





Special Feature

Promoting the Advancement of Broadcasting Services: the Road Map to 4K and 8K

Media, Culture and Industry in the 4K/8K Smart TV Era —The Prospects of Broadcasting—

New Breeze Vol. 26 No. 2 Spring

New Breeze ISSN 0915-3160 Quarterly of the ITU Association of Japan BN Gyoem Bldg., 1-17-11 Shinjuku, Shinjuku-ku, Tokyo 160-0022 Japan Tel: +81-3-5357-7610 Fax: +81-3-3356-8170 http://www.ituaj.jp/english/

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Publisher: Michiaki Ogasawara Editors: Yuzo Mori Atsuko Ishii

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Subscription forms are available on the ITU-AJ website: http://www.ituaj.jp/english/subscription_form.pdf

Subscription Fee:

Single issue: Annual subscription (4 issues):

¥1,500 ¥6,000

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About the ITU-AJ

The ITU Association of Japan (ITU-AJ) was founded on September 1, 1971, to coordinate Japanese activities in the telecommunication and broadcasting sectors with international activities. Today, the principle activities of the ITU-AJ are to cooperate in various activities of international organizations such as the ITU and to disseminate information about them. The Association also aims to help developing countries by supporting technical assistance, as well as by taking part in general international cooperation, mainly through the Asia-Pacific Telecommunity (APT), so as to contribute to the advance of the telecommunications and broadcasting throughout the world.

Toward Flexibility for a New Wireless Age

Wireless technology has come to be regarded as an indispensable means for making the society of the twenty-first century better, safer, and more convenient. However, issues raised by emerging technologies are becoming ever more numerous, complicated, and time-consuming.

Through his experience in ITU activities, Dr. ITO feels that the world is changing faster than we think and that the Radio Regulations Board has an increasingly important role to play in balancing the requirements of purely regulatory aspects and business. He strongly believes that this objective can only be achieved through the flexible and thoughtful application of radio regulations.

Background to Dr. ITO's Candidacy for Re-Election

Dr. ITO has 25 years' experience in R&D laboratories and 15 years' experience in actual business. He served as Executive Vice President & CTO of KDDI from 2005 to 2009, piloting the company's entire engineering activities.

After his long career in the telecommunication business, Dr. ITO was elected as a member of the Radio Regulations Board in 2010, receiving the highest number of votes in the Asian region.

Dr. ITO has been extremely active in ITU work over the years and has played a leading role in the World Radiocommunication Conference (WRC) and Radiocommunication Assembly (RA). During his long tenure as Chair of the ITU-R Study Group 4 from 1997 to 2003, he earned wide respect for being a most impartial chairperson.

After being elected as a member of the RRB, Dr. ITO has contributed to making decisions on important subjects, proposing fundamental ideas to interpret the provisions of the Radio Regulations taking into account the spirit of the ITU Constitution.

In view of this wealth of experience, and the emergence of new environments in radiocommunication, Dr. ITO is very well qualified to serve as a Board Member of the ITU.

Professional Experience

2007–present: Chairman of the Board, KDDI Foundation 2007–9: Chairman of the Board, KDDI Laboratories 2005–9: Executive Vice President of KDDI Co., Ltd. 2002–5: COO, Solution Sector, KDDI 2000–2: Managing Director, Engineering & Mobile 1995–2000: General Manager, Wireless Business of KDD 1970–95: R&D Laboratories, KDD



Dr. Yasuhiko Ito

ITU Experience

- Radio Regulation Board (2011-present)
- Chairman, Radiocommunication Assembly (2003)
- Chairman, SG4, ITU-R (1997-2003)
- Vice-Chairman, SG4, ITU-R (1993-97)
- Chairman, WG 5B, WRC-97
- Chairman, WG 5C, WRC-95
- Chairman, WG 4A, WARC-ORB88

Education

- 1981 PhD, Waseda University, Japan
- 1976 Master of Electrical Engineering, Princeton University, USA
- 1971 Master of Engineering, Waseda University, Japan
- 1969 Bachelor of Engineering, Waseda University, Japan

Publications (in Japanese)

Low Earth Orbit Satellite Telecommunication Systems (IEICE, Japan, 1999)

Basics and Applications in Satellite Communications (Baifukan, Japan, 1996)

International Telecommunication Networks (IEICE, Japan, 1994)

Awards

Japanese Government's Medal of Honor with Purple Ribbon in recognition of his numerous telecom achievements and contributions, 2004

ITU Silver Medal in recognition of his contributions to ITU-R, 2003

Promoting the Advancement of Broadcasting Services: the Road Map to 4K and 8K

1. Changes in the environment surrounding broadcasting

About sixty years have passed since the start of terrestrial TV broadcasting in 1953. Since then, other services such as satellite broadcasting and cable TV have also been introduced, and these have evolved into digital multi-channel services. At the end of March 2012, the digital switch-over of terrestrial broadcasting was completed. Broadcasting has become fully digital, and an infrastructure that allows the viewing of high-quality HD broadcasts has been set up. Meanwhile, broadband communication networks have also been set up. These provide an environment that supports services such as Smart TV with full collaboration between broadcasting and communication.

However, in the broadcasting-related market and the market for television receivers, the digital terrestrial switch-over caused demand to surge in the domestic markets due to people replacing their old televisions, and as a result the number of TV sets shipped annually since the start of digital broadcasting has plummeted to about 60% of its level before the switch-over. In the global market, the share of Japanese manufacturers has declined from a hitherto dominant position, and Korean and Chinese manufacturers and now in ascendency.

In television viewing trends, the spread of new technologies such as tablets, smart phones and Internet video distribution services has made it possible to use video distribution services with a diverse range of agents and transmission paths. It could be said that the younger generation in particular are moving away from the old era of families sitting around the TV into a new era



Satellite and Regional Broadcasting Division Information and Communications Bureau Ministry of Internal Affairs and Communications

where people are watching more but spend less time in front of the television.

For broadcasting and related services to continue meeting the needs of viewers amid these upheavals in infrastructure, markets and so on, it is becoming necessary to exploit new technologies to offer interesting broadcast programs and services with higher picture resolution and enhanced functionality.

2. Enhanced picture quality: The appeal of 4K and 8K

Although current digital broadcasting is referred to as highdefinition television, video systems with higher resolution have already appeared, and two video formats were standardized by the ITU-R in 2006. Since these formats respectively have about 4,000 and 8,000 pixels in the horizontal direction, they are referred to as "4K" and "8K" (current Full HD video is designated as "2K").

These formats provide highly detailed and ultra-sharp video pictures, since 4K has four times as many pixels as 2K, and 8K has sixteen times as many. 4K is already making inroads into movies, and compatible products such as cameras and projectors are now commercially available. Some 4K videos have even appeared on Internet content delivery services such as YouTube. Television receivers equipped with 4K compatible displays are already available from manufacturers in Japan and overseas. Even in Japan, large-screen televisions (37 inches or more) now account for over 30% of the televisions shipped annually and there is a growing demand for high-definition displays, resulting in gradual sales growth and hopes of a recovery in demand. The display



resolution of tablets and smart phones has also been increasing, and there is reckoned to be a large latent demand from users who want high-quality video services.

On the other hand, NHK has spent many years researching and developing 8K technology. 8K is said to be the ultimate two-dimensional resolution that can be distinguished by the human eye, resulting in highly immersive and realistic images when shown on a large screen. 8K television receivers are still at the prototype and testing stages, but were enthusiastically received at public viewings held during the 2012 London Olympics and Paralympics and this year's Sochi Olympics and Paralympics.

The 4K and 8K video standards do not simply call for more pixels and higher resolution, but also specify a wider color gamut with more gradation levels, allowing them to display images of objects that look just like the real thing, and offering viewers new experiences and emotions. Concerned parties have already started researching how to exploit the compelling nature of this technology across a range of genres where objects and events can be presented with a sense of presence, such as dynamic sports action, fine architecture, or the detailed structure of precious works of art.

When employing Smart TV functions to make use of large amounts of information at a time by combining television broadcast programs with data from the Internet, it is possible to provide a clear picture on large-screen displays, which can be said to have the merit of high definition.

In August 2012, the ITU-R established recommendations for video formats in ultra-high definition broadcasting. Also, since video compression technology is a key requirement for sending high-definition, high-capacity video data by broadcasting or communications, international standards for next-generation compression and coding methods were issued in April 2013. Due to this sort of progress in the international standardization of important related technologies, various countries and businesses have started on the development of related products and the like, and it can be said that efforts to develop new products for the implementation of 4K and 8K video services have started to gain pace.

3. Preparation of a road map by the investigative committee for the advancement of broadcasting services

Work is already being done by related businesses in various countries — especially South Korea and Europe — regarding the enhancement of broadcast services for next-generation broadcasting technologies such as 4K and 8K. There are also increasing efforts being made in connection with services other than broadcasting. Things are changing in this field at a remarkable pace, and intense competition is predicted. Japan needs to make the best use of its technological strength in the field of audio-visual services without falling behind the movements of other countries, and should accelerate and promote efforts aimed at the introduction of advanced broadcasting services.

In recognition of this, the Ministry of Internal Affairs and Communications (MIC) set up an Investigative committee for the advancement of broadcasting services in November 2012, and on June 11, 2013 it formulated and published a road map obtained in the early implementation of 4K and 8K broadcasting.

Specifically, it investigated the transmission paths to be used (satellite broadcasting, cable TV, etc.), the schedule for the introduction of next-generation broadcasting services, the agents involved in their implementation, and the like, and set forth targets to be worked on in partnership with concerned parties.

First, as the transmission path used for 4K and 8K broadcasts,

it was decided that experimental broadcasting would start in satellite broadcasting where the constraints such as frequency availability are relatively relaxed, and that efforts would also be made simultaneously on broadcasting by cable networks and IPTV. The idea is to respond to the needs of users, such as those wishing to receive advanced services without affecting the viewers of broadcast services such as terrestrial and satellite TV.

Regarding the schedule for the introduction of next-generation broadcasting services, the decision was made to promote the spread of television receivers by targeting years when international sports events of interest to viewers would be held. Specifically, targets were set for 2014 (Brazil World Cup), 2016 (Rio de Janeiro Olympics and Paralympics), and 2020, and to accelerate the necessary technical verification and other requirements for the start of broadcasting while keeping an eye on technological trends. The aim is to have experimental 4K broadcasts starting in 2014 and 8K broadcasts starting in 2016, paving the way for full-scale broadcasting of both 4K and 8K by 2020.

In September 2013, after establishing this road map, the resolve of related organizations to steadily realize these goals was strengthened by the decision to hold the 2020 Olympics and Paralympics in Tokyo.

4. All-Japan promotion — Next Generation Television & Broadcasting Promotion Forum

This road map is a considerable challenge, since it pushes forward the start of broadcasting targeted by industries by at least two years. In the investigative committee, to achieve an early launch, it was pointed out that it is essential for the concerned parties to cooperate in preparing a promotional system to achieve the pooling of Japan's resources relating to this field. As a part of this, "Next Generation Television & Broadcasting Promotion Forum" was established in May 2013 with the participation of 21 businesses including broadcasters, manufacturers and communications providers. Subsequently, an even wider range of concerned parties took part in this initiative, and there are now 42 businesses playing an active role (details will appear in the next paper). In addition to work commissioned by the MIC and technical verifications performed by constructing a test bed (experimental platform), the forum also carries out activities such as content production trials to produce content for test broadcasts, and accumulating and sharing know-how, and is the driving force for the steady implementation of the road map. In the future, it is expected that individual broadcasters will advance to the stage of working on 4K and 8K services as the business of each company.

5. Potential applications of 4K and 8K

It is expected that 4K and 8K ultra-high-definition video technology will be used not only in broadcasting but also in diverse video delivery services but also in various business fields where video is used to assist with medical treatment, education, design, crime prevention and the like. For example, in the medical field it is possible to provide solutions by using 4K and 8K technology in situations where high-resolution video is required, such as endoscopy or the monitoring of surgical procedures. We hope to promote 4K and 8K technology for use in BtoB applications in the business field, and this possibility is also being investigated by Next Generation Television & Broadcasting Promotion Forum. By using the early introduction of this technology into the business field as a way of generating momentum, and by promoting its use in a wide range of business fields, we expect to hasten reductions in the cost of related equipment, thereby accelerating the spread of this technology in other fields like broadcasting.

6. Initiatives of the MIC

The MIC is putting its weight behind private-sector initiatives such as these, thereby promoting the relaxation of budgets and the implementation of necessary systems.

3.1 billion yen was allocated in the FY2012 supplementary budget for the operation of a next-generation satellite broadcasting test bed, and this work was entrusted to and promoted by the next-generation broadcasting promotion forum. A further 1.55 billion yen was allocated in the supplementary budget for FY2013, showing support for the steady future implementation of the road map. We therefore think it would be worth measuring indicators such as the level of activation in the broadcast-related market.

Regarding the technical criteria that are necessary for the implementation of 4K and 8K broadcasting in Japan, the telecommunications council is proceeding with investigations based on the purpose of the road map and on the schedule for the introduction of next-generation broadcasting services, and is planning initiatives such as a revision of the required technical standards.

The promotion of 4K and 8K broadcasting is connected with the next-generation infrastructure for broadcasting itself, and leads one to consider the future form of broadcasting and related services. Consequently, as with the digital switch-over of terrestrial broadcasting, it is important to proceed carefully while obtaining the consent not only of broadcasting stations but also of manufacturers, distributors, and ordinary citizens including viewers and users. Unlike the digital switch-over, people are not being asked to switch over during a fixed period. However, it is necessary to buy a new TV set in order to receive the new services, and to make things as smooth as possible for viewers, it is important to provide them with the information they need, whenever they need it. It is also important for broadcasters to publicize their future service plans so as to smoothly implement investment and planning measures such as updating their facilities. Finally, although this is a matter for the business judgment of each service provider, it is thought that a major trend is the need to set common goals by providing places where fixed consent still applies. From this sort of viewpoint, it is thought that government also has a major role to play.

7. Conclusion: Putting 4K and 8K technology within everyone's reach

The purpose of the 4K and 8K road map drawn up last year was to provide the concerned parties with a common broad outlook on the future. First, preparations are currently gathering pace smoothly with the aim of starting test broadcasts in the current year FY2014.

However, for 4K and 8K broadcasts to become accepted as actual services, it is necessary to overcome transmission path issues and content production technology issues, including various specific issues such as how to proceed and how these services will relate to current broadcasting.

Since February this year, the MIC has held conferences aimed at fleshing out the road map and accelerating its implementation. Keeping an eye on technology and market trends, we hope to follow up the promotion plan while assessing the needs of viewers/ users and the business of service providers. Rather than simply taking a technological lead, we also hope to make advances based on the needs of consumers, the business viewpoints of service providers, and international trends.

Broadcasting has a strong influence and a wide reach over the whole of Japan, and it is not appropriate to take a technology-led approach to the introduction of new services in this medium. So as not to cause confusion among viewers or in the market, we want to keep pace with the road map while striving for consensus among a wide range of concerned parties regarding the promotion schedule and processes.



Figure 2: The road map to 4K and 8K broadcasting (Investigative committee for the advancement of broadcasting services)

We are also aiming for the recovery and improvement of the international competitiveness of manufacturers. We will not achieve this by forcing viewers to replace their television sets, but will instead proceed with a viewer-centric viewpoint.

In June last year, the cabinet published "Declaration to be the World's Most Advanced IT Nation." Their plan is to create an IT user society at the world's highest levels and disseminate the results globally over a five-year period (by 2020), through a process described as "Creating new business and reinforcing international competitiveness in the imaging industry through the creation of next-generation broadcasting services." The MIC will also promote activities relating to the strengthening of broadcasting services as part of its long-term ICT strategy.

Media, Culture and Industry in the 4K/8K Smart TV Era —The Prospects of Broadcasting—

Keiya Motohashi

Head, Executive Office Next Generation Television & Broadcasting Promotion Forum

1. NexTV Forum

The Next Generation Television & Broadcasting Promotion Forum (NexTV Forum Japan) is a unique organization.

It was established in May 2013 by a group of 21 companies related to Japan's media industry, including broadcasters, telecommunications carriers, manufacturers of consumer electronics and broadcasting equipment, cable TV operators, advertisers and trading companies. Since then, other organizations have joined, including Internet service providers and overseas news agencies and manufacturers, and the forum now has expanded to 40 members (as of February, 2014).

NexTV Forum Japan is not simply a consortium for the promotion of UHDTV (4K and 8K television). The forum holds discussions on the technology needed to implement UHDTV broadcasting and develop receiver equipment, and studies the standard technical specifications needed by broadcasting services centered around satellite broadcasting. At the same time, it will act as a broadcaster of experimental services during the initial stages of UHDTV broadcasting in Japan. (Figure 1)

2. Action plan of NexTV Forum Japan

In June 2013, the Ministry of Internal Affairs and

Communications published its road map for the enhancement of broadcasting services such as 4K/8K television and Smart TV. This road map was the culmination of half a year's discussions among technology and media business experts, consumer electronics manufacturers, telecommunications carriers, broadcasting stations and other organizations representing Japan.

It included the following statement: "We aim to commence satellite broadcasting trial services of 4K television in 2014 and 8K television in 2016, and to introduce and promote commercial 4K and 8K services for households and other users in 2020". Our forum is a consortium of voluntary private sector organizations that aim to implement the road map drawn up by the Ministry of Internal Affairs and Communications.

The schedule for the introduction and growth of commercial services was set before the decision made by the International Olympic Committee in September 2013 to hold the 2020 Olympics and Paralympics in Japan's capital city Tokyo. It is hoped that the spread of new and interesting television services will be timed to coincide with this global landmark sporting event.

In August 2012, the International Telecommunication Union (ITU) published recommendation BT-2020, which standardizes the technical parameters relating to UHDTV.

ure 1: Overview of NexTV Forum Japan				
Name Location	Next Generation Television and Broadcasting Promotion Forum Akasaka Minato-ku, Tokyo, 107-0052, Japan			
Establishment	Мау, 2013			
Founder Member DENTSU INC. Fuji Television Network, I FUJITSU LIMITED Japan Broadcasting Corp Jupiter Telecommunicatik KDDI CORPORATION NEC Corporation NIPPON TELEGRAPH A Nippon Television Netwo Panasonic Corporation	ers (21 Companies) Inc. poration ons Co., Ltd. ND TELEPHONE CORPORATION rk Corporation	Sharp Corporation SKY Perfect JSAT Corporation SoftBank BB Corp. Sony Corporation SUMITOMO CORPORATION TOHOKUSHINSHA FILM CORPORATION TOKYO BROADCASTING SYSTEM TELEVISION, INC. TOSHIBA CORPORATION TV Asahi Corporation TV TOKYO Corporation WOWOW INC.		
Honorary Chairma Director-General Advisers	an WATANABE, Katsuaki SUDOH, Osamu ITOH, Susumu MURAI, Jun SUZUKI, Yôiti	Former Vice Chairman of Japan Business Federation (KEIDANREN) Professor & Dean, The University of Tokyo Professor, Tokyo University of Science Professor & Dean, Keio University Professor, Tohoku University		

Coincidentally, 2020 is also the year in which Tokyo will host the Olympics and Paralympics, and the fortunate timing of this event has provided us with an excellent opportunity to push ahead with the full-scale implementation of next-generation television media services.

Although details such as the schedule for starting broadcasts and the initial editing plans are still being studied, we plan to start regular 4K television broadcasting in mid-2014 by using a satellite broadcasting platform.

In parallel with the 4K satellite TV broadcasts, the major providers of IPTV and cable TV in Japan are also eager to launch 4KTV services, and may start their own trials of 4K broadcasting and VOD services during 2014.

The road map makes it clear that UHDTV and advanced Smart TV are to be promoted as an integral package. (Advanced Smart TV is an integrated service with higher added value that simultaneously links broadcast programs and information with services, content and information delivered via the Internet.) Japan's broadcasting stations are currently in the process of expanding their HDTV programs and Internet collaborative services. In the future, it is expected that an even fuller range of services will become available, such as UHDTV services with higher resolution, services that combine displays with diverse network services and content, and services that combine personal terminals such as tablet PCs with large-screen UHDTV displays. One of the key roles of our forum is to conduct research aimed at popularizing these new services and provide a forum for mutual collaboration between related broadcasting stations, network service providers, terminal manufacturers and the like.

3. Differences between 2014 and 2016

Here we present a brief description of the differences in the technical specifications of the 4K broadcasts planned for 2014 and the 8K broadcasts planned for 2016. In both cases, the detailed specifications are still under investigation, although the specifications for 2014 will soon be finalized. The satellite broadcasting specification for 2016 will be discussed by broadcasters, receiver manufacturers and the like for about one year during 2014.

For the 4K satellite broadcasts of 2014, we plan to use the HEVC (H.265) next-generation video compression technology. However, we plan to keep the other technical parameters the same as for existing satellite broadcasting. This is because we have to develop the broadcasting and receiving equipment as quickly as possible.

On the other hand, for the 8K (and 4K) satellite TV broadcasts scheduled for 2016, we are not only planning to use HEVC but are also considering the introduction of various new technologies including modulation schemes, multimedia coding and multiplexing technology. This is because in addition to increasing the video picture resolution, it will also be essential to implement interesting advanced Smart TV services based on collaboration between broadcasting and network communications.

4. Advantages and issues of 4KTV program production

4K program production trials have already been started by

members of NexTV Forum Japan who can draw on their expertise in broadcasting and video culture, including organizations such as NHK and major terrestrial commercial broadcasters, prominent satellite broadcasters and leading cable TV companies.

These broadcasters are continuing to take on the challenges of program production in the various production techniques of their specialized genres, including sports such as golf, soccer, baseball and motor racing, live music, dramas, documentaries, travel programs and programs about Japan's traditional arts. Many pioneering producers, directors and engineers have discovered new creative possibilities when using new tools for 4K video. Specifically, 4K video can convey details that are lost in conventional HDTV, such as the undulations of a grassy lawn or shadows at night time, the fizzing motion of water droplets, atmospheric shots showing the movement of the wind, sunlight filtering through the leaves of trees, and the muscular movements of sports players. It can also reveal subtle color tints and gradations in vivid detail, and allows producers to depict images with a wide dynamic range that would be lost in conventional video. It is expected that producers at each broadcaster will benefit from the increased screen display area and the expanded creative possibilities that this technology offers in all genres, including video journalism, entertainment and the avant garde.

On the other hand, through repeated trials of actual program production, NexTV Forum Japan provides a forum for the exchange of discussions and the sharing of program production issues that arise with 4KTV. 4K is a system that originates from Hollywood movie production companies and the introduction of digital movie distribution methods. Although the movie and TV industries are both cultural institutions that produce moving images, they differ significantly in terms of the production and representation methods that they typically use. Movies are generally produced by individually filming a series of carefully staged shots, which are then edited over a period of time while applying processes such as color grading to produce the final product. On the other hand, most TV programs (especially live sports events, music events and studio shows) are basically shot simultaneously by multiple cameras, switching between the signals from these cameras to assemble the best shots into video that is broadcast live or recorded for subsequent transmission.

At present, most 4K camera equipment and post-production equipment is geared towards use in movie production, and is rarely compatible with multi-camera live broadcast set-ups. There is also a lack of suitable zoom lenses, and those that are available tend to have a shallow depth of field that makes focusing difficult. It has become clear that there are still many production issues such as these.

For the successful launch of a broadcasting service, it is necessary not only to develop and maintain technical systems, but also to facilitate the mass production of high-quality content and reduce the costs of program production by making the equipment easy to use. The production of interesting 4K programs featuring live sports and music events requires a system where shooting and production can be performed while switching between the video signals from multiple cameras in real time. Our forum includes equipment manufacturers and operation businesses among its members, bringing in the latest know-how on program production equipment and post-production work. Members also share and discuss production issues that have arisen when broadcasting stations start producing 4K programs, while working on improvements to the production equipment, systems and road map. This is another key role of NexTV Forum Japan.

5. Possible applications beyond home entertainment

4KTV and 8KTV technology is spreading into the world of home entertainment such as broadcasting and VOD Internet delivery, but there are growing industry expectations that this technology can also make a public contribution in many other fields.

Japan is rapidly advancing into an era of low birth rates and an aging society. 4K and 8K technology is expected to make an important contribution to this situation in public fields such as medicine, education, disaster prevention and mitigation, advanced machinery and architectural design.

It is also expected to make significant contributions to industries such as signage and advertising, publishing, ODS (Other Digital Stuff: using large screens at cinema complexes to show non-movie content like music and sports events), and tourism by creating new industries with high added value, and in art and culture where it could be used as a new way of displaying and preserving objects and for the creation of new art works in museums, art galleries and the like.

We believe that we can make a global contribution by developing and creating state-of-the-art services and technologies while collaborating with specialists in each of these fields on aspects such as technologies, content and service models.

6. Improving broadcast services and culture

We believe that it would be wrong to begin UHDTV broadcasting merely for its own sake. It is essential that it is used to create a new video culture and to further stimulate video-related industries. As for broadcasting stations, their basic objective and mission is to enhance the "creative" and "journalism" aspects of their work, and this remains the most important concept even in the rapid flow of digital technology.

We must bear in mind that the use of digital technology, Internet collaboration, and the new expressive capabilities of UHDTV provide a way of further enhancing these sorts of concepts and functions.

Improved picture quality or improved functionality? – The road to nextgeneration TV

Next year, 2015, marks the 90th year since the start of radio broadcasting in Japan. During this time, broadcasting has exploited the products of state-of-the-art technology in each era, and has made itself an essential part of our everyday lives by offering better services in the form of journalism and entertainment.

At the last Tokyo Olympics in 1964, color TV relays and satellite relay technology were put to practical use, and in the same year, work began on the research and development of HDTV and flat-screen televisions that are considered the norm in today's digital era. At the 2012 London Olympics, Japan's public broadcaster NHK held live public viewings of 8KTV (called 'Super Hi-Vision' in Japan) in three countries — the US, UK and Japan — with the cooperation of organizations including the BBC. The 2012 Olympics were also called the "Social Olympics", since highlights of many events were shown worldwide on YouTube, and social media services like Twitter were used to connect athletes directly with their fans.

At the 2020 Tokyo Olympics and Paralympics, what sort of services will television and the Internet be able to deliver to viewers and users in Japan and around the world?

Broadcasting should be made even more engaging by making the fullest possible use of the digital and network technology that is currently emerging from intense technology development and service development.

These changes could bring about the sort of revolution that only comes once in five centuries, like the development of Gutenberg's movable type printing press. Whereas traditional media are reliant on paper or radio waves and only support one-way traffic, it is now becoming easy for users to connect to networks in large numbers at the same time, and to publish their own material via two-way services. We should keep this sort of idea in mind when working on the development of UHDTV services.

People sometimes ask which is more important — improving picture quality or increasing functionality. We think both are important.

A big difference from 20 years ago when HDTV first started to spread around the world is the spread of the Internet and the rapid growth in popularity of services and terminals that use it, resulting in major changes in people's expectations of television and broadcasting. As the younger generation of "digital natives" drifts away from television, it will be difficult to drag them back to conventional linear TV viewing simply by increasing the resolution of video beyond HDTV.

On the other hand, the features of UHDTV such as its high picture resolution, wide dynamic range and extensive color gamut should make it suitable for exploring new genres and new entertainment fields.

That is why we think that the increased resolution of UHDTV and the enhanced features of SmartTV are both equally important.

There are still many issues that remain to be solved. These include reforming the workflow of program and content production in response to technical innovations, constructing a "business model" that facilitates the expanded reproduction of high-quality content, supports proper licensing of material, offers training in various systems and business fields, and supports archive storage with the creation and management of metadata, and developing systems for the education, management and non-technical aspects of people skilled in journalism and creative genres. By continuing to meet challenges such as these, we will find the way to gaining society's acceptance of and support for UHDTV broadcasting and services.



The Future of Satellite Communications and Satellite Broadcasting



Shinji Takada President & Chief Executive Officer SKY Perfect JSAT Corporation (SJC)

1. Introduction

The merger of JSAT Corporation, SKY Perfect Communications, Inc., and Space Communications Corporation in October 2008 has resulted in the creation of SKY Perfect JSAT Corporation (SJC), Asia's largest satellite service provider offering both "satellite communications" and "satellite broadcasting" services.

The new SKY Perfect JSAT maximizes the strengths available from a hybrid business, operating both a stable space & satellite communication business and a proven, high-growth multi-channel pay TV business under one roof, while at the same time building better services and a greater capacity to compete through efficient and agile business management policies.

2. Communcation service

SJC is a leading satellite operator in the Asia-Pacific region and provides high-quality satellite communications.

Its fleet consists of 16 spacecraft, the JCSAT and SUPERBIRD satellites in Asia-Pacific, and the HORIZONS satellite in North America (operated through a joint venture by its affiliate, JSAT International Inc., and Intelsat), enabling it to offer a wide range of services, including video distribution/contribution and data communication, as well as unrivalled back-up capacity.



With an aim to strengthen and develop the global business, SJC entered into an agreement to procure the JCSAT-14 satellite with Space Systems/Loral last year. JCSAT-14 will be launched in the second half of 2015, succeeding JCSAT-2A, which is currently operated in the orbital position of 154 degrees east longitude. JCSAT-14 is designed to carry Ku-band and C-band payloads, including new regional Ku-band beams that cover Asia and the Pacific Ocean areas. The C-band payload offers enhanced capacity and extensive beam coverage over Asia, Australia, New Zealand, Russia, and the Pacific Islands, in response to the strong demand for greater satellite capacity in these areas.

In addition, among various services in the satellite communications business field, maritime broadband service in particular has been drawing attention in recent years. SJC started "OceanBB" in 2010 as a maritime broadband service offering high speed Internet access with a transmission rate up to 1 Mbps at a flat rate. The feature of this maritime service is that it achieves a higher transmission speed than conventional services by using the Ku-band frequency. With the roaming services of KVH in the U.S., we can offer services in major sea areas around the world. The realization of a broadband environment in vessels is bringing various innovations in the marine transportation field.

SJC will respond to the demand for mobile satellite communications for vessels and airlines, which is expected to continue growing.

3. Broadcasting service

SJC now operates SKY PerfecTV!, Japan's largest pay TV platform, providing service to more than 3.7 million subscribers in Japan via DTH from satellites in three orbits and FTTH.

To further strengthen and advance the expansion of our global business in the field of broadcasting, in February 2014 we launched WAKUWAKU JAPAN, a 24-hour channel featuring

all-Japanese content made available in local languages, on the satellite services Indovision and Okevision, which are owned by MNC,



Indonesia's largest media group. This initiative involves the cooperation of numerous Japanese companies in providing content. With Indonesia as the starting point, we are planning to expand the channel to other countries.

We are also working towards the commencement of broadcasts in 4K, a new high-definition broadcasting format. On October 20, 2012, we successfully presented our first live 4K broadcast of a soccer match, and since then we have been moving ahead with trials in a wide variety of genres, including live broadcasts of music events.

4. Conclusion

SKY Perfect JSAT will continue to enhance and expand its services in the field of satellite communications and broadcasting, which have become an integral part of daily life. SKY Perfect JSAT is also committed to the dynamic global expansion of our business activities, including the sale of satellite capacities/ broadcasting content all over the world.

4K and 8K: Changing the World of Video

Naoko Masaki Journalist



1. Introduction

I recently saw a magazine ad for a marketing course that covered topics including the use of Web 2.0 sites as a means of publishing information. These days, public opinion is often influenced more by social media than by traditional forms of mass communication. Social media engages with the public at a social level by using scalable messaging functions that are open to everyone. In this respect, it is the polar opposite of traditional mass media. Social media services are appearing with an increasingly diverse range of forms and capabilities.

This reflects the beginning of a move away from existing mass media channels to new social media outlets, like the "Our Town" independent video competition (http://www.sheknowsjournal. com/wagamachicm/top.html), course materials from universities like MOOC, video programs, and content such as video clips and seminars that support these programs. Our program ("Search of the Future") was criticized for having incomprehensible opening titles when it started 17 years ago, but things can change beyond all recognition. We have also entered the era of "content marketing", where individuals, universities and businesses use content (edited information) to communicate with people or consumers.

2. The start of the post-HD era

The global market for 4K (3840×2160) televisions is expected to grow quickly to 12.5 million units, and Chinese TV manufacturers have been working hard to meet this demand. As before, their market strategy is based on price competitiveness. In China, TCL and Skyworth launched budget 4K TVs to coincide with the Labor Day national holiday. TCL's 55-inch E5690 4K TV retails at 9,999 yuan (about 1,600 US dollars, or 164,000 Japanese yen), and Skyworth's 39-inch 4K TV retails at 3,999 yuan (the same price as their existing 42-inch 1080 HD TV). Both products have a panel resolution of 3840×2160 (Ultra HD, UHD). TCL is a large Chinese manufacturer that releases products in the US under the TCL and RCA brand names. It is expected that its 4K TV will also be marketed in the US at the same price. At \$1,600, this would cost about the same as the 55-inch 1080 HD TVs currently on sale in the US. The E5690 is advertised as a "cloud TV", and the smart features offered by its quad-core GPU and dual-core CPU running Android 4.2 OS include the ability to scale up video from HD to 4K resolution. It also supports 3D with an active shutter system. The stage is now set for a major battle in the 4K market. 4K systems, live switchers and high-capacity storage systems also featured prominently in manufacturer exhibits at the IBC2013¹, NAB2013² and CES2014³ trade shows. It is only a matter of time before 4K become widely available in

products with 30-inch or larger displays. This year's CES featured a Polaroid 50-inch 4K TV for just \$999. SEIKI unveiled a 4K upconverting HDMI cable, and has already started shipping a 50inch 4K TV priced at \$1,499.

As you know, the 4K video standard has approximately four times the image resolution of HD. So in that sense, 2013 marks the start of the post-HD era. There are actually several different varieties of 4K.

The largest size is 4K16:9 (4096×2304), while standard 4K has a resolution of 4096×2160. There is also 4K2:1 (4096×2048), and 4K Quad Full HD (QFHD, 3840×2160), which is simply four times the size of standard HD (1920×1080). Furthermore, RED (one of the pioneers of 4K cameras) has established its own video sizes, including 4.5K (4480×1920) and 5K full-frame (5120×2700), so the simple designation "4K" can refer to a variety of different sizes.

Super Hi-Vision (SHV) was a hot topic at last year's International CES in Las Vegas. Even in the consumer world, it has been shown that the next stage in screen resolution will be products centered on 4K TV. Changes are taking place rapidly, and I think it's safe to say that the transition to 4K is already under way, even without the momentum of e-book readers or 3D television. At this year's CES, there were even more 4KTV presentations, showing that this trend is growing worldwide. 4K is now available to ordinary consumers, who may be unaware of its history but simply want to upgrade their existing equipment.

3. 4K was a standard for movie production

Were you aware that a 4K process was standardized by DCI4? When I first saw 4K video about 10 years ago, I was blown away by its picture quality compared with the analog TV of the time. Time passed, and in October 2010 I had the opportunity to talk with specially appointed professor Tomonori Aoyama⁵ of Keio University's Graduate School of Media and Governance about our company's WEB-TV and NetRushTV (http://www.netrush. jp/) services, where Japan's 4K technology had been adopted by the hybrid video industry as a key technology for the digital switchover. Around that time, even professor Aoyama found it difficult to imagine 4K spreading to the world of TV from the movie industry. The manufacturers had no concrete plans to start offering 4K. Also, the people that developed this technology had apparently thought that it could go no further after being standardized for use in movie theaters. However, my opinion was that 4K technology was more important than ever, and had many other potential applications outside of cinema. In the following year (2011), I therefore produced the show "Samurais of digital

cinema" and had it shown on Television Kanagawa with the aim of handing on this historical perspective and connecting with the future. In this show, I wanted to talk directly to the people behind this technology about the history and future of this technology, and held face-to-face discussions with people in the hybrid movie industry who were using 4K video. 4K technology was born in Japan and is a success story for the researchers at NTT's laboratories. But it is still just getting started, and I think it will become an important tool in the hybrid movie industry. After a hundred years of 35 mm film, the switch to digital formats is a major change for the movie industry. I was able to experience this for myself when I interviewed people like Wendy Aylsworth (at that time, vice chairman of the Society of Motion Picture and Television Engineers (SMPTE) and currently Senior Vice President of Technology Technical Operations Inc., Warner Bros.) and Garrett J. Smith (Vice President of Production Technology, Paramount Pictures), who had supported 4K's growing role in Hollywood movies. In the transition from analog to digital, it was clear that efforts would also be made to deliver video content over the Internet. If you take a look at an old story called "Search of the Future — Samurais of Digital Cinema" (available in Japanese: http://www.netrush.jp/asx/mirai114.asx and English: http://www. sheknowsjournal.com/nr_engtop.html), you can see I hope to continue collecting materials on the present and future of cuttingedge technology.

In the road map for the promotion and popularization of 4K and 8K formulated by the Ministry of Internal Affairs and Communications, full-scale 4K broadcasting will start this year (2014), and there will be a growth in demand for 4K TV of sports events such as the Sochi Olympics. 8K broadcasts will start during the Rio Olympics in 2016, and hopefully 4K and 8K technology will be well established by the time the Tokyo Olympics begin in 2020. However, for the success of full-scale 4K or 8K it is important not to forget suitable content. Beautiful ultra-high-definition video pictures can move us emotionally, but how will they change the world of broadcasting? Ultra-highdefinition video such as 4K and 8K is expected to be highly suited to programs where artistry is required, such as sports, drama, movies and music, and broadcasting tests have already been performed. On the other hand, video for programs like news reports that require prompt real-time pictures can still use editing and delivery (distribution) methods based on existing Hi-Vision or SD equipment together with archive footage and video captured by smart phones. Instead of focusing on producing TV that is compatible with 4K or 8K displays, it is perhaps more important to produce TV that supports simulcasting. The providers of IPTV and webcast services offer content in multiple formats. Originally, the free world of the Internet led to free competition between streaming and webcast delivery, but as 4K content increases, it seems inevitable that webcast delivery will also increase.

4. Preparing for 4K

While its production companies are of course obliged to support 4K, the BBC has announced that it will use 500 JVC ProHD network camcorders (GY-HM650) in its global news gathering.

These are professional HD memory card camcorders that support dual HD codecs (MPEG-2 and AVCHD), and can record HD video simultaneously with SD video or proxy files in H.264/ MOV format. It uses two SDHC/SDXC memory cards at a time; one for HD files and the other for SD files or low-bit-rate proxy files. With a built-in FTP client and network connectivity, it can send footage to the broadcasting station without using microwave or satellite links. Its features include:

- Compensating for packet losses in IP delivery
- Enabling video transmission without the need for bulky equipment

According to JVC Europe, this camera meets the EBU's "Tier 2J" recommendations for journalism use, confirming its suitability for broadcast news production. Cameras in the GY-HM600 series also meet the requirements for general long form HD programming ("Tier 2L") when used with a suitable external recording device capable of 50 MB/s or above. The order from the BBC was based on several factors - compact size, EBU quality compliance, multi-codec support and FTP transfer capabilities. Cloud-based IP video delivery has previously been affected by noise and freezing issues at the receiving end, but it seems that these have now been resolved. For a professional camera, the unit cost of ¥544,000 is very affordable, and its compactness, mobility and reliability make it ideal for electronic news gathering, where Japanese broadcasters still seem to value cameras that can be carried on the shoulder. These days, news reports are mostly gathered with small cameras. On the other hand, the era of 4K cameras has arrived, and I'm finding it hard to choose a camera that matches my budget. Having worked in the business for 20 years without subsidies or sponsorships, replacing the camera system has been one of my biggest headaches. Switching to 4K would increase the cost, and would also mean having to update the editing system. So if I go for a 4K system, I have to buy the equipment before I can start work. It's no fun, I can tell you. Perhaps the BBC's camera deal can be taken as an indication that news-gathering will continue to use the same full-HD systems as before, while content creation will use a mixture of full-HD and 4K. Video production technology will always be advancing, but the training of people capable of producing programs is something that never changes.

The "Search of the Future" documentary team will continue to examine social media's ability to disseminate content, and through our dispatches and summary items, we hope to continue showing you how new video technologies will affect the status and style of media in the future.

- 1 IBC2013: International Broadcasting Convention (Europe's largest broadcast equipment trade show)
- 2 NAB2013: A global trade show held by the National Association of Broadcasters
- 3 CES2014: Consumer Electronics Show. An international event hosted by the US National Association of Broadcasters.
- 4 DCI: Digital Cinema Initiatives. A digital cinema standards organization consisting of the US's leading movie distribution companies.
- 5 Dr. Tomonori Aoyama graduated from and is currently an eminent professor at the University of Tokyo. He was previously a researcher at the Nippon Telegraph and Telephone Corporation (NTT).

A World of HD Broadcasting from Japan

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Technology Trends

High-Capacity Impulse Radio Equipment Using the 80 GHz, Millimeter-Wave Band

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1. Introduction

As mobile terminals have become more common and the amount of content available has increased, traffic on communications networks has increased explosively. Because of this, there is demand to increase capacity of radio transmission systems in telecommunications. Highcapacity transportable radio systems are also promising for use as emergency lines, to provide rapid relief when optical cables are cut in disasters or other emergencies.

In light of these circumstances, Fujitsu has developed high-capacity radio equipment¹ using our own impulse radio technology in the 80 GHz band. The 80 GHz band is part of the millimeter-wave band, which is not strongly affected by atmospheric attenuation, and where wide bandwidths can be used.

2. Basic principals of impulse radio

"Impulse" refers to an extremely short pulse with sharp changes in the time domain, and with energy from low frequencies right up to over 100 GHz, in the frequency domain.

In the impulse radio scheme, impulses are generated according to the input digital signal, and the high-frequency components of the impulses are transmitted as a radio signal. The principles of impulse radio are shown in Figure 1.

The transmitter uses a pulse generator (PG) to generate an impulse signal based on the information source, which is a digital signal. A band pass filter then extracts the 80 GHz band frequency components. The resulting impulse signal is called a wave packet, which is transmitted through a

to an extremely (LNA), the envelope is recovered with a detector (DET), and the digital signal is identified.

3. Eighty GHz band impulse radio equipment overview

power amplifier (PA) and an antenna. At

the receiver, the wave packet is amplified to

the desired level using a low-noise amplifier

The 80 GHz band impulse radio equipment is an all-in-one transmitterreceiver, including user interface, built to outdoor specifications. It is shown in Figure 2.

Using impulse radio technology eliminates the need for components normally required for radio, such as the modem, local oscillator, and mixer. Using a wide bandwidth, enables high-capacity transmission up to 3 Gbps. Combined, these allow a compact, light-weight, low-power implementation that can complement or substitute for optical cable communication.

The type and aperture of the antenna can be selected according to

Figure 2: 80 GHz band impulse radio equipment











Table 1: Principal specifications

Item	Specification	
Frequency band	Low group: 71 to 76 GHz, High group: 81 to 86 GHz	
User rate	3,000 Mbps	
Transmit power (point value)	+17 dBm	
Line Interface	Ethernet: 10 GbE, GbE CPRI: 2.4 Gbps	
Latency (1 Link, one direction)	Ethernet: 77 µsec CPRI: 15 µsec	
Operations and Maintenance	Remote monitoring: SNMP Local monitoring: local terminal	
Power consumption	20 W	
Size	31	
Mass (console)	3.0 kg or less	
Antenna aperture and gain	30стф: 43 dBi 60стф: 48 dBi	



the transmission distance. The radio equipment and antenna can also be attached and detached easily, so installation and maintenance is easy. The principal specifications are shown in Table 1.

4. Example applications

The 80 GHz band impulse radio equipment provides high-capacity transmission in a compact, light-weight, and low-power implementation which can complement or replace optical cable communication. We now describe examples of applications utilizing these characteristics.

When constructing mobile basestation networks, this technology can be applied to common public radio interface (CPRI) or Ethernet signal transmission when it is difficult to install optical cables along public roads, or it takes a long time to prepare for construction of optical fiber links. Application for mobile base-station networks is shown in Figure 3.

Also, due to its portability, it would be useful for emergency lines when disaster occurs, or for private intranets at facilities such as companies, universities or hospitals.

5. Conclusion

The development and implementation of this 80 GHz band impulse radio equipment expands the range of applications of radio communications to include scenarios that were difficult with conventional radio systems due to inadequate transmission capacity.

The impulse radio scheme we have implemented and used establishes the basic technology resulting from the Research and Development Project for Expansion of Radio Spectrum Resources, sponsored by Japan's Ministry of Internal Affairs and Communications².

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JICA Broadcast Training

International Economic Affairs Division Global ICT Strategy Bureau Ministry of Internal Affairs and Communications

1. JICA Broadcast Training as ODA

As technical cooperation which composes ODA¹ (Figure 1), the Ministry of Internal Affairs and Communications (MIC) provides three types of training related to digital terrestrial broadcasting (JICA Broadcasting Training) for developing countries with close cooperation with JICA.

Each JICA Broadcasting Training is provided based on some ideas referred to as "Significance of ODA"² (Figure 2). Through contribution on the healthy development of broadcasting which is essential for social order and prosperity of a nation, JICA Broadcast Training aims to contribute to solving social problems, world peace, and national development. Also, it is another important aspect that JICA Broadcast Training raises Japan's presence in the world, and promotes the spread of Japan's knowledge and systems related to broadcasting, that is to say enhancing soft power.

Generally speaking, ODA needs support by "All-Japan"; integrating people, knowledge, financing and technology of both the public and private sectors. This



Figure 2: Significance of ODA

- Official Development Assistance (ODA) promotes Japan's diplomatic efforts, and is one of the most significant means of diplomacy to which Japan contributes internationally.
- Actively using ODA to contribute to the stability and development of developing countries, and to solving global-scale issues also benefits Japan as a country.
- It contributes to reducing poverty in developing countries (to achieving millennium development goals (MDGs)), to building peace and sustainable economic growth, and to the spread and permeation of Japan's knowledge and systems (expanding soft power). It also contributes to promoting new growth strategies.

applies to JICA Broadcast Training as well. To make JICA training fruitful and easier to understand how to utilize Japan's technology and systems for participants, the training has thus far obtained positive understanding and cooperation from many broadcasters and manufacturers in Japan.

2. Japanese broadcast standards and training

Digital terrestrial broadcasting technology makes it possible to realize high picture quality, expansion of broadcasting areas with efficiency, multiple-channel broadcasts, and transmission of various additional information. Therefore, it is expected utilization of this new technology could be a key in solving many social problems in the world.

At the present time, there are four main standards in digital terrestrial broadcasting, that is ISDB-T, DVB-T/T2, ATSC, and DTMB (Figure 3). Japan has already adopted ISDB-T (Integrated Services Digital Broadcasting-Terrestrial).

In 2013, three countries decided to adopt ISDB-T: Botswana in February, Guatemala in May, and Honduras in September. Moreover, the Philippines, which had been reconsidering which standard to adopt reaffirmed their adoption of ISDB-T in November. In January 2014, MIC dispatched a public-private joint mission in the field of ICT including digital terrestrial broadcasting technology to The Philippines and they participated in ISDB-T International Forum in Manila. Mr. Yoshitaka Shindo, the Minister of Internal Affairs and Communications, led approximately 170 people from 70 companies in Japan.

As of March 2014, Japan is the only country that has completed the transition from analog to digital broadcasting (Analog Switch-Off) with the ISDB-T. Through JICA training, MIC tries to



Figure 3: Digital Terrestrial TV Broadcasting standards in the world

Table 1: JICA Broadcast Training

share Japan's successful experience of ASO, technic on how to realize various services using ISDB-T, and knowledge about the potential use of ISDB-T in the future, in order to contribute to the development of broadcast policy making and related businesses in each country.

Under the situation that there are significant technical differences between each standard, MIC and JICA provide the training program which mainly consists of contents about a smooth transition to ISDB-T. Therefore, most of the participants come from countries that have already adopted or are considering adopting ISDB-T.

3. Training overview

In 2013, MIC and JICA held three types of broadcast-related training programs (Table 1).

The "Digital Terrestrial TV Broadcast (DTTB) Engineering" course was held in June and September. The program provided a systematic learning of digital broadcast engineering theory, initiatives and problem solving measures taken in Japan to spread digital broadcasting,

Course Title	Dates (2013)	Trainees (2013)	Content
Digital Terrestrial TV Broadcast (DTTB) Engineering	<english> 6/26 to 8/2</english>	Bhutan (2), Botswana, South Sudan (2), Sri Lanka (3), Zimbabwe (2) <5 countries, 10 participants>	Digital technology theory (sampling, transmission, modulation) Transmission systems (parallel operation of digital and analog) Issues with implementing digital broadcasting (Japan case studies, channel planning) Applications for disaster reporting, digital broadcasting services for educational programming.
	<spanish> 9/10 to 10/11</spanish>	Argentina, Bolivia, Brazil, Costa Rica (2), Ecuador, Guatemala, Paraguay, Peru, Uruguay, Venezuela <10 countries, 11 participants>	
TV Program Production for Digital Terrestrial Broadcasting	9/2 to 9/20	Angola, Brazil (2), Chile (2), Costa Rica, Malaysia, Myaemar, Paraguay, Peru, The Philippines, Viet Nam <10 countries, 12 participants>	Broadcast program content rights and protections Program production technology (HD-specialized filming, digital video compositing technology, etc.) Vint a program production company for a deeper understanding of program production using digital broadcastity, technology (dist transmission, Cone-Sig broadcastit, multi-linguage broadcastit, etc.). Training in planning program production using data transmission technologi program production using data transmission technologiper. Publishing and discussing program planning proposals.
ISDB-T Broadcasting Executives' Seminar	11/5 to 11/15	Brazil, Chile, Democratic Republic of the Congo (DRC), Malawi, Paraguay, Peru, Sri Lanka (2) <7 countries, 8 participants>	-Japan broadcatting policy, ISDB-T features, etc. - Issues and solutions in switching to digital terrestrial broadcatting. - Methods for deciding a channel plan. - Developing content using features of ISDB-T - Tour of broadcast station, Inter BEE trade show

and technical operation know-how for engineers from broadcasters and related facilities in each country. Many of the countries adopting the ISDB-T are in Central and South America (Figure 1), hence this training program was held in two languages to facilitate participation by engineers; the June course was in English and the September course was in Spanish.

The second training type, titled

"TV Program Production for Digital Terrestrial Broadcasting" was held in September, for directors and producers from national and public broadcasters. The program covered basic knowledge and technologies related to program production for digital broadcasting, as well as new program production technologies and planning methods using the features and technologies of ISDB-T, such as data Photo 1: Transmission/reception training 1



Photo 2: Transmission/reception training 2



Photo 3: Electric field strength measurement training 1 (class training)



Photo 4: Electric field strength measurement training 2



broadcasting³ and One-Seg broadcasting⁴. To encourage conversion of broadcast to digital, it is important not only to prepare the equipment, but also to broadcast attractive and interesting content, so that the population would be willing to view digital broadcasts. Improving the program production capabilities of producers and directors involved in digital content production will become increasingly important in the future, and for that reason, starting in 2013, this new training was offered.

The third training type was titled "ISDB-T Broadcasting Executives' Seminar.", aiming to improve general problem solving policy deliberation capabilities for managers of ministries overseeing broadcast administration and related facilities, such as the policy knowledge and public-private cooperation approaches needed in conversion to digital. To support the spread of the ISDB-T, it is particularly important that management in broadcast-related organizations recognize and understand the superiority of ISDB-T, such as One-Seg broadcasting, data broadcasting, and Emergency Warning Broadcasting System (EWBS)⁵. The program also aimed to promote sharing information about the state of broadcasting in each country, and as such, encourage cooperation across countries in the field of broadcasting, based on the friendships built during the program in Japan.

4. Future of training

The environment surrounding broadcast changes continuously, and various new issues to be reconsidered arise every year. Different participants join the program from various backgrounds. It is thus important to study the issues and amend the contents of programs accordingly. An evaluation meeting is set on the last day of training programs for those concerned, including JICA, MIC and implementing organizations, to gather and meet with participants of the programs, and to talk about impressions and possible future improvements.

We received various opinions from participants this year. Most responses indicated that the overall training was beneficial, but when asked to identify points for improvement, one response was that it would be good to have courses tailored in more detail to the needs of each country, since progress in switching to digital differs by country. On the other hand, another response indicated that it was important to have the same training for different countries, to get an insight into such differences. There were also opinions to be considered to improve and make the training more meaningful in the future, such as requests for content that was not covered this time, or to place more emphasis on different topics and change how time is allocated.

An evaluation meeting is not the only chance to consider improvements. We are also considering using opportunities for exchanges between the trainees and Japan before they arrive in Japan to see what Photo 5: Channel planning training







Photo 6: Sendai broadcast station tour



concerns and interests they may have, while participants are tasked with preparing a country report describing the state of broadcasting in their country which is to be presented on the first day of a training program.

MIC and JICA hope to provide training that meets the needs of participants by valuing such feedback from them and continue to study such needs.

5. Expectations for the training

Naturally, the broadcast-related issues and the needs of the people in each country differ, since participants gather from different countries. On the other hand, what we, Japan, are able to convey is the experience of Japan in switching to digital broadcasting. In sharing this experience of Japan, there may not be much that can be applied directly in the participants' home countries. Even so, they can adopt and utilize what they have learned in Japan, and if even a little of it is useful, then the training should be meaningful. Through digital broadcasting, we hope to improve the lives of people around the world even by a small amount, and that would, as a result, help to increase the number of people with an affinity for Japan, maintaining the connections among concerned personnel in Japan and the participants, so that we can help each other in the future as well.

Finally, we would like to express thanks for the large amount of cooperation we received in providing this training, from JICA, the course leaders from the NHK Communications Training Institute (NHK-CTI) as an implementing organization, and everyone at the various broadcasters and manufacturers. In 2013, the 2020 Olympics was awarded to Tokyo. As the switch to digital broadcasting progresses around the world, the MIC is working vigorously to maximize this opportunity to enrich broadcasting in Japan. We expect that Japan and participants will keep in touch with, and many broadcasting-related people from many countries will attend our training, and come to see the real situation of broadcasting in Japan.

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- 2 From Ministry of Foreign Affairs web site: http://www. mofa.go.jp/mofaj/gaiko/oda/about/oda/oda.html
- 3 Allowing the latest information to be displayed with a push of a button on a remote control, including news, weather, lifestyle, educational, or government report information.
- 4 With services for portable/mobile devices (One-Seg), digital broadcasts can be viewed on devices other than mobile phones while out, such as automobile navigation systems, PCs and portable televisions.
- 5 Enabling emergency information to be received, whether at home or away from home.



= Cover Art =

Fuji sanjurokkei SHinshu, Suwa no Mizuumi (Lake Suwa in Shinano province, from the series 36 Views of Mt. Fuji.)

Utagawa Hiroshige (1797-1858)

Woodblock print: Courtesy of Sakai Kokodo Gallery

Case Study of ICT Solutions Contributing to Improving Life in Rural Areas

Hideyuki Iwata Senior Research Engineer, Supervisor Leader of Bridging the Standardization GAP Committee NIPPON TELEGRAPH AND TELEPHONE CORPORATION/ The Telecommunication Technology Committee



1. Introduction

The TTC Promotion Committee began its activities in April, 2007, based on the slogan "Let's SHARE (Success & Happiness by Activating Regional Economy) together." Through cooperation among five countries in Asia (Indonesia, Malaysia, Philippines, Thailand, and Vietnam), and with the support of the Asia-Pacific Telecommunity (APT), it has been conducting ICT pilot projects in rural areas, with solutions for social issues in agriculture, aquaculture, environment, health, education, and constructing telecommunications infrastructure. Also, the Case Study Team (CST) was established in 2008, under the Bridging the Standardization GAP Working Group (BSG-WG) of the Asia-Pacific Telecommunity Standardization Program (ASTAP), to do standardization activities, taking case studies on APT projects implemented in each country and extending them into neighboring Asian countries. Activities of the TTC Promotion Committee were concluded in March, 2013, and in April, 2013, the Bridging the Standardization GAP Committee was established to take over its standardization and promotional activities.

2. Overview of the SHARE pilot model

Figure 1 shows the model for pilot projects demonstrated in rural areas of South-East Asia, for solutions in agriculture, aquaculture, environment, health and education. For the areas of agriculture and aquaculture, the model was to build sensor networks, gather





data measured with various sensors on a field server, and send it to specialists in urban areas through the network. Specialists then analyzed the data, and promptly sent feedback through the network, such as urgent information or useful ways to resolve issues.

3. Overview of projects

3.1 eHealth solution

An ehealth solution was implemented in the Tanah Datar Regency of the West Sumatra province of Indonesia. Adequate health and medical services are not always provided to residents of rural areas of Indonesia. In this project, a basic health data-base and a wireless network connecting hospitals, clinics, regional government offices was built using Wi-Fi, to centralize and share data such as measured height, weight, and blood pressure from various health-related facilities. Web pages and CD players with large-screen TVs in hospital and clinic waiting rooms were also used to distribute government information about handling diseases such as dengue fever, influenza, and rabies.

3.2 eAquaculture solution

An agriculture and aquaculture solution pilot project was implemented at Palapakin Lake, one of the San Pablo seven lakes on the outskirts of Manila, in cooperation with the Ateneo de Manila University in the Philippines. As shown in Figure 2, a network was built with sensors measuring water temperature, pH, dissolved oxygen (DO), turbidity, and conductivity around

> the lakeshore. Field servers from the three cooperating research groups (from the Philippines, Thailand, and Japan) gathered the sensor data. In particular, the Philippine field server was self-propelled; consisting of a bamboo boat with field server powered by solar panel and battery, GPS, and sensors; so it was able to take measurements over the whole of the lake. Information was distributed to fisherperson through a portal site created and operated by Ateneo de Manila University.

3.3 eEducational solution

An educational solution was implemented with the Universiti Malaysia Sarawak (UNIMAS). In this project, an optical network connecting elementary and middle schools with a telecenter was constructed and educational solutions were provided to improve the Quality of Life (QoL) of residents. Solutions were provided by Wi-Fi from the Optical Network Unit (ONU) to students at the elementary and middle schools using tablet PCs. Students accessed servers in the telecenter, which provided educational applications for topics such as arithmetic and English, and cloud services for storing photographs, video and other data on the server.

3.4 eEnvironmental solution

An environmental solution was implemented in the city of Palangkaraya, in the province of Central Kalimantan in Indonesia. For this project, a Machine to Machine network (M2M) for gathering fire control information was built in a peat land area, in cooperation with Palangkaraya University. In particular, it measured water levels in the canal and peat land, which is closely correlated to the outbreak of peat fire. Figure 3 shows an overview of the sensor network. Measurements were taken at the canal and at three points in the peat land. In addition to water levels, instruments for measuring carbon dioxide, methane, precipitation, temperature, humidity, and wind speed were installed. The measurement data was collected by field servers and gathered on a data server by Wi-Fi. The data server and the university were also connected by wireless network, so the daily data sequence for individual measurement points could be checked from the university, enabling quick response when there was a fire.

4. Building solution models for governments in developing regions

We plan to build a showcase in the Tanah Datar Regency of West Sumatra, Indonesia, where the ehealth solution was provided, by gathering the solutions that can be provided to regional governments in areas of agriculture, aquaculture, environment, health and education. However, regional governments have a serious lack of ICT expertise, so even if these services are implemented, it will be difficult to maintain the environments. Because of this, we plan to build a T3 center in Tanah Datar with three functions: to cultivate ICT personnel (Training), to implement solutions (Technology Transfer & Testing), and to provide solutions (Telecenter & Data center).

5. Standardization of ICT solutions for rural areas in developing countries

In 2008, the CST was established under the BSG-WG

Figure 2: APT 2009-J3 pilot project in Philippines



Figure 3: Schematic view of network in Palangkaraya



of ASTAP, with Indonesia, Thailand, Malaysia, Philippines, Vietnam, Japan, and Korea as members, as a function to discuss application of the APT-supported solutions performed in each of the countries in neighboring Asian countries. In the BSG Committee, which took over the activities of the TTC Promotion Committee in 2013, it is also doing upstream activity for ASTAP, making a handbook for implementing ICT solutions in rural areas of developing countries, which summarizes the case studies.

6. Conclusion

We have implemented pilot projects for various solutions, using ICT to solve social issues in rural areas of developing countries. Solutions that match local needs could be provided by collaborating with local universities. Who will continue the project after it is completed is an issue with this type of project, and if the efforts of the T3 center are successful, we can expect to create local industry as indicated in the SHARE slogan, and also to develop them as sustainable models for other neighboring countries.

Toward Connectivity for All

Candidate for the Post of Deputy Secretary General of the Asia-Pacific Telecommunity (APT)

Masanori KONDO





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PROFESSIONAL CAREER

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- 2011 🛉 Director, International Economic Affairs Division
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- 2008 Director, International Affairs Office, Postal Policy Division
- 2005 Director of the Research Department, Institute for Information and Communications Policy
- 2001 Deputy Director, International Organizations Office, International Policy Division (MIC)
- 1996 First Secretary, Embassy of Japan in the Hashemite Kingdom of Jordan
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2013-	Lecturer, Keio University, Japan
2006-2007	Visiting Scholar, Rikkyo University, Japan
2006-2007	Visiting Scholar, Obirin University, Japan
2005	Lecturer, Waseda University, Japan
2004-2005	Associate, Harvard University (Weatherhead Center), U.S.A

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Candidate: Dr. Yasuhiko ITO (Japan)

- Current Member of the Board
- Proven leader in wireless technology and wireless business

Re-elect Dr. Yasuhiko ITO to the Radio Regulations Board Region E (Asia and Australasia)