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.
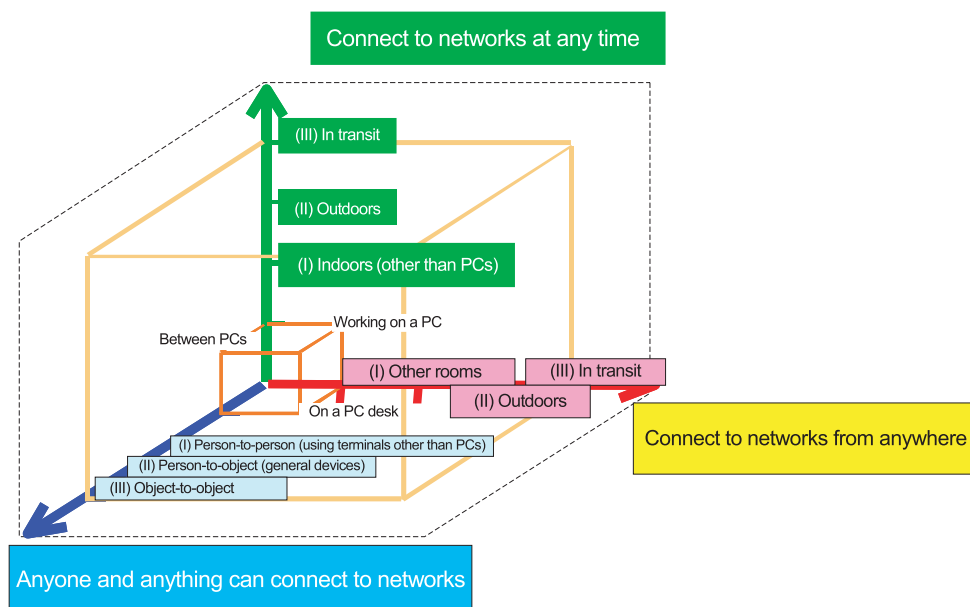
Although the ubiquitous network society is a new concept, it is not an idea that appeared all at once in complete form. It is no more than an extension of the computerization that has already taken place and an advancement of the digitization of information and the widespread development and use of networks. 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 previously 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)

	%
Fraud and unscrupulous methods of business	62.7
Leaks and improper use of personal information in the possession of business	59.7
Improper access to and use of personal information	58.2
Increasing complexity of services and devices	49.2
Infection by computer viruses. etc.	37.8
Possibility of being monited by third parties including family	37.5
Excessive reliance on information & communications devices	35.7
Decline in thinking abilities and reading and writing skills	34.7
Weakening of personal relationships	24.7
None in particular	7.7
Other	2.3
No response	1.2

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)
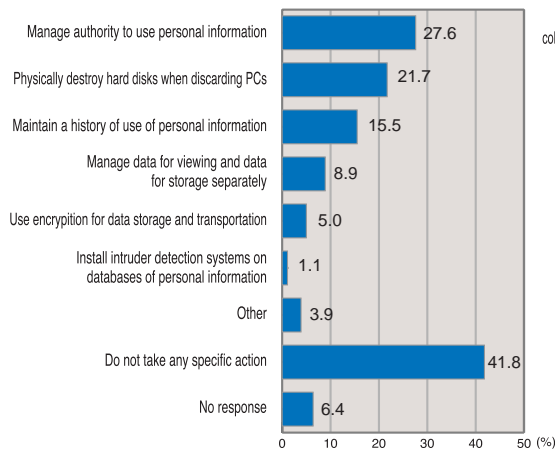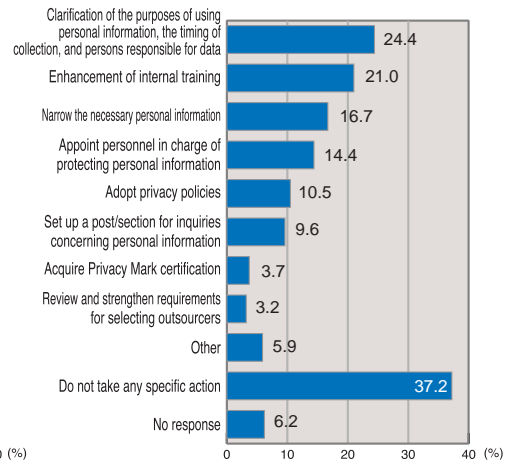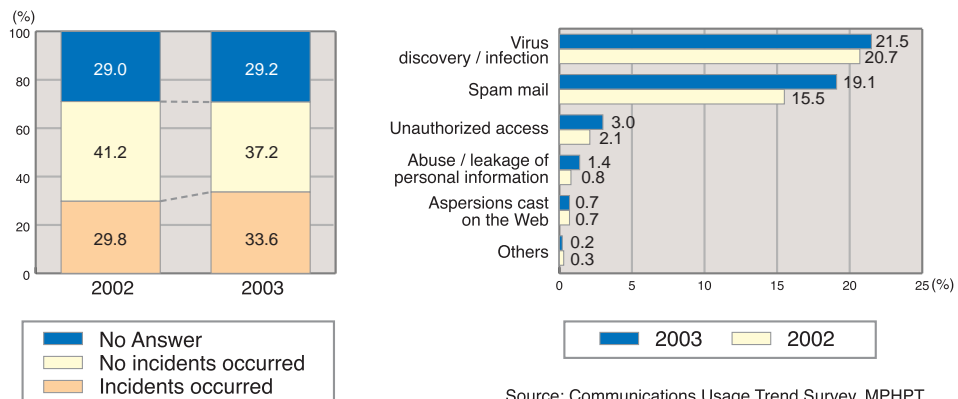
Category	Value
Manage authority to use personal information	27.6
Physically destroy hard disks when discarding PCs	21.7
Maintain a history of use of personal information	15.5
Manage data for viewing and data for storage separately	8.9
Use encryption for data storage and transportation	5.0
Install intruder detection systems on databases of personal information	1.1
Other	3.9
Do not take any specific action	41.8
No response	6.4

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

Category	Value
Clarification of the purposes of using personal information, the timing of collection, and persons responsible for data	24.4
Enhancement of internal training	21.0
Narrow the necessary personal information	16.7
Appoint personnel in charge of protecting personal information	14.4
Adopt privacy policies	10.5
Set up a post/section for inquiries concerning personal information	9.6
Acquire Privacy Mark certification	3.7
Review and strengthen requirements for selecting outsourcers	3.2
Other	5.9
Do not take any specific action	37.2
No response	6.2

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)

	2002	2003
No Answer	29.0	29.2
No incidents occurred	41.2	37.2
Incidents occurred	29.8	33.6

Category	2003	2002
Virus discovery / infection	21.5	20.7
Spam mail	19.1	15.5
Unauthorized access	3.0	2.1
Abuse / leakage of personal information	1.4	0.8
Aspersions cast on the Web	0.7	0.7
Others	0.2	0.3

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.
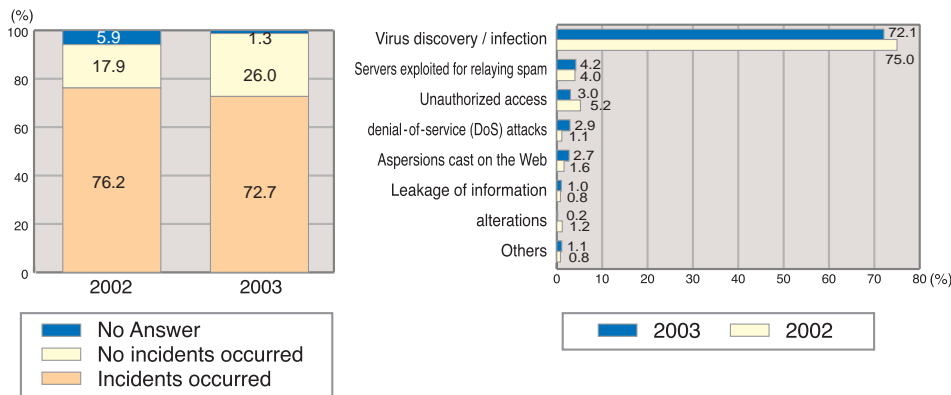
f. Fictitious billing problems

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.

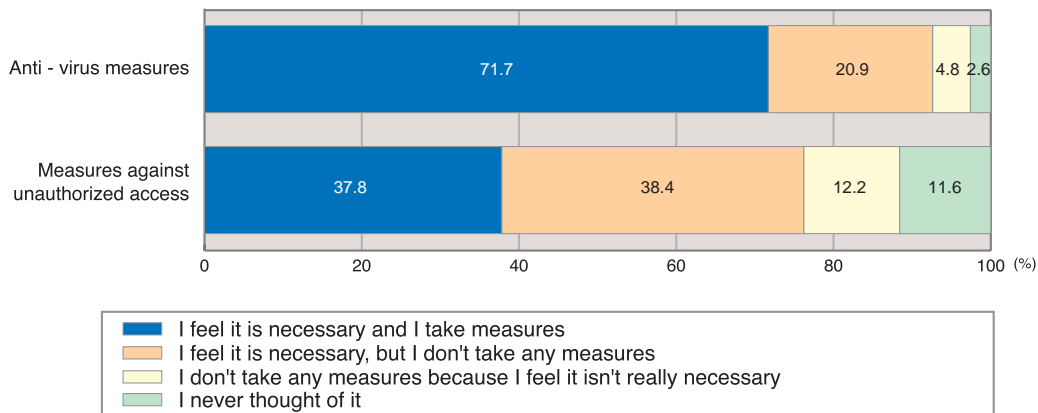**(ii) Measures and issues for personal information security**

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

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(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.

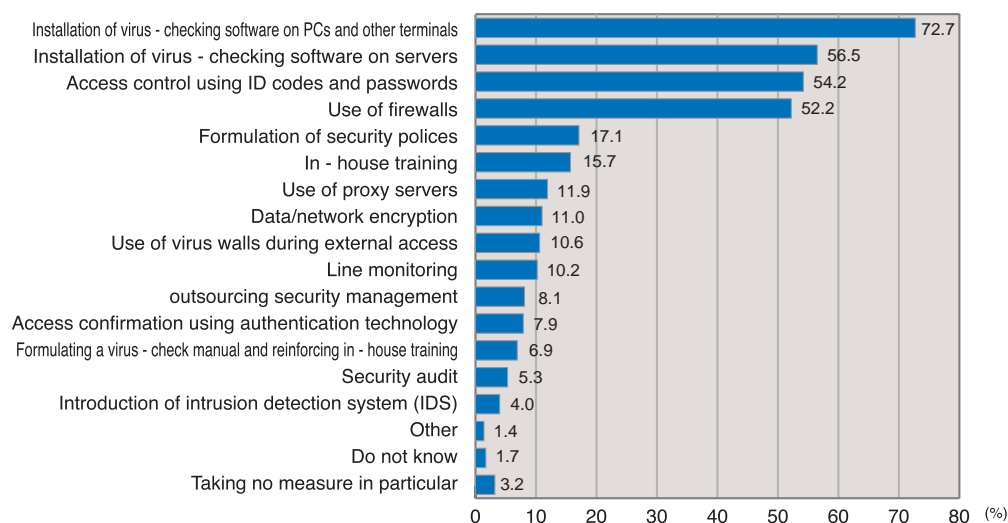At the International Telecommunication Union (ITU), there was a Japan-led investigation into a framework for information security in the telecommunications field and, in March 2004, there was agreement on developing requirements for information security management for telecommunications bodies. In addition, 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)

Measure	%
Installation of virus - checking software on PCs and other terminals	72.7
Installation of virus - checking software on servers	56.5
Access control using ID codes and passwords	54.2
Use of firewalls	52.2
Formulation of security polices	17.1
In - house training	15.7
Use of proxy servers	11.9
Data/network encryption	11.0
Use of virus walls during external access	10.6
Line monitoring	10.2
outsourcing security management	8.1
Access confirmation using authentication technology	7.9
Formulating a virus - check manual and reinforcing in - house training	6.9
Security audit	5.3
Introduction of intrusion detection system (IDS)	4.0
Other	1.4
Do not know	1.7
Taking no measure in particular	3.2

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 progress-

ing 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)
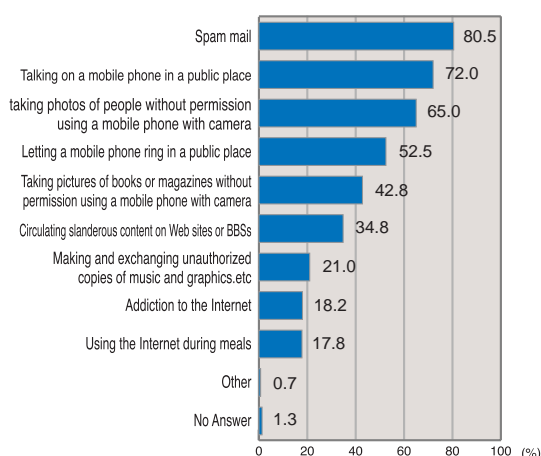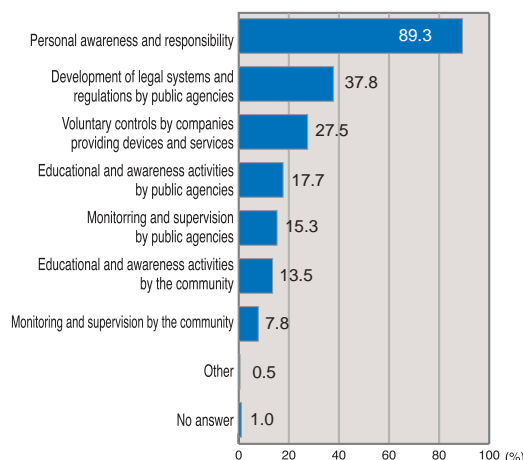
Category	%
Spam mail	80.5
Talking on a mobile phone in a public place	72.0
taking photos of people without permission using a mobile phone with camera	65.0
Letting a mobile phone ring in a public place	52.5
Taking pictures of books or magazines without permission using a mobile phone with camera	42.8
Circulating slanderous content on Web sites or BBSs	34.8
Making and exchanging unauthorized copies of music and graphics.etc	21.0
Addiction to the Internet	18.2
Using the Internet during meals	17.8
Other	0.7
No Answer	1.3

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

Category	%
Personal awareness and responsibility	89.3
Development of legal systems and regulations by public agencies	37.8
Voluntary controls by companies providing devices and services	27.5
Educational and awareness activities by public agencies	17.7
Monitorring and supervision by public agencies	15.3
Educational and awareness activities by the community	13.5
Monitoring and supervision by the community	7.8
Other	0.5
No answer	1.0

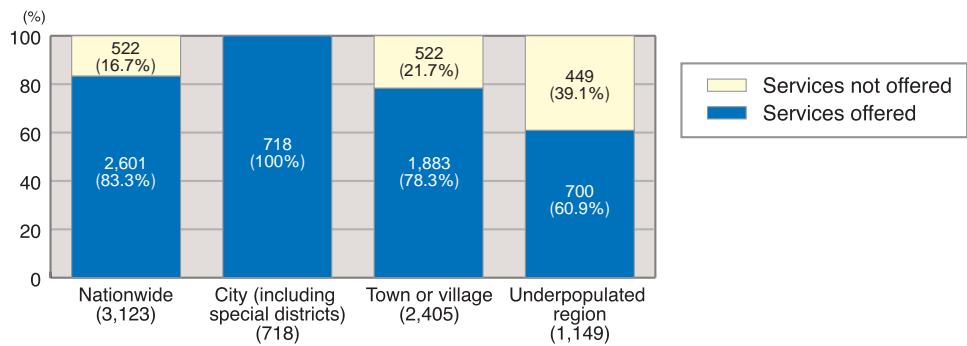Source: Survey of Personal Activities in a Ubiquitous Network Society

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
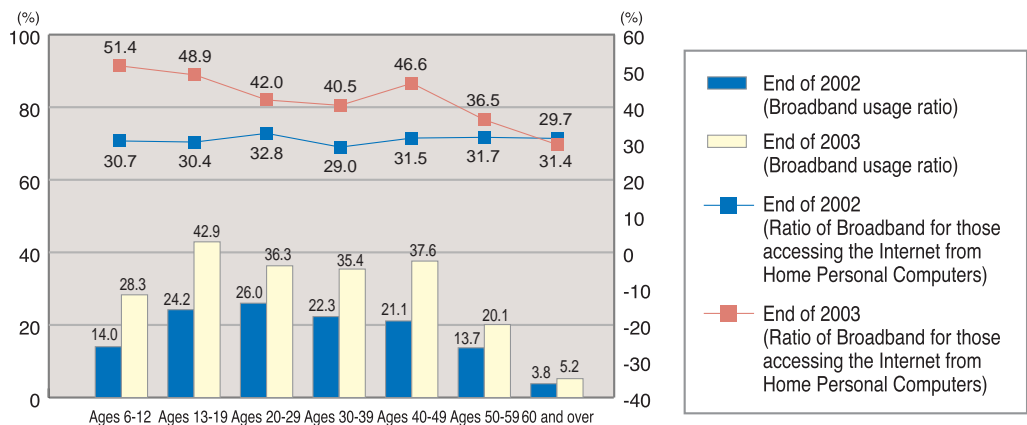
are still relatively high for use with daily products or foods. In addition, it is difficult to get across the profitable applications of ubiquitous networks and many companies see the clarification of advantageous uses of ubiquitous networks as an issue in promoting the efficient use of ubiquitous tools. 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)
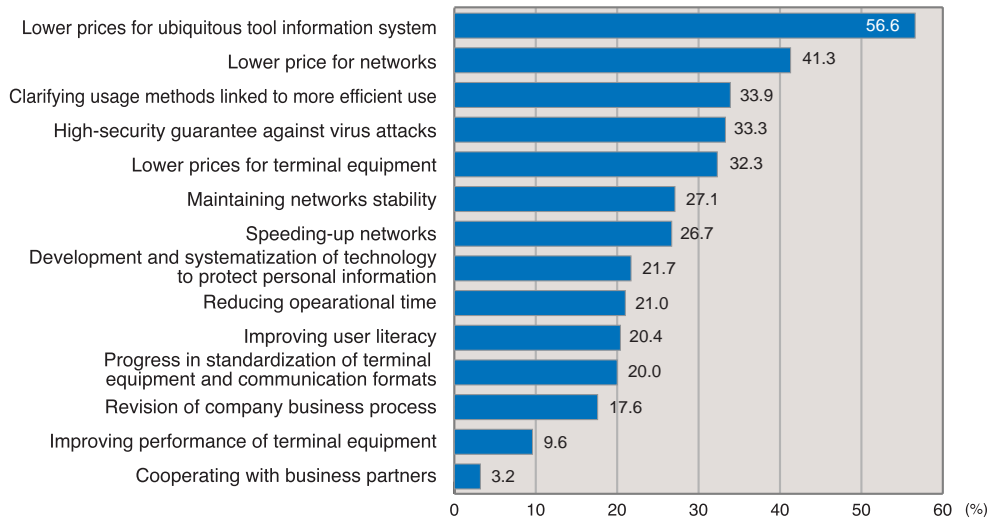**<Number of cities, towns and villages* where at least one broadband service** is offered>**

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)

Lower prices for ubiquitous tool information system	56.6
Lower price for networks	41.3
Clarifying usage methods linked to more efficient use	33.9
High-security guarantee against virus attacks	33.3
Lower prices for terminal equipment	32.3
Maintaining networks stability	27.1
Speeding-up networks	26.7
Development and systematization of technology to protect personal information	21.7
Reducing opearational time	21.0
Improving user literacy	20.4
Progress in standardization of terminal equipment and communication formats	20.0
Revision of company business process	17.6
Improving performance of terminal equipment	9.6
Cooperating with business partners	3.2

0   10   20   30   40   50   60 (%)

*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