Section 8
Promoting R&D

1. Developing R&D Policies in the Information and Communications Field

In order for Japan to achieve sustainable economic development and for Japanese people to lead safe lives with a sense of reassurance, it is necessary to make active and strategic investment in the selected fields of science and technology, and to maintain and develop the competitiveness of industry by promoting R&D. The Second-term Science and Technology Basic Plan (decided by the Cabinet in March 2001) set forth that special focus will be placed on four fields of science and technology including the information and communications field, and that R&D resources will be preferentially allocated to these fields. The Telecommunications Council of the MPHPT submitted a "blueprint for an R&D approach for Japan in the info-communications field" in August 2002, and by presenting a basic R&D strategy, emphasized the importance of promoting R&D according to the basic strategy. Furthermore, the Telecommunications Council deliberated on "R&D/standardization strategies toward increasing the technological competitiveness in the information and communications field," and upon reporting the findings in March 2003, compiled the R&D themes and policies to be undertaken into the "R&D Basic Plan (Fourth Edition)," "R&D Implementation Strategy," and "Standardization Strategy."

Toward effective and efficient promotion of R&D, the MPHPT formulated the "MPHPT Guidelines for Evaluating Research and Development on Information and Communications," and commenced research evaluation as part of policy evaluation from fiscal 2002 using the project evaluation method. Since the need for establishment of a competitive R&D environment, particularly expansion of competitive funds and fair, highly-transparent evaluation, has been pointed out for effective utilization of the limited R&D funds, the MPHPT promotes the strategic information and communications R&D promotion system and implements R&D by inviting proposals of themes from the public.

R&D in the information and communications field involves abundant R&D elements and requires large capital investment due to the specialty and high cost of the necessary facilities, so private companies face enormous obstacles in investing in R&D in this field. Therefore, the MPHPT intends to further advance R&D in the information and communications field by establishing and expanding special taxations to support the R&D.

An independent administrative institution, the Communications Research Laboratory, is expected to play its role as the sole public R&D institution in the information and communications field. It undertakes leading-edge R&D, which is too risky to be carried out by the private sector, to contribute to enhancing the competitiveness of the Japanese information and communications industry and contribute to realizing affluent national life through utilization of cutting-edge IT technology. Moreover, the MPHPT established an IT R&D base (an open laboratory) equipped with an R&D environment including functionally sophisticated network facilities in the Keihanna Human Info-Communication Research Center of the Communications Research Laboratory in fiscal 2002 with the aim of discovering and utilizing research potentials of local communities and smoothly introducing the research findings to society. The Communications Research Laboratory is scheduled to consolidate with the Telecommunications Advancement Organization of Japan (TAO) in April 2004 to form a new organization, the Info-Communications Research Institute.

2. Implementing Selective R&D

(1) R&D of technologies for achieving ubiquitous networks

With further acceleration of network speed and diversification of network access modes, arrival of a "ubiquitous network society" is anticipated in the future, allowing use of large-capacity applications. A ubiquitous network society, which will be realized through a combination of Japan's highly reputed technologies—optical communications, mobile, and intelligent home appliances—is also expected to contribute greatly to securing international competitiveness. Therefore, in fiscal 2003, the MPHPT commenced R&D of elemental technologies that are indispensable for achieving ubiquitous networks, such as the ultra high-speed, real-time authentication technology and the network technology to coordinate and control an enormous number of terminals.

The electronic tags that are currently used in place of barcodes mainly for physical distribution management and entrance/exit management are expected to serve as a basic tool for ubiquitous networks by developing further linkage with networks in the future. Accordingly, the MPHPT

established the "Research Study Group for High-Level Usage of Electronic Tags in the Age of Ubiquitous Networks" in April 2003 to discuss usage of radio frequencies and policies for utilization of networks.

(2) Prospects for the network robot technology

When the ubiquitous networks connect with the personal robots and industrial robots that are expected to be used at home and offices in the future, new lifestyles will emerge, and it is anticipated that this will contribute not only to solving various social issues, such as the aging and health/nursing care problems, but also to building a new Japan-inspired IT society in the 21st century. In order to clarify the future image of network robots and consider the R&D themes to be undertaken, the MPHPT has held the "Study Group on Network Robot Technology" since December 2002.

(3) R&D of the gigabit network technology

With the goal of realizing an ultra high-speed network at the beginning of this century, the TAO mapped out a gigabit network for R&D purposes (JGN: Japan Gigabit Network) as a nationwide open test bed consisting of an ultra high-speed optical fiber network, which connects ATM switching systems located at 10 locations around Japan and an R&D facility for shared use. Through such measures the organization promotes R&D of the next-generation Internet technology and other ultra high-speed network technologies, as well as advanced application technologies. The above facilities have been widely opened to universities, research institutes, administrative organs, local governments, and private companies from fiscal 1999 to the end of fiscal 2003 for R&D of ultra high-speed network technologies and advanced application technologies.

(4) Promoting R&D on the technologies for further accelerating network speed

With the aim of realizing technologies for accelerating the speed of networks at an early stage, the MPHPT has been promoting "R&D on Ultra High-Speed Photonic Network Technologies" since fiscal 2001 and "Development of a Terabit-Class Super Network" since fiscal 2002 under the collaboration of industry, universities, and the government. In the "R&D on Ultra High-Speed Photonic Network Technologies," development and experiments of elemental technologies were launched in fiscal 2002 based on the results of the designing and trial production conducted in fiscal 2001. The "Development of a Terabit-Class Super Network," on the other hand, commenced the designing and trial production of technologies for promptly processing network accesses from diverse systems.

(5) R&D of information and communications technologies utilizing quantum engineering and nano-technology

Quantum information and communications technologies, which conduct data processing/transmission using the particle quality of electrons and light, and technologies that apply nano-technology and bio-technology to information communications by making use of the substance properties specific to the nano-size are a focus of attention as revolutionary technologies that have the potential to make possible networks equipped with such superior features as encryption communications with guaranteed high security and ultra high-speed communications that surpass optical communications. The MPHPT commenced R&D on quantum encryption technologies, which are expected to be put to practical use in the relatively near future, in the TAO in fiscal 2001 with the cooperation of industry and universities. In order to further enhance the R&D for achieving a breakthrough in information and communications, the MPHPT plans to drive R&D also on the aspect of applying nano-technology and bio-technology to information and communications.

(6) R&D of the time-stamp platform technology

There are increasing needs to identify the precise time at which an online transaction or procedure was made and prove that time to third parties. Moreover, in order to upgrade standard time delivery and time authentication services and to improve their security, it is necessary to promptly promote R&D of technologies for delivery/authentication of the correct time. Thus, the MPHPT has held the "Study Group on R&D related to Standard Time Delivery and Time Authentication Services" since January 2002 and compiled a report in June 2002. In response to this report, the MPHPT has been advancing R&D for establishing the "time-stamp platform technology" since fiscal 2003 in cooperation with industry and universities.

(7) R&D of network-human interface

It is essential to create an environment in which even people who are unfamiliar with information and communications networks can use the networks safely with a sense of reassurance without finding the operations difficult. Therefore, it will become important to resolve the issue of interface between humans and the information and communications networks. The MPHPT established the "Study Group on Network-Human Interface" in March 2002, which drew up a report in July 2002. In response to the report, the MPHPT launched "R&D on Network-human Interface" in fiscal 2003, and carries out practical R&D on network-based automatic translation

systems using cell phones and technologies for preventing the harmful effects of visual images on humans.

(8) Promoting R&D of Natural Vision

R&D of Natural Vision, which is nearly able to reproduce the real colors, texture, 3D appearance, and shine of actual objects based on multiple primary colors exceeding the conventional RGB, has been carried out in the TAO since fiscal 1999 as development of an unprecedented, novel image technology. Since Natural Vision is not only a pioneering technology that will bring science and technology to a higher level, but it is also widely applicable in fields of new service needs, such as remote medical care, e-commerce, and digital archiving, the achievements of this R&D are awaited with high expectations. The elemental technologies for Natural Vision for still images have mostly been established, and prototype systems for textile e-commerce and pathologic diagnosis systems have been created using the technology. The TAO is presently in the phase of conducting experiments for evaluation toward practical application.

(9) R&D of stratospheric platforms

Stratospheric platforms enable the usage of ultra high-speed Internet and multimedia mobile communications anywhere in Japan with the help of automatically operated airships equipped with communications devices suspended in the stratosphere at an altitude of approximately 20 km from the ground in relatively favorable weather. As a consequence, such platforms have garnered much attention as a new form of information and communications infrastructure. Since they can also be used for ground observation by mounting an observation sensor and are open to many other purposes, their wide application is anticipated. Thus, the MPHPT and the Ministry of Education, Culture, Sports, Science and Technology (MEXT) have jointly conducted R&D since fiscal 1998 in cooperation with industry and universities, with the goal of realizing such stratospheric platforms at an early stage. To be more specific, the MPHPT has been responsible for R&D of the communications and broadcasting mission and the tracking control system technology, and conducts the R&D under the direct authority of the TAO.

(10) Advances in space communications

Space communications have many favorable features such as the capability of providing consistent communications throughout the nation, the simultaneous broadcasting capability, and being disaster-proof in nature, and as a result, they have been widely used in areas such as communications, broadcasting, and positioning technology. Considering the role the space communications should play in the information and communications infrastructure, which will be rapidly developed and advanced in the future, the MPHPT promotes development of various demonstrative satellites and satellite experiments as follows for realizing the space communications that will be required in the future: [1] R&D of the Engineering Test Satellite VIII; [2] R&D of ultra high-speed Internet satellites; [3] R&D of the quasi-zenithal satellite; and [4] R&D of the global precipitation measurement (GPM) initiative.

(11) R&D of information and communications technologies for practical application of the next-generation geographic information system (GIS)

A 3D GIS is able to precisely reproduce the landscape of densely built buildings in an urban area on a monitor screen by achieving 3D analysis of geographic information and additionally using urban landscape information. This system is expected to allow people to conduct landscape simulation for city planning and build a disaster information system more effectively. The MPHPT conducted "R&D on information and communications technology for establishment of GIS" toward realizing the 3D GIS from fiscal 1999 to fiscal 2002, and formulated the "Technical Guidelines for 3D GIS" and the "Data Guidelines for 3D GIS."