Chapter 1

Feature : Building a Ubiquitous Network Society That Spreads Throughout the World

Introduction

Today, Japan's broadband networks are the world's fastest and lowest cost, and the number of broadband subscribers is increasing. At the same time, the numbers of mobile phone and mobile phone Internet subscribers are increasing and mobile networks are expanding. In addition, terrestrial digital television broadcasting began in December of 2003 in Tokyo, Nagoya, and Osaka, and intelligent home appliances and RFID tags that can access networks are starting to be put to practical use.

These developments in the use of broadband, mobile phones and networks, digital broadcasting, and information terminals is giving rise to a virtuous cycle and is leading toward the realization of ubiquitous networks that enable anyone to access and exchange information of any kind freely at any time from anywhere, and from any appliance.

Looking at the status of network use, the Internet is pervading daily life with the Internet user population reaching approximately 77.3 million at the end of 2003, exceeding 60% of the total Japanese population. In addition, users are accessing the Internet not only from PCs but also from a variety of different types of terminals, and not only when at work or home, but even while in transit, approaching a situation where anyone can access the Internet from anywhere and at any time. The Internet gives a tremendous convenience and benefit to people and is becoming a necessity.

Moreover, various services that use mobile phones and contactless IC cards are evolving, coming into widespread use and enhancing the convenience of people's lives. Some of these network services that originated in Japan are also spreading throughout the world. In this way, the relationship between the public and information and communications networks is strengthening and expectations are high concerning future services using ubiquitous networks such as those relating to safety and security.

The use of broadband and mobile networks by businesses is also steadily advancing. Businesses are undertaking various tests and other activities concerning the application of RFID tags, contactless IC cards, and so on, generating the buds of new forms of network use. Both Japanese and American businesses have high expectations concerning ubiquitous networks and they are investigating services for a range of different terminal types.

Electronic commerce using broadband and mobile services is highly active and markets for high-performance information and communications devices that will form the foundations of future ubiquitous networks such as flat-panel televisions and DVD recorders are expanding and becoming a driving force behind the recovery of Japan's economy.

In the future, the realization of such ubiquitous networks is expected to produce a variety of benefits including increasing prosperity in people's lifestyles, stimulating economic activity, and alleviating social problems. Japan, which is in the position of a pioneer in these fields, is using forums such as the World Summit on the Information Society (WSIS) to explain concepts and results to people from countries around the world, and it is expected that the ubiquitous network will spread throughout the globe.

Throughout this process, Japan will cooperate with countries around the world in promoting the international standardization of ubiquitous network technologies and promoting network services that originated in Japan. At the same time, it is necessary for Japan to undertake active measures that will ensure information security and resolve various outstanding issues including bridging the digital divide.

With this awareness of current issues, this Information and Communications in Japan 2004 features the building a ubiquitous network society that spreads throughout the world, and analyzes the current status of evolving network infrastructure, the changes in lifestyles resulting from networks, the current conditions and expectations concerning the use of networks by businesses, and the issues concerning the realization of an optimal ubiquitous network society in the future and its economic impact.

Section 1 Advances in Network Infrastructure

1. Advances in Network Infrastructure

(1) Broadband at the World's Highest Levels

The number of broadband subscribers (including FTTH, DSL, cable Internet, and wireless (such as FWA)) reached 14.95 million at the end of fiscal 2003 **(Figure 1-1-1)**. The number of DSL subscribers, who use special modems connected to telephone lines, was 11.20 million at the end of fiscal 2003 and is a driving force being the expansion of broadband services. The number of cable Internet subscribers, who use cable television networks to connect to the Internet, was 2.58 million at the end of fiscal 2003 and is increasing steadily. FTTH is a an ultra-high speed network that boasts communications speeds faster than DSL and cable Internet, and the number of subscribers at the end of fiscal 2003 was 1.14 million, a 3.7-fold increase from the 310,000 subscribers at the end of the previous year.

The number of broadband users at the end of 2003 is estimated to have been 26.07 million (a 33.4% increase over the previous year and a 20.4% penetration rate). Broadband users account for 33.7% of the total population of Internet users of 77.3 million. Thus, more than one in three Internet users access the Internet by broadband.

The percentage of households that use broadband to access the Internet from a home PC increased from 29.6% at the end of 2002 to 47.8% at the end of 2003, an increase of 18.2 points in just one year. A total of 61.7% of households use always-on Internet connections including broadband and always-on ISDN. In contrast, the percentage of households that use dial-up ISDN or telephone connections decreased from 56.1% to 38.4%, down 17.7 points from the previous year **(Figure 1-1-2)**.

Figure 1-1-1 Number of Broadband Subscribers

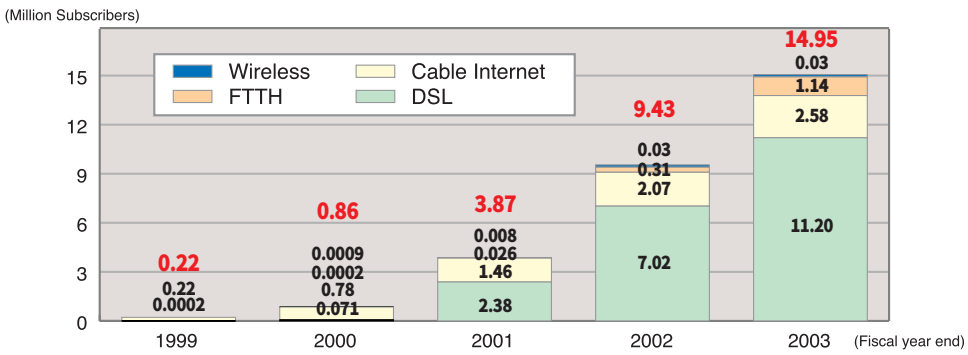
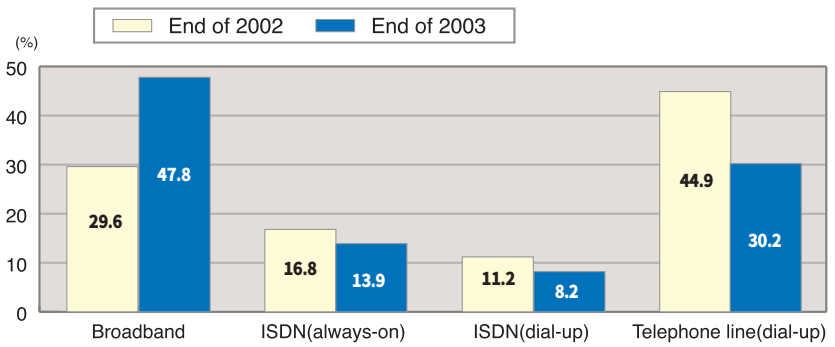


Figure 1-1-2 Internet Connection Methods from Home PCs



* Broadband: include DSL, cable Internet, wireless (such as FWA), and optical fiber.

Source: Communications Usage Trend Survey, MPHPT

The continuing fall in broadband fees is one factor behind the rapid proliferation of broadband services. An international comparison of DSL and cable Internet fees converted to the cost per 100 kbps reveals that fees in Japan at the world's lowest levels **(Figure 1-1-3)**.

An international comparison of broadband penetration in 2002 shows that Japan is third in terms of the number of subscribers behind the United States (19.88 million subscribers) and the Republic of Korea (10.13 million subscribers). The Republic of Korea has the highest broadband penetration rate at 21.3%. Japan is in ninth place **(Figure 1-1-4)**.

(2) Development of Mobile Internet

(i) Increased use of the Internet from mobile phones

The number of mobile phone subscribers in Japan exceeded 80 million in January 2004, reaching 81.52 million at the end of fiscal 2003. Of those, 69.73 million were mobile phone Internet subscribers (i.e., subscribers to Internet service that use mobile phones) **(Figure 1-1-5)**.

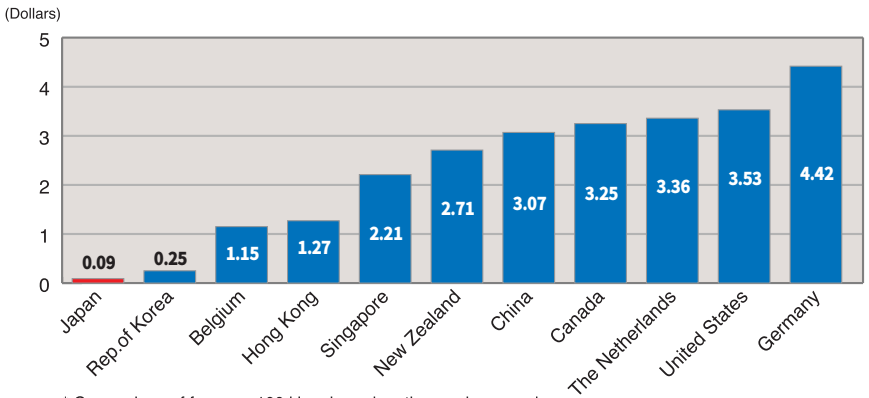
(ii) Increase in 3G mobile phones and advanced functions

Standardization and development of systems for the practical application of third-generation (3G) mobile phones is advancing rapidly in Japan. In October 2001 the NTT DoCoMo Group introduced the world's first W-CDMA format 3G mobile phone, and the KDDI Group began CDMA 2000 services in April 2002 while J-Phone (currently Vodafone) began W-CDMA services in December 2002. The number of 3G mobile phone subscribers reached 16.69 million at the end of fiscal 2003 and continues to increase steadily **(Figure 1-1-6)**.

(iii) International Comparison of Mobile Internet Use

An international comparison of the percentage of mobile phone Internet subscribers of all mobile phone subscribers of leading carriers in various countries and territories reveals that Japan's rate of 89.5% is the world's highest followed by the Republic of Korea and China. Thus, Asia is a driving force behind the increase in mobile Internet use **(Figure 1-1-7)**.

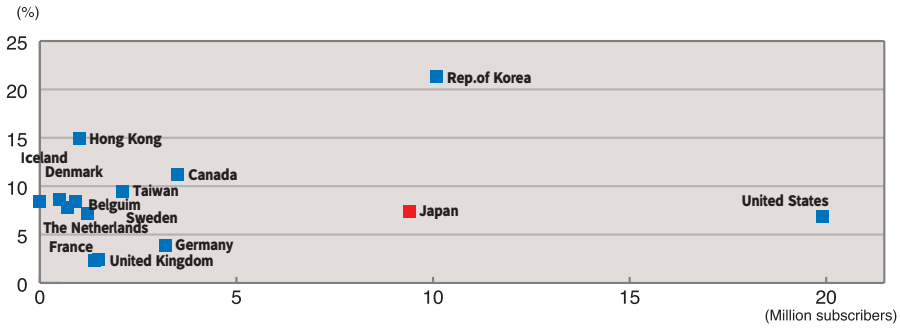
Figure 1-1-3 International Comparison of Broadband Fees (cost per 100 kbps; July 2003)



* Comparison of fees per 100 kbps based on the service speeds and service fees of DSL and cable Internet in each country.

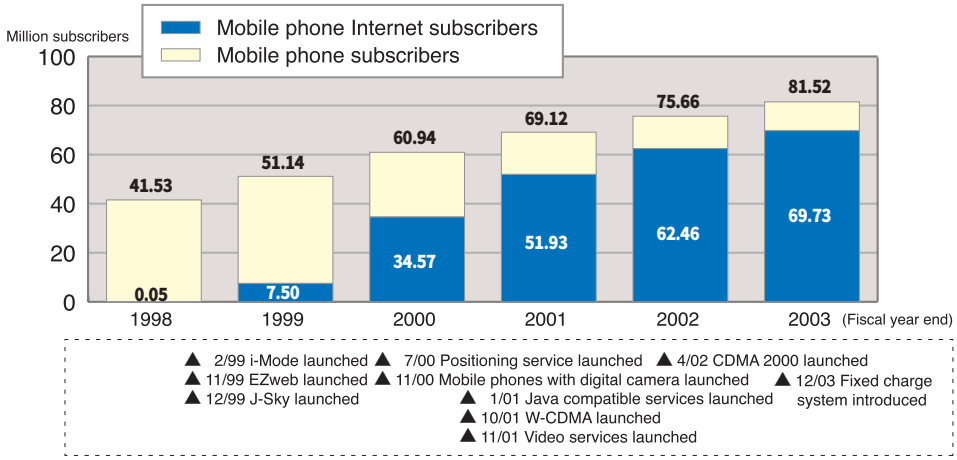
Produced from Birth of Broadband, ITU

Figure 1-1-4 International Comparison of Total Broadband Subscribers and Subscribers per 100 inhabitants (2002)



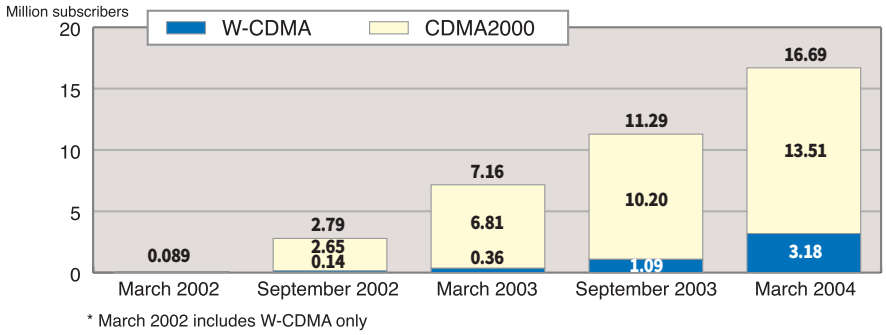
Produced by the MPHPT based on Birth of Broadband, ITU

Figure 1-1-5 Number of Mobile Phone Subscribers and Number of Mobile Phone Internet Subscribers



* The number of mobile phone Internet subscribers is the total of i-Mode, EZweb (including the former EZaccess), and Vodafone Live! (including the former J-Sky) subscribers.

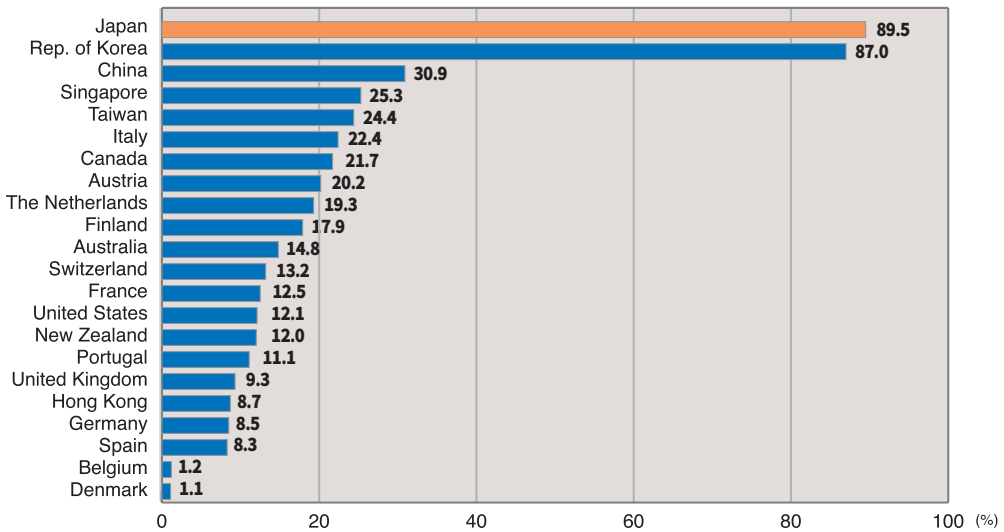
Figure 1-1-6 Number of 3G Mobile Phone Subscribers



* March 2002 includes W-CDMA only

Produced from Telecommunications Carriers Association documents

Figure 1-1-7 Mobile Phone Penetration Rates in Major Countries and Territories (mobile Internet subscribers of all mobile phone subscribers) (end of September 2003)



* Figures are the percentages of mobile phone Internet subscribers of all mobile phone subscribers of leading carriers in each country and territory.

Produced from "3G Mobile"

(3) Increases in IP Telephone and Hot Spots

In conjunction with the increased use of broadband, use of IP telephone has also been increasing, and 7.3% of households were using IP telephone at the end of 2003. Also, 11.1% of businesses were using IP telephone at the end of 2003 and 42.7% planned to introduce it.

The number of high-speed wireless access points (hot spots) in public places increased from 1,624 at the end of fiscal 2002 to 5,350 at the end of fiscal 2003 **(Figure 1-1-8)**. Use of hot spots by Internet users increased to 9.5% at the end of 2003, up 0.7 points from the end of 2002 **(Figure 1-1-9)**.

(4) Digitization of Broadcasting

Terrestrial digital television broadcasting began in three major metropolitan areas of Tokyo, Nagoya and Osaka on December 1, 2003 **(figure 1-1-10)**. With this start, digital broadcasts are available in all broadcasting media including terrestrial, satellite, and cable television broadcasting. The shift to digital is equal to the change from black and white to color. With the advent of digital broadcasting, in addition to the existing passive viewing style, viewing styles that encourage more action by viewers may also be realized.

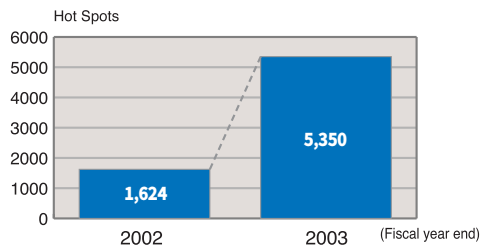
The shift from analog to digital broadcasting is scheduled from completion by 2011 with the exception of terrestrial radio broadcasting. The shift to digital is already essentially complete for communications satellite broadcasting. Analog high-definition broadcasting satellite (BS) broadcasting is scheduled for termination in 2007 while other BS broadcasting (NHK-1, NHK-2, and Wowow) will end in 2011. A goal of converting virtually all cable television broadcasting to digital by 2010 has also been set **(Figure 1-1-11)**.

Terrestrial digital television broadcasting in Japan offer tremendous benefits to users including high-definition broadcasting and the provision of stable services even while viewers are in transit or using mobile terminals, and have outstanding features compared to other countries **(Figures 1-1-12 and 1-1-13)**. The expansion of terrestrial digital television broadcasting will make it possible for viewers to access high-definition, high-quality programming at any time from any location and is expected to enhance the competitiveness of Japanese businesses through the development of household appliances with advanced functions.

(5) Development of e-Government and e-Local Government

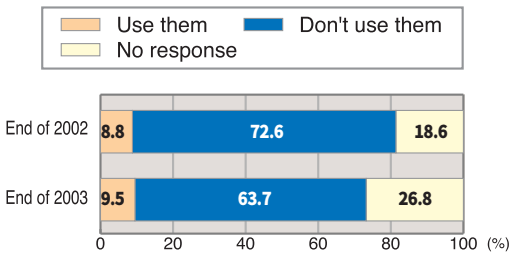
With regard to performing administrative procedures online, the Law Concerning the Use of Information and Telecommunications Technology on Administrative Procedures came into force in February 2003, and the development of systems including a government public key infrastructure (GPKI) and a general-purpose reception system was completed by the end of fiscal 2003. The development of an environment for performing administrative functions online is basically complete including the Basic Resident Registers Network System

Figure 1-1-8 Change in Number of Hot Spots



Source: Survey of the Current Status and Issues of Networks

Figure 1-1-9 Use of Hot Spots

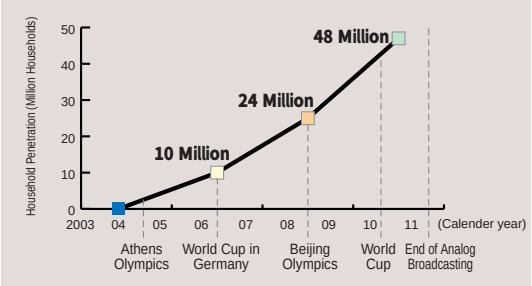


Source: Communications Usage Trend Survey, MPHPT

Figure 1-1-10 The Launch of Terrestrial Digital Television Broadcasting in Tokyo

(The ceremony held at the launch of terrestrial digital television broadcasting)

Figure 1-1-11 Goal for Penetration of Terrestrial Digital Television Broadcasting in Households



Source: Fourth Action Plan for Promotion of Digital Broadcasting, National Conference for Promotion of Terrestrial Digital Broadcasting

becoming fully operational in August of 2003 and the start of a public personal certification system that operates online, as well as electronic payment services for payment of taxes and various administrative fees in January 2004. In addition, during fiscal 2003, all local government bodies began participating in the Local Government Wide Area Network (LGWAN).

Using this environment, the online filing of most applications and notifications handled by central government agencies became possible by the end of fiscal 2003 including the start of electronic filing of tax returns to the Nagoya Regional Taxation Bureau (covering Gifu, Shizuoka, Aichi, and Mie Prefectures).

In addition, the MPHPT revised the "Policy Concerning the Promotion of Computerization Measures by Local Governmental Bodies in Response to the IT Revolution" (adopted August 2000) and the "e-Government and e-Local Government Promotion Program" (adopted October 2001) and announced the "e-Local Government Promotion Guideline" in August 2003 as a reference for independent and positive actions supporting the realization of e-local government, taking into careful consideration conditions in local governmental bodies as well as differences in their scale and abilities.

2. Technology Development and Standardization for Enhancing International Competitiveness

For users to access diverse services on safe and secure networks, activities are expected to promote research and development and testing that will contribute to the construction of ubiquitous networks such as the development of terminals that even general users not familiar with PC operation can use easily by making use of Japan's experience in home appliance operability and reliability, areas in which Japan excels.

In order to distribute broadly the results of R&D, enhance international competitiveness, and improve people's lifestyles, it is essential that measures be taken to promote the integration of R&D and standardization and the distribution around the world of technologies developed in Japan including standardization activities that protect intellectual property rights from the earliest stages of R&D.

Figure 1-1-12 Benefits to Viewers of Terrestrial Digital Television Broadcasting

① Viewers can enjoy clear pictures in detailed, high-definition and CD-quality sound that provides an on-the-scene experience.
② Users can acquire a wide range of information not previously available and access diverse and highly convenient services such as interactive functions linked to the Internet.
③ Users can view broadcasts on mobile phones and PDAs and use services stably even while in transit.
④ Digitalization will substantially increase the volume of information that can be broadcast, making enhanced credit and explanatory services possible as well as viewer-friendly services such as the function to adjust the pace of speech when it is too fast for easy comprehension.
⑤ Users will be able to select programs using services with electronic programming guides (EPG) and watch programs whenever they want using server-type broadcast services.

Produced based on the Fourth Action Plan for Promotion of Digital Broadcasting, National Conference for Promotion of Terrestrial Digital Broadcasting

Figure 1-1-13 International Comparison of Terrestrial Digital Television Broadcasting

	Europe (DVB-T Format)	Japan (ISDB-T Format)	United States (ATSC Format)
Can be received while in transit	△ Under development.	◎ Suitable. Services to begin in 2005.	× Not suitable.
High-Definition Broadcasts	× Not provided.	◎ The policy is for at least 50% of programming to be broadcast in high- definition (NHK's policy is 80%).	◎ There is little high-definition programming available.
Interactive Functions	○ Interactive functions are available in some countries.	◎ Interactive functions with dial-up and broadband are standard features.	△ Under consideration.

3. Evolving Towards Ubiquitous Networks

Japan has the world's lowest-cost and fastest broadband networks, and the number of broadband users is increasing steadily. The use of advanced services from Internet-compatible terminals and camera-equipped devices including mobile phones is increasing, and the creation of hot spots is leading the to development of an environment in which users can connect to the Internet at any time from anywhere. In this way, networks are shifting to broadband and mobile access.

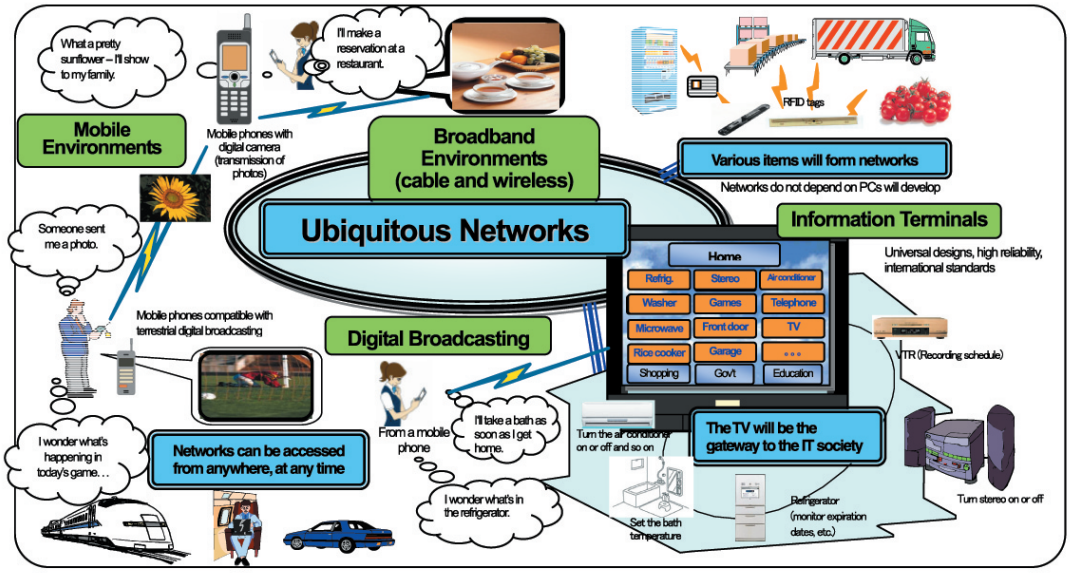
With respect to terminals, with the start of terrestrial digital television broadcasts, it is expected that high-quality television image will spread throughout households and that televisions will become a means of accessing the Internet in forms such as broadcast program that is linked to the Internet and Internet access from a television screen. In addition, mobile terminals that can receive terrestrial digital television broadcasts are expected, and an environment under which such broadcasts can be received anywhere is being developed.

Moreover, the development of intelligent home appliances will make it possible for home appliances, which until now have all been used independently, to provide convenient network services such as links to the Internet and the ability to be operated from outside the home. At the same time, links between devices in the home such as home appliances, PCs, and mobile phones will lead to energy conservation and higher efficiency, safety, and improved operability. The practical application of RFID tags that can access networks will make possible integrated management that covers entire product lifecycles in areas such as increasing the efficiency of manufacturing, distribution, and inventory management, performing product adjustments, managing product histories, and preventing loss and theft as well as in such areas as distribution, sales, use, maintenance, and recycling.

In the future, we will see the development of seamless networks that can ensure the quality of communications and high security through the shift to IPv6 (Internet Protocol version 6) and other measures, and the connection of various types of devices to networks will allow the determination of the status of “people” and “things” that are linked to networks in real time and the provision of new and diverse services.

These networks, applications, and terminals will create a virtuous cycle that will lead towards the realization of ubiquitous networks that allow anyone to connect to networks at any time from anywhere to acquire and exchange information freely **(Figure 1-1-14)**.

Figure 1-1-14 Image of Ubiquitous Networks



Source: Survey of the Current Status and Issues of Networks

Section 2
Changes in Lifestyles Resulting from Network Use

1. Status of Internet Usage

(1) Internet usage pervades various aspects of people's lives

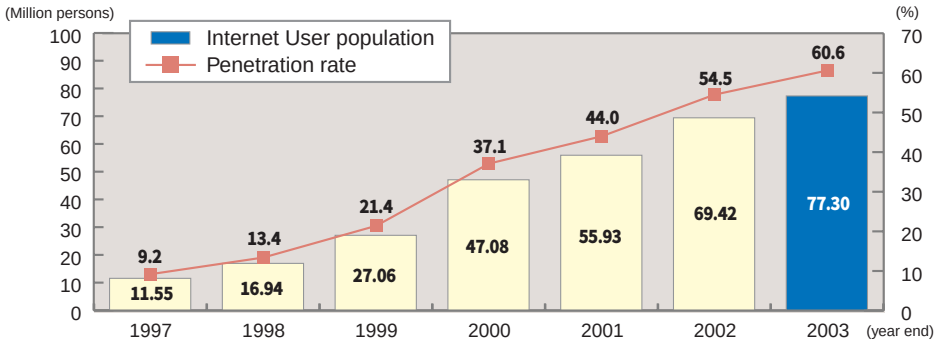
The number of Internet users in Japan continues to grow. At the end of 2003, the population of Internet users was estimated to be 77.30 million (up 6.1 points from the previous year), an increase of 7.88 million in just one year. The penetration rate now exceeds 60% at 60.6% **(Figure 1-2-1)**.

(2) Status of Internet usage

The most common use of the Internet when accessed from home PCs is "e-mail" used as a means of communication (57.6%), followed by "searching for information on goods and services" (57.4%), "obtaining news and other information" (48.7%), and "purchasing goods and services" (36.8%) **(Figure 1-2-2)**.

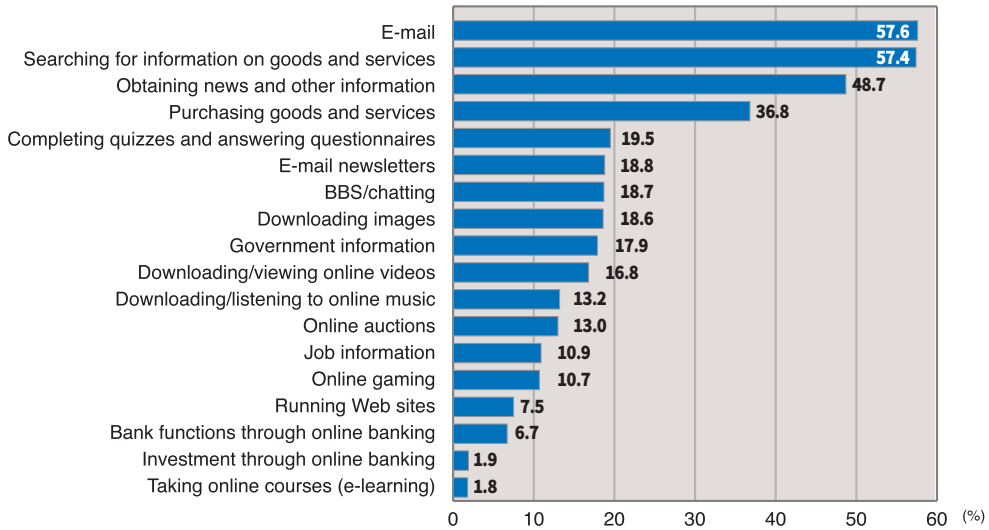
Concerning use of the Internet as an information-gathering tool, most Internet users rate highly the information-gathering speed of the Internet (98.4%) and use the Internet as their first means when searching for or gather information (93.5%). In addition, confidence in the information on the Internet is higher than in the past (88.4%) **(Figure 1-2-3)**.

Figure 1-2-1 Transitions in the Internet User Population and Penetration Rate



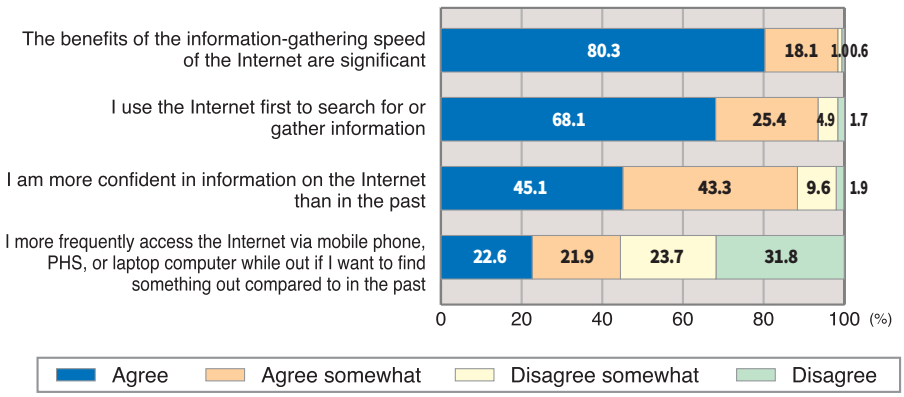
Source: Communications Usage Trend Survey, MPHPT

Figure 1-2-2 Purposes of the Internet Use from Home PCs (multiple responses possible)



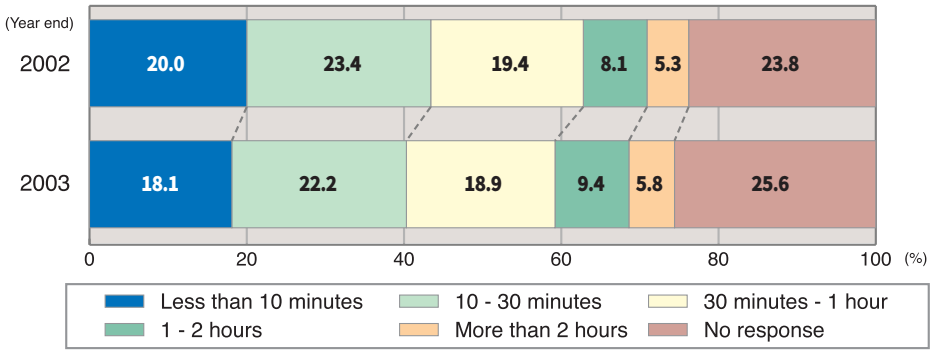
Source: Communications Usage Trend Survey in 2003, MPHPT

Figure 1-2-3 How Users Feel about the Internet as an Information-gathering Tool



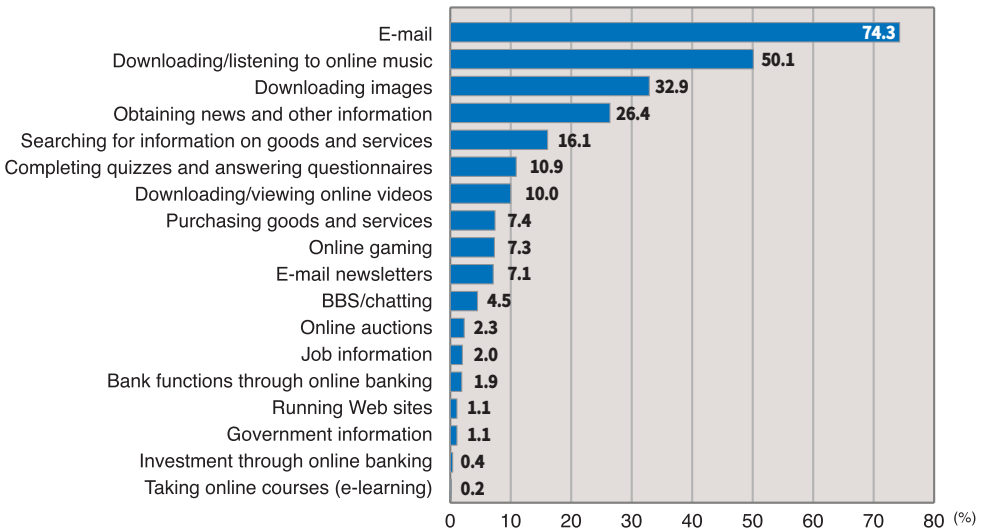
Source: Survey of Personal Activities in a Ubiquitous Network Society

Figure 1-2-4 Average Time of Internet Use per Access from Home PCs



Source: Communications Usage Trend Survey, MPHPT

Figure 1-2-5 Purposes of Internet Use from Mobile Phones/PHS (multiple responses possible)



Source: Communications Usage Trend Survey in 2003, MPHPT

Of those users who access the Internet from home PCs, a review of the change in the average time of use per access from the end of 2002 to the end of 2003 shows that short-term users who access the Internet for "less than 10 minutes" decreased by 1.9 points to 18.1%. In addition, the percentages of long-term users increased, with those accessing the Internet for "1 to 2 hours" increasing to 9.4% (up 1.3 points from the previous year) and "more than 2 hours" increasing to 5.8% (up 0.5 points from the previous year) **(Figure 1-2-4)**.

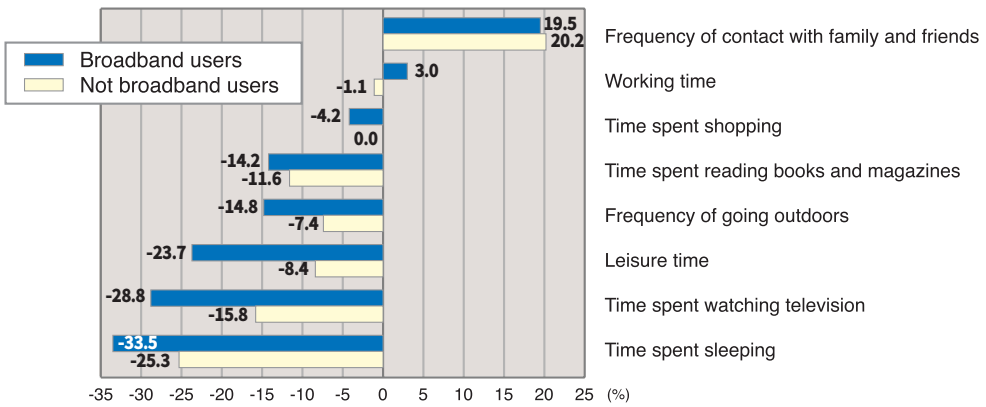
The most use of the Internet when accessed from mobile phones/PHS is "e-mail" at 74.3%, followed by "downloading and listening to online music" (50.1%), "downloading images," (32.9%), and "obtaining news and other information" (26.4%) **(Figure 1-2-5)**.

(3) Changes in lifestyles resulting from Internet use

When Internet users were asked about changes in their lifestyles, many responded that the "frequency of contact with family and friends" increased, regardless of whether they used broadband. Many broadband users responded that there were decreases in "time spent sleeping," "time spent watching television," and "leisure time," and the decrease in resting and leisure times was particularly prominent **(Figure 1-2-6)**.

Internet usage is not limited to the home, and usage sites are diversifying. Among people who use the Internet "multiple times per day" while outside the home or office, the most common use location is "lodging facilities (hotels and inns)" at 59.5%, followed by "stations and airports" at 57.0% and "eating facilities (coffee shops, fast food and other restaurants)" at 50.3%. Use in

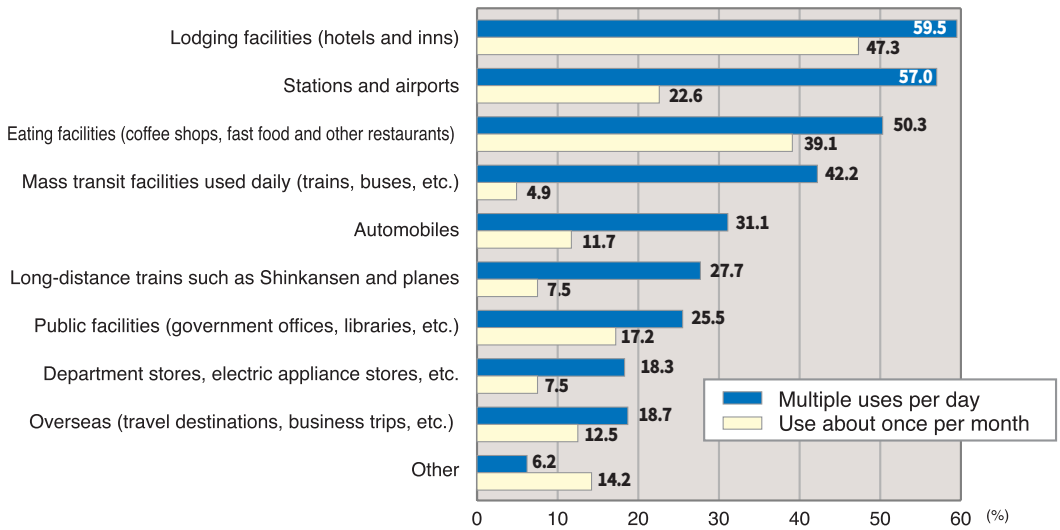
Figure 1-2-6 Changes in Lifestyles from Network Use (multiple responses possible)



Note: The percentage of respondents who answered "decreased" was subtracted from the percentage who answered "increased."

Source: Survey of Personal Activities in a Ubiquitous Network Society

Figure 1-2-7 Internet Use Sites Outside the Home or Office (multiple responses possible)



Note: Connection to the Internet as used here excludes connections from mobile phones/PHSs.

Source: Survey of Personal Activities in a Ubiquitous Network Society

the "mass transit facilities used daily (trains and buses, etc.)" (42.2%) and "automobiles" (31.1%) were also relatively high, indicating that the frequency of Internet use while people are in transit is high **(Figure 1-2-7)**.

(4) Internet use pervades day-to-day activities

(i) Internet use expands in all user segments

Internet use by individuals continues to increase and expand each year and is pervading a broad range of user segments. Looking at Internet use rates by age group at the end of 2003, Internet usage in the 60 years old and over group was 21.6%, substantially lower than the more than 90% rates in the 13 to 19 years old, 20 to 29 years old, and 30 to 39 years old groups. From the end of 2002 to the end of 2003, however, usage in the 60 years old and over group increased by 1.33 times, a faster rate of growth than in other age groups **(Figure 1-2-8)**.

(ii) Internet usage during personal activities

Opportunities for users to access the Internet while engaging in day-to-day personal activities including sending and receiving e-mail, searching for and transmitting various types of information, and using various services are increasing. This type of network usage takes place during day-to-day activities, and use of the Internet regardless of time and locations is increasing.

Of the all time spent engaged in various personal activities, the percentage of time accounted for by Internet use while "resting at home" is 35.0% and while "at work or school" is 21.1%, thus taking up more than 20% of personal time. In addition, the percentage of Internet use time while engaged in "getting ready for work, school, etc." (18.2%), while "in transit (to and from work, school, etc.)" (13.2%), while doing "housework" (17.6%) and during "leisure, etc." (19.3%) are almost all just under 20%. Thus, Internet use is increasing in all aspects of daily life **(Figure 1-2-9)**.

2. Prospects for Network Use in the Future

(1) Network usage intentions

Among persons who currently use the Internet, the most common intended future Internet uses were for personal purposes including "viewing Web sites" (69.9%) and "sending and receiving e-mail" (57.1%). There is also a high level of interests in "Access Internet services" (54.0%) including online shopping and making reservations. The level of interest in "Access Internet services" was the highest among non-Internet users (47.6%), indicating a high expectations concerning Internet services including greater convenience and greater enjoyment **(Figure 1-2-10)**.

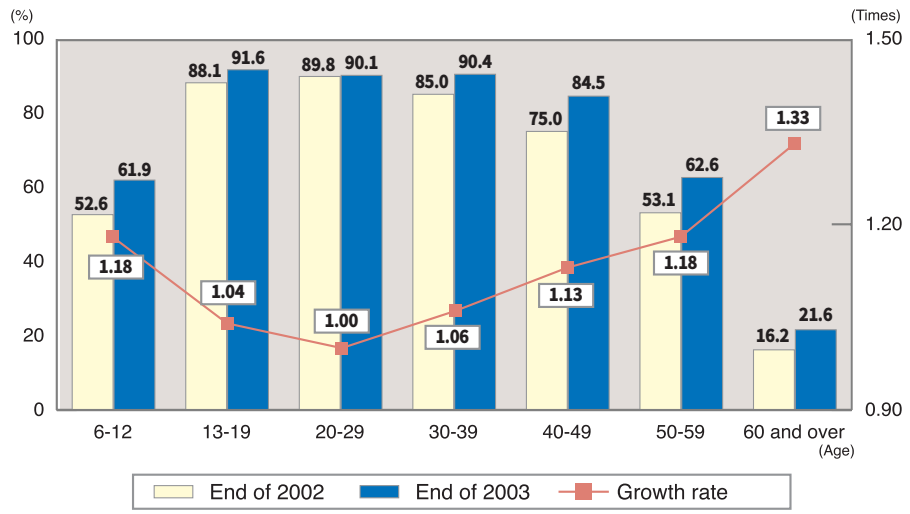
(2) Examples of new network services in Japan and overseas

(i) Recent developments concerning network services in Japan

a. Network use in Security

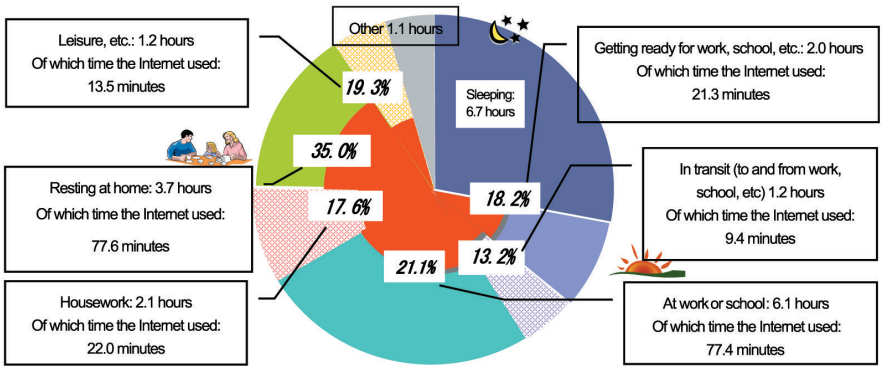
Testing was conducted at a kindergarten in Wakayama Prefecture of a system that allows guardians to check on their children while at home or at work using position data from RFID tags attached to the children and network cam-

Figure 1-2-8 Internet Usage Rates by Age Group



Source: Communications Usage Trend Survey, MPHPT

Figure 1-2-9 Internet Usage in Day-to-Day Activities (totals for all respondents)



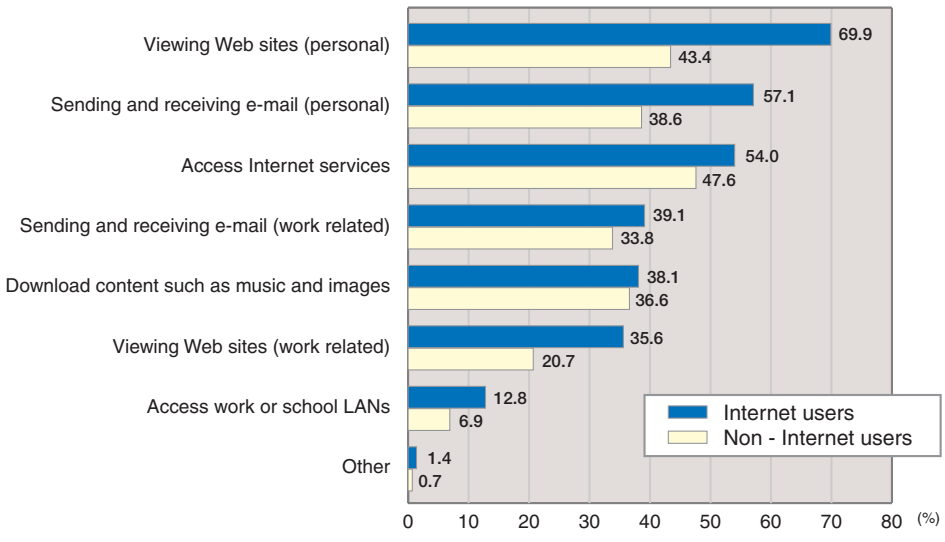
Note: The percentages in the graph are the ratio of the Internet usage time in a certain lifestyle scene; "getting ready for work , school, etc.," "in transit (to and from work, school, etc)," "at work or school," "housework," "resting at home" or "leisure, etc."

Internet Use Applications (all respondents)
(percentages of applications mentioned up to the second rank)

	Getting ready for work, school, etc.	In transit (to and from work, school)	At work or school	Housework	Resting at home	Leisure, etc.
1st	Send/ receive e-mail 67.3%	Send/ receive e-mail 75.0%	Send/ receive e-mail 63.2%	Send/ receive e-mail 62.5%	Send/ receive e-mail 54.6%	Send/ receive e-mail 59.8%
2nd	Weather forecasts 25.6%	Transportation, time table, maps 24.6%	Search engines 33.4%	News, etc. 17.4%	Prizes, contests, free item applications 20.5%	Transportation, time table, maps 20.4%
3rd	News, etc. 24.4%	News, etc. 21.1%	News, etc. 28.4%	Prizes, contests, free item applications 11.9%	Search engines 15.9%	Weather forecasts 19.3%

Source: Survey of Personal Activities in a Ubiquitous Network Society

Figure 1-2-10 Internet Use Objectives (multiple responses possible)



Source: Survey of Personal Activities in a Ubiquitous Network Society

era data transmitted over optical fiber lines. This service has been praised by users for its ability to allow users to check on their own children while at kindergarten, something that was not possible in the past, and to allow others such as grandparents to view their grandchildren from remote locations, resulting in both a sense of security and enjoyment.

b. Network use in shopping

At conventional stores, payment has typically been made in cash or by credit card, but in recent years, use of cashless payment systems that use contactless IC cards or mobile phones has been increasing. The contactless IC cards of one company that provides electronic money services had issued more than 3.8 million cards by March 2004, and the number of shops where they can be used has increased to about 3,700 nationwide.

c. Network services originating in Japan spread throughout the world

Various network services developed and offered in Japan are steadily spreading throughout the world. The mobile phone Internet connection services that began in Japan in February 1999 are now offered by overseas partner communications carriers, primarily in Europe, and the number of subscribers exceeds 2 million (as of January 2004).

Use of contactless IC cards for public transportation services is expanding in Hong Kong, Singapore, China, and other areas, and in June of 2003, a cumulative total of 22.5 million cards have been issued.

Japanese game makers have launched online game services that can be accessed over networks in North America, and the number of subscribers is approximately 200,000 (as of January 2004).

(ii) Recent developments concerning network services overseas

a. Network services in the Republic of Korea

In the Republic of Korea, which boasts a highly-developed broadband environment, new apartment complexes with home networks installed have been completed. Residents can use control panels in each room to operate home appliances and control electricity and gas as well as manage household functions such as operating home appliances from outside the home via a mobile phone.

b. Network Services in the United States

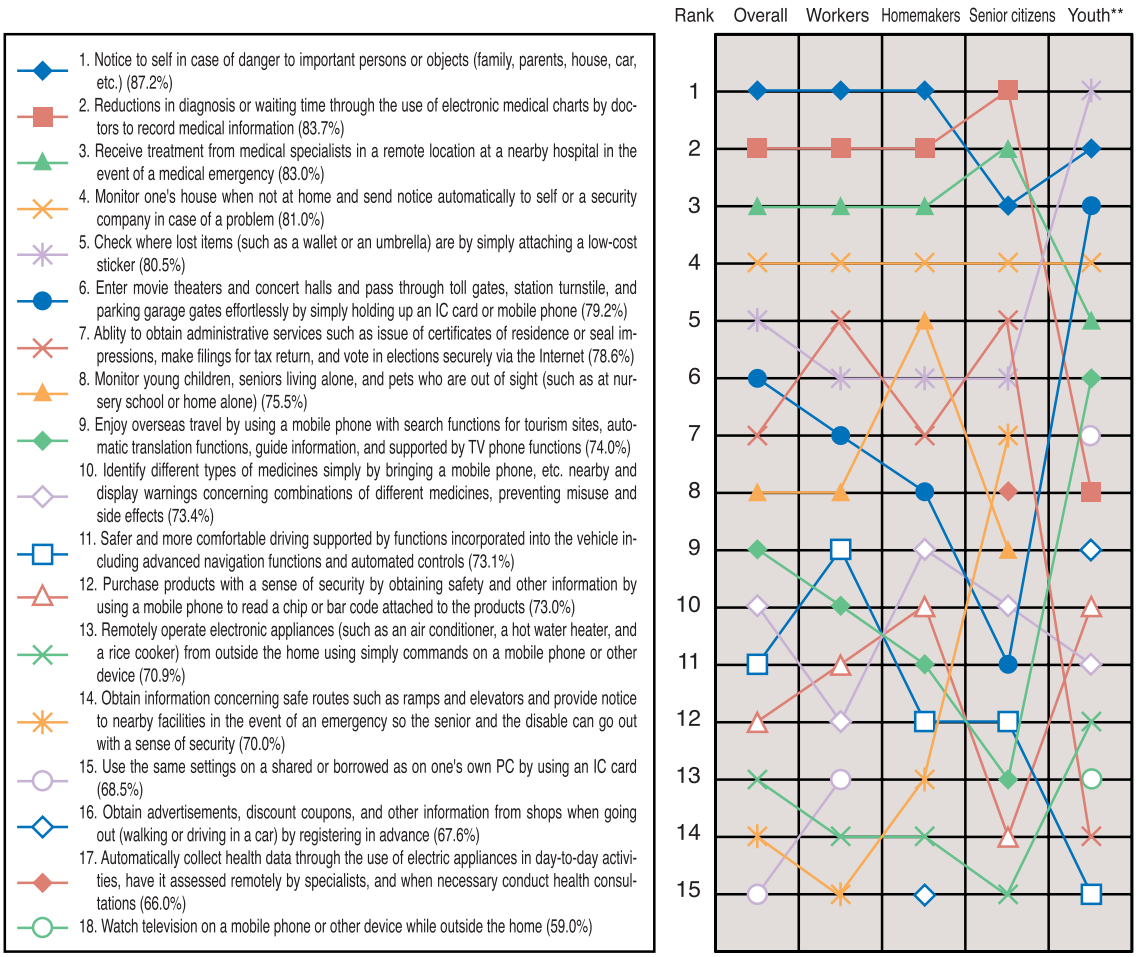
A theme park in the United States is offering a service that allows visitors to confirm the location of family and friends who accompanied them if they become separated. Visitors are given wrist-watch type wireless communications terminals and they can check on the location of other visitors who accompanied them at kiosks located throughout the park, making it possible to find lost children.

(3) Expectations concerning ubiquitous network services

It is expected that ubiquitous networks that allow users to connect to information and communications networks at any time from anywhere will be created in the near future.

Use intentions concerning ubiquitous network services that are currently under consideration indicate that working people face location and time restraints because of time spent working, and there are strong expectations that ubiquitous network services will help people overcome these restraints. Homemakers spend long hours in the home and have relatively heavy burdens in taking care of children or seniors, cooking, and performing housework, so expectations for ubiquitous network services to support these tasks are high. Seniors expect that ubiquitous network services will help them engage in meaningful activities without worry. Youth seek to use ubiquitous network services that will provide them with greater convenience and emotion **(Figures 1-2-11 and 1-2-12)**.

Figure 1-2-11 Intent to Use Ubiquitous Network Services* (multiple responses possible)

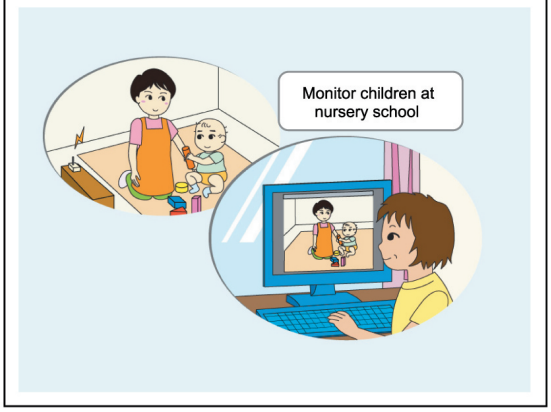


* Ranked in the order of services with high levels of intent to use (the total of “definitely want to use” and “want to use somewhat” responses). The percentages after the services indicate the percentages of the respondents who want to use the services to all respondents.
** Workers includes persons 20 years old and older who are employed; homemakers includes persons aged 20 to 59 who are full time housewives, individuals who work part time, and unemployed persons; seniors includes persons 60 years old and older; youth includes persons 15 to 19 years old and students 20 years old and older

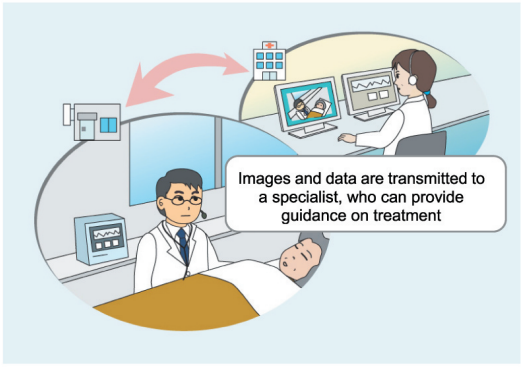
Source: Survey of Personal Activities in a Ubiquitous Network Society

Figure 1-2-12 Image of Ubiquitous Network Services (Examples)

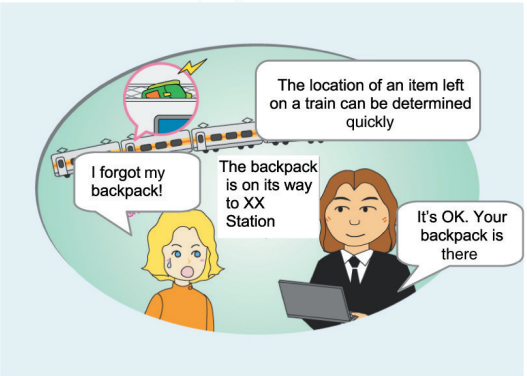
Children at a nursery school can be monitored from home using a network camera.



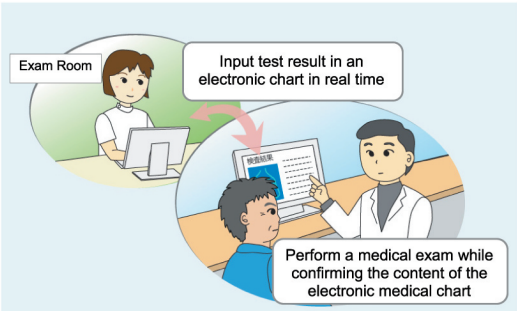
Images of a patient at a clinic can be transmitted to a specialist at a hospital and emergency treatment instructions given.



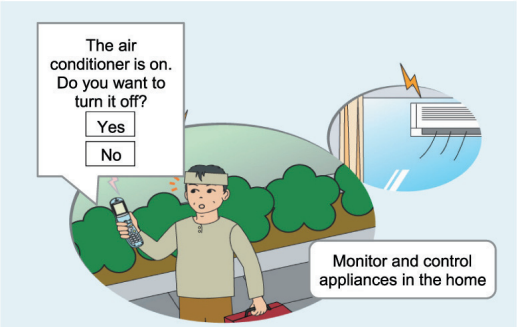
If an item is left on a train, a mobile terminal can be used to detect a signal from an RFID tag attached to the item and the item's location can be quickly determined.



When undergoing a medical exam, test results from another room are input into an electronic chart in real time and a diagnosis can be made based on that information.



If you go out with the air conditioner on, notice can be sent to a mobile terminal.



Source: Survey of Personal Activities in a Ubiquitous Network Society

Section 3 Use of Networks in Business

1. Current Status of Network Use in Business

(1) In-house and Business-to-Business (B-to-B) Use of Networks

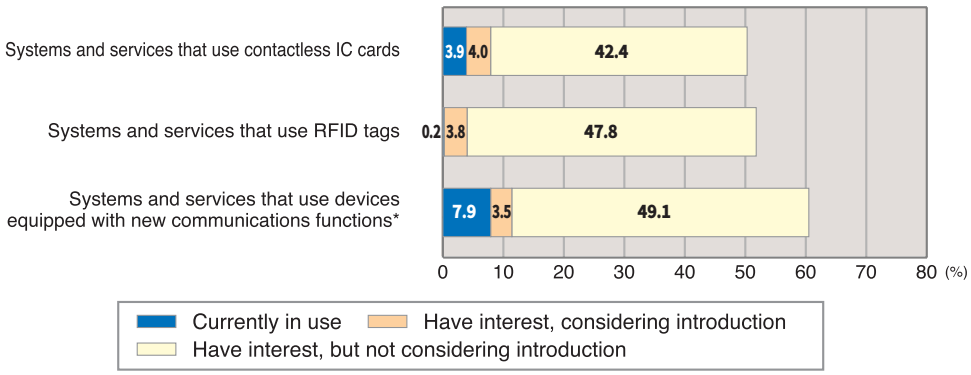
In recent years, new terminals, devices, and tools such as RFID tags, contactless IC cards, and new network-compatible devices (hereinafter referred to collectively as "ubiquitous tools") have been put to practical application and demonstrative testing is also increasing.

A survey of the use of systems and services that employ ubiquitous tools by businesses that do business mainly with other companies (B-to-B commerce) shows that 7.9% of such businesses have installed "systems and services that use devices equipped with new communications functions", while 3.9% have installed "systems and services that use contactless IC cards". Although the rates of use are currently low, many businesses are interested in using such systems and services **(Figure 1-3-1)**.

Advanced information and communications network environments are providing benefits to numerous businesses that use those networks. For example, more than 70% of businesses using broadband and mobile networks believe that there are benefits to such use. In addition, nearly 50% of businesses believe that there are benefits from using ubiquitous tools **(Figure 1-3-2)**.

As to details of the benefits, increasing the pace of business is considered highly significant in all network environments. A high percentage of businesses believe that the benefits of using ubiquitous tools will be even

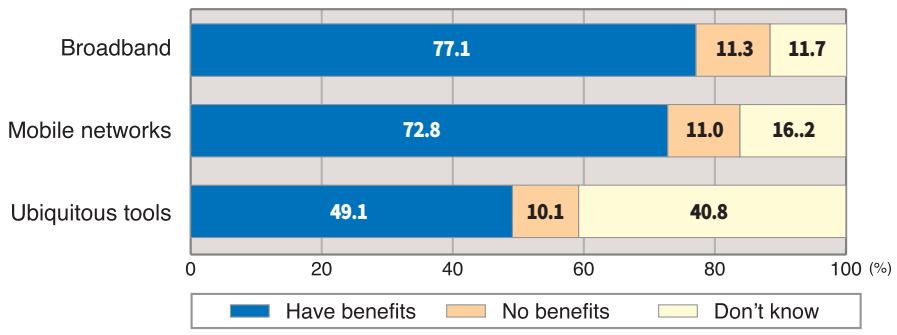
Figure 1-3-1 Introduction of Systems and Services that Use Ubiquitous Tools



*Devices newly equipped with communications functions refers to devices such as cars with GPS functions and remote-control cameras that in the past were not equipped with network functions but with advances in technologies have come to have such networks functions.

Source: Survey of Ubiquitous Network Usage Trend by Businesses

Figure 1-3-2 Existence of Benefits from the Use of Advanced Information and Communications Network Environments in In-house and B-to-B Operations*



* Percentage of businesses engaged in B-to-B commerce that have installed network environments

Source: Survey of Ubiquitous Network Usage Trend by Businesses

more substantial than the benefits from broadband and mobile networks including lowering business costs and reducing employee labor as well as high added value benefits including enhancing business analysis and proposal of business strategies, improving customer satisfaction, and promoting collaboration with business partners **(Figure 1-3-3)**.

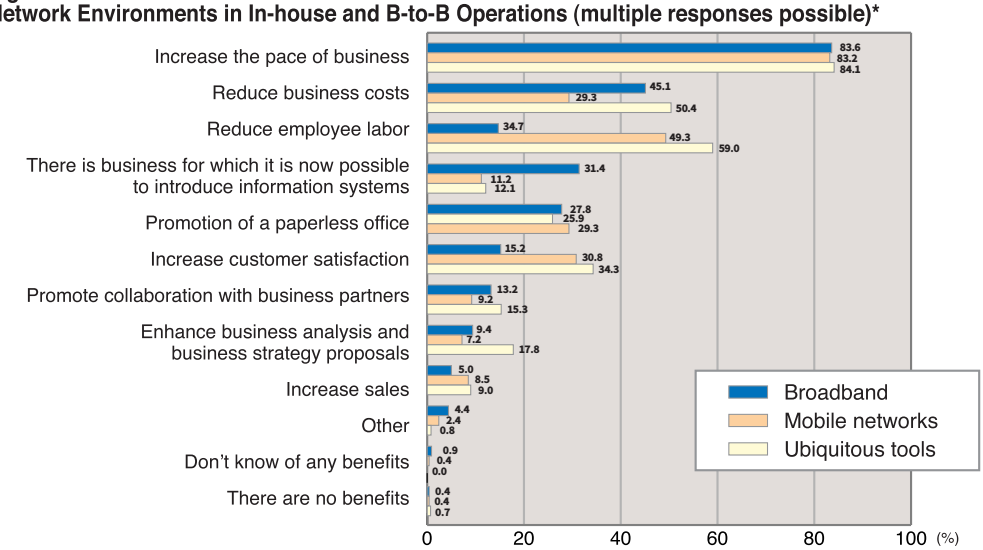
(2) Use of Networks in Business-to-Consumer (B-to-C) Commerce

Of businesses currently engaged in B-to-C e-commerce using the Internet, 27.9% of businesses are conducting e-commerce suitable for broadband such as the distribution of large-volume content or the creation of sites suitable for viewing with broadband. When businesses that are currently interested in or considering engaging in such commerce are included, this figure increases to 79.7% **(Figure 1-3-4)**.

Benefits from the use of broadband engaged in B-to-C business are highly varied. More than 50% of businesses gave "increased service users," "goods and services can be offered at all times," and "expanded sales channels for goods and services" as benefits of using broadband in e-commerce **(Figure 1-3-6)**.

Of businesses engaged in B-to-C e-commerce using the Internet, 46.0% engage in e-commerce that use mobile terminals such as Internet-compatible mobile phones; the percentage is higher than that of e-commerce suitable for broadband **(Figure 1-3-5)**. More than 60% of businesses gave "expanded sales channels for goods and services," "increased service users," and "goods and services can be offered at all times" as benefits of engaging in B-to-C e-commerce suitable for mobile terminals **(Figure 1-3-7)**.

Figure 1-3-3 Details of Benefits from the Use of Advanced Information and Communications Network Environments in In-house and B-to-B Operations (multiple responses possible)*



* Percentage of businesses engaged in B-to-B commerce that have installed/are considering to install network environments

Source: Survey of Ubiquitous Network Usage Trend by Businesses

Figure 1-3-4 Status of E-Commerce Suitable for Broadband *

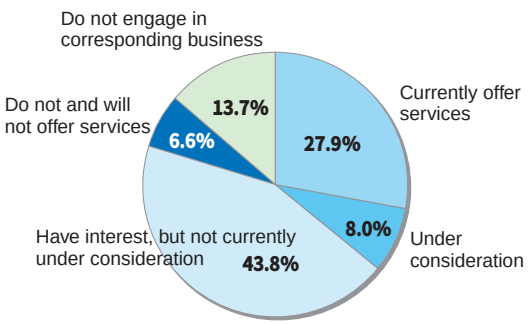
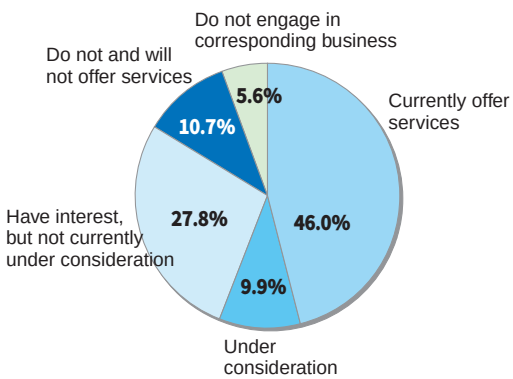


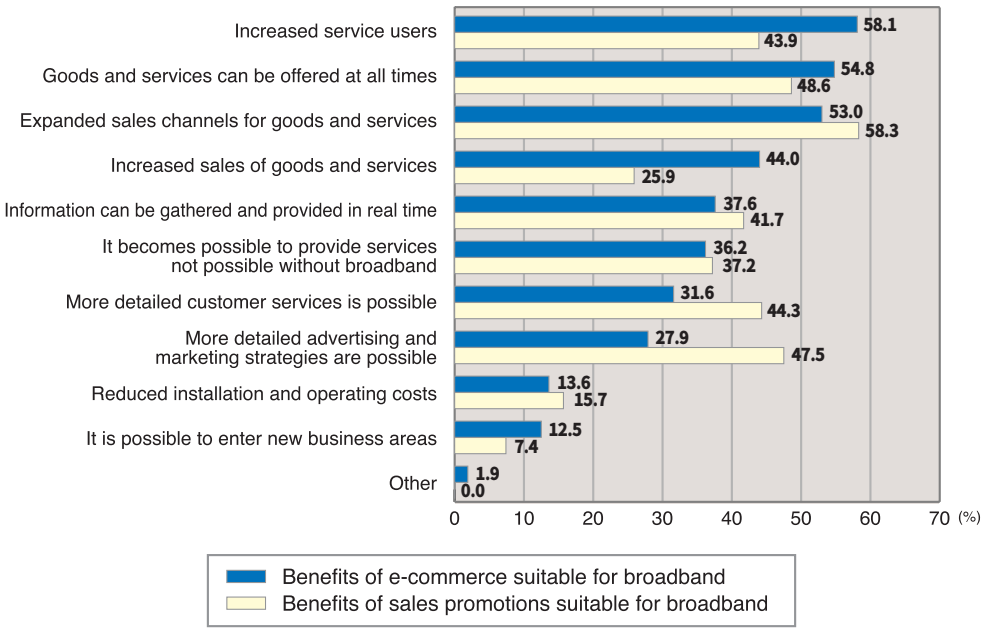
Figure 1-3-5 Status of E-Commerce Suitable for Mobile Terminals *



*Percentage of B-to-C businesses engaged in consumer-oriented e-commerce.

Source for Figures 1-3-4 and 1-3-5: Survey of Ubiquitous Network Usage Trend by Businesses

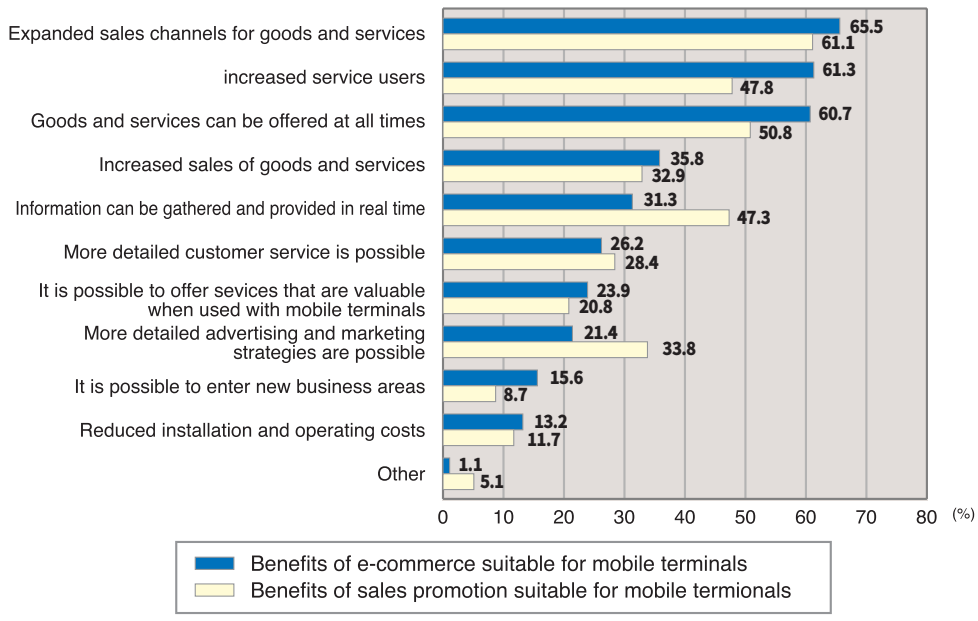
Figure 1-3-6 Benefits of E-Commerce and Sales Promotions Suitable for Broadband* (multiple responses possible)



* Percentages of responses by B-to-C businesses that are currently offering or considering e-commerce or sales promotions suitable for broadband.

Note: Broadband as used here for the purposes of comparison in Japan and the United States means an always-on connection with a fixed fee and a one-directional speed of at least 200 kbps. E-commerce means the sale of goods and the provision of services or contents for a fee using the Internet.

Figure 1-3-7 Benefits of E-Commerce and Sales Promotions Suitable for Mobile Terminals* (multiple responses possible)



* Percentages of responses by B-to-C businesses that are currently offering or considering e-commerce or sales promotions suitable for mobile terminals.

Source for Figures 1-3-6 and 1-3-7: Survey of Ubiquitous Network Usage Trend by Businesses

The provision of services to consumers using ubiquitous tools including RFID tags, contactless IC cards, intelligent home appliances, and network televisions has just started and there is only a small number of companies offering such services on a full scale. Consideration of practical applications is increasing, however, with 7.2% of companies considering the introduction of consumer services using contactless IC cards, and 6.2% considering the use of RFID tags.

Among companies that are using or are considering the use of ubiquitous tools, shopping (the sale of goods) is the most common application, accounting for more than 60% of such tools. In areas other than shopping, it is expected that mobile phones with embedded contactless IC cards will be used in entertainment and transportation, while RFID tags will be applied in foodstuff related areas **(Figure 1-3-8)**.

The most common devices and terminals targeted by companies engaged in B-to-C commerce that currently conduct e-commerce using the Internet are PCs at 89.7% and Internet mobile phones at 43.9%. When asked what types of terminals they would target for e-commerce newly in the future, however, the most common responses were Internet mobile phones followed by network televisions at 11.1% and other intelligent home appliances at 6.3% **(Figure 1-3-9)**.

(3) Comparison of network use by businesses in Japan and the United States

Use of advanced information and communications networks environments by businesses in the United States is also progressing, and businesses are aware of a variety of benefits. Because of differences in network environments and in awareness concerning networks, there are some differences between Japan and the United States in the current network use and the perceived benefits of network use.

The percentage of B-to-C businesses that are cur-

Figure 1-3-8 Ubiquitous Tools Currently in Use or Being Considered for Use (multiple responses possible)

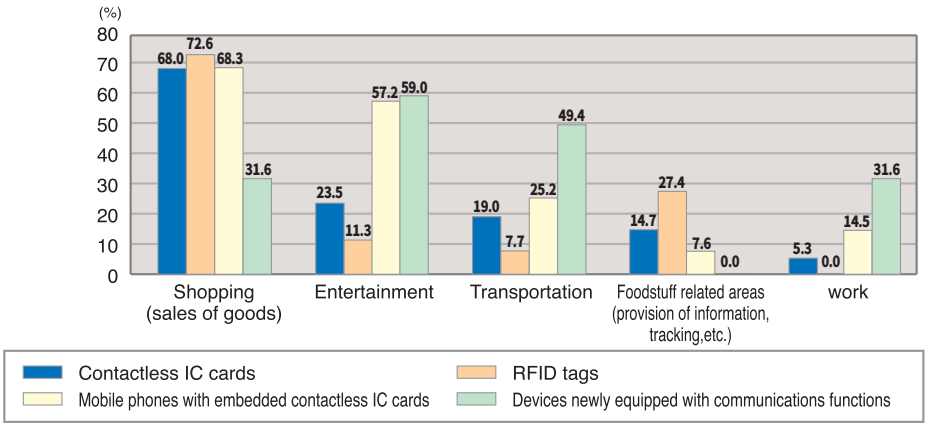
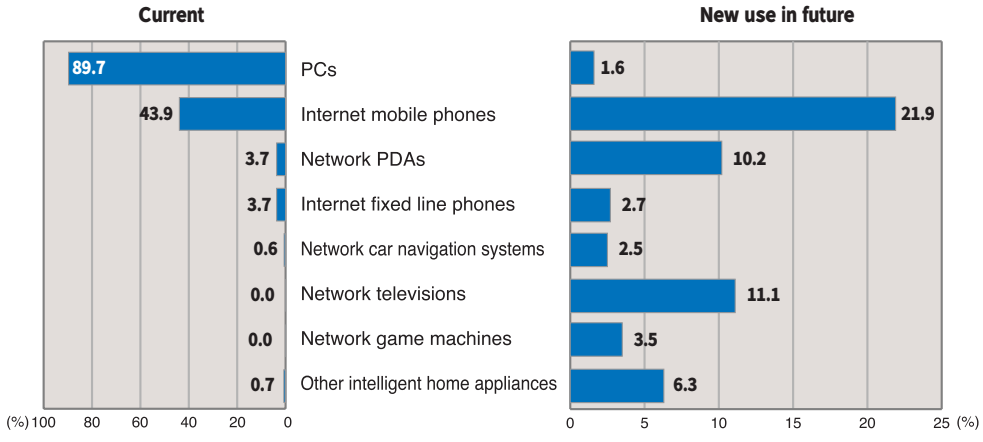


Figure 1-3-9 Devices and Terminals Targeted for E-Commerce Using the Internet* (currently in use and being considered for new use) (multiple responses possible)



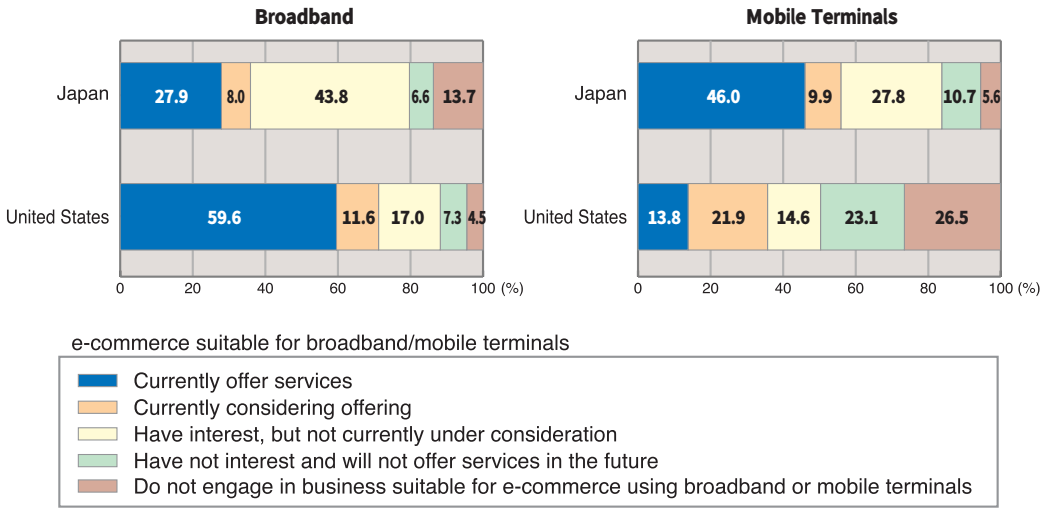
* Percentages of B-to-C companies currently offering e-commerce using the Internet.

Source for Figures 1-3-8 and 1-3-9: Survey of Ubiquitous Network Usage Trend by Businesses

rently conducting e-commerce suitable for broadband is higher in the U.S., but the percentage of companies conducting e-commerce suitable for mobile terminals is higher in Japan **(Figure 1-3-10)**. This indicates that in Japan, the use of mobile Internet is more widespread and that business using Internet mobile phones is flourishing.

When asked about the benefits of using advanced information and communications network environments, more companies in Japan responded that it will "increase the pace of business." There were no substantial differences between Japan and the U.S. in categories relating to business efficiency such as "reduce business costs" and "reduce employee labor," but Japan is higher than the U.S. in some categories. In categories concerning increases in added value such as "increase sales" and "enhance business analysis and business strategy proposals," more U.S. companies perceived benefits than Japanese companies **(Figure 1-3-11)**.

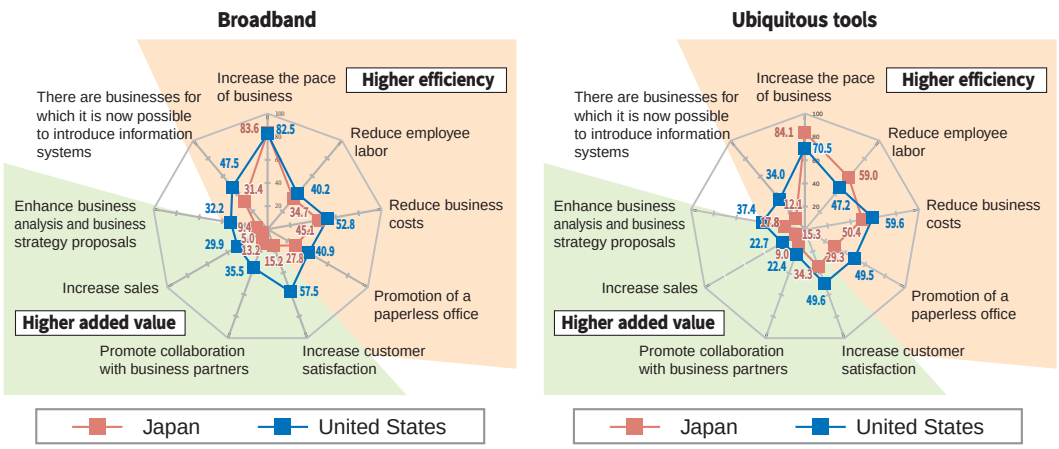
Figure 1-3-10 E-Commerce of B-to-C companies suitable for Broadband and Mobile Terminals in Japan and the United States



* Percentages of B-to-C companies currently conducted consumer-oriented e-commerce.

Source for Figures 1-3-10: Survey of Ubiquitous Network Usage Trend by Businesses

Figure 1-3-11 Comparison of Benefits Obtained from the Use of Advanced Information and Communications Network Environments in Japan and the United States



Source for Figures 1-3-11: Survey of Ubiquitous Network Usage Trend by Businesses

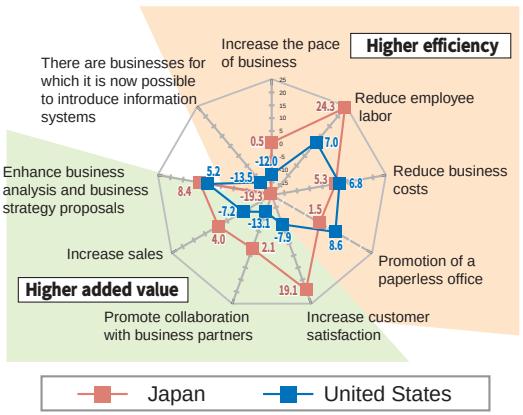
A comparison of the percentages of companies that believe there are benefits to using broadband and of companies that believe there are benefits to using ubiquitous tools, a lower percentage of U.S. companies perceive benefits to using ubiquitous tools while higher percentages of Japanese companies believe there are benefits to using ubiquitous tools relating to higher added value such as "increase customer satisfaction," "increase sales," and "promote collaboration with business partners" **(Figure 1-3-12)**. This indicates that expectations concerning the use of ubiquitous tools such as RFID tags and contactless IC cards are higher among Japanese companies than U.S. companies and Japanese companies are considering different methods of application of existing information and communications networks.

2. Future Prospects for Network Use by Businesses

(1) Examples of new network applications in Japan and overseas

Networks are becoming increasingly advanced and

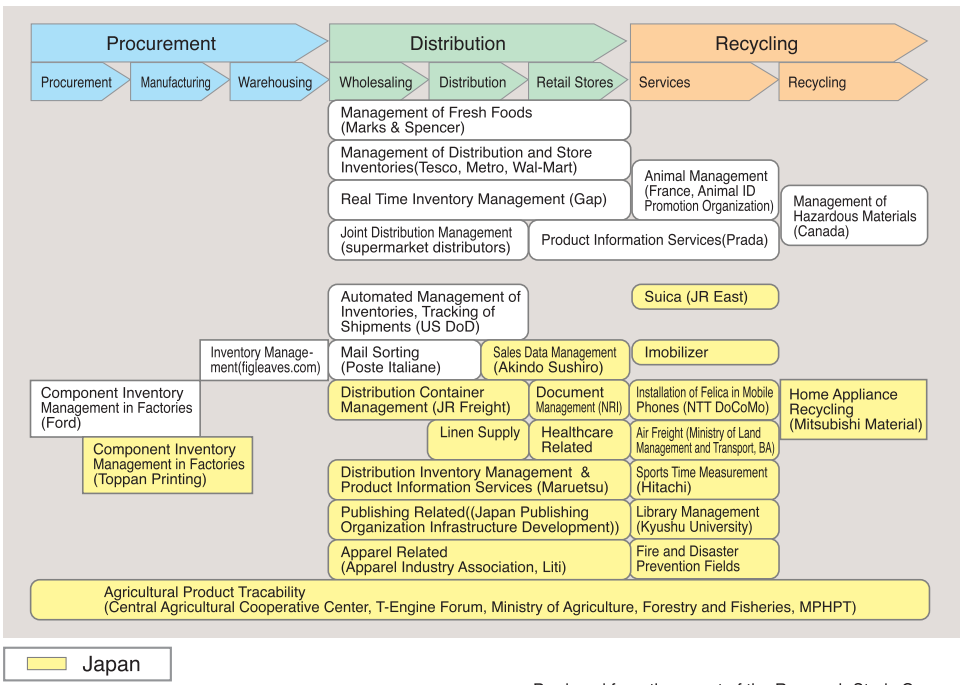
Figure 1-3-12 Comparison of Benefits Obtained from the Use of Ubiquitous Tools and those from the Use of Broadband* in Japan and the United States



*The percentage of companies that have enjoyed benefits from the use ubiquitous network tools minus the percentage of companies that have enjoyed benefits from the use of broadband.

Source for Figures 1-3-12: Survey of Ubiquitous Network Usage Trend by Businesses

Figure 1-3-13 Examples of Uses of RFID Tags in Japan and Other Countries



Produced from the report of the Research Study Group for High-Level Usage of Electronic Tags in the Age of Ubiquitous Networks, MPHPT

their use is expanding to a variety of fields, and diverse services using broadband and mobile networks, which have grown rapidly in the past several years are being developed. At the same time, new terminals, devices, and tools (ubiquitous tools) such as RFID tags, contactless IC cards, and intelligent home appliances are being put into practical application. Amidst these developments, examples of new network businesses can be seen.

For example, the application of RFID tags is for the most part limited to use within individual companies, but in the future, comprehensive application including use among multiple companies and services that provide information to consumers are expected. Demonstration tests of such applications are currently being conducted in Japan and other countries **(Figure 1-3-13)**.

(2) Expectations of businesses concerning ubiquitous networks

When asked about the features of ubiquitous networks that have an impact on their business, both Japanese and American businesses listed a wide range of features created by ubiquitous networks. Japanese businesses have a strong awareness that ubiquitous networks will offer "ability to use networks regardless of location," and make it possible "historical tracing and management using RFID tags," while American businesses have high expectations of "improved network stability."

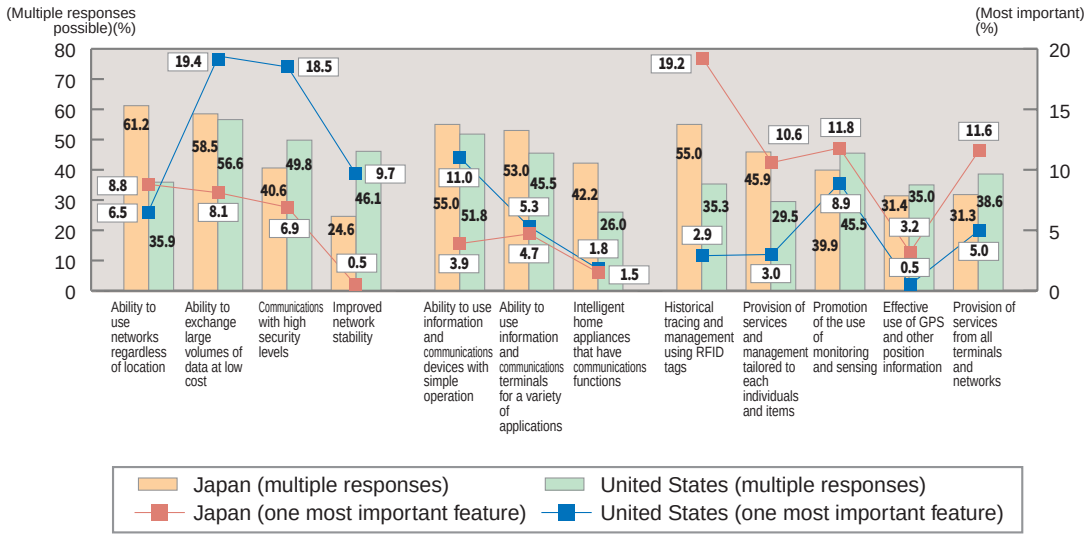
In addition, many American businesses have high expectations concerning features that will enhance existing network function such as "ability to exchange large volumes of data at low cost" and engage in "communications with high security levels," while many Japanese businesses mentioned features that make use of the properties of ubiquitous networks including "historical tracing and management using RFID tags" and "provision of services from all terminals and networks" **(Figure 1-3-14)**. Japanese businesses see ubiquitous networks as information and communications technologies with new functions, while American businesses tend to see than as an extension of existing networks.

(3) The direction of network use by businesses

As a result of the broader bandwidths and lower cost of Internet lines and the higher performance and lower cost of information and communications terminals including PCs and mobile terminals in the past several years, information and communications networks are making significant qualitative and quantitative strides. For example, initially the main mode of use of the Internet was a PC connected to a narrow-band dial-up telephone line, but owing to the adoption of broadband, the proliferation of mobile Internet, the use of large-volume data and Internet access from outside the home have become expected as a matter of course by consumers. As a result, the number of companies providing services to consumers using broadband and mobile networks is increasing and markets are expanding.

In conjunction with these developments in broadband and mobile network use, new applications for information and communications networks are also starting to appear in Japan. For example, RFID tags and contactless IC cards are tools that can increase operational efficiency and make possible the provision of high value added services, and some companies are already starting

Figure 1-3-14 Comparison of the Effects of the Features of Ubiquitous Networks on the Business and Operations of Japanese and U.S. Companies*



* Percentages of B-to-B companies.

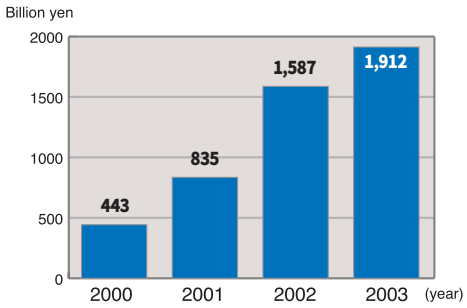
Source: Survey of Ubiquitous Network Usage Trend by Businesses

to use them. In the future, businesses will overcome the barriers imposed by existing lines, terminals and communications volumes to provide services intended for environments with diverse terminals. We can also expect the development of new services customized for specific individuals and objects using various devices, RFID tags, and contactless IC cards connected to networks as well as direct links between objects that will further increase the efficiency of business operations and increase the added value provided to consumers. Business and services formats are likely to change in virtually all areas.

In this way, ubiquitous networks will enhance existing networks as well as link and combine individual networks, including fixed line and mobile communications or communications and broadcasting, devices, and terminals. This will make technologically possible the distribution of services and contents with a high degree of freedom. For businesses to enjoy the true value of this, however, they must not only consider the benefits to themselves, but must also provide services that have real benefit to all the businesses and consumers. Otherwise, the introduction of systems through industry and their use by consumers will not progress, and there will be little benefit to investing in networks.

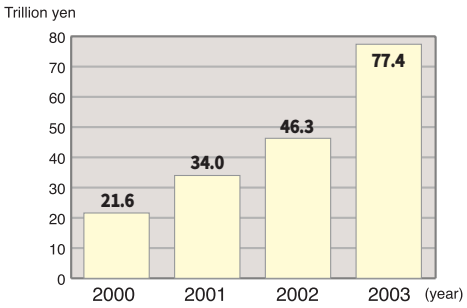
In order to continue the construction of service systems and infrastructure that will promote the development of network use and enable both businesses and consumers to enjoy their benefits, each company must consider the use of information and communications systems that go beyond simply increasing efficiency but also increase added value and keep in mind the construction of services that can be used in an integrated fashion throughout industry and society.

Figure 1-3-15
Scale of B-to-C Electronic Commerce Markets



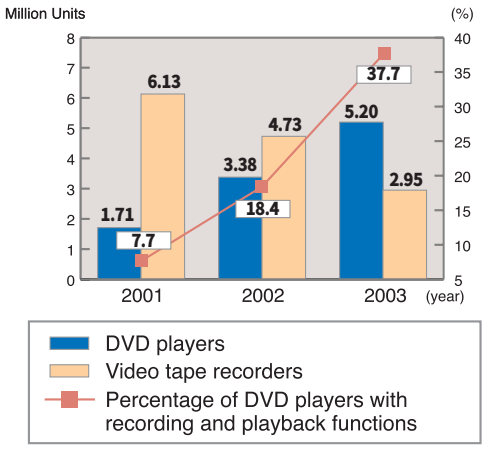
Source: Survey on the Economic Analysis of IT

Figure 1-3-16
Scale of B-to-B Electronic Commerce Markets



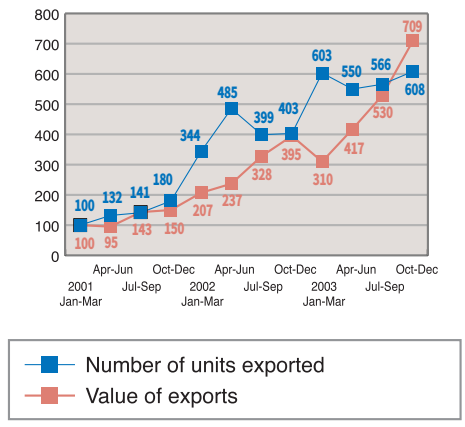
Source: Market Research on Electronic Commerce in FY2003, Ministry of Economy, Trade and Industry, Electronic Commerce Promotion Council of Japan, NTT Data Institute of Management Consulting

Figure 1-3-17 Domestic Shipments of DVD Players and Video Tape Recorders



Produced from Japan Electronics and Information Technology Industries Association documents.

Figure 1-3-18 Number and Value of Color Television Exports (for broadcast use, excluding CRT televisions) (with the first quarter of 2001 set to 100)



Source: Survey on the Economic Analysis of IT

3. The Impact of Ubiquitous Networks on the Japanese Economy

(1) Developments in evolving advanced information and communications network environments and markets

Against a backdrop of a rapid expansion of broadband and mobile networks in recent years and advances in information and communications technologies, various business and service markets that make use of advanced information and communications network environments have grown rapidly.

The scale of B-to-C e-commerce markets was 1911.7 billion yen in 2003 (a 20.5% increase over the previous year) while B-to-B e-commerce markets reached 77.4 trillion yen (a 67.2% increase over the previous year) **(Figures 1-3-15 and 1-3-16)**.

The number of DVD players shipped exceeded the number of video tape recorders shipped, reaching 5.2 million units in 2003 (a 54.0% increase over the previous year) **(Figure 1-3-17)**. In addition, total domestic shipments of flat-panel televisions including liquid crystal display and plasma display panel(LCD, PDP) televisions are increasing rapidly, reaching 1.77 million units in 2003 (a 47.7% increase over the previous year). Sales of televisions compatible with terrestrial digital broadcasts began in June 2003, and in the half year until terrestrial digital broadcasts began in December of that year, sales were strong at 0.44 million units.

Demand is high in Japan and overseas for the high-performance products concerning which Japanese manufacturers exhibit strong competitiveness, and the value of exports is increasing. The number of units and the value of exports of color televisions other than cathode ray tube units have been increasing over the past several years as a result of higher exports of LCD and PDP televisions **(Figure 1-3-18)**.

The Japanese economy is recovering steadily, supported by increased activity in markets for advanced information and communications devices, increases in capital investment, and growing exports. The real GDP growth rate has improved and the rate was positive for the entire year in 2003 for the first time in three years.

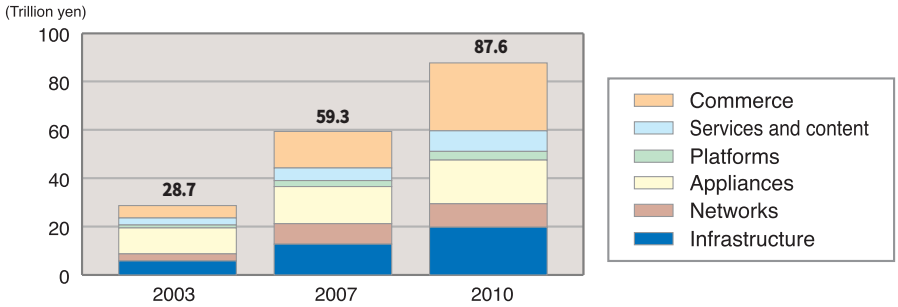
In the future, new business activities, services, and goods that use advanced network environments and meet the needs of consumers will continue to expand in a wide range of markets and will continue to support the Japanese economy and be put to use around the world.

(2) Current size of ubiquitous network related markets and future prospects

As advanced information and communications network environments develop, industries that will support ubiquitous networks in the future such as information and communications device manufacturing and network services as well as businesses whose use of networks has been limited by various problems with information and communications networks are supposed to create new services using networks and develop new businesses and services, thereby stimulating the Japanese economy.

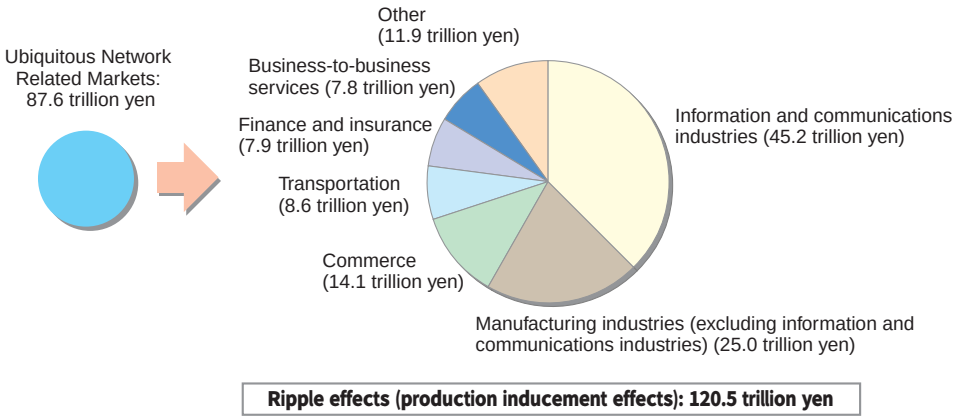
It is estimated that the scale of the markets supporting ubiquitous networks including infrastructure, network services, information and communications devices, and platforms as well as the markets for services and commerce using advanced information and communications network environments will reach 59.3 trillion yen in 2007 and 87.6 trillion yen in 2010. Compared to 2003, ubiquitous network related markets are expected to be 3.1 times larger in 2010 **(Figure 1-3-19)**. Also, the economic ripple effects (production inducement effects) of ubiquitous network related markets (final demand) on all industries are forecast to reach 120.5 trillion yen in 2010 **(Figure 1-3-20)**.

Figure 1-3-19 Forecast of Ubiquitous Network Related Markets



Billion Yen	2003	2007	2010	2010/2003
Commerce	5,133	15,104	28,070	5.5 times
Services and contents	2,898	5,195	8,498	2.9 times
Platforms	1,212	2,481	3,590	3.0 times
Appliances	10,720	15,338	18,056	1.7 times
Networks	2,929	8,466	9,693	3.3 times
Infrastructure	5,785	12,733	19,738	3.4 times
Ubiquitous network related markets	28,675	59,316	87,644	3.1 times

Figure 1-3-20 Economic Ripple Effects of Ubiquitous Network Related Markets (production inducement effects on all industries in 2010)



Source for Figures 1-3-19 and 1-3-20: Survey on the Economic Analysis of IT

Section 4 Realization of a Ubiquitous Network Society and Issues

1. Structure of a Ubiquitous Network Society

(1) The ubiquitous network society is a new concept unique to Japan

The ubiquitous network society is a society in which various services are provided and people's lives made more prosperous through the ability of everyone to link to networks at any time, from anywhere, and from any appliances **(Figure 1-4-1)**.

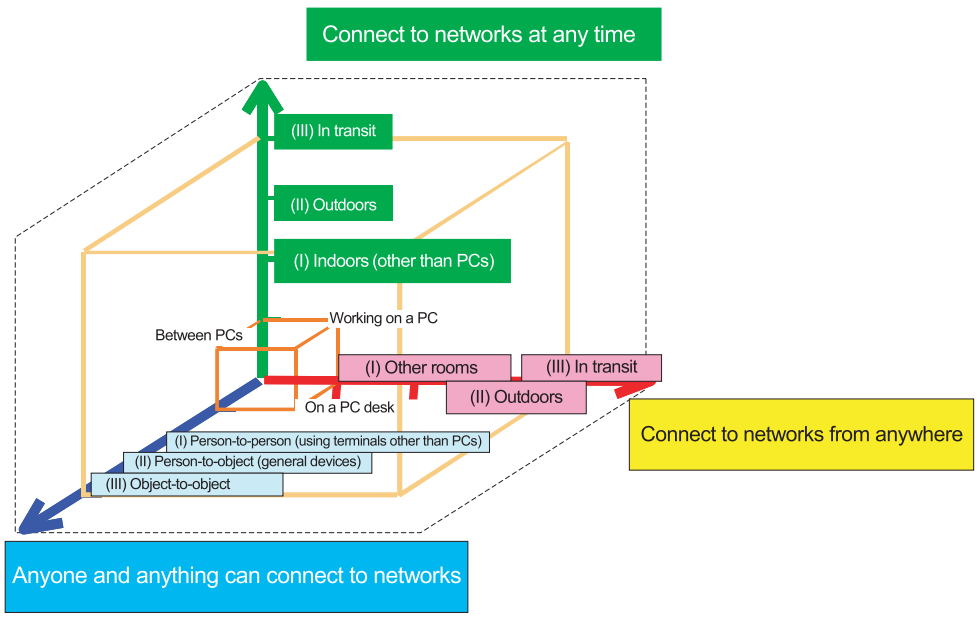
Ubiquitous, which is derived from Latin, means "existing in all places at the same time, omnipresent." The word ubiquitous was first used in the information and communications field when Mr. Mark Weiser of Xerox Corporation proposed the concept of "ubiquitous computing" in 1988. The ubiquitous network society under consideration today is an information and communications technology paradigm conceptualized in Japan in conjunction with advances in information and communications networks. The concept includes ubiquitous computing, but is even more advanced.

Although the ubiquitous network society is a new concept, it is not an idea that appeared all at once in complete form. It is no more than an extension of the computerization that has already taken place and an advancement of the digitization of information and the widespread development and use of networks. One of the features of the digitalization of information in a ubiquitous network society is the digitization of data that in the past did not take specific form. Features of the spread of networks are the conversion of ordinary devices into information terminals that can be carried and used without awareness, an increase in networks that can be accessed and used without awareness, and increases in the capacity of data lines.

(2) Significance of the ubiquitous network society

The significance of the ubiquitous network society is the ability to respond to the advanced needs of users including the needs to "know and act more (vitality)", "protect and be protected more (security)" "enjoy oneself and be moved more (emotion)" and to make users' lives more prosperous in terms of vitality, security, emotion, and convenience through the provision of information and communications network environments and services the link people and objects both physically and mentally **(Figure 1-4-2)**.

Figure 1-4-1 Concept of the Ubiquitous Network Society



Source: Survey of Personal Activities in a Ubiquitous Network Society

(3) Activities designed to realize a ubiquitous network society

The MPHPT has been holding meetings of the Policy Roundtable for Realizing Ubiquitous Network Society since March 2004. The roundtable is considering the following issues from broad perspectives towards the realization of a ubiquitous network society: (1) broad design of a ubiquitous network society and measures for its realization; (2) measures for developing environments for the creation of new businesses and human resource training; and (3) measures to remedy areas that fall into the dark side of the ubiquitous network society **(Figure 1-4-3)**.

Japan is in a leading position towards the realization of a ubiquitous network society and is expected to actively address various issues, promote international standardization of ubiquitous network technologies in cooperation with other countries, promote network services that originated in Japan, and give form to the benefits that will make people's lives more prosperous, stimulate economies, and contribute to the resolution of social problems. At the same time, Japan is expected to actively promoting the concept of the ubiquitous network society and making its undertakings, experience, and expertise towards the expansion of ubiquitous network societies shared throughout the world.

2. Issues Concerning the Realization of a Ubiquitous Network Society

(1) Issues concerning the realization of a ubiquitous network society

The most common area of insecurity or dissatisfaction with Internet usage among individuals in 2003 was "protection of personal information," which was mentioned by 55.4% of respondents, followed by "infection by computer viruses" at 43.1%. The most common problem with the use of information and communications networks by businesses was "information security measures" at 66.3% followed by "infection by computer viruses" at 62.9%. Both individuals and businesses believe that ensuring information security including the protection of personal information is the most important issue.

The most frequently mentioned concerning regarding the use of ubiquitous networks was "fraud and unscrupulous methods of business" at 62.7% followed by "leaks and improper use of personal information in the possession of businesses" (59.7%) and "improper access to and use of personal information" (58.2%). Concerns are high about ensuring information security and protecting personal information **(Figure 1-4-4)**.

Experts in the field were asked about "strengths that Japan should extend" and "issues that need to be over-

Figure 1-4-2 Benefits from the Realization of a Ubiquitous Network Society

Characteristics of a Ubiquitous Network Society	Examples	Examples of Benefits			
		Energetic	Worry-free	Convenient	Exciting
Devices not previous used as information terminals will be made into terminals	o Intelligent home appliances, furniture, houses	o Measure, transmit, and store health data using home appliances	o Monitor the house while out and lock doors using a mobile phone	o Remote operation of home appliances such as confirming refrigerator contents using a mobile phone	o Use a TV for video conferencing with grandchildren at a remote location
Portable terminals that can be used without awareness	o Wearable information terminals	o Collect and store data such as respiration and heart rates while exercising	o Convey information on surroundings to the socially handicapped to ensure safety	o Obtain maps and other information while traveling	o Receive and enjoy music and movies at any time
Networks that can be used without an awareness of connecting	o RFID tags for personal certification. Transmission of personal information and location data	o Identify patients and obtain data without errors to prevent medical accidents	o Ensure security by identifying people entering home and offices	o Operate devices by voice without manual input and access networks	o Issue electronic tickets for concerts, etc. based on personal certification
Further expansion of broadband such as FTTH and 3G mobile phones	o Fixed line and wireless broadband networks	o Centrally manage health image data to allow access from anywhere	o Use high-quality video to convey treatment instructions to ambulance crews	o Participate in video conferences while outside the office	o Watch TV broadcasts on a mobile phone while moving outside
Digitization of information not previously available in digital format	o Transmission of information concerning specific items and location data	o Detect medicines and prevent errors concerning dosages, combinations, etc.	o Use historical data concerning foods to ensure safety	o Attach low-cost RFID tags to items to find them if they are lost	o Devices identify display items in museums and provide explanations

Source: Survey of Personal Activities in a Ubiquitous Network Society

come," and with respect to both, the common responses were "ease of use and understanding" (human-computer interfaces that anyone can use) and "security and safety" (structures to prevent improper use of personal information, theft of money, etc.). From the perspective of users, in information and communications fields that have tremendous impact on personal lives and throughout all industries, it is essential to implement such policies and demonstration tests that will make it possible for everyone to easily enjoy the benefits of advances in information and communications.

(2) Protection of personal information and privacy

The expansion of information and communications networks has resulted in heightened concerns about the accidental leakage of private information such as personal data and data on past conduct as well as improper use of information by third parties. In 2003, 62.7% of individuals were concerned about the issue of protection of personal information. In addition, the number of reports of incidents concerning protection of personal information in five major newspapers has been increasing each year, reaching 316 incidents including leaks of personal information and improper use of information in 2003. In February 2004, there was an incident in which the personal information of approximately 4.5 million subscribers including names, addresses, telephone numbers, and e-mail addresses in the possession of a major telecommunications carrier was leaked.

Figure 1-4-3 Image of the Policy Roundtable for Ubiquitous Network Society

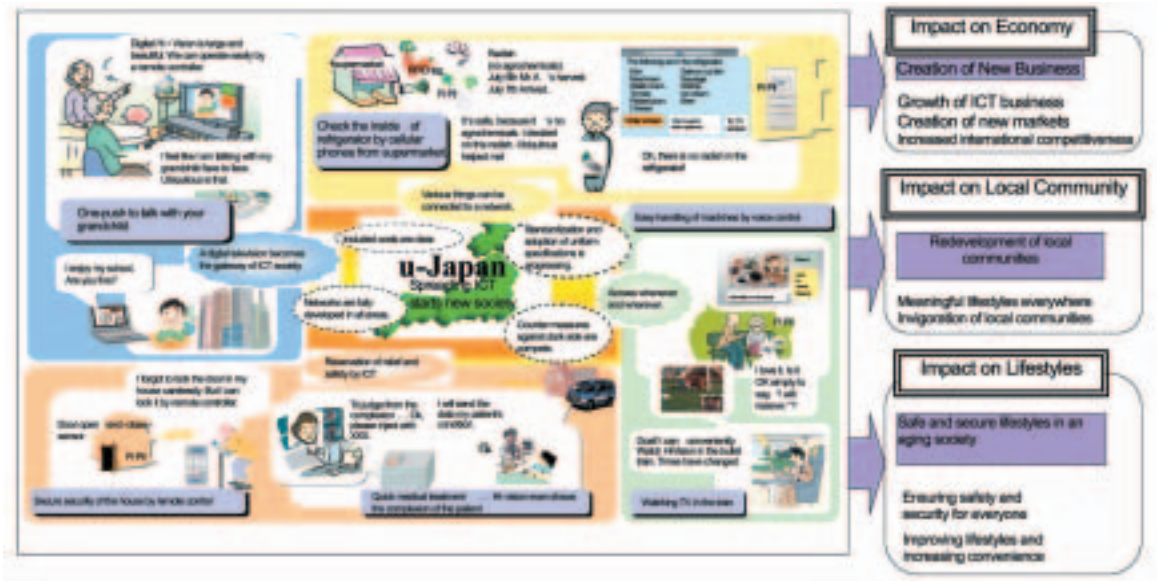
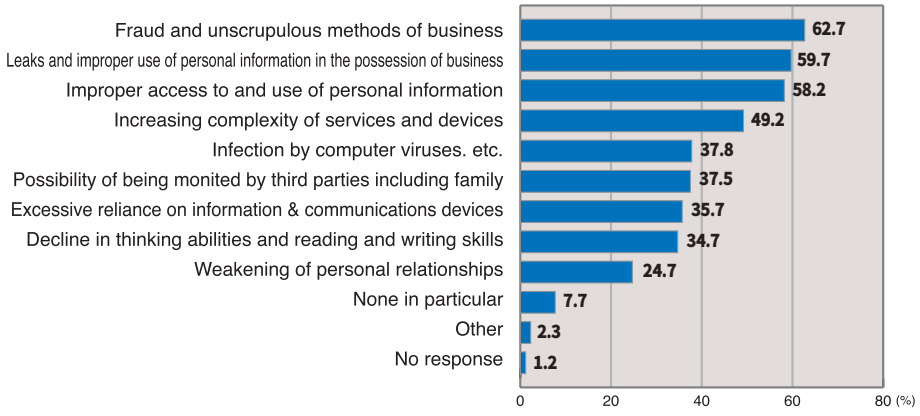


Figure 1-4-4 Individuals' Concerns Relating to the Use of Ubiquitous Network Services (multiple responses possible)



Source: Survey of Personal Activities in a Ubiquitous Network Society

(i) Measures by individuals to protect personal information

When asked about measures they take to protect personal information, only 27.3% of individuals responded that they take such measures. Thus, the number of individuals taking measures is quite low. Of individuals who do not take any measures to protect personal information, many do not know any specific measures for doing so (59.8%).

(ii) Measures by businesses to protect personal information

The most common system and technological measure that businesses took to protect personal information in 2003 was "manage authority to use personal information" at 27.6%, while the most common organizational and structural measure was "clarification of the purposes of using personal information, the timing of collection, and persons responsible for data" at 24.4%. However, the number of businesses that "do not take any specific action," for system and technological measures was 41.8% and for organizational and structural measures was 37.2% **(Figures 1-4-5 and 1-4-6)**.

(3) Insuring Information Security

(i) Trends in information security infringement

a. Security incidents suffered by individual users

Among those using the Internet from their personal computers, there was a 3.8 point increase from 2002 in people suffering information security incidents in 2003, to 33.6%. The most common problem was discovery of or infection by a virus, which affected 21.5% of users **(Figure 1-4-7)**.

b. Security incidents on information and communications networks suffered by companies

Companies using information and communications networks that suffered security incidents in 2003 decreased by 3.5 points from 2002, to 72.7%. Of these, the most common was discovery of or infection by a virus that affected 72.1%

Figure 1-4-5 System and Technological Measures to Protect Personal Information (multiple responses possible)

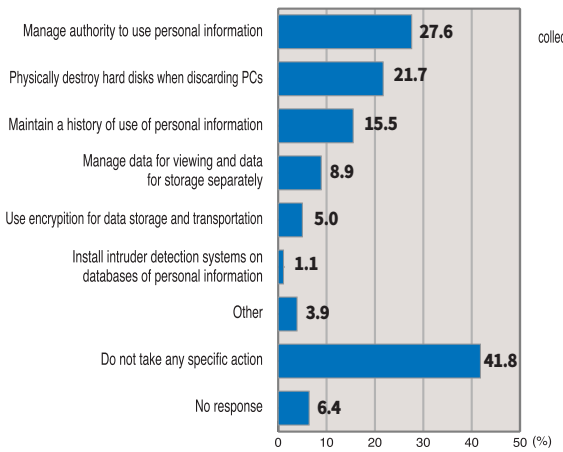
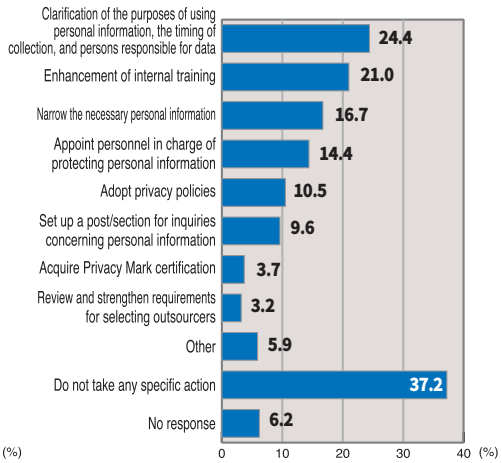
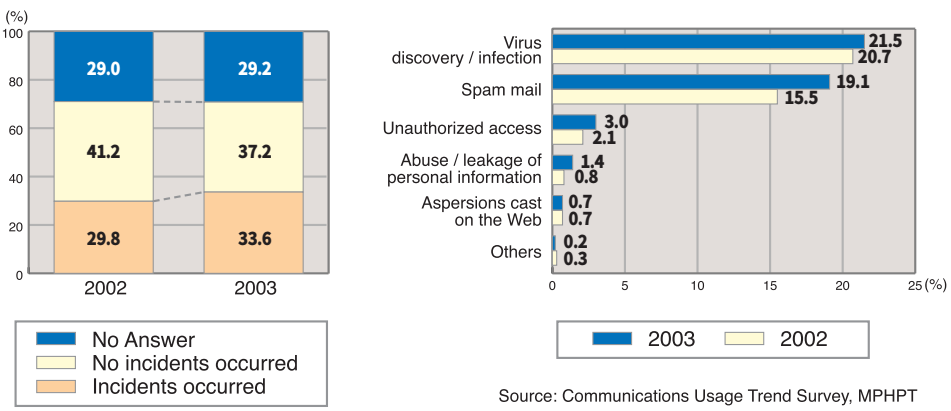


Figure 1-4-6 Organizational and Structual Measures to Protect Personal Information (multiple responses possible)



Source for Figures 1-4-5 and 1-4-6: Survey of Information Security Measures, MPHPT

Figure 1-4-7 Situation and Types of Security Incidents Suffered by Internet Users Accessing from PCs (multiple responses possible)



Source: Communications Usage Trend Survey, MPHPT

of companies using an information and communications network **(Figure 1-4-8)**.

c. Viruses

Following the spread of the Klez virus in 2002, 2003 saw the spread of viruses such as SQL Slammer, Bugbear, and Blaster. Since these viruses replicate in large numbers in somewhat different forms, users had to be extremely vigilant in their anti-virus measures.

d. Unauthorized access

There were 58 cases of infringement of the Unauthorized Computer Access Law in 2003, with 76 people arrested. This was an increase of seven cases over 2002, with seven more people arrested.

e. Spam mail

Spam mail which is bulk mail sent out for advertising is an unpleasant experience for the recipients and makes them uneasy about the flow of their own personal information, causing major damage to users of information and communications networks. Even though the number of notifications of illegal mail received at the Spam Mail Consultation Center started to decline a little from August 2003, the number still remains high at nearly 20,000 per month.

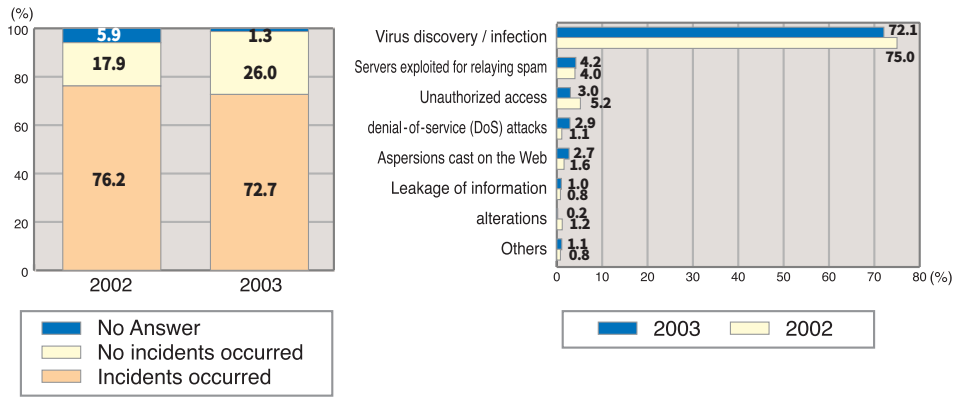
f. Fictitious billing problems

There has also been an increase in so-called billing for fictitious charges. In fiscal 2003, the MPHPT's Telecommunications Consumer Affairs Office received 4,119 complaints, a 7-fold increase over the 2002 figure of 555.

(ii) Measures and issues for personal information security

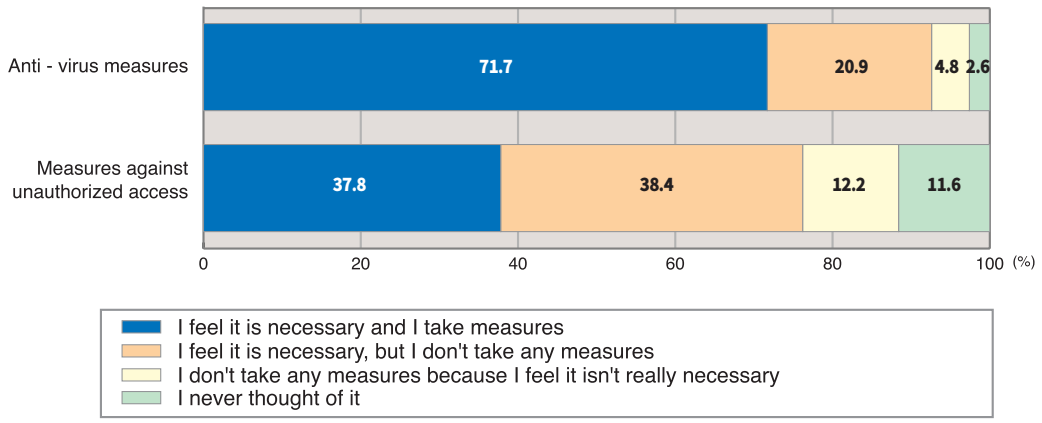
There is high awareness among Internet users of the need for measures against viruses and unauthorized access, with 92.6% stating that anti-virus measures are necessary and 76.2% saying that measures against unauthorized access are necessary. On the other hand, the number of users who are actually implementing such measures is only 71.7% for viruses and 37.8% for unauthorized access, leaving an implementation gap for viruses and unauthorized access **(Figure 1-4-9)**.

Figure 1-4-8 Situation and Types of Security Incidents on Information and Communications Networks Suffered by Companies (multiple responses possible)



Source: Communications Usage Trend Survey, MPHPT

Figure 1-4-9 Status of Implementation of Information Security Measures



Source: Survey of Personal Activities in a Ubiquitous Network Society

(iii) Measures and issues for corporate information security

Although 95.1% of companies implement some form of measure relating to information security, the flip side of the growing penetration of security measures for system and technology is the delay in measures relating to information security for operations and organization **(Figure 1-4-10)**. It is becoming impossible to insure proper information security in information and communications networks that are moving to high-speed networks with security measures aimed only at systems and technology. That is why, to ensure information security, it is important that there be organizational steps taken inside and outside companies, an improvement both in the awareness and knowledge of employees and their information literacy, the formulation of security policies, and regular implementations of information security audits, as information security measures at the operational and organizational levels.

(iv) International approaches for insuring information security

Since there are no actual borders to information and communications networks, it is possible that an attack on information and communications networks will go beyond one country to cause increasing damage. This is why there is growing awareness of information security among international organizations and various countries, and they are strengthening their approach to insuring information security.

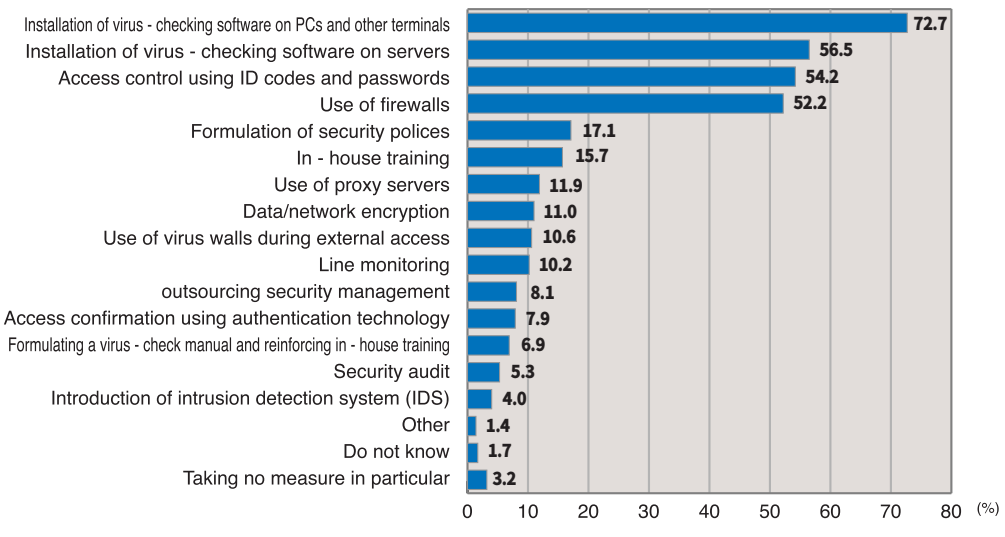
At the International Telecommunication Union (ITU), there was a Japan-led investigation into a framework for information security in the telecommunications field and, in March 2004, there was agreement on developing requirements for information security management for telecommunications bodies. In addition, the Council of Europe adopted "Convention on Cybercrime" in November 2001 at its Committee of Ministers. As of March 2004, 37 countries, including Japan, had signed the convention and five had concluded it.

According to the OECD's DSTI/ICCP (2003) 10/Final report, 18 of the OECD member countries, including Japan, the United States, the United Kingdom, and the Republic of Korea, had established spam-related laws as of January 2004, and other countries were preparing legislation. The ten countries which have not established laws, including France and Germany, are dealing with the issue by applying laws that are already in place and developing measures against spam by preparing bills. The United States approved the spam-preventing CAN-SPAM Act of 2003: Controlling the Assault of Non-Solicited Pornography and Marketing Act of 2003 in December 2003, and it came into force in January 2004.

(4) Trends in Individual and Corporate Responsibility

With the penetration of mobile phones with digital camera, new social problems have arisen such as "taking photos of people without permission using a mobile phone with camera", or "taking pictures of books or magazines without permission using a mobile phone with camera", so that as we head into a ubiquitous network society, the personal manners of network users are becoming important. At 80.5%, "spam mail" comes at the top of the list of conducts that should be avoided when using information and communications networks

Figure 1-4-10 Status of Information Security Measures Taken by Companies (multiple responses possible)



Source: Communications Usage Trend Survey in 2003, MPHPT

and services. Many users also point out manners concerning mobile phones as they have been highly penetrated **(Figure 1-4-11)**.

Users feel that the most important matter by far to improve information and communications networks and services is "personal awareness and responsibility", at 89.3% **(Figure 1-4-12)**.

Users feel that it is important, in order to reap the benefits of information and communications networks and services, for each every user to have personal awareness and responsibility rather than dealing with it through regulations and superintendence. In the future, as we approach the realization of ubiquitous networks, the convenience and fun will increase and the opportunities for choice among various information and communications networks and services expand. There is a desire that, as is the case in our current society, social rules and information and communications network society rules are respected, and that both individuals and companies will move ahead with a sense of personal awareness and responsibility.

(5) Looking to Bridging the Digital Divide

(i) Current status of regional divide in broadband services

As for the state of broadband service, in terms of cities, towns, and villages where service is offered in at least one part of the territory, the total nationwide where at least one broadband service is being offered was 83.3% as of the end of fiscal 2003, and 60.9% for underpopulated regions. When comparing cities with town and villages, the figure is 100% for cities and 78.3% for towns and villages, with broadband facilities progressing mainly in cities, and private sector investment not progressing in underpopulated regions due to profitability issues, leaving a regional divide **(Figure 1-4-13)**.

(ii) Current status of broadband usage divide

Broadband usage increased between the end of 2002 and the end of 2003, irrespective of age group, gender, size of town, or annual income. Since the increase in broadband usage among the under 49 age group was particularly sharp, though there was a narrowing of the Internet usage divide by age group. Broadband usage divide is continuing to spread **(Figure 1-4-14)**.

(iii) Current status of internet usage divide

At the end of 2003, there was a big divide in Internet usage ratio between younger users and older users. In particular, all age groups under 60 had a usage ratio of over 60%, but usage dropped dramatically among the over 60s, to 21.6%.

(iv) Breaking barriers in Information and communications usage for the elderly and disabled

In order to fully enjoy the advantages of a ubiquitous network society, it is necessary to build a society where everyone, including the elderly and those people with disabilities, can freely transmit and access information. From this perspective, there is a need to develop information and communications equipment and systems that are adapted to the elderly and people with disabilities, and to work towards their penetration and the improvement of social environment (universal design).

This is why there is an ongoing approach to information and communications equipment that can easily be

Figure 1-4-11 Conduct that Should be Avoided when Using Information and Communications Networks and Services (multiple responses possible)

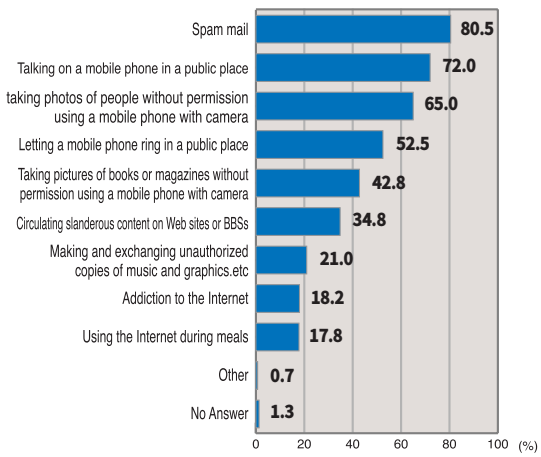
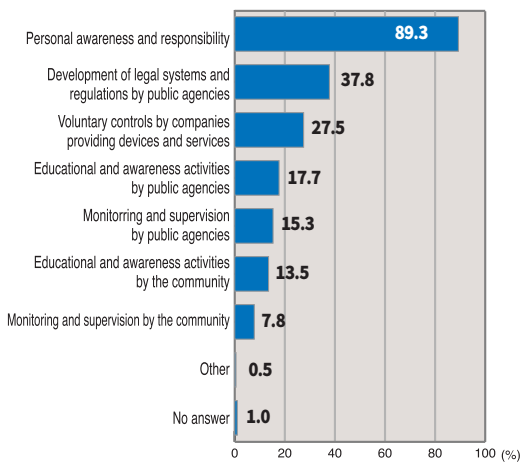


Figure 1-4-12 Matters Important for Improving Use of Information and Communications Networks and Services (multiple responses possible)



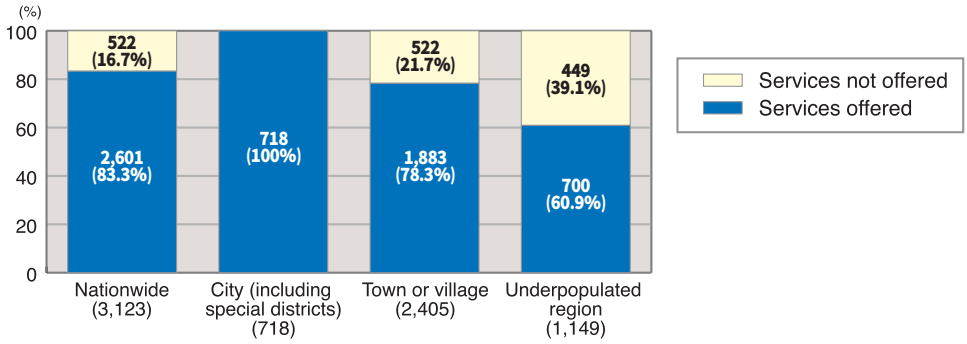
Source: Survey of Personal Activities in a Ubiquitous Network Society

used by anyone, such as marketing a mobile phone adapted to users who have in the past been uneasy about the operation, displaying in large characters only frequently used functions such as telephone or e-mail.

(6) Standardization and Demonstration Tests

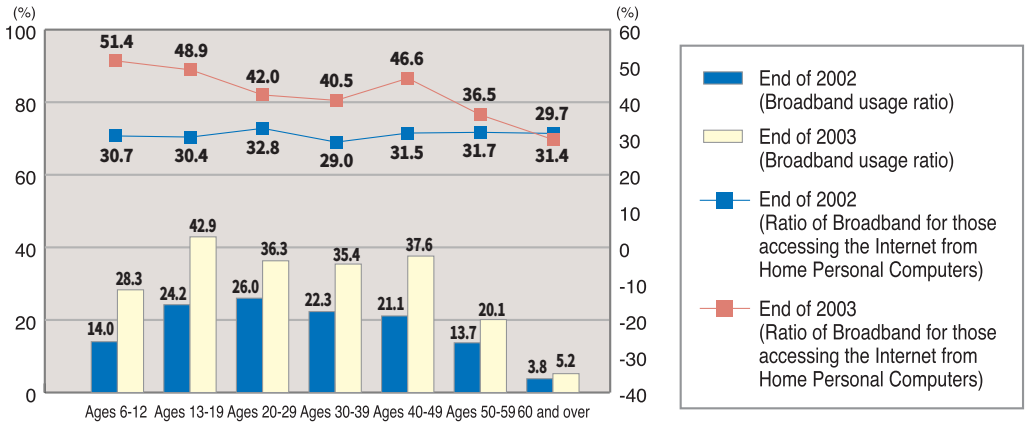
Many companies are taking up the lowering of costs of information systems that use networks, networks and terminal equipment as an issue in promoting the efficient use of ubiquitous tools **(Figure 1-4-15)**. The unit cost of RFID tags is at around 100 yen, including installation expenses. Even though the lowering of costs is progressing rapidly with the appearance of tags at 10 yen where there is volume of about one million units a year, prices are still relatively high for use with daily products or foods. In addition, it is difficult to get across the profitable applications of ubiquitous networks and many companies see the clarification of advantageous uses of ubiquitous networks as an issue in promoting the efficient use of ubiquitous tools. Another issue the companies brought forward for efficient use of ubiquitous tools is the standardization of terminal equipment and communication formats. In the future, it is likely that the realization of ubiquitous networks will come about through many companies installing ubiquitous networks for various parts of their business, conducting demonstration tests to accumulate technology as well as to clarify the cost reductions and returns on investment.

Figure 1-4-13 Spread of Broadband Services (end of fiscal 2003)
<Number of cities, towns and villages* where at least one broadband service is offered>**



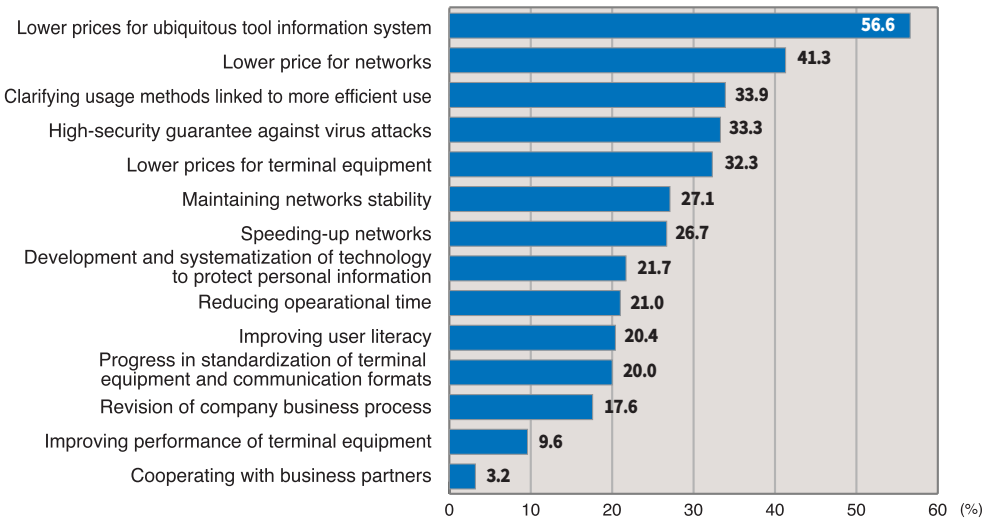
Notes: 1. Cities, towns, and villages where service is provided in at least one part of the territory.
2. Broadband here refers to ADSL, FTTH, Cable Internet, and FWA
3. The number of provided cities, towns, and villages was calculated by MPHPT on the base of information available on the websites of providers
4. The total number nationwide of cities, towns, and villages as well as depopulated regions was current as of April 1, 2004.
5. Depopulated regions refer to those towns and villages publicly designed under Article 2, Clause 2 of the Law on Special Measures to Promote the Independence of Depopulated Areas.

Figure 1-4-14 Trends of Broadband Usage Ratio and Ratio of Broadband for Those Accessing the Internet from Home Personal Computers by Age Groups



Source: Communications Usage Trend Survey, MPHPT

Figure 1-4-15 Necessary Elements for the Efficient Use of Ubiquitous Tools* Inside and Between Companies (up to 5 answers)



*The ubiquitous tools refer to equipment compatible with RFID tags and new networks, as well as new terminals, equipment, and tools.

Source: Survey of Ubiquitous Network Usage Trend by Businesses