Information and Communications in Japan 2004

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

July 2004

Ministry of Public Management, Home Affairs, Posts and Telecommunications
An analysis is made of the current status in Japan of realization of a ubiquitous network that allows all users to access and exchange information of any kind freely at any time, from anywhere, and from any appliance through the use of broadband and mobile access as well as intelligent home appliances and RFID tags that can access networks.

Also, the current status of Internet access by “anyone, at any time, from anywhere” and the expectations for ubiquitous network services in the future are analyzed and explained.

In addition, issues that must be addressed for the realization of a ubiquitous network society in the future such as ensuring the security of information and bridging the digital divide and the impact of markets related to a ubiquitous network on the economy are analyzed.

Chapter 1. Building a Ubiquitous Network Society That Spreads throughout the World

Section 1. Advances in Network Infrastructure
Section 2. Lifestyles Changed by Networks
Section 3. Use of Networks in Business
Section 4. Realization of a Ubiquitous Network Society and Issues

Chapter 2. The Current Status of Information and Communications (includes extensive data)

Chapter 3. Trends in Information and Communications Policies (focusing on undertakings of the MPHPT)
1. Current Status of Networks

1) Broadband Is Expanding Rapidly
   - The number of broadband subscribers is approaching 15 million (Figure 1).
   - Japan has the third largest number of broadband subscribers in the world. Per capita, Japan is the ninth in the world (Figure 2).
(2) Japan’s Broadband Services Are the World’s Least Expensive, and Highest Speed

- Japan’s broadband services are so inexpensive monthly and high speed that of the top 10 broadband services provided by businesses in OECD countries, eight are offered by Japanese companies (Figure 1).
- A comparison of costs per 100 kbps also reveals that Japan has the world's lowest cost broadband services (Figure 2).

![Figure 1. Comparison of Broadband Fees by Service in OECD Countries (October 2003)](image1)

![Figure 2. International Comparison of Broadband Fees per 100 kbps (July 2003)](image2)

Produced based on OECD documents

Produced based on ITU documents
(3) Japan Leads the World in Mobile Internet Access

- The number of mobile phone subscribers has exceeded 80 million and the number of mobile phone Internet subscribers is approaching 70 million (Figure 1).
- Japan’s mobile Internet compatibility rate (89.5%) is the highest in the world (Figure 2).
(4) Mobile Terminals Are Also Advancing Rapidly

- The number of third-generation mobile phone subscribers has grown rapidly to 16.69 million in less than two and a half years (since the start of services in October 2001) (Figure 1).
- The number of mobile phone with digital camera subscribers is 47.86 million, exceeding 60% of all mobile phone subscribers (Figure 2).
(5) IP Telephone and Hot Spots Are Steadily Increasing

- IP telephony has been introduced by 7.3% of households and 11.1% of businesses (Figure 1).
- The number of hot spots has more than tripled in just one year (Figure 2).

**Figure 1. Introduction of IP Telephony (end of 2003)**

- Use of IP telephony by both households and businesses is increasing.

**Figure 2. Change in Number of Hot Spots (end of fiscal 2003)**

- The number of hot spots has more than tripled in just one year.

Source: Survey of Communications Usage Trend Survey in 2003, MPHPT

Source: Survey of the Current Status and Issues of Networks
(6) Ubiquitous Networks: Networks That Anyone Can Use Any Time From Anywhere and from Any Appliance

Advances in broadband, mobile services, digital broadcasting, and information terminals will give rise to a virtuous cycle and will lead to the development of ubiquitous networks.
2. Expectations of Users

(1) The Internet Penetration Rate Has Exceeded 60%

The number of Internet users in Japan is 77.3 million, exceeding 60% of the population for the first time.

Transitions in the Internet User Population and Penetration Rate

More than 60% of the Japanese population uses the Internet.

Notes:
1. The above population of Internet users, includes persons who use one or more of a PC, mobile phone, PHS, mobile information terminal, game machine, or television, etc. to use the Internet.
2. The percentage of Internet users at the end of 2003 (60.6%) was calculated by dividing the estimated number of Internet users of 77.30 million (from this survey) by the total population at the end of 2003 of 127.52 million (from the Japan's Projected Future Population (medium variant) by the National Institute of Population and Social Security Research).
3. Figures for 1997 to 2002 were taken from White Paper: Information and Communications in Japan (White Paper: Communications in Japan up to 2000).
4. In these estimates, the subject age group is expanding each year because of the increase in users who are senior citizens or elementary and junior high school age, so simple comparisons with data from 2000 and earlier are not possible (until the end of 1999, the age range was 15 to 69, at the end of 2000 it was 15 to 79, and since the end of 2001 it has been age 6 and up).
(2) Access to the Internet at Any Time, from Anywhere

Internet access from PCs only is decreasing. There is a growing tendency for users to access the Internet from various appliance.

Number and Percentage of Internet Users by Type of Terminal

End of 2002: 69.42 million

- From PCs only 38.84 million (56.0%)
- From mobile phones only 10.61 million (15.3%)
- From TVs only 1.35 million (1.9%)

End of 2003: 77.30 million

- From PCs only 31.06 million (40.2%)
- From mobile phones only 14.53 million (18.8%)
- From TVs only 0.82 million (1.1%)

Access from PCs only is decreasing. Use of mobile phones as well is increasing.

Source: Communications Usage Trend Survey, MPHPT
(3) Access to the Internet by Everyone
The fastest growth in Internet usage is seen in the 60 and older age group.

Internet Usage Rates and Growth Rates by Age Group

Use by the senior is growing rapidly.

Source: Communications Usage Trend Survey, MPHPT
(4) Trends in Internet Usage

Internet usage in all scenes of daily life is increasing.

Internet Usage Applications (percentages of applications mentioned up to the second rank)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Getting ready for work, school, etc.</th>
<th>In transit</th>
<th>At school or work</th>
<th>Housework</th>
<th>Resting at home</th>
<th>Leisure, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Send/receive e-mail</td>
<td>Send/receive e-mail</td>
<td>Send/receive e-mail</td>
<td>Send/receive e-mail</td>
<td>Send/receive e-mail</td>
<td>Send/receive e-mail</td>
</tr>
<tr>
<td>2nd</td>
<td>Weather forecasts</td>
<td>Transportation, time table, maps</td>
<td>Search engines</td>
<td>News, etc.</td>
<td>Prize contests, free items application</td>
<td>Transportation, time table, maps</td>
</tr>
<tr>
<td>3rd</td>
<td>News, etc.</td>
<td>News, etc.</td>
<td>News, etc.</td>
<td>Prize contests, free items application</td>
<td>Search engines</td>
<td>Weather forecasts</td>
</tr>
</tbody>
</table>

Source: Survey of Personal Activities in a Ubiquitous Network Society
(5) Intent to Use Ubiquitous Network Services

The intent to use ubiquitous network services that provide a sense of security is high.
(5) Intent to Use Ubiquitous Network Services (continued)

**Image of Expected Ubiquitous Network Services by User Characteristics**

**Workers**
- Clang clang
- I'll receive notice if some tries to steal my car
- Do you want to call to the security company?

**Homemakers**
- Monitor children at nursery school

**Senior citizens**
- Transmit images and data to a specialist from a clinic and receive emergency treatment instructions

**Youth**
- Determine the location of lost items left on trains
- "I lost my backpack!"
- "The backpack is on its way to XX Station"
- "It's OK. Your backpack is there."

Source: Survey of Personal Activities in a Ubiquitous Network Society
3. Expectations of Business in Use of Ubiquitous Networks

(1) Devices and Terminals for use in Electronic Commerce and Sales Promotion Activities Using the Internet

Today PCs and mobile phones that are compatible with the Internet are commonly used, but there are expectations for network-compatible televisions in the future.

Figure 1. Devices and Terminals Used for Electronic Commerce Using the Internet (multiple responses possible)

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>New in the future</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>89.7</td>
<td></td>
</tr>
<tr>
<td>Mobile phone</td>
<td>43.9</td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.7</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2. Devices and Terminals Used for Sales Promotion Activities Using the Internet (multiple responses possible)

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>New in the future</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>94.9</td>
<td></td>
</tr>
<tr>
<td>Mobile phone</td>
<td>36.9</td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td></td>
</tr>
</tbody>
</table>

There are strong expectations that in the future Internet-compatible mobile phones and network-compatible televisions will be used.

Source: Survey of Ubiquitous Network Usage Trend by Businesses
(2) Merits of Ubiquitous Networks that will have an Impact on Business and Differences in Awareness in Japan and the United States

- There are many businesses in Japan and the U.S. that believe an impact of ubiquitous networks on business will be the “ability to exchange large volumes of data at low cost.”
- Compared to in the U.S., in Japan there is a stronger awareness of the “ability to use networks regardless of location” and “ability to trace and manage historical data using RFID tags.”
- In the U.S., there is a higher awareness of “improved network stability.”

### Merits of Ubiquitous Networks That Will Have an Impact on Business and Comparison of Awareness in Japan and the U.S. (multiple responses possible)

<table>
<thead>
<tr>
<th>Merits of Ubiquitous Networks</th>
<th>Japan</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to exchange large volumes of data at low cost</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Ability to use networks regardless of location</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Communications with high security levels</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Improved network stability</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Ability to use information and communications devices with simple operation</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Ability to use information and communications terminals for a variety of applications</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Intelligent home appliances that have communications functions</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Historical tracing and management using RFID tags</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Provision of services and management tailored to each individuals and items</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Promotion of the use of monitoring and sensing</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Effective use of GPS and other position information</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
<tr>
<td>Provision of services from all terminals and networks</td>
<td><img src="Diagram_Japan" alt="Japan" /></td>
<td><img src="Diagram_US" alt="United States" /></td>
</tr>
</tbody>
</table>

Note: Comparison of percentages in companies engaged in business-to-business commerce

Source: Survey of Ubiquitous Network Usage Trend by Businesses
4. Realization of a Ubiquitous Network Society and Issues

(1) Benefits from the Realization of a Ubiquitous Network Society

The realization of a ubiquitous network will bring about an “energetic,” “worry-free,” “convenient,” and “exciting” society.

<table>
<thead>
<tr>
<th>Characteristics of a Ubiquitous Network Society</th>
<th>Examples of Benefits</th>
</tr>
</thead>
</table>
| Devices not previously used as information terminals will be made into terminals | **Energetic**  
- Measure, transmit, and store health data using home appliances  
- Centrally manage health image data to allow access from anywhere |
| Portable terminals that can be used without awareness | **Worry-free**  
- Collect and store data such as respiration and heart rates while exercising  
- Convey information on surroundings to the socially handicapped to ensure safety |
| Networks that can be used without an awareness of connecting | **Convenient**  
- Identify patients and obtain data without errors to prevent medical accidents  
- Ensure security by identifying people entering home and offices |
| Further expansion of broadband such as FTTH and 3G mobile phones | **Exciting**  
- Use high-quality video to convey treatment instructions to ambulance crews  
- Participate in video conferences while outside the office |
| Digitalization of information not previously available in digital format |  
- Transmission of information concerning specific items and location data  
- Use historical data concerning foods to ensure safety |
|  
- Wearable information terminals  
- RFID tags for personal certification. Transmission of personal information and location data  
- Centrally manage health image data to allow access from anywhere  
- Detect medicines and prevent errors concerning dosages, combinations, etc.  
- Use historical data concerning foods to ensure safety  
- Attach low-cost RFID tags to items to find them if they are lost  
- Devices identify display items in museums and provide explanations |

Source: Survey of Personal Activities in a Ubiquitous Network Society
Digital Hi-Vision is large and beautiful. We can operate easily by a remote controller.

I feel like I am talking with my grandchild face to face. Ubiquitous is that.

One-push to talk with your grandchild

I enjoy my school. Are you fine?

A digital television becomes the gateway of ICT society.

Networks are fully developed in all areas.

Counter measures against dark side are compete.

Reservation of relief and safety by ICT

To judge from the complexion... Ok, please inject with XXX.

I will send the data my patient's condition.

Quick medical treatment... Hi-vision even shows the complexion of the patient.

Secure security of the house by remote control

Door open-and-close sensor

Easy handling of machines by voice control

I love it. Is it OK simply to say, "I will reserve"?

I forgot to lock the door in my house carelessly. But I can lock it by remote controller.

Access whenever and wherever.

Quick medical treatment... Hi-vision even shows the complexion of the patient.

Source: Policy Roundtable for Ubiquitous Network Society
(3) Ripple Effect of Ubiquitous Network Related Markets on the Economy

- Ubiquitous network related markets will reach 87.6 trillion yen in 2010. The cumulative value in the eight years from 2003 will be 449.1 trillion yen (Figure 1).
- The ripple effect of ubiquitous network related markets will be 120.5 trillion yen in 2010. The cumulative value in the eight years from 2003 will be 611.1 trillion yen (Figure 2).

Figure 1. Estimated Scale of Future Ubiquitous Network Related Markets

Markets will triple to 87.6 trillion yen in 2010

Figure 2. Ripple Effect of Ubiquitous Network Related Markets on the economy (value of production induced in all industries by ubiquitous network related markets)

The ripple effect will reach 120.5 trillion yen.

Note: The ubiquitous network related markets referred to here is the total of: (1) infrastructure markets; (2) network markets; (3) appliance markets; (4) platform markets; (5) services and contents markets; and (6) B-to-C (business to consumer) electronic commerce markets and cashless commerce markets using RFID tags and non-contact IC cards.

Note: The cumulative total in the eight years from 2003 to 2010 is 611.1 trillion yen.

Source: Survey on Economic Analysis of IT
(4) Concerns of Individuals relating to a Ubiquitous Network Society

Many users are concerned about fraud and unscrupulous methods of business as well as leaks and improper use of personal information.

Users are concerned about fraud and unscrupulous methods of business as well as leaks and improper use of personal information.
(5) Issues Concerning Businesses Towards the Realization of a Ubiquitous Network Society

- Consumer-oriented companies place the greatest priority on “issues concerning protection of personal information.”
- In contrast, business-oriented companies are most concerned about “network security risks.”

Issues that Need to be Resolved for Businesses to Enjoy the Benefits of a Ubiquitous Network Society

**B-to-C Companies**

- Issues concerning protection of personal information
- Network security risks
- High cost of network use
- High cost of terminals, RFID tags
- Network stability
- Improving device and terminal ease of use
- High costs of system operation
- Increasing network line speeds
- Rising demand for ubiquitous network services
- Legal system for a ubiquitous network society is not developed
- Standardization of device and service specifications
- Copyright management and protection
- Don’t know at this stage
- Not engaged in a business that will enjoy the benefits
- None in particular

**B-to-B Companies**

- Issues concerning protection of personal information
- Network security risks
- High cost of network use
- High cost of terminals, RFID tags
- Network stability
- Improving device and terminal ease of use
- High costs of system operation
- Increasing network line speeds
- Rising demand for ubiquitous network services
- Legal system for a ubiquitous network society is not developed
- Standardization of device and service specifications
- Copyright management and protection
- Don’t know at this stage
- Not engaged in a business that will enjoy the benefits
- None in particular

Source: Survey of Ubiquitous Network Usage Trend by Businesses
(6) Measures Taken by Individuals to Prevent Leaks of Personal Information

- More than 70% of individuals do not take any measures to prevent leaks of personal information (Figure 1).
- The most common measure to protect personal information is not listing personal information on BBSs (Figure 2).

Figure 1. Percentage of Individuals Taking Measures to Protect Personal Information

- I take measures
- I feel it is necessary, but I don't take any measures
- I don't take any measures because I feel it isn't really necessary
- I never thought of it

70% do not take any measures.

Figure 2. Measures Taken to Protect Personal Information (multiple responses possible)

- Do not post personal information in electronic bulletin board
- Installed anti-virus software
- Do not download software carelessly
- Install OS security patches
- Use different passwords
- Periodically change passwords
- Do not input credit card numbers
- Maintain an access log
- Use provider services
- Other

Source: Survey of Personal Activities in a Ubiquitous Network Society
(7) Measures Taken by Businesses to Prevent Leaks of Personal Information

Many Companies do not take any measures in organizational, structural and technological areas (Figures 1 and 2).

Figure 1. Organizational and Structural Measures to Protect Personal Information (multiple responses possible)

- Clarification of the purposes of using personal information, the timing of collection, and responsible managers
- Enhancement of internal training
- Narrow the necessary personal information
- Appoint personnel in charge of protecting personal information
- Adopt privacy policies
- Set up a post/section for inquiries concerning personal information
- Acquire certification of Privacy Mark
- Review and strengthen requirements for selecting outsourcers
- Do not take any specific action
- No response

40% of companies do not take any measures.

Figure 2. Information System and Technological Measures to Protect Personal Information (multiple responses possible)

- Manage authority to use personal information
- Physically destroy PCs when discarding
- Maintain a history of use of personal information
- Manage data for viewing and storage separately
- Use encryption at storage and transportation
- Install an intruder detection system on databases of personal information
- Do not take any specific action
- No response

Source: Survey of Information Security Measures
High percentages of users mention “spam mail” and “talking on a mobile phone in a public place” as conduct that should be avoided (Figure 1).

A high percentage of users mention “personal awareness and responsibility” as important for improving manners.
(9) Bridging the Digital Divide

- The most significant factor in differences in Internet use is “generation” (Figure 1).
- There is still a regional disparity in the spread of broadband services (Figure 2).

Figure 1. Analysis of Factors in the Disparity in Internet Use (end of 2003)

<table>
<thead>
<tr>
<th>Negative Factors to Use</th>
<th>Positive Factors to Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>6-12 years old</td>
<td>13-19 years old</td>
</tr>
<tr>
<td>19-29 years old</td>
<td>30-39 years old</td>
</tr>
<tr>
<td>40-49 years old</td>
<td>50-59 years old</td>
</tr>
<tr>
<td>60 years old and older</td>
<td>Special district, ordinance-designated city, or prefectual capital</td>
</tr>
<tr>
<td>Other city</td>
<td>Town or village</td>
</tr>
<tr>
<td>Less than 2 million yen</td>
<td>2-4 million yen</td>
</tr>
<tr>
<td>4-6 million yen</td>
<td>6-8 million yen</td>
</tr>
<tr>
<td>8-10 million yen</td>
<td>More than 10 million yen</td>
</tr>
</tbody>
</table>
| Source: Communications Usage Trend Survey in 2003, MPHPT

Note: In order to determine the scale of impact from each characteristic on use or non-use, type II quantification analysis was performed. The larger the absolute value relating to each characteristic, the greater the impact of that characteristic on use or non-use.

Figure 2. Spread of Broadband Services (end of fiscal 2003)

- Nationwide
- City (including special districts)
- Town or village
- Underpopulated region

Notes:
1. Total of cities, towns, and villages where at least one broadband service (ADSL, FTTH, cable Internet, or FWA) is offered in at least one part of the territory.
2. Underpopulated regions refers to those towns and villages publicly designated under the Law on Special Measures to Promote the Independence of Depopulated Areas.
The Ubiquitous Network Society is Expanding Throughout the World

- The MPHPT formulated the Asia Broadband Program jointly with the cabinet office and other involved ministries in March of 2003.
- Interest in the ubiquitous network society was heightened at the World Summit on the Information Society (WSIS) held in Geneva, Switzerland, in December of 2003.
- Standardization of ubiquitous network technology is progressing and network services that originated in Japan are spreading throughout the world.

**Promotion of the Asia Broadband Program**

Asians energize flows of information within Asia so that Asia becomes a global information hub.

**World Summit on the Information Society (WSIS)**

Asians energize flows of information within Asia so that Asia becomes a global information hub.

**Popularization of the concept of the ubiquitous network society to the entire world**

**Expansion of network services originated in Japan to the world**

**Display of items with RFID tags**

- Fruit
- Medicine bottles

**Small payments**

**Non-contact IC cards**

**Commuter passes and tickets**

**Mobile phones with advanced functions**

**TV phones**

The ubiquitous network expands throughout the world.