From the Keynote Speech at C&C User Forum 2004 (2004/12/01)

Toward the Realization of Ubiquitous Society

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1. Most Advanced Ubiquitous Environment in the World

We have already discussed much about the Ubiquitous Environment and now we would like to review what exactly "Ubiquitous" is. "Ubiquitous" is characterized by the possibility of connecting with an object, or "anything." This is in addition to other properties often spoken of, such as "anytime," "anywhere" and "anyone." Moreover, we must create an environment in which these properties can be enjoyed "worldwide" (**Fig. 1**)

As people referred to the year 2004 as "Ubiquitous Year One," an environment deserving of the name "ubiquitous" is actually being developed.

One of the technologies playing an important role in the construction of the ubiquitous environment is the mobile phone, which is the ubiquitous tool that is most familiar to us (**Fig. 2**). In Japan the number of users now exceeds 80 million about 90% of the sets incorporate an Internet connection mode such as "i-mode," and about 60% of them incorporate a digital camera. 3G mobile services have gained about 6 million subscribers in only about half a year and now have a market share of about 30%.

The functions of the mobile phone are undergoing continuous evolution. For instance, the new "i-mode FeliCa service" of NTT DoCoMo Inc. allows your cash to be input and enables payments via a mobile phone. The service is used in various services including payments at automatic vending machines and for electronic ticketing as well as in credit transactions. Functions utilized in these services include the contact-less IC card function, credit function, e-money function and bi-directional communications with POS, automatic vending and check-in machines

Photo 1 Akinobu KANASUGI during speech.

and the use of these advanced functions are expanding more and more.

The second important technology that implements the ubiquitous environment is the wireless broadband technology (**Fig. 3**).

The wireless broadband technology is increasing its speed, coverage and mobility, and the high-speed wireless broadband technologies such as 4G and IEEE802.20 will bring about the convergence of the mobile phone and wireless LAN communication in the future.

For the fixed phone network, the number of broadband contracts in Japan has exceeded 16 million in August 2004, the household penetration rate is more than 30% and the monthly communication fee is the lowest in the world (**Fig. 4**).

What is expected to grow in the future is the next-generation network based on "Optical." According to the mid-term management strategy announced in November 2004, NTT Group will invest 5 trillion yen in

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order to shift 30 million customers from the existing metal wire and fixed telephone network to optical fiber access and next-generation network services by 2010 and will eventually turn all of its 60 million fixed phone customers to optical ones. This means that the next-generation IP network will form the ubiquitous network as an infrastructure for all services. When this leads to the convergence of networks, between voice and next generation IP and between fixed and mobile, the application of information technology in the services will be more extensive than ever.

In fact, web-based business is growing rapidly thanks to its handiness, fixation of data communications rate and broadband communication which allows the pictures of merchandises to be browsed smoothly. Shopping via the mobile phone is also growing, and the Internet-order businesses are really hot as seen with the annual gross merchandise sales of "Rakuten" that has exceeded 100 billion yen. The B-to-C business is expanding smoothly.

The third technology contributing to the development of the ubiquitous environment is that supporting the digital home appliances (**Fig. 5**). In 2003, 1.96 million DVD recorders were shipped, achieving an annual growth of 315%. Other digital appliances including flat screen TVs, digital cameras and digital video cameras will also form the ubiquitous environment when they are connected to the network.

The fourth technology is that of automobiles (**Fig. 6**). Networking of automobiles has been advanced with the ETC, ITS and VICS as well as the car navigation systems. Japan has 70 million automobiles and they are expected to play an important role in the creation of the ubiquitous environment.

Japan is in a position close to the ubiquitous society under the leadership of the world's most demanding

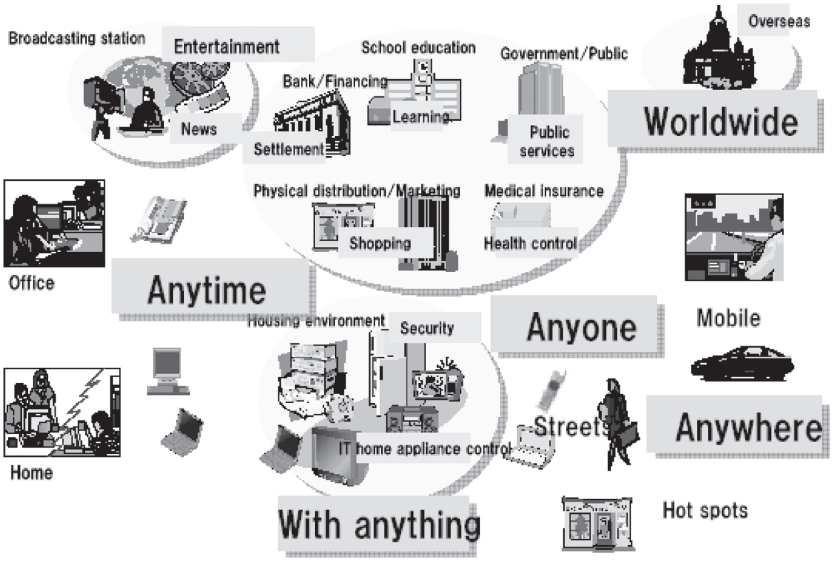

Fig. 1 What is "Ubiquitous"?

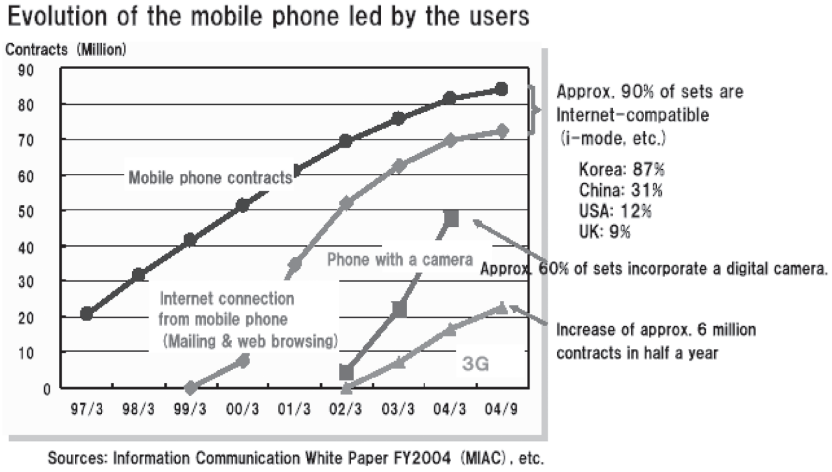

Fig. 2 Preparation of ubiquitous environment (1) mobile phone.

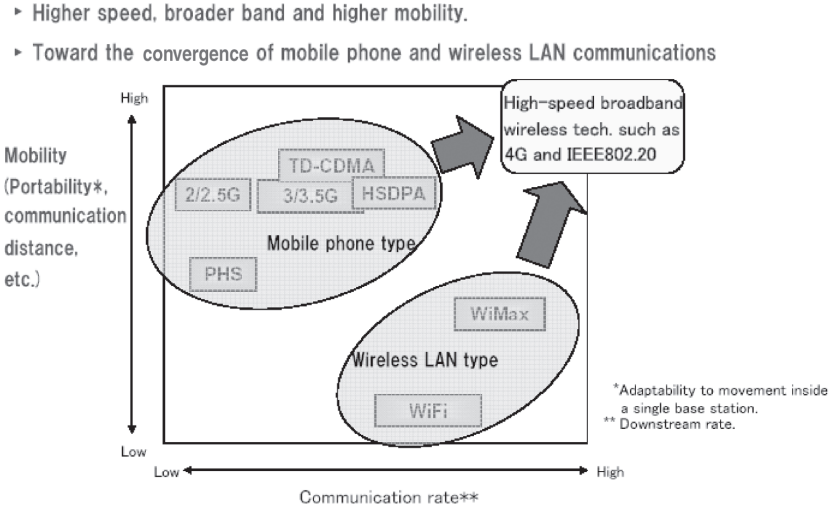

Fig. 3 Advance of wireless broadband technology.

consumers and the preparation of infrastructures under the e-Japan Strategy. The future topics for Japan will be how to make use of the ubiquitous environment and how to create new services and new added value based on it.

2. From the Ubiquitous Environment to the Ubiquitous Society

Now let us anticipate how the ubiquitous society will be.

For the new services oriented to the household and consumer markets, content distribution services will extend the scale backed by the broadband communications (**Fig. 7**). For example, the music download service site "Mora" currently distributes about 70,000 music selections to PC users, but it will increase the scale of distribution to 150,000 selections by the end of March 2005. This site also provides music download services to the owners of network-compatible home appliances through a music distribution infrastructure called "Any Music". "Any Music" is a company established jointly by Sony Corp., Pioneer Corp., Sharp Corp. and Kenwood Corp., and in May 2004 has started an online CD sales service in a tie-up with FM broadcasting stations.

For the implementation of ubiquitous homes, Matsushita Electric Works, Ltd. is experimenting with the "Home Exchange (HX)" featuring IPv6 compatibility.

An example of a new service that targets the "homes" of telecommunication carriers is the "FLET'S PHONE" of the NTT East Japan and West Japan Corporations. This service includes the IP-TV phone communication service, Internet service including mails and websites, and home networking for connection with home appliances. The phone-internet-broadcasting converged service includes the distribution of broadcasting and VOD content through broadband dedicated terminals and many communication carriers are also providing this service.

Meanwhile, the governmental IT strategy has advanced from the "e-Japan Strategy" to the "e-Japan Strategy II" and is expected to convert into the "u-Japan"

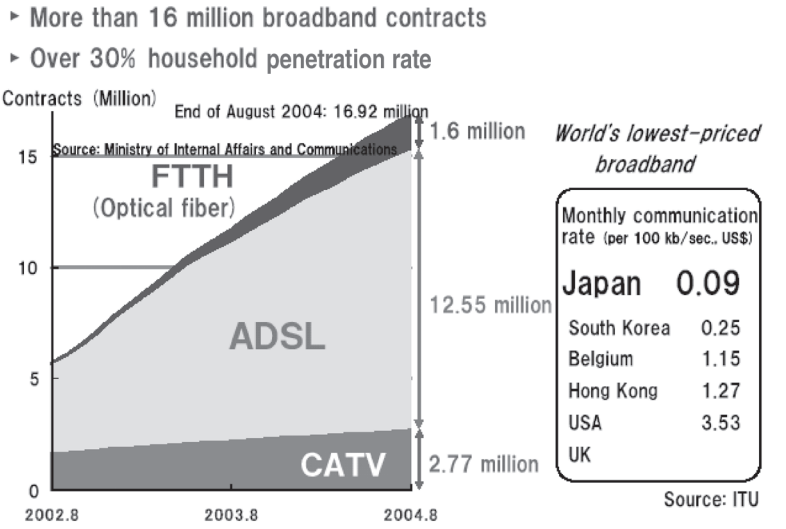

Fig. 4 Preparation of ubiquitous environment (2) broadband.

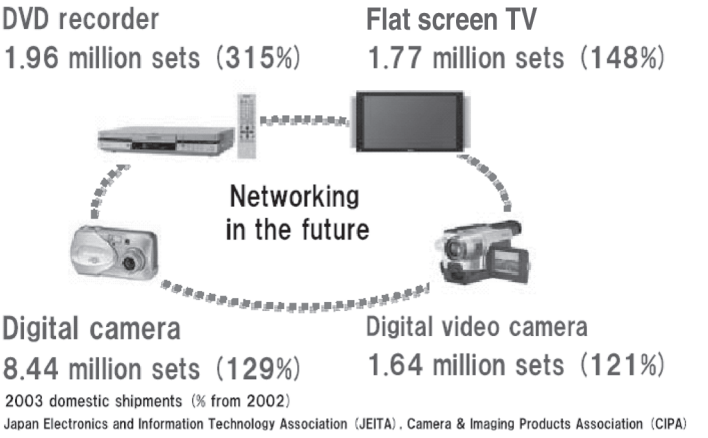

Fig. 5 Preparation of ubiquitous environment (3) digital home appliances.

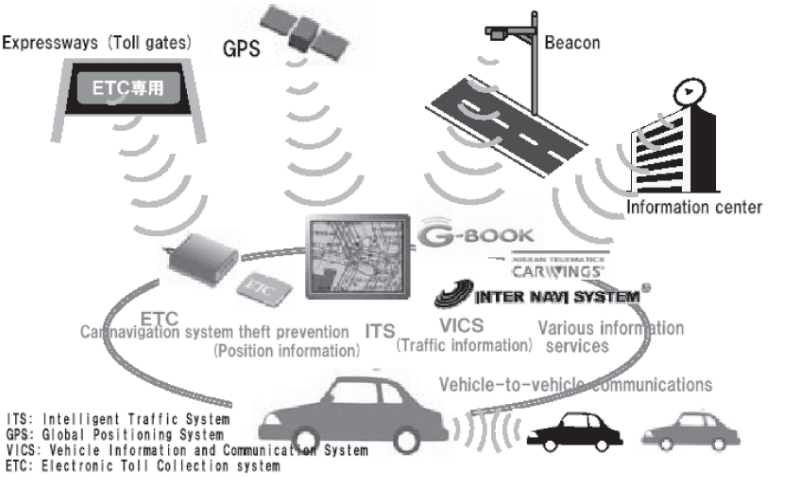

Fig. 6 Preparation of ubiquitous environment (4) automobiles.

Strategy aiming at the realization of a ubiquitous society in which network connection is available for "anyone at anytime and anywhere" (**Fig. 8**)

The preparation of the infrastructures of the e-government and e-municipality has already been completed, together with administrative agency network and the infrastructures for the authentication of individuals, business corporations and administrative institutions.

The ubiquitous society is supported by information security. The Japanese Government therefore has established the "Information Security Policy Conference (tentative name)" and "National Information Security Center (tentative name)" in order to review the system for the enforcement of information security policies in general and to enhance the information security measures of the government.

3. Private Businesses' Efforts for the Active Utilization of "Ubiquitous"

I will explain the orientation of the application of "ubiquitous" from the three viewpoints of "enhancement of customer relations," "real-time management" and "creation of new businesses" (**Fig. 9**).

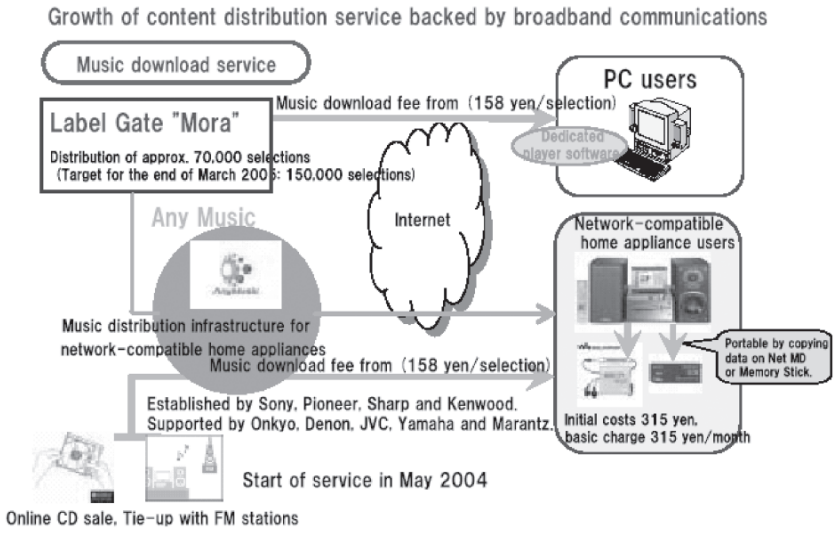

Fig. 7 New services for household/consumer markets.

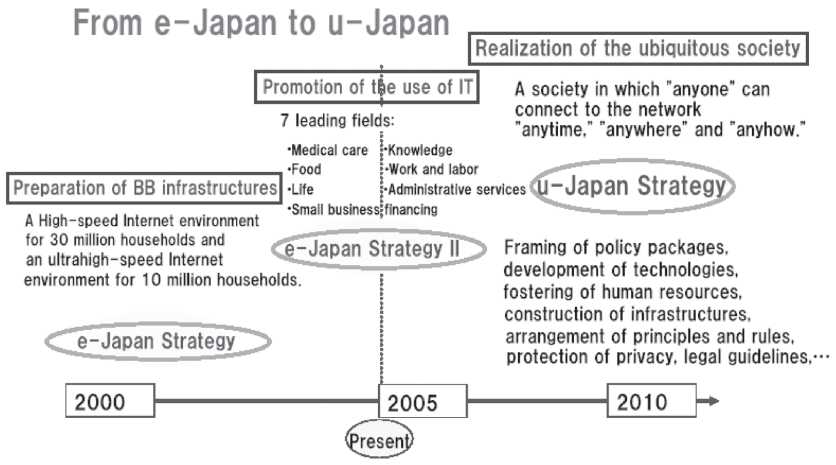

Fig. 8 IT policies for the realization of the ubiquitous society.

(1) Enhancement of Customer Relations

When broadband communication is used in customer relations, for example when it is applied to a house remodeling company, the sales personnel can use it when giving advice on the selection of construction materials or making inquiries on available products (**Fig. 10**). It can also show to the client on a PC, the actual imaging of the client's request or views of the room.

In the case of the NTT DIRECTORY SERVICE Co., which builds Japan's largest-scale IP contact centers with 2,300 operator seats, it has reduced the communication costs by adopting the IP phone, extended the services and arranging a system that can be enhanced flexibly. It manages 44 centers in 23 locations all over Japan integrally from a single data

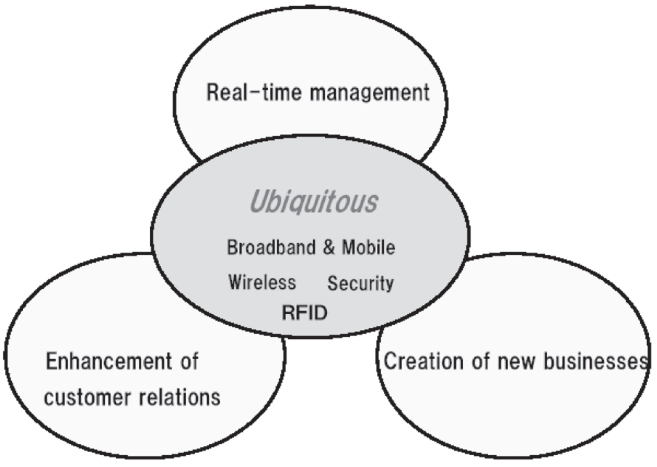

Fig. 9 Three viewpoints of the use of ubiquitous infrastructures.

center.

With regard to cases that attempt to enhance customer relations with the broadband network, a mechanism for feeding back customer and market information to the related in-house system will be built using the next-generation CRM system (**Fig. 11**).

(2) Real-Time Management

Real-time management is implemented by identifying the customer and market trends in real time, ensuring flexibility and speed in meeting changes in the main office, visualizing the supply chain and increasing its speed (**Fig. 12**).

An example of work style innovation based on a broadband office can be seen in the Broadband Solution Center of NEC. This office has seats for only 70% of the total employees, and the remaining 30% of them are expected to access the office securely from outside. Also, a paperless system, free desk system and web conference system are introduced in order to achieve a 75% reduction in the amount of photocopying and a 70% reduction in the number of meetings. The Broadband Solution Center won the "Nikkei Sangyo Shimbun Special Award" in the "2004 Nikkei Monozukuri Grand Prix."

For the use of mobile communication for improvements in efficiency, there is the "UNIVERGE FOMA interlinked solution," which is a mobile centrex allowing a single FOMA mobile phone set to implement a "my office" anywhere, whether it is outside or inside the office. The FOMA N900iL set can easily implement a "my office" because it can be used as a wireless extension line of wireless LAN in the office at the same time as a FOMA cellular phone outside the office (**Fig. 13**).

For the use of the RFID, there is an example of its use in a PC production site. NEC Personal Products, Ltd. has previously been reading 80,000 barcode read operations manually. When this workshop was automated with the RFID, the reading work was able to be eliminated, leading to an improvement in productivity by more than 10% at the same time as an improvement in quality.

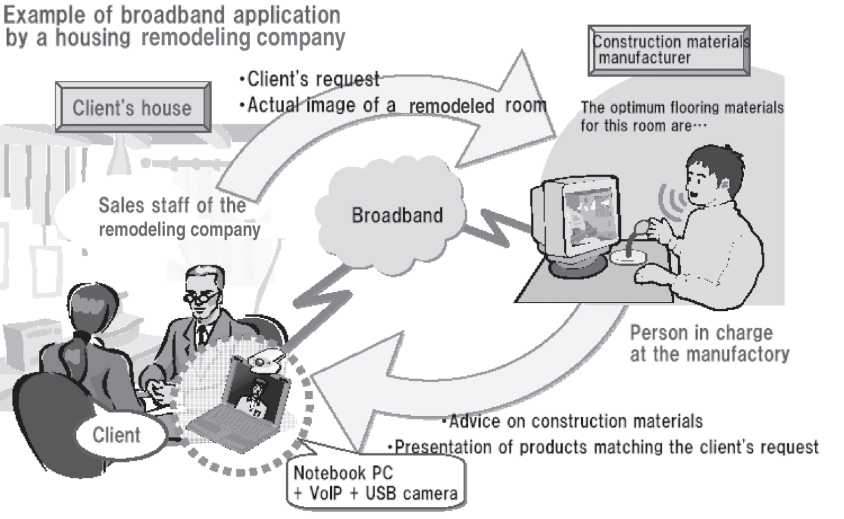

Fig. 10 Application of broadband in customer relations.

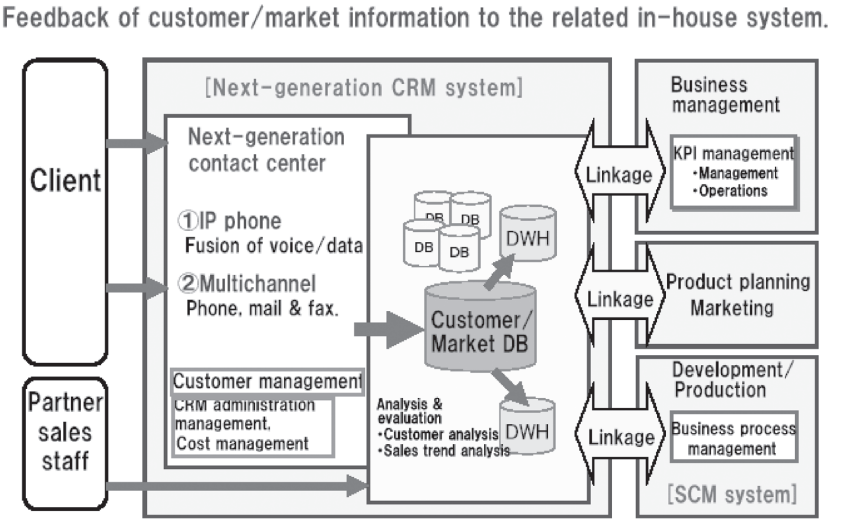

Fig. 11 Enhancement of customer relations with broadband networking.

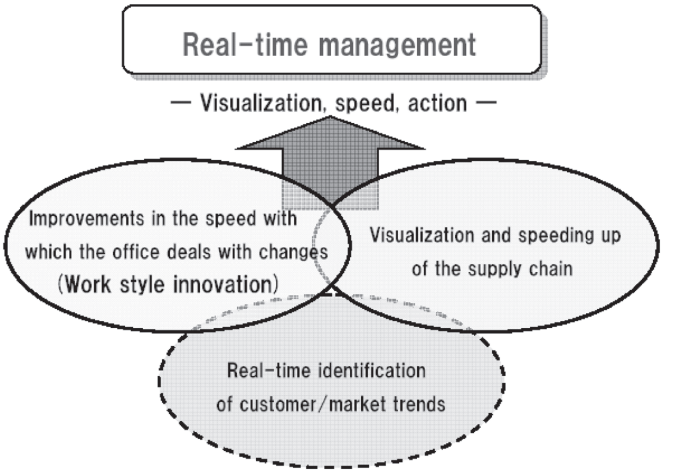

Fig. 12 Ability to respond to charge supports real-time management.

The introduction of RFID was started from logistics and asset management and is expected to be applied to the management of "all items" in the future (**Fig. 14**).

(3) Creation of New Businesses

The creation of new businesses is possible for example by the convergence of broadcasting and communication (**Fig. 15**). NEC has collaborated with the TV Asahi Station in order to implement a bi-directional communication service involving 550,000 online viewers in an audience-participated IQ test program "Test The Nation."

For the collaboration between different business fields based on the Mobile FeliCa service, NEC has developed "Light Holder" that offers an infrastructure for an electronic ticketing service. This middleware enables the connection of a coupon service between stores of different types and expands the potential for acquiring new customers.

The Japanese Ministry of Internal Affairs and Communications estimates that the scale of the ubiquitous network-related market will be 87.6 trillion yen in 2010. It also estimates that the ripple effect on all industries will be as high as 120.5 trillion yen (**Fig. 16**).

The efforts being made by private businesses are expected to promote innovations from the three viewpoints of "enhancement of customer relations," "real-time management" and "creation of new businesses" and to be accelerated by the ubiquitous environment. In other words, this is the acceleration of management innovation by information and communication technology.

From the viewpoint of the information systems department, the above facts mean the importance of the following points.

- Positive use of the broadband network:
  Reduction of communication costs by the promotion of the IP phone.
- Promotion of job efficiency improvements:

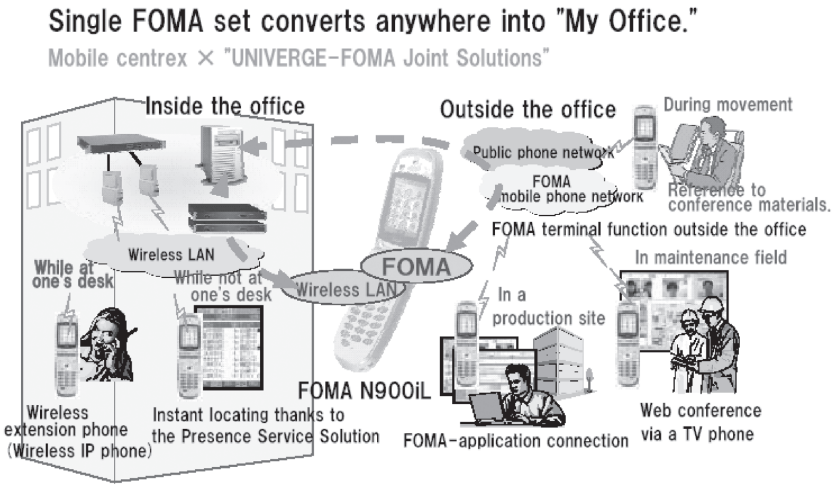

Fig. 13 Mobile communications for improvements in business efficiency.

Introduction of RFID will start with physical distribution management and commodity management (merchandise and office facilities)
⇒The applications are expected to support the management of "everything" in the future.

Physical distribution	General physical distribution management, home delivery, containers, postal services.
Marketing/distribution	Merchandise management, customer management.
Road/traffic	Air and railroad user support, location information, electronic license plates, vehicles.
Foods	Traceability, automated food management, food purchase guidance.
Financing	Prevention of money bills and securities counterfeiting.
Medical care/pharmacy	Medical treatment, support for drugs users, drugs management, hospital management.
Environment	Disposal and recycling.
Education/culture	Library management, cultural assets protection, exhibition guidance, general guidance.
Home information appliances	Remote/automated control of home appliances.
Life & personal use	Commodity management.

Source: "Forum on the Advanced Use of Electronic Tags in the Age of Ubiquitous Networks," Ministry of Internal Affairs and Communications

Fig. 14 Main application fields of RFID.

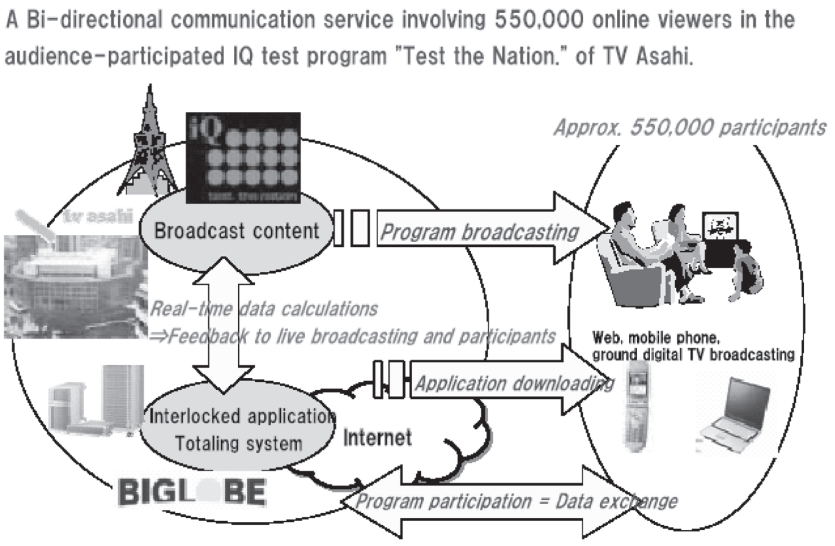

Fig. 15 Creation of new business through the convergence of broadcasting and communication.

Work style innovation with "broadband office." Improvement of manufacturing and processes with RFID, etc.
- Security based on the collaboration of staff departments.
- Creation of new businesses (Collaboration between different industries)

In other words, it is the CIO (Chief Information Officer) that should play the role of the "ubiquitous" promoter from the viewpoint of management.

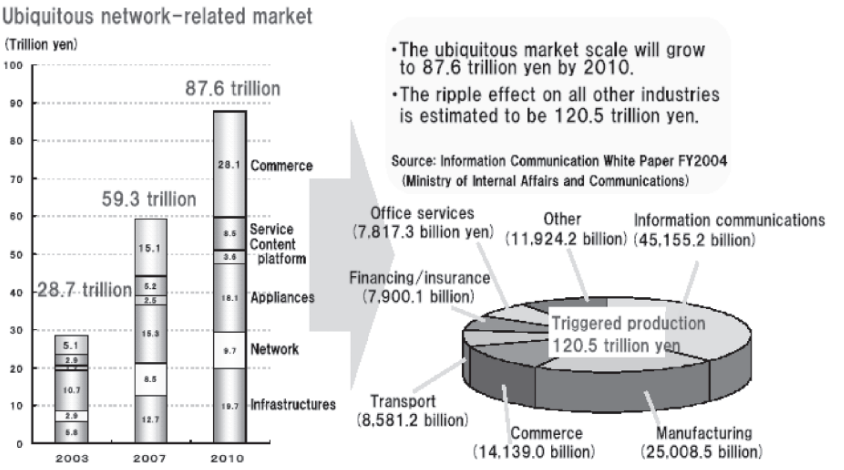

Fig. 16 Expansion of the ubiquitous market and ripple effects.

4. NEC's Efforts during Year 2004

Finally, I would like to introduce the activities of the NEC Corporation in the past year by dividing them according to fields.

(1) R&D

This slide shows the major activities in the field of R&D. Among them, the typical example is the demonstrative experiment of the Business Grid at Mazda Motor Corporation (**Fig. 17**).

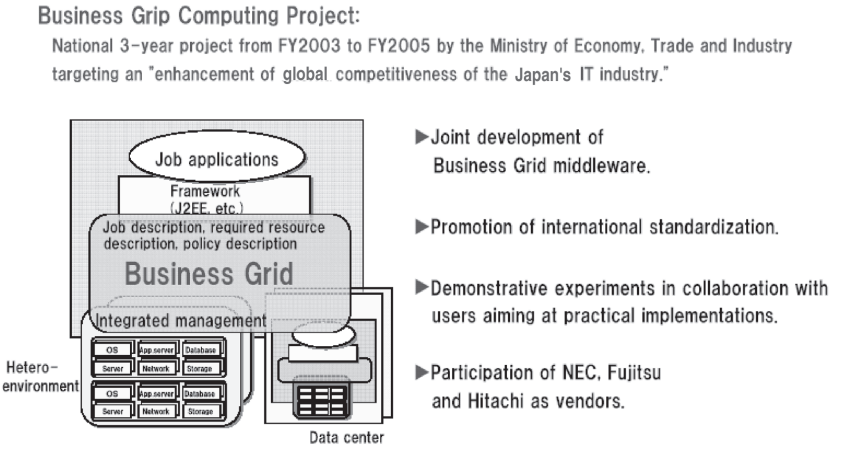

Fig. 17 Business grid demonstrative experiment at Mazda Motor Corp.

Aiming at the "enhancement of global competitiveness of Japan's IT industry," the Japanese Ministry of Economy, Trade and Industry is promoting the Business Grid Computing Project as a 3-year project from fiscal 2003 to fiscal 2005. The demonstrative experiment at Mazda consists of the joint development of business grid middleware, promotion of worldwide standardization and other tests in a tie-up with the users, which is aimed at practical utilization. The vendors participating in this experiment in addition to NEC include Fujitsu Ltd. and Hitachi Ltd.

(2) Platform: Hardware

The released hardware includes the compact VoIP network server model "UNIVERGE i-Express 5800/Lite," new server product "NX7700 Series," world's fastest supercomputer "SX-8" and ACOS Series large mainframe server "i-PX9000."

The line of NEC servers was made seamless up to the high end by adopting hardware incorporating Intel CPUs. Particularly, the blade servers and the ft servers were enhanced with the Express Series models, the mission criticality was enhanced with the NX Series and the inheritance of user assets and open collaboration were enhanced with the i-PX Series.

(3) Platform: Software

NEC systematized application-development software "Ubiquitous Application Infrastructure," released media optimization software "MM-GATE" which received the Software Product of the Year 2004, and enhanced the functionality of middleware product group "VALUMO-ware."

(4) Development of Solutions

For the development of solutions related to broadband, the NEC Broadband Solution Center was opened and the UNIVERGE FOMA interlinked

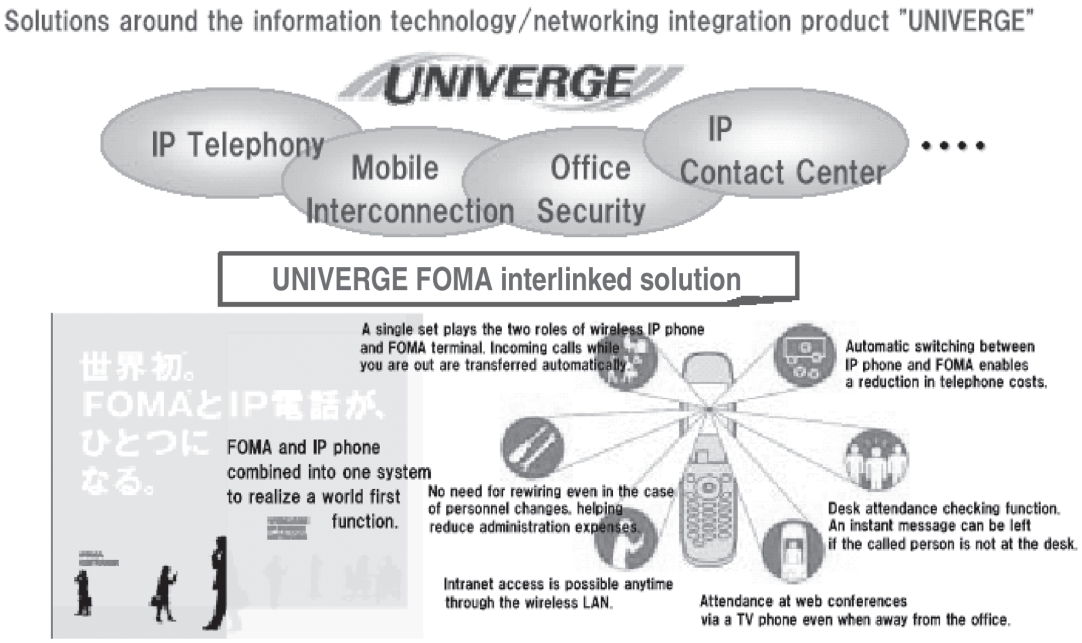

Fig. 18 IT-NW integration: UNIVERGE solutions.

solution and UNIVERGE Mobile Solution were developed. Also, an information leak prevention solution and personal information protection solution were developed as security solutions, and a platform optimizing solution was developed as a platform solution.

UNIVERGE solutions for the integration of information technology and networking such as IP Telephony, Mobile Interconnection, Office Security and IP Contact Center, are provided around the UNIVERGE IT-NW integration products (**Fig. 18**).

(5) Alliance

NEC has established the ALAXALA Networks Corporation jointly with Hitachi Ltd., concluded an agreement on the next-generation SCM with i2 Technologies Inc., and has setup strategic capital cooperation with ABeam Consulting.

The cooperation with ABeam Consulting is aimed at the provision of consistent services, from upstream consultation to system implementation and outsourcing and was announced November 16.

(6) Enhancement of Business Structure

In this field NEC has established N&J Financial Solutions, Inc. NEC Unified Solutions, Inc. and the Automotive Competence Center.

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