey of IT's Impact of on Industry*; *Advertising Expenditures in Japan for 2000*, Dentsu

Exhibit 19. LAN Usage



Source: *Communications Usage Trend Survey (Business Section)*

Electronic Government

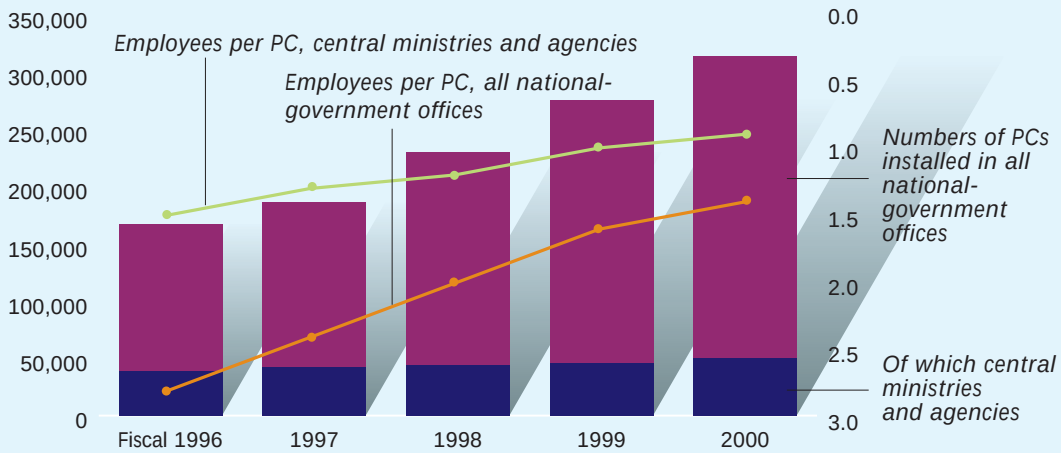
1 Information intensification in the national government

Surveys indicate that there was one PC per employee in each of the central ministries and agencies of the national-government bureaucracy in fiscal 1999 and that one PC was available to each 1.4 employees in all national-government entities (other than national universities) in fiscal 2000, an increase from one per 2.8 employees in fiscal 1996 (Exhibit 20). This PCs are being net-worked to an increasing extent, with about three-fourths of them connected to a LAN as of fiscal 2000 (Exhibit 21).

2 Information intensification in local governments

As of fiscal 2000 there was one PC available to every 1.3 staff of prefectural governments, with the year-to-year trend line steadily approaching one PC per employee. Although the ratio of employees to PCs was still greater

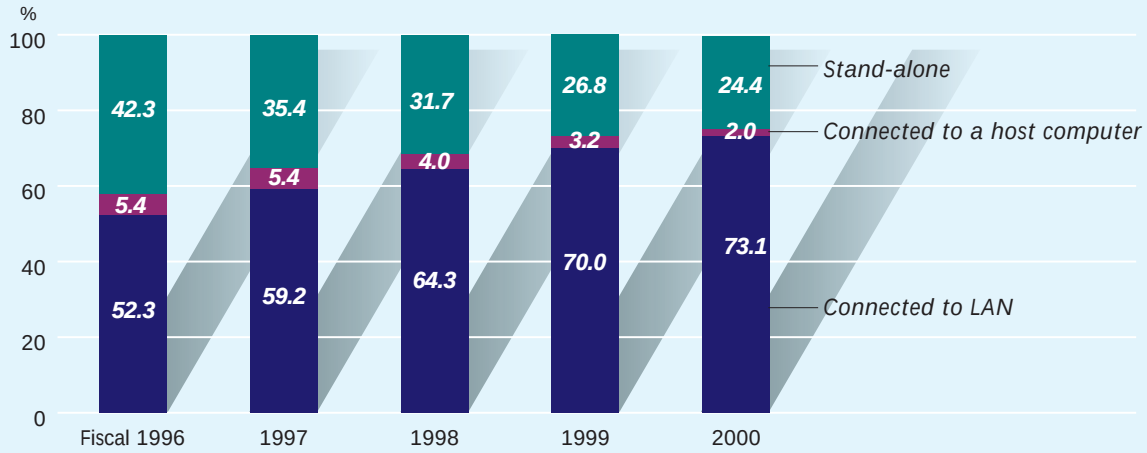
Exhibit 20. PCs Installed in National-Government Offices and Employees per PC



	Fiscal 1996	1997	1998	1999	2000
Numbers of PCs installed in all national-government offices	167,075	185,814	230,066	275,755	313,711
Of which central ministries and agencies	39,167	42,457	43,702	45,432	50,204
Employees per PC, all national-government offices	2.8	2.4	2.0	1.6	1.4
Employees per PC, central ministries and agencies	1.5	1.3	1.2	1.0	0.9

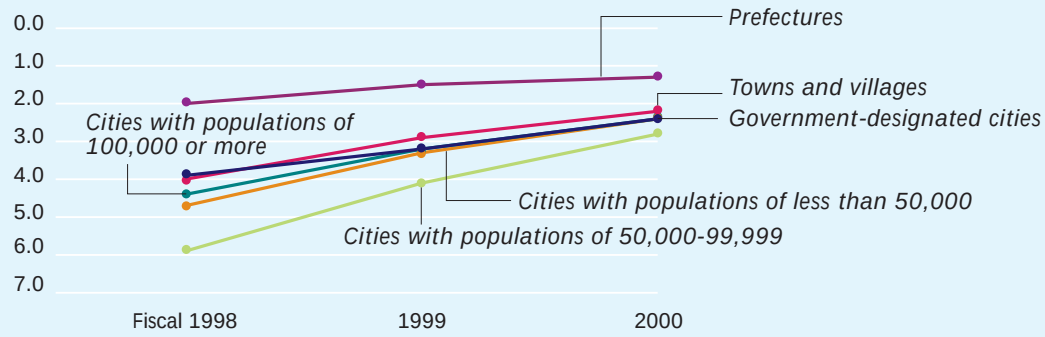
Note: Figures exclude national universities.
Source: *Survey of Research in Science and Technology*, Management and Coordination Agency (now the MPHPT)

Exhibit 21. Rates of LAN Connection



Source: *Survey of Research in Science Technology*, Management and Coordination Agency (now the MPHPT)

Exhibit 22. Employees per PC in Local-Government Offices



	Fiscal 1998	1999	2000
Prefectures	2.0	1.5	1.3
Government-designated cities	3.9	3.2	2.4
Cities with populations of 100,000 or more	5.9	4.1	2.8
Cities with populations of 50,000-99,999	4.4	3.2	2.4
Cities with populations of less than 50,000	4.7	3.3	2.4
Towns and villages	4.0	2.9	2.2

Source: *Survey of Administrative Information Intensification in Local Government*, Management and Coordination Agency (now the MPHPT)

than two at the municipal-government level, it had halved from about four in fiscal 1998 (Exhibit 22). The proportion of local-government PCs that are connected to a network is

steadily rising, reaching more than 60% in fiscal 2000 (Exhibit 23).

3 Information intensification in the national government's relationships with individuals and businesses

The Cabinet Office and all 12 national-government ministries and agencies now have websites. The total number of websites sponsored by entities in the national bureaucracy, including local facilities and branches, amounted to 1,215 in fiscal 2000, up 39.0% year over year. In line with Framework for Electronic Delivery of the Administrative Information (approved in March 2001 by the Inter-Ministerial Council for Promoting the Digitization of Public Administration), more administrative information is to be made available on these sites.

In April 2001 the MPHPT began operating its e-Government Coordination System, a website links to various ministries' and agencies' websites. The system provides information from websites, lists of text files available from ministries and agencies, and information on administrative procedures. It also allows users to search for regulatory data over the Internet.

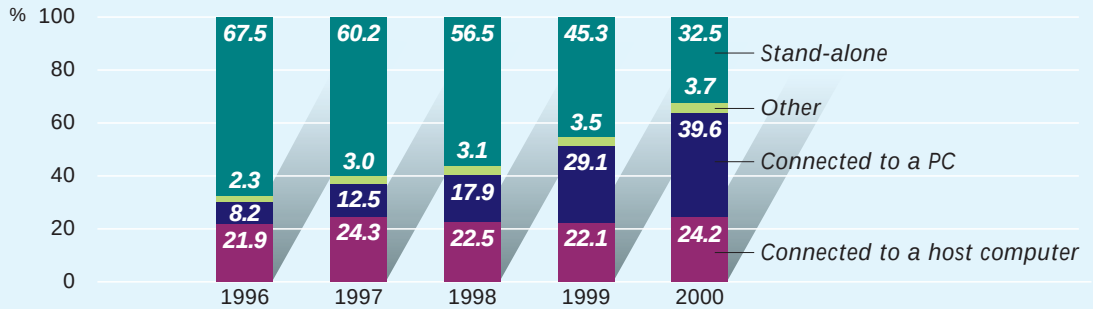
The bureaucracies of the national government have a total of about 10,000 different application and notification forms. The goal is for users to be able to fill out and submit all of them online by 2003. The MPHPT will be mapping out an action plan in early fiscal 2001 that calls for even earlier online availability of these procedures.

The government has also embarked upon a program in which the bidding process for national public-works projects can be conducted online. In April 2001 a bidding information service was inaugurated that gathers, stores, and allows for the search of existing and scheduled solicitations to bid and bid results. Some electronic bidding is set to become available in October.

4 Information intensification in local governments' relationships with homes and businesses

The governments of all 47 prefectures and all government-designated cities had websites as of fiscal 1998. The number of municipal governments having websites has grown sharply: 83.6% of cities and wards as of fiscal 2000,

Exhibit 23. Rates of PC Network Connection



Source: *Survey of Administrative Information Intensification in Local Government,* Management and Coordination Agency (now the MPHPT)

up from 57.7% in fiscal 1998, and 61.1% of towns and villages, up from 34.9%. Local-government websites tend to focus items of particular interest to the local community, such as notices special events and information about public facilities.

Some local governments are doing some pioneering work in electronic government. For example, the processes of online applications to bid for public-works projects and applications to amend items on one's registration to qualify for bidding have been inaugurated on a test basis in some areas, with full-scale operation scheduled to begin in fiscal 2001. To encourage the further development of online services, the MPHPT has provided support to local governments for creating electronic organizational and individual authentication systems. Additionally, in December 2000 the national government's Inter-Ministerial Council for Promoting the Digitization of Public Administration approved a National-Government Action Plan for Promoting Online Application and Notification Procedures in Local Government.

5 People's views of electronic government

An web survey indicates that only about one-third of respondents are aware that bureaucratic procedures can be taken care of online. Additionally, more than 50% of respondents believed that the national government should provide more information over the Internet that would enable people to understand the workings of the government (for example, by providing detailed databases of laws and systems) and that would enhance people's participation in government (for example, by providing a means of voting in referendums online). On the local-government level, a large majority of respondents believe that electronic government functionality, especially online availability of common applications and notifications, is important (Exhibit 24), so further work is needed in this area.

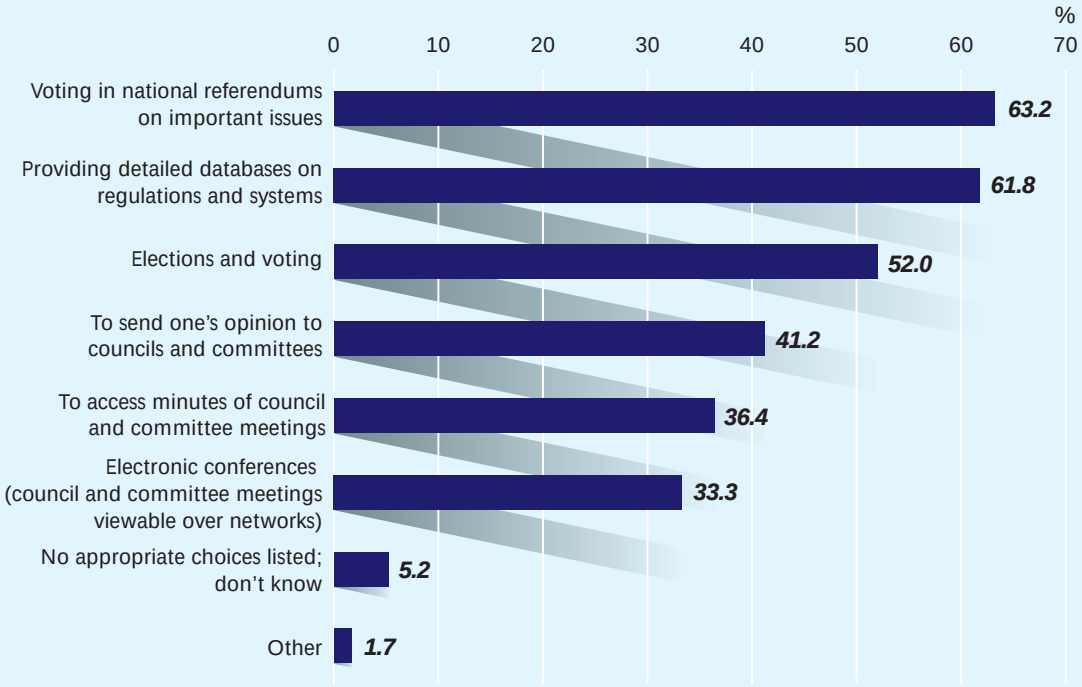
Only about 5% of respondents view national- and local-government websites "daily or regularly," and more respondents expressed dissatisfaction rather than satisfaction with bureaucratic websites, implying the need for website developers to consider the user in their website designs.

6 Electronic government trends overseas

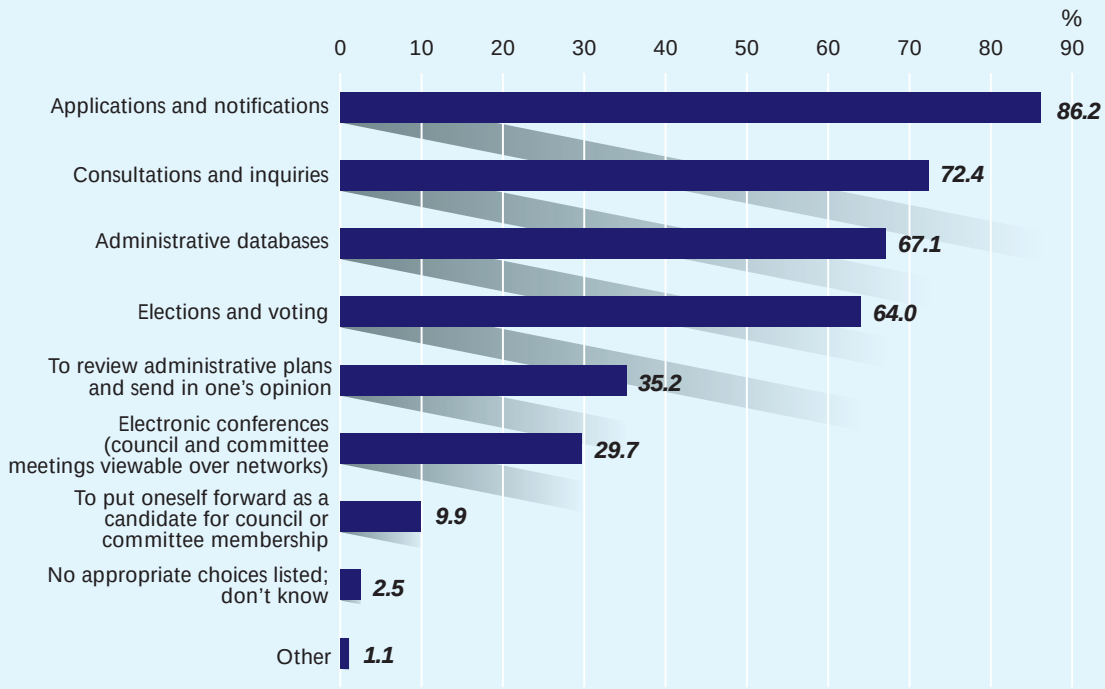
Like Japan, other countries are developing electronic government functionality to enhance administrative efficiency and improve services to local populations. A key feature in many countries is the development of government portal sites. For example, in December 2000 the U.K. began test operations of its "ukonline" portal site. Users specify a password and are provided with information on their potential service needs based on address information that they have entered. Ukonline allows for comprehensive searches information made available by all national- and local-government agencies. Using an authentication system, users may access the system to receive all possible administrative services, making ukonline a true electronic government system, not merely an information access portal.

Exhibit 24. Perceived Need for Electronic Government Services

1. At the National Government



2. At the Local Governments



Source: *Survey of Electronic Government*

4 IT: Permeating People's Lives

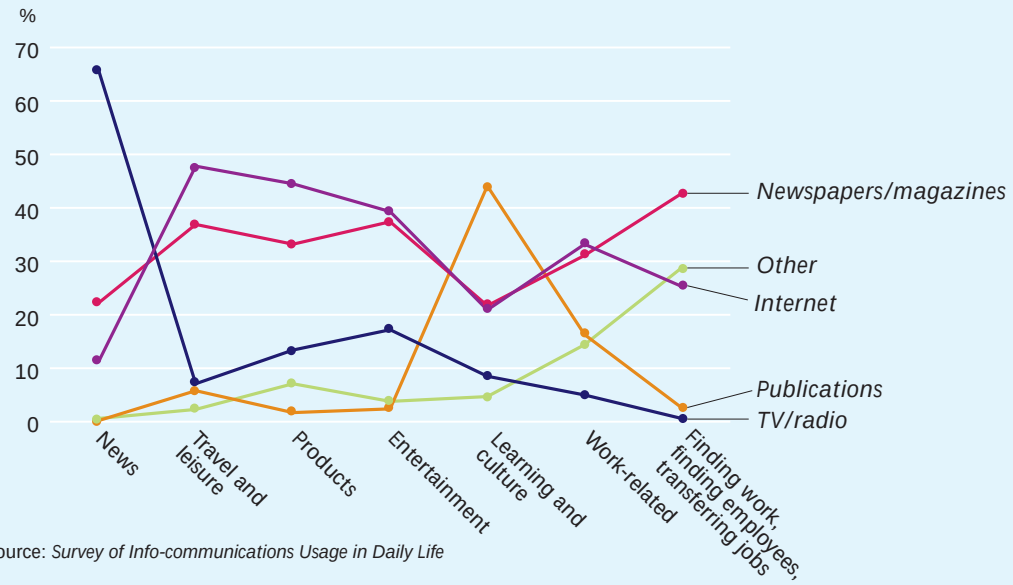
1 The information and communications equipment that people own

A larger number of households owned PCs, cell phones, and personal digital assistants (PDAs) in 2000 than a year earlier. A survey indicates that the more recently a household has bought a PC, the more likely the reason for the purchase is to connect to the Internet—62% of PC purchasers over the past year acquired the equipment for this purpose. The proportion of PC- or cell phone–owning houses that are connected to the Internet has increased year over year, indicating that the desire to use the Internet has supported the increase in the penetration rates of PCs and other information and communications equipment.

2 How people use the Internet in their daily lives

An online survey asked respondents to state which medium (the Internet, print media, TV/radio) they used most frequently to obtain various categories of information (Exhibit 25). The most commons means of accessing information on travel and leisure, products, and entertainment was the Internet, probably because of the wealth of easily searchable information available. Respondents were also asked what areas of

Exhibit 25. Media Used for Obtaining Daily-Life Information



Source: *Survey of Info-communications Usage in Daily Life*

their daily lives in which they used the Internet most. Responses were limited to such areas as gathering information personally, implying the need for further permeation of the Internet into other areas of daily life.

3 Shopping

One area of e-commerce that generated intense interest in 2000 was auction sites on which individual Internet users could buy and sell items from and to one another. When a web survey asked why they participate in online auctions, many users responded that they used the sites in an attempt to buy or sell things not usually available through ordinary retail.

Operators of auction sites attempt to run trouble-free auctions, but there are inevitably people who try to swindle others or sell illegal goods. Various means of monitoring products that appear on auction sites, providing escrow services, and authenticating the identity of participants are being developed.

4 Pastimes and entertainment

Online computer games generated much interest during 2000 among the millions of people who play computer games, now an integral means of entertainment in their daily lives. Online games are already well established as a major subset of Internet content in the U.S. and Republic of Korea, and such games are expected to become a significant part of Japan's game culture in the near future. Other areas in the entertainment category have come under greater critical scrutiny, however. The prime example is peer-to-peer exchanges of music files, which many consider a violation of copyright.

5 Healthcare and social services

As Japan's society rapidly ages, the healthcare and social-service sectors are seeking ways to use information and communications technology effectively to provide support for medical facilities and the elderly and develop ways to deliver social services more efficiently and effectively.

6 Work

Teleworking and the use of satellite offices/home offices (SOHO) are gradually becoming more common in Japan as alternative modes of work. About 70% of both males and females responding to an online survey indicated a desire to engage in telework sometime in the future. The MPHPT and the Japan SOHO Association are working to compile an online *SOHO Directory* of people who work at home or satellite offices and the types of work that they do, in an effort to link these people with those who need such work performed. The MPHPT plans to verify the effectiveness and technological potential of the *SOHO Directory* system.

7 Information intensification in community life

It is hoped that creating and effectively using advanced information and communications networks will go a long way toward solving issues that communities around Japan are

confronting, including the aging of the population, depopulation of rural areas, and the need for local economic revitalization. Private-sector and educational organizations, mainly at the local level, are cooperating to undertake various measures, such as information and communications infrastructure development and effective use of the Internet, to promote the creation of active, distinctive local communities.

5 Seizing Digital Opportunity

1 Regional differences in Internet use

A mail-in survey indicates that the major metropolitan areas are not necessarily taking the lead in Internet usage. For example, while the southern Kanto and Kinki regions (which are essentially metropolitan areas) have higher proportions of people who access the Internet via household PCs (including notebook PCs) than in other regions, the proportion of people who access the Internet via cell phone and PHS is higher in the more-rural Hokuriku region than in the southern Kanto region (Exhibit 26-1). Among cities as well, a greater proportion of respondents living in government-designated cities and Tokyo's wards access the Internet via PC than in other cities; towns and villages, but the relative proportions are less than other cities for Internet access via cell phone (Exhibit 26-2). Possible factors behind these differentials are that cell phones are less expensive than PCs and are easier to use.

2 Differences in Internet use according to personal characteristics

Internet usage varies with occupation, with the unemployed using it the least and a large proportion of students and employed people logging on (Exhibit 27-1). A considerably smaller proportion of elderly people use the Internet than do people in their 20s (Exhibit 27-2). Students and people in their teens and 20s use cell phones more than they do PCs to access the Internet. Internet usage tends to be directly proportional to annual household income. However, once annual household income reaches ¥6 million, the rate of Internet usage via cell phone turns virtually constant (Exhibit 27-3).

3 Popularizing the Internet

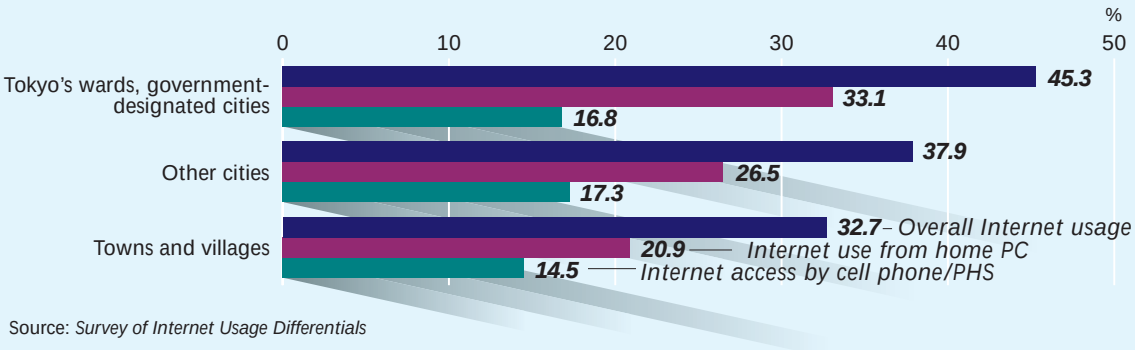
A statistical analysis of the survey data cited above indicates that three characteristics—age, annual household income, and occupation—are strongly correlated with Internet use, whereas sex and geographic characteristics (city size, region) are relatively weakly correlated (Exhibit 28). A more-detailed analysis reveals that characteristics associated with "elderly-related" characteristics—being in one's 60s or one's 70s or older, and having low annual income—are correlated with the lowest rate in Internet usage while "student-related" characteristics, such as being a student and being in one's teens, are predictive of a high rate of Internet usage.

According to one survey, the main reasons cited by respondents for not using the Internet are that they have no incentive for trying out the Internet and that there are impediments that prevent them from using the necessary equipment. The strongest inducement to usage, judging from the

Exhibit 26. Internet Usage by Regional Differences

1. By Region

2. By Type of Municipality

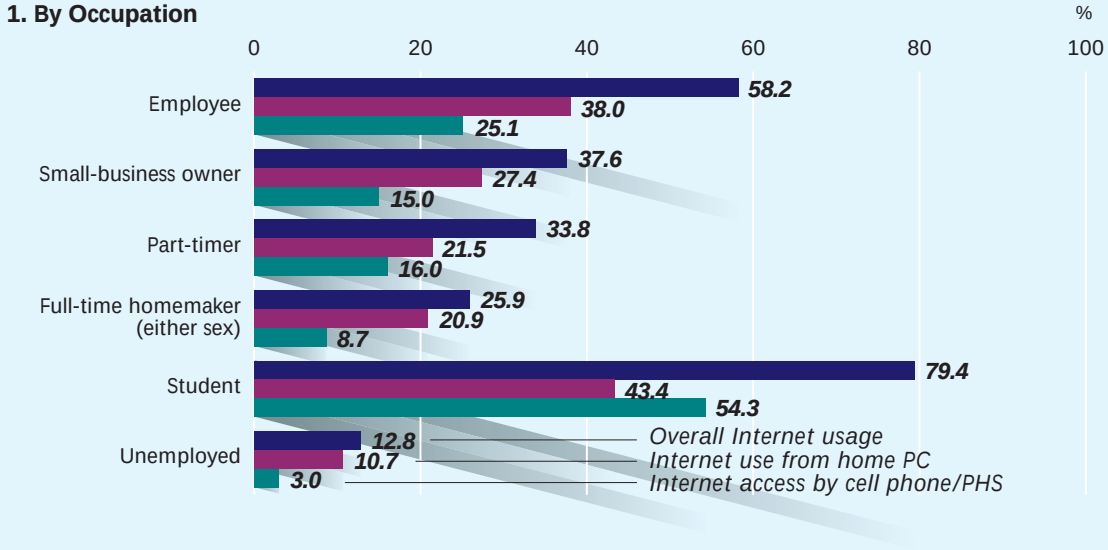


Source: *Survey of Internet Usage Differentials*

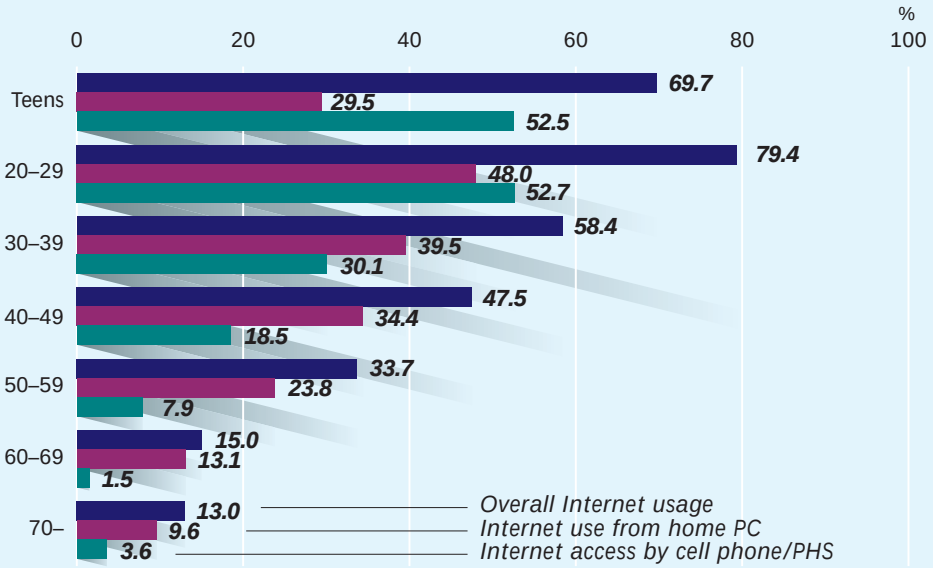
answers given by respondents, would be opportunities to learn how to use the Internet in comfort, followed by the development of easier-to-use equipment (Exhibit 29). These responses would indicate (1) that expansion of existing Internet courses would be effective in narrowing differentials in Internet usage and (2) that the development of Internet-access

Exhibit 27. Internet Usage by Personal Characteristics

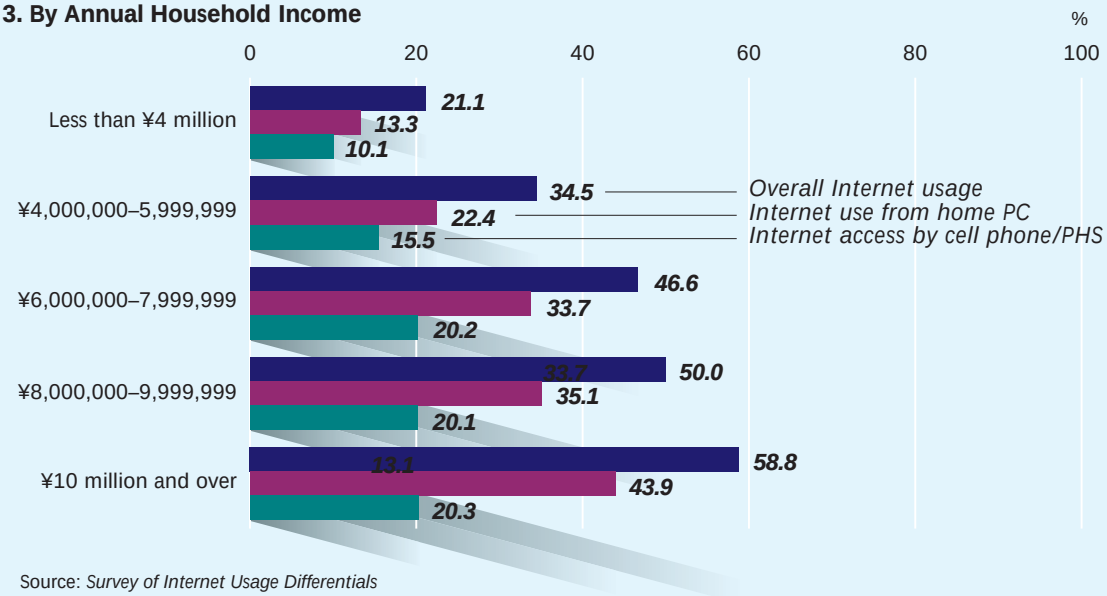
1. By Occupation



2. By Age

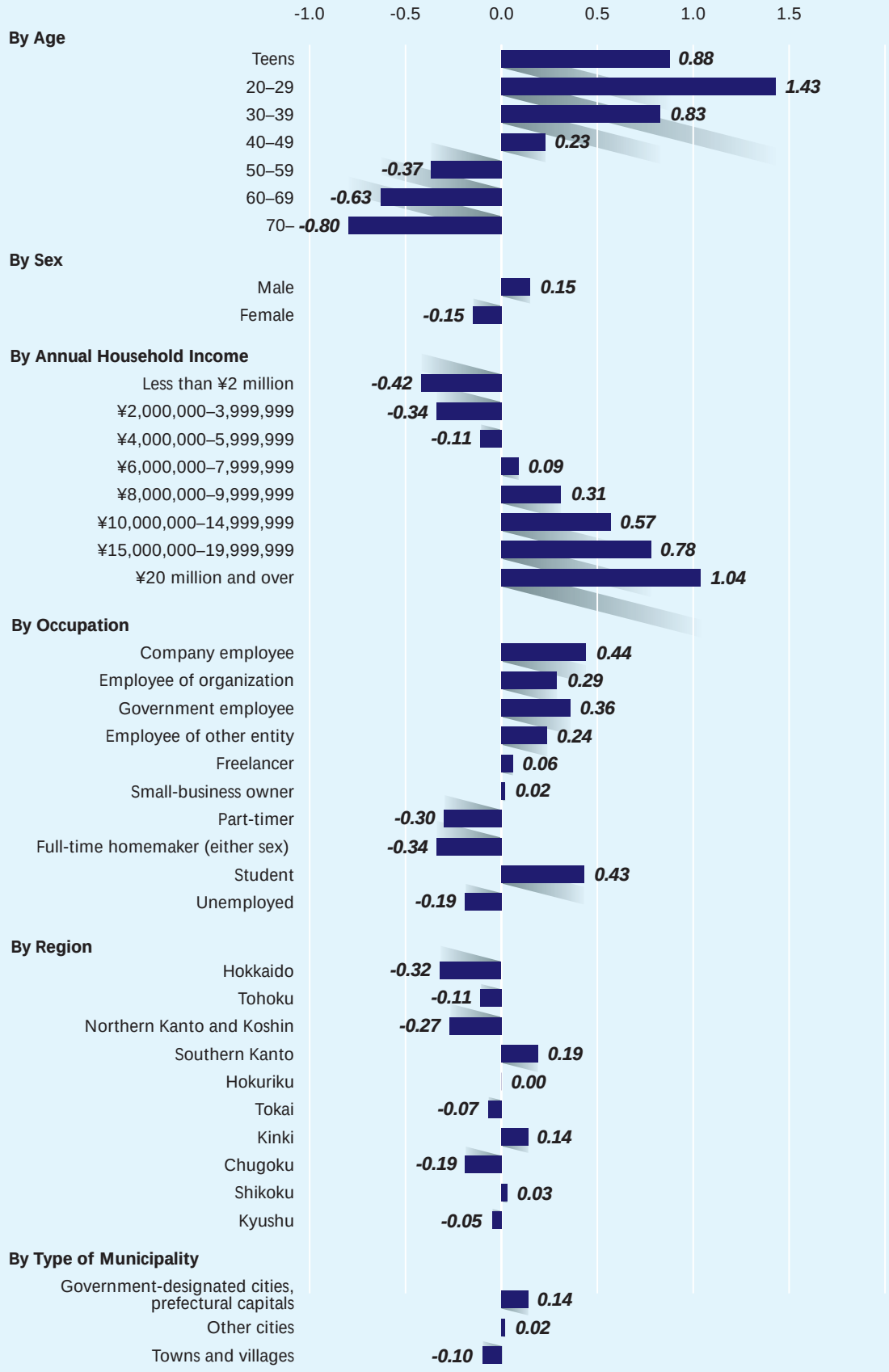


3. By Annual Household Income



Source: *Survey of Internet Usage Differentials*

Exhibit 28. Impact of Regional and Personal Characteristics on Internet Use



Source: *Survey of Internet Usage Differentials*

equipment other than PCs—such as special telephones and interactive TVs—could be one way of solving the problem of difficult-to-operate equipment.

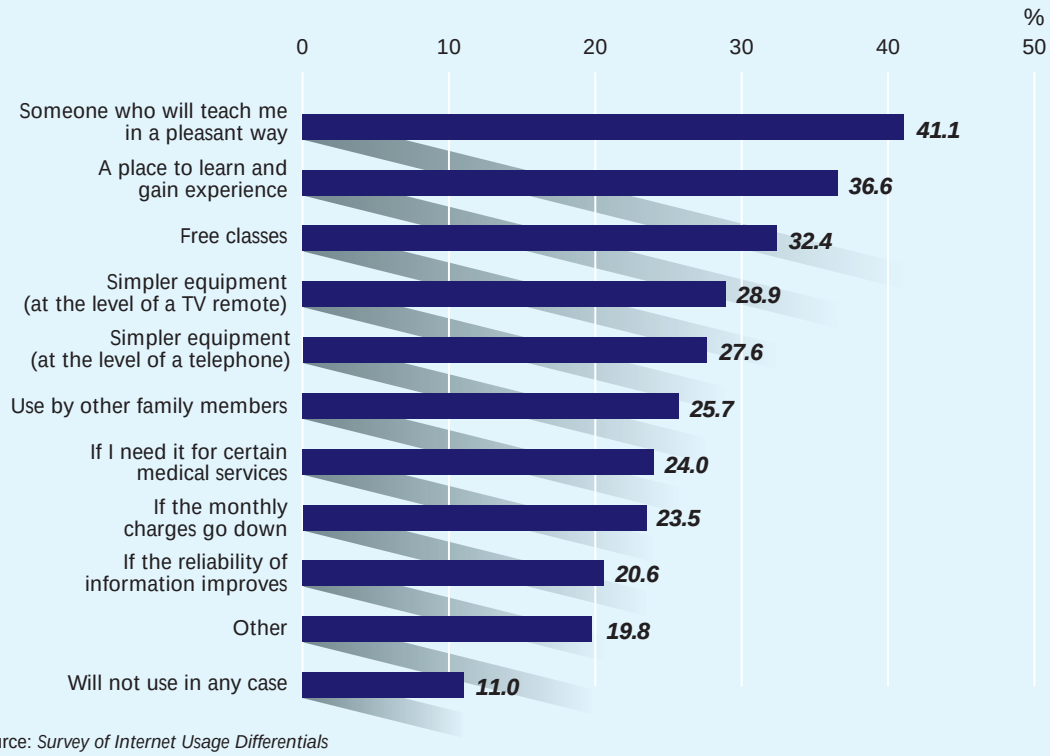
4 The digital divide between disabled users and others

The W3C, an international organization dedicated to promoting the standardization of web-related technology, has developed guidelines for making it easier for the disabled to access information on the Internet. The MPT and Ministry of Health and Welfare have formed a study group to map out their own guidelines based on those of the W3C. The MPHPT is currently developing a website support system based on the study group's guidelines.

5 Trends overseas

An international digital divide exists, with a country's Internet usage rate exhibiting a strong positive correlation with per-capita GNP. This indicates the need for developed countries to support the popularization of the Internet in developing nations.

Exhibit 29. What It Will Take to Get Nonusers to Begin Using the Internet



Source: *Survey of Internet Usage Differentials*

6 Facilitating the Spread and Development of E-Commerce

1 New rules for promoting e-commerce

In its efforts to remove impediments to the IT revolution, the Japanese government has revised components of the regulatory system to allow private-sector transactions to take place via e-mail as well as by the traditional exchange of paper documents, previously the only valid means of conducting such transactions. Beyond this, the government is currently working on a legal framework for generating basic rules required by the unique characteristics of e-commerce, such as rules for electronic contracts and information asset contracts and rules of responsibility for information brokerage businesses.

2 Constructing a system for popularizing e-commerce

The Law on Electronic Signature and Authentication, which came into force of April 1, 2001, was enacted to give legal status to electronic signatures as a means of verifying that the other party in an e-commerce transaction is really who he or she says he is and to create a national approval system for electric certification operation. As a result, the electronic-signature and electronic-authentication market is expected to grow substantially. The government is also working on developing and popularizing safe and secure Internet settlement methods such as use of credit cards and e-money.

3 Ensuring the safety of e-commerce transactions

The number of complaints from consumers over transactions conducted on the Internet has increased during the past several years. A survey of Internet users reveals that more than 40% of respondents will not engage in e-commerce because of concerns about funds settlement. Alleviating these concerns will require developing ways to ensure that products and services are of high quality and that personal information cannot be leaked.

Another common area of complaint is that traditional corporate alliances and practices are impediments to e-commerce. It will be important for the government and private sector to review this situation and reach a consensus.

4 Internet governance; remaining problems

In line with the growing economic significance of the Internet, it is projected that such activities as disputes over Internet domain names—specifically, the acquisition of domain names based on company or trade names by third parties, who then attempt to sell the domain names to the company in question for huge sums of money—are going

to increase in number. An appropriate system for resolving these disputes needs to be created. Furthermore, in light of the growing significance of Internet governance, it is important for Japan to continue participating actively in discussions at such venues as the Internet Corporation for Assigned Names and Numbers (ICANN).

Human Resources Development

Current state of information literacy

People need the opportunity to learn to become "information-literate"—to acquire the ability to freely use information and communications equipment—if they are to benefit equally from the IT revolution. Our analysis of the current state of information literacy in Japan indicates a strong positive correlation between Internet use and level of information literacy.

Internet literacy varies inversely, and strongly, with age (Exhibit 30) and directly with annual household income. This would indicate that people in their 20s or with higher household income are well on their way to having a good command of Internet content, but that much more needs to be done for the elderly in this area. Consistent with this is the fact that many people have pointed out the need for setting up more locations at which less-than-literate potential users can try out equipment at no charge, take courses, or consult with those who are more experienced.

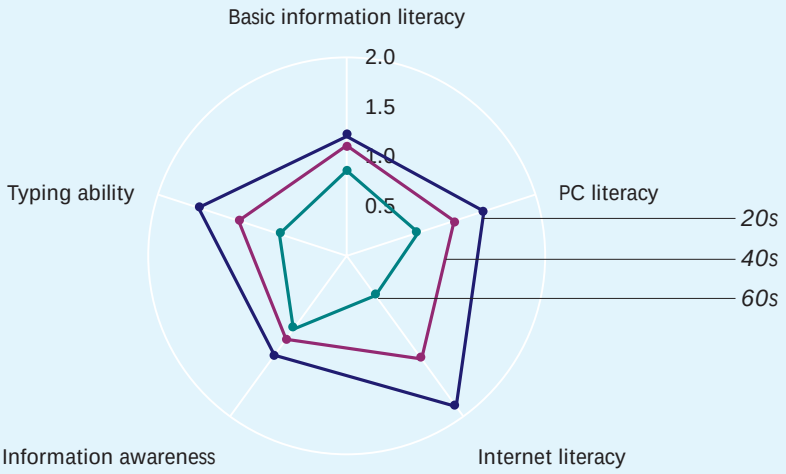
2 Enhancing information literacy

Promoting information intensification in the Japanese educational system is indispensable to securing the personnel needed to support the advanced IT society of the 21st century. As of March 2000, computers for student use were installed in all public secondary and high schools, and the goal is to have Internet connections in all public schools nationwide by the end of fiscal 2001. In that high-speed connections are also becoming indispensable, the MPHPT and the Ministry of Education, Culture, Sports, Science and Technology are jointly developing an R&D network connecting the nation's elementary, secondary, and high schools by high-speed fiber-optic and DSL circuits and are researching advanced network construction technology. It is projected that more than 4,000 of Japan's 40,000 public schools will be connected to the Internet via high-speed access circuits by the end of fiscal 2001.

To bolster information literacy in the population in general, the MPHPT has set up a special subsidy for IT study. This is to be used to support local governments in setting up courses that teach people such basic IT skills as accessing the Internet and sending and receiving e-mail. Thanks to this subsidy, some 110,000 people have taken basic IT skills courses offered in 45 of Japan's prefectures since January 2001. We forecast that 5.5 million people will have taken such courses by the end of fiscal 2001.

In addition to these courses, around the country there are a growing number of non-profit activities aimed at forming Internet-based communication networks among the elderly, who thus far have tended to use the Internet minimally. It is hoped that further

Exhibit 30. Information Literacy by Age



Source: *Survey of Internet Usage Differentials*

activities of this nature will be developed to provide willing seniors with more opportunities to participate in society at large, communicate with people of different generations via the Internet, and share their own experiences and expertise with others.

3 Increasing the pool of IT technicians

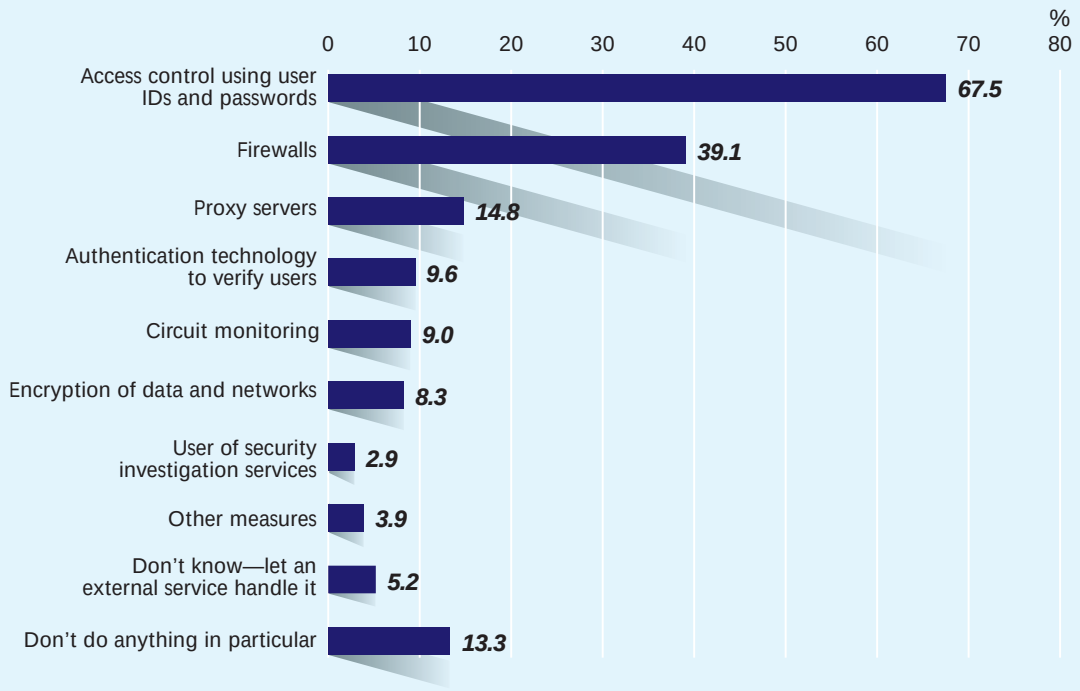
In Japan there is a shortage of technicians able to construct and maintain information and communications networks within companies. Many listed corporations have indicated that they plan to counter this shortage by cross-training existing employees. In the IT industry itself, there is a shortage of UNIX and other technicians, and universities and other educational institutions are unable to supply sufficient graduates to meet the demand. In light of the pressing to enlarge the pool of technicians with the expertise to operate and maintain corporate information networks, the government is providing financial support to organizations that run training courses dedicated to enhancing the technical skills of IT specialists.

6 Ensuring Information Security

1 Illegal access; computer viruses

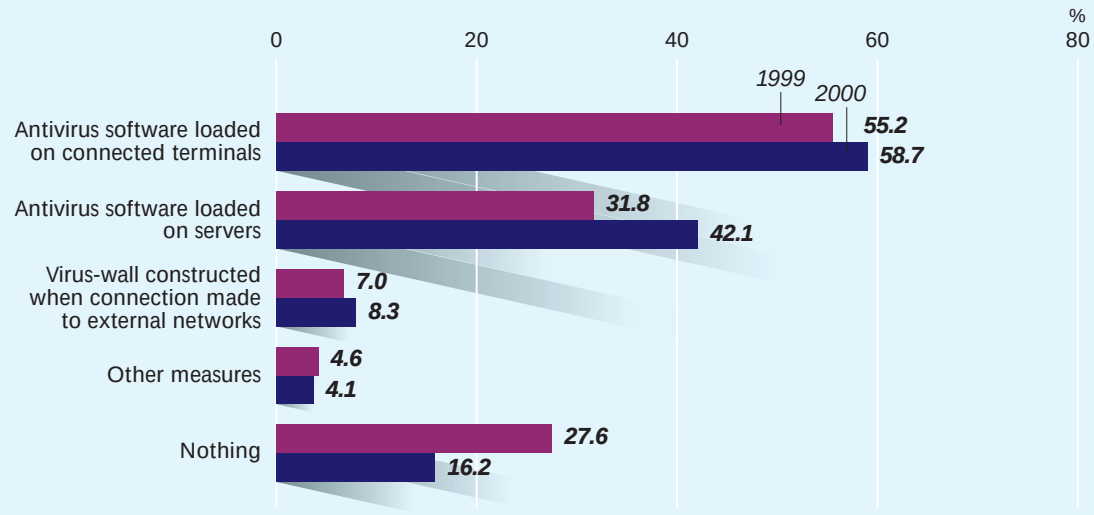
The more IT becomes an integral part of society and people's lives, the more likely a single breach in security could explode into a huge social and economic problem. There have already been incidents of stolen user IDs and passwords leading to illegal access to corporate and other networks and computers, and damage resulting from computer viruses is an increasingly common problem. Although governments and the private sector are devising countermeasures to prevent such incidents, breaches in security that lead to serious damage are only getting worse, with DoS attacks (denial-of-service attacks, in which a network is flooded with useless traffic to bring it to a halt) and e-mail virus intrusion are becoming more frequent and widespread. The threat of "cyber-terror"—attacks that could severely disrupt people's lives and economic and social activity—is very real.

Exhibit 31. How Businesses Are Responding to Illegal Access (Fiscal 2000)



Source: *Communications Usage Trend Survey (Business Section)*

Exhibit 32. Virus Countermeasures Taken by Businesses



Source: *Communications Usage Trend Survey (Business Section)*

What are businesses and individuals doing on their own to counter this? One study indicates that 77.5% of businesses are taking measures against illegal access, with 67.5% having access controls that incorporate IDs and passwords but only 39.1% taking the more-effective approach of installing a firewall (Exhibit 31). The attitude toward viruses seems just as lukewarm, with 58.7% of companies having installed antivirus software on the computers connected to their networks, but only 8.3% constructing virus-walls when they connect to external networks (Exhibit 32). Clearly, effective firewalls and virus-walls need to be put to greater use.

Individuals are not doing any better. Results of a mail-in survey indicate that, while as many as 35.2% have loaded antivirus software onto their computers, only 15.3% say that they check e-mail attachments for viruses—notwithstanding the growing number of incidents of infection via this port of entry. As with businesses, individuals need to become more aware of how they should be countering computer viruses.

2 Illegal and harmful information

The National Police Agency reports that 26% of the inquiries that the agency received on high-tech crime during 2000 concerned illegal and harmful information, such as obscene pictures and offers to sell illegal drugs appearing on the Internet. Although it is imperative that this problem be dealt with effectively, most existing countermeasures are those being taken voluntarily by ISPs themselves. Additionally, users may also avail themselves of filtering software and technology to block out harmful material from their computers.

3 Protecting personal information

Until recently the issue of protecting personal information has been handled voluntarily by telecommunications carriers. In October 2000, however, the Expert Committee on Legislation for Protecting Personal Data of the government's IT Strategy Headquarters compiled an Outline of Basic Legislation for Protecting Personal Information, on the basis of which a Bill to Protect Personal Information was presented to the 151st ordinary session of the Diet. For its part, the MPHPT, based on the final report of its Study Group to Recommend Legislation for the Protection of Personal Information in Telecommunications, plans to undertake further study toward the preparation of specific laws for the telecommunications field.

Mapping Out the National IT Strategy

1 Building a strategic system that will usher in an IT society

In July 2000 the Japanese Cabinet created an IT Strategy Headquarters, chaired by the prime minister, to coordinate ways to ensure that the entire population enjoys the benefits of the IT revolution and that Japan becomes an internationally competitive force in the IT sector. Additionally, an IT Strategy Council comprising 20 experts in the field was formed to bring together the public and private sectors to conduct strategic, focused investigations in the IT field.

The two groups have held six joint meetings since their formation. As a result of their efforts, the Basic Law on Formation of an Advanced Information and Telecommunications Network Society (IT Basic Law) was passed in November 2000 (and came into effect in January 2001); 50 laws that formerly made it obligatory for paper documents to be exchanged in private sector transactions were revised en masse (passed in November 2000; came into effect in April 2001); and, at the direction of the cabinet minister responsible for IT, two bills were prepared, one promoting electronic government (for example, shortening the period during which government ministries and agencies are supposed to have their procedures available online) and e-commerce and one for developing a high-speed Internet. At the sixth joint meeting of the two groups, in November 2000, a Basic IT Strategy calling for Japan to become the world's leading IT nation within five years was mapped out.

The work of the IT Strategy Headquarters and IT Strategy Council having been completed, in January 2001 a second IT Strategy Headquarters was created in the Cabinet, which at its first meeting mapped out a strategy, called the "e-Japan Strategy," for making Japan an IT nation. At its third meeting, in March, the headquarters filled out the details of the e-Japan Strategy with an e-Japan Priority Policy Program. Finally, the headquarters plans to work out by the end of June an e-Japan 2002 Program that reflects all government ministries' measures to be taken under the e-Japan Strategy and the e-Japan Priority Policy Program in fiscal 2002.

2 Basic policies for promoting the IT society

In November 2000 the IT Strategy Council created a Basic IT Strategy, and in January 2001, based on the Basic Law on Forming the Advanced Info-communications Network Society (IT Basic Law), the Strategic Headquarters for Promoting the Advanced Information and Communications Society (IT Strategy Headquarters) mapped out an e-Japan Strategy as a national strategy for carrying out the IT revolution. The e-Japan Strategy

aims to develop an environment based on market principles in which the private sector can use its energies to maximum effect and calls for Japan to become the world's leading IT nation within five years.

At its third meeting, at the end of March 2001, the IT Strategy Headquarters filled out the details of the e-Japan Strategy with an e-Japan Priority Policy Program, which delineates policies to which the government should give priority to ensure the timely creation of an advanced information communications network society. Finally, the headquarters plans to work out by the end of June an e-Japan 2002 Program that reflects all government ministries' measures to be taken under the e-Japan Strategy and the e-Japan Priority Policy Program in fiscal 2002.

3 The MPHPT's comprehensive role in promoting the IT society

The MPHPT formed an Advisory Group for Promotion of IT Policies of MPHPT in January 2001 to solicit views from various fields, including information and communications and local-government administration, on the measures that the ministry should take to ensure the realization of an intelligent, creative society in which all people can use and benefit from IT to the fullest. Additionally, in July 2000 the MPHPT created a Headquarters for Promoting Information Intensification in Local Governments in Response to the IT Revolution, headed by the minister of public management, home affairs, posts and telecommunications. In August this group compiled Guidelines for Promoting Information Intensification Measures in Local Governments in Response to the IT Revolution, which lists specific areas in which local governments need to take immediate action. Finally, in December the group developed an action plan that, based on these guidelines, delineates the activities that the MPHPT should undertake in each of the fiscal years.

Policies for Creating an Environment That Will Bring About the IT Society

1 Formation of the world's most advanced information and communications network

The e-Japan Priority Policy Program targets the development of the world's top network with ultra-high-speed access within five years. To that end, and to ensure the realization of network infrastructure usable at low cost by the general population, the program calls for (1) the creation of conditions ensuring fair competition in telecommunications and (2) measures to facilitate the laying of fiber-optic lines and other components of the network infrastructure.

Also to this end, the MPHPT is promoting numerous measures and activities, including: implementation of asymmetric regulations; measures to promote incentive-based competition policy; creation of a telecommunications conflict resolution committee; establishment of a system for the use of existing fiber-optic lines and connection rules of regional IP networks; establishment of a system to facilitate the use of utility poles; expansion of the number of frequencies available for high-speed wireless access; increase in transmission speeds; measures to enhance basic Internet technology; R&D to advance mobile communications technology; and digitization of broadcasting.

2 Promoting education and nurturing human resources

To raise the level of people's information literacy and ensure a sufficient pool of experts—technicians and researchers—who will serve as the leading edge of IT, the e-Japan Priority Policy Program calls for creating an IT environment in schools, promoting citizens' movements to popularize IT, aggressively promoting reform in the nation's universities, and bringing in foreign personnel.

In cooperation with the Ministry of Education, Culture, Sports, Science and Technology, the MPHPT is promoting a number of relevant measures, including: Internet access in the schools, more education-oriented content, the creation of education portal sites, and other measures to ensure that basic IT skills are learned; training for workers involved in such specialty technology as telecommunications systems design and broadcast program production; and nurturing content creators.

3 Promoting e-commerce

To ensure that a convenient, easy-to-use e-commerce market is in place by 2003, the e-Japan Priority Policy Program calls for amending regulations that impede e-commerce and creating new rules, reviewing the Commercial Law and other relevant laws, and

developing measures to protect and ensure the appropriate use of intellectual property.

The MPHPT is promoting the following measures and activities: implementation of "procedures for the advance verification of administrative agencies' application of regulations," establishment of a legal framework that will allow for the writing of rules of responsibility for ISPs, rationalization of domain name usage, establishment of a legal framework for protecting personal data in the telecommunications field, and creating an international environment.

4 Promoting information intensification in the national government and local governments

The e-Japan Priority Policy Program calls for the following measures to be in place by fiscal 2003: (1) measures to promote information intensification among the general population, the business world, and the bureaucracy and in bureaucratic administrative tasks, to ensure that electronic information is treated the same way as written documentation, and (2) measures to promote information technology in the public sector, such as Intelligent Transfer Systems (ITS).

The MPHPT will coordinate a government-wide effort to provide administrative information on websites, allow applications and notifications to be handled online, allow for the placement and opening of bids online, and encourage government operations to go online. The ministry is also promoting the development of an action plan for individual procedures, the use of networks rather than paper for tasks common to each of the national-government ministries, nationwide development of a Vehicle Information and Communication System (VICS), and the construction of an Internet-mediated distribution framework containing geographic and other information and a next-generation 3D geographic information system (GIS).

5 Ensuring the safety and reliability of advanced networks

The e-Japan Priority Policy Program calls for the following measures to ensure highly safe and reliable network security by 2003: establishment of a system to form the basis for information security; security countermeasures to be used by government entities and the private sector; measures against cyber-terror directed at key infrastructure; R&D relative to information security; personnel development; and the forging of stronger international ties.

The MPHPT will likewise engage in or promote relevant activities: assessment of encryption technology; assessment and review of information security policy; support for the installation of equipment that enhances the reliability of telecommunications systems; establishment of a license system for information security; development of technology for preventing and detecting incidents of illegal access and cyber-terror; development of encryption technology, electronic signature authentication technology, and other technologies needed for ensuring the safety and reliability of information and communications networks.

6 Comprehensive problems

There exist problems common to all five categories noted above that will require focused efforts to ensure the realization of an advanced information and communications network society. The e-Japan Priority Policy Program classifies these into four categories —promotion of R&D, closing the digital divide, handling new problems that will arise from changes in social and economic structures, and promotion of international coordination and contributions to international efforts. The program calls for aggressive efforts to resolve all issues. The MPHPT is also making every effort to deal with these problems.