

Interim Report on the Study Group on Information Communication Technology for Realizing a Safe and Secure Society (Summary)

I Disaster Control and Risk Management

① Desired information transmission with residents

1/ Utilization of cellular terminals that residents usually take with them in order to promptly and securely communicate warnings and messages at any time and to anyone in the time of disaster.

2/Current status

- The major means for communicating warnings issued by municipalities is the municipal disaster prevention administration radio (Broadcast system). (Establishment rate: 74.6% [as of the end of March 2006])
- Among analog broadcast receivers, about 500,000 units appear to support emergency warning broadcasts. On the other hand, all digital broadcast receivers can receive emergency warning broadcasts while they are turned on.
- Fixed phones and cellular phones are major means of communication with citizens.
- Means for obtaining information while moving to escape disaster are extremely restricted.
- Using two or more means of communication is effective to ensure communication with citizens.

3/ Trends of related technologies

- By around 2015, broadband and multiband will be more popular as a means of mobile communication and the software radio technology will develop. In times of disaster, critical radio communications will be secured with surviving mobile communication networks.
- Larger satellite-borne antennas are expected to improve the transmission rate of satellite cellular phones by several tenfold.
- The technology to automatically start one-segment receivers and the like upon receiving emergency warning broadcast is now at the level of trial production.

4/ Effects

- Communication is ensured whenever and wherever you are, regardless of whether in an underground mall, in a tunnel or under rubble, and whether in a mountainous

region, on an isolated island or on the sea.

- Terminals automatically select an available means of radio communication (e.g., wireless LAN, satellite cellular phones, etc.) on the spot and secures communication.
- Information on the evacuation site to head for, medical institutions and other critical information are provided over the Web and by other means. Citizens can view the site on their cellular terminals and other devices.

5/ Issues to be addressed toward realization

① **Research and development issues**

- Mobile satellite communication broadcasting technology
- Software radio technology
- Technology for general-purpose radio functions and technology for integration between mobile communication networks

② **Demonstration experiments**

- To implement demonstration experiments for disaster control and risk management using Engineering Test Satellite (ETS-VIII)

③ **Power-saving terminals**

Building of social consensus

Improved information literacy

② **Desired key network of the controlling institution**

- 1/ To build the key network for disaster control based on the IP network which is being globally standardized to improve the level of disaster information sharing

2/ Current status

- A dedicated network has been built for each institution and the issue remains in the sharing of disaster information.
- Obsolete networks were designed to be mainly used for the transmission of voice, facsimile and smaller-volume data. The issue remains in the transmission of larger-volume data such as video.

3/ Trends of related technologies

- At present in ITU, network standardization is being promoted that aims at providing a wide-range multimedia video and data service as well as VOIP and securing QoS. The total architecture and the scenario to move to a telephone network have been recommended in the middle of 2006, and discussions on video and other services will be

promoted thereafter.

- By around 2010, cellular phone networks will be more and more IP-based in addition to fixed phone networks, which will allow the seamless use of fixed and cellular phone networks.

- By around 2015, it is expected to be a social infrastructure that is convenient and stable at the same time, as well as being highly resistant to disasters and cyber terrorism.

4/ Effects

- The minimum of communication is secured at the cost of communication quality by implementing a flexible line control.

- Compatibility between advanced functions and economic efficiency through the use of commercial-off-the-shelf devices and technologies.

5/ Issues to be addressed toward realization

① **Research and development issues**

- IP network technology

(Technology for securing communication quality, technology for improving fault-resiliency, technology that enables, as required, cooperation with institutional networks that require a particularly high security, etc.)

② **To reduce the operating cost by enabling the use of the network for administrative services also in usual situations.**

③ **Desired mutual mobile communication of the controlling institution**

1/Mutual communication at disaster sites was realized through a new radio communication technology that enables large-volume communication, including videos, in a mobile environment.

2/ Current status

- The mutual communication wave for disaster prevention that allows mutual communication between fire service, police, Coast Guard and Defense Agency has been established and is being expanded. However, it is still insufficient.

- As for radio used in the public sector, broadband and mobile transmission have not

been fully addressed.

3/Trends of related technologies

- By around 2010, broadband-based radio as requested in the public sector area will be discussed and it will reach the technological level that enables the realization of a radio communication system of, at the least, higher technology than the current cellular phones.

- By around 2010, the achievements of the basic experiments and application experiments using ETS-VIII will establish an element technology for satellite communication terminals which are small enough not to hamper activities at disaster sites.

4/ Effects

- Large-volume communication including video is now available in the mobile environment.

- Collected information is promptly and securely distributed to and shared by related institutions and sites.

- A wide area is covered that includes isolated islands and mountainous regions.

- Critical communications will be secured in case the ground network is damaged.

5/ Issues to be addressed toward realization

① **Research and development issues**

- New digital technologies for disaster prevention communication

(Mobile broadband technology in the VHF/UHF bands, etc.)

- Ad-hoc network technology

- Mobile satellite communication technology

② **Demonstration experiments**

- Demonstration experiments for disaster control and risk management using Engineering Test Satellite (ETS-VIII) were implemented.

- Demonstration experiments were implemented for disaster prevention applications sharable among local governments by building a model that realizes the collection and sharing of video from devastated sites, etc.

④ **Desired information collection**

1/ To directly transmit video shot from helicopters and other aircraft to disaster control

headquarters without leaving any blank areas. Image information on devastated sites is available within 90 minutes, even in bad conditions such as during the night, in stormy weather, or in smoke.

A nation-wide sensor information network collects data from several ten thousands of ground observation stations.

2/ Current status

- Real-time transmission of video from devastated sites by helicopters and other aircraft is available only in the areas covered by receiver facilities or after portable receiver facilities are carried in and installed (currently video recording is implemented).
- Video radar technology that enables shooting of devastated sites at a resolution of 1 m or finer has not been realized yet.
- Data collection from sensors involves increased fear of crowded and devastated communication lines as the number of sensors increases.

3/Trends of related technologies

- The basic technology for using satellite communication has been verified. Once reduction is achieved in size and weight as well as cost, practical application is expected for the transmission of moving images at the rate of 1.5Mbps for helicopters and 8Mbps for airplanes.
- By around 2015, onboard processing of aircraft video radar will be available with a resolution of about 30cm.
- The battery life of low-power terrestrial sensors has improved to a twenty-year level.
- A system is expected that enables batch collection of various sensor information from those at a lower rate to those at a higher rate via communication satellites.

4/ Effects

- Video shot from helicopters and aircrafts can be transmitted in real-time without being affected by the devastated conditions of terrestrial receiver facilities at the sites.
- Images of devastated sites can be obtained earlier without being affected by conditions such as darkness, stormy weather, trees or smoke.
- Information obtained by ground observation stations, ocean buoys and fixed-point cameras are automatically collected real-time.

5/ Issues to be addressed toward realization

① Research and development issues

- Technology for transmitting real-time video from helicopters and aircrafts.
- Remote sensing technology (SAR technology for aircrafts and observation satellite technology, etc.)

- Sensor network technology

② **Demonstration experiments**

- Implementation of demonstration experiments using Wideband InterNetworking engineering test and Demonstration Satellite (WINDS)

③ **Reduction of operational costs through integrated maintenance and operation with the watch system for assuring the security and safety of children and elderly people.**

⑤ Desired information processing

1/ To utilize the Geographic Information System (GIS) to categorize and analyze a huge amount of information and present it in an easily understandable manner.

To automatically process disaster information that is generated every second and analyze it through knowledge processing, etc. to produce useful summary information.

To utilize the state-of-the-art ubiquitous network technology for disaster control.

2/ Current status

- GIS for 2D information has been commercialized. Studies are now underway on 3D GIS and GIS in which the concept of time is introduced.

- The Disaster Information System (DIS) that distributes information on gas supply stops, power supply stops, spatial seismic intensity distribution and other data over the central disaster prevention radio network has been operating.

It is now used in institutions that subscribed to central disaster prevention radio.

- Demonstration experiments that collect data by attaching electronic tags on burnt sections, destruction judgment, and the number of people who need rescue at some places have been implemented at the disaster control headquarters by using a wireless LAN ad hoc network at sites. They have not yet reached the level of practical use.

3/Trends of related technologies

- Geographic Information System (GIS) has started practical application since combination of multi data and ground surface information has been developed.
- By around 2015, the cost of electronic tags will considerably decrease, and thus they are expected to be attached to locations in addition to goods and used as a bulletin board.

4/ Effects

- Information that is useful for disaster control, such as upper atmosphere observation data in addition to ground-surface and terrestrial geographic information, is organized, analyzed and displayed by the GIS technology in a manner that is easy to understand. This can be used to improve the precision of damage prediction.
- A huge amount of information generated from the Internet is analyzed through information processing, knowledge processing and image recognition, and then automatically processed into a variety of useful summary information.
- State-of-the-art ubiquitous network technologies such as electronic tags are also utilized for disaster control.

5/ Issues to be addressed toward realization

○ **Research and development issues**

- GIS technology
- Automatic information analysis and integration technology
- Ubiquitous network technology

○ **Standardization of data formats**

○ **Securing robustness, stability, safety, reliability, durability and repairability against disasters and disorders.**

Examples for realizing the desired information communication system

1/ Communication satellite

2/Flexible communication device reconfiguration technology

3/ Communication satellite

4/ Digital radio technology

5/ Office of the Prime Minister, related ministries and agencies, etc.

6/Prefectures

7/GIS technology

8/Disaster control headquarters, etc.

9/Municipalities

10/(Mutual cooperation)

11/Full IP disaster prevention communication network

12/Fire stations, police stations, etc.

13/Collecting information on status of devastation in a narrow area (voices, photos and screen images)

- 14/Ad hoc disaster prevention radio communication technology
- 15/(man-to-man communication)
- 16/(Mutual communication)
- 17/Urban environment monitoring technology
- 18/Ad hoc devastation status monitoring sensor network
- 19/Distribution of information to devastated people on the fate of people, the disaster and evacuation
- 20/ Electronic tag technology for collecting devastation status information
- 21/Devastated people
- 22/Broadcast satellite
- 23/(Security and robustness)
- 24/Communication satellite
- 25/Small-sized receiver antenna
- 26/Wireless LAN one-segment service
- 27/Wide-area information in fine weather and during daytime
- 28/(Helicopter television and satellite communication, etc.)
- 29/People having trouble in getting home
- 30/Wide-area information on volcanic fumes, rain and night hours
- 31/(Real-time video radar technology)
- 32/Wide-area information (satellite observation technology)

II. Food Security and Safety

1. Current status

(1) Trend in recent years

- Confidence in food safety was shaken due to the problems of mislabeling, tampering and agricultural chemical residues, etc.
- The environment has changed due to widening and globalization of food distribution, emergence of new hazardous factors such as enterohemorrhagic *Escherichia coli* O157 and Bovine Spongiform Encephalopathy (BSE), and development of new technologies including gene recombination technology.

(2) Efforts in the food industry

- Food labeling based on standards such as JAS
- Manufacturing management based on hygiene management methods such as HACCP

(*1)

- Traceability based on standards such as ISO 22000

*1 HACCP

The abbreviation for Hazard Analysis Critical Control Point. A hygiene management method to guarantee higher food safety through monitoring focused on critical processes in manufacturing.

*2 ISO22000

The international standard developed by ISO for food safety management. It adopted the HACCP risk analysis method for food safety hazards and the ISO9001 management system concept.

(3) Characteristics of the food industry

- Low revenue structure
- Great difference in the business sizes of manufacturers and business operators
- Production and distribution chains with complicated routes
- Increased imported foodstuff and food products

2. Issues to be addressed

(1) More sophisticated production and distribution management

- Realization of traceability systems that accompany the cost merits of production and distribution management.

(2) Interconnectivity between databases

- Realization of database interconnectivity between business operators in complex production and distribution chains

(3) Establishment of desired relationships between consumers and business operators

- Elimination of discrepancies between the information provided by business operators and that desired by consumers
- Identification of definitions regarding food security and safety
- Identification of role sharing among operators, administration and consumers

(4) Detection of hazardous factors

- For food security and safety, it is necessary to detect not only the historical information on production and distribution but also the hazardous factors such as harmful microorganisms and chemical substances.

3. Future perspective

(1) Securing food security

- To provide information in a form that is easy for consumers to understand by attaching electronic tags and 2D codes to foodstuff and food products, including highly processed food and imported foodstuff, which have high consumer needs so as to make them traceable.

(2) Securing food safety

- To improve product freshness management by linking a combination of electronic tags and sensors with the temperature control system of refrigerator-freezers and operation management systems.

- Real-time quality control will be realized by incorporating biosensors to detect contamination by biological or chemical foreign materials as well as to note the expiration of fresh food products. In turn, this will realize a prompt and efficient callback of defective products.

4. Promotion measures for the future

(1) Development of a system for securing food security and safety

- Research and development of ubiquitous technologies, technologies for utilizing electronic tags and sensor network technologies aimed at the realization of a

traceability system

- Research and development of the biosensor technology aimed at the detection of hazardous factors and the realization of a callback system

(2) Securing of interconnectivity, operability and security

- Implementation of development that enables interconnection and interoperation, and publishing of the achievements to make them available to everyone.
- Utilization of technology for preventing information falsification and reviewing of the guideline for protecting privacy

(3) Promotion of wisdom-sharing and people's understanding regarding food security and safety

- Visualization through creating a database of wisdom regarding food safety
- Building relationships which allow consumers and producers to see each other individually, including risk communications.

(4) Promotion of dissemination

- **Development of a packaged easy-to-introduce system** as well as publication of software for securing the compatibility of the system
- Development and dissemination of cellular phones incorporating an electronic tag leader
- Implementation of demonstration experiments involving consumers through cooperation with related ministries

III. Support for Daily Lives of Children and Elderly People

1. **Current status**

(1) Assuring the security and safety of children

- Parents' unease is expanded due to the increase in the number of brutal crimes in addition to accidents
- Trend toward nuclear families, increase in the number of double-income households and weakened relationship with local communities
- Decreased watch by adults' eyes due to expanded commuting areas
- Increased cases of being involved in crimes due to access to undesirable information

(2) Assuring the security and safety of elderly people

- Increased number of single old people and households consisting of only elderly people in the coming aged society
- Change in the nursing system per se (from facilities to homes) and the current status of nursing sites (shortage of manpower, feeling that "nursing should be done by human beings")
- Expanded opportunities for elderly people to demonstrate their abilities associated with the increase in average life expectancy

2. Issues to be addressed

(1) Assuring the security and safety of children

- Scope of responsibility for assuring security and safety, and identification of the roles to play
- Transmission and sharing of information among schools, administrative institutions and homes
- Securing of the means for sharing information and improvement of awareness toward assuring security and safety

(2) Assuring the security and safety of elderly people

- Scope of responsibility for assuring security and safety, and identification of the roles to play
- Establishment of a system for watching and understanding changes in elderly people as well as fostering of the ability of elderly people to ask for assistance from people nearby
- Improvement of environment in which elderly people can use the information communication technology

(3) Issues common to children and elderly people

- Assuring of security and **protection of privacy**
- Consideration to the people to be watched

3. **Future perspective**

- ① Always locating children and elderly people wherever they are by watch boxes (a set of electronic tag reader, camera and sensor) installed all over the city. Also, securing them from traffic accidents through interaction with ITS and other technologies
- ② Realizing entry and exit control at schools and facilities through the combination of two or more technologies, such as biometrics and possessing of tags
- ③ Realizing daily surveillance of the health condition and other elements of elderly people who need care or who live in remote regions. In case any abnormality is detected, notice will automatically be provided to medical doctors, caregivers, volunteers in the neighborhood and family members.
- ④ Preventing crimes such as billing fraud by automatically determining the content of phone conversations based on past events and the ongoing conversation.
- ⑤ Self-reliance support for elderly people by increasing opportunities for them to participate in society through the provision of new user interfaces.

4. **Promotion measures in the future**

- (1) Solving technical issues
 - Strongly driving research and development for practical application of ubiquitous network technologies, the ITS technology and technologies for universal design by 2010.
- (2) Assuring security and **protecting privacy**
 - Realizing a system that can control detailed information for each individual and preparing an environment that allows anyone to easily use system introduction cases
 - Developing a guideline for protecting privacy in the watch system
- (3) Promoting area-integrated demonstration experiments
 - While driving demonstration experiments integrated with people living in the region to realize a system that meets regional needs, building a social consensus on the construction of the new system
- (4) Promoting the use and dissemination of support
 - Timely updating and publishing of system introduction cases
 - Considering improvement and application as a system shared with the disaster prevention sector. Also, considering covering the system by subsidies and aid