국제 유비쿼터스 사회에서의 우주통신 정책과 제도

The Law and Policy of Space Communication in the International Ubiquitous Society.....Bridging Digital Divide in the Asia-Pacific

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1. Introduction

In order to bridge the digital divide issues in the Asia Pacific region, Japan initiated the Asia Broadband Program, during implementing E-Japan and U-Japan Plans with collaboration among Asia Pacific Counties.

This paper describes first joint experiments that were undertaken in Japan, Singapore and China. Then this paper also describes Japanese efforts to build space infrastructure for development of ICT Society in the Asia Pacific region for further international cooperation to bridge the digital divide.

Through these programs it is very important for us to find the way to implement the concept of "common benefit"of Article of 1 of the Space Treaty and its reaffirmation in the UN Resolution of 1997 after 30 years of the Treaty. However, the benefit couldbe increased, and expanded beyond the access to space communication services to bridge the digital divide issues in the developing countries in the Asia Pacific region.

Global information traffic over the Internet shows bipolarization towards the US and Europe. The volume of information distributed in Asian society, including Japan, on the other hand, is relatively small to the scale of population and economy..

In order to increase information traffic in Asia, framework to promote digital content distribution and measures to meet to the multi-language environment in this area will be vital. Recognizing that promotion of international digital-content e-commerce and a solution to language barriers would be effective, the following two tests were conducted.

2. Japan-Singapore advanced IT testing

Demonstration testing of an international digital-content e-commerce

performance fees according to the use of content, the use of broadband networks in the international digital contents business is limited.

In order to solve the issues of internationalsales of digital contents, a method that is applicable when sales are undertaken through the other country's operator(B2B2C) was developed and tested.

Trough the testing, practical performance was confirmed with a constant flow of transactions from content registration to distribution. Further, unified management of various rights including intellectual property rights was confirmed and an arrangement that enables content-holders to undertake international distribution was also demonstrated. These results were proposed before TV anytime, a standardization forum, as a new distribution model.

3. Japan-China advanced IT testing

Demonstration testing of a multilingual system that uses machine translation technology was conducted between Japan and China. As current machine translation is based on text format, the quality is never satisfactory. It can hardly be used in actual communications since the speaker's intention is often not conveyed to the listener. In order to make communications without being aware of language barriers, the following two methods were demonstrated.

In order to complement the poor quality of machine translation, additional methodsto support communication by machine translation, i.e., visual tools that assist intuitive understanding (including video and characters) and enriched dictionaries and example sentences in specific areas will be necessary. Therefore, the quality of machine translation in specific area was demonstrated by introducing these methods.

In the future, by combining additional tools for machine translation and upgraded translation tools, more efficient communications will be undertaken in the multilingual environment.

4. Future initiatives

l International digital-content e-commerce platform

In order to realize international digital-content e-commerce, the above-mentioned testing should be developed into a setup for constant e-commerce. In addition, to make the system useful in industries with high potential for digital contents, applications of platform technology will be developed.

l Multi-language system

By using more practical collaborative targets and other Asian languages, expanding the translation function, as well as improving joint use of the translation platform, the results of this testing can be further developed.

In order to bridge the digital divide, especially information flow with broadband networks among the Asia Pacific countries, above-mentioned issues would be very important for more international collaboration and cooperation.

5. Japan aims to build space infrastructure for bridging digital divide and development of ICT society

The Japan Aerospace Exploration Agency (JAXA), which undertakes Japan's space and aviation research and developmentwas formed by combining three agencies that handle basic research and development and utilization technologies. JAXA operates as the central agency that consistently executes everything from the pursuit of space science to the development of space utilization and rockets and transport systems.

The following part of this paper covers the building of space infrastructure aimed at a new information base for the further advancement of information and communication technology (ICT) society within the context of JAXA's

activities promoting the most advanced space research and development for implementing the Asia broadband plan.

6. Toward a safe and secure ICT society

Japan is advancing the building of 'space infrastructure' using communication satellites with the objective of a more livable ICT society. When the utilization of satellites moves forward in the creation of space infrastructure, information will be available even in areas that cannot be reached by terrestrial networks, and it will be possible to maintain stable communications unaffectedby disasters and changes in the weather. In addition, people throughout Japan as well as Asia Pacific region will be able to benefit from ICTs.

The aim of JAXA is the 'space infrastructure conception' that will rise above a leading-edge ICT society. Building space infrastructure will require the development of satellites that are highly reliable and have greater transmission speed and capacity. Accordingly the launch of satellites outlined below is planned.

7. Optical Inter-Orbit Communication Engineering Test Satellite (OICETS)

Test of high-efficiency, large-capacity satellite

Scheduled launch: in 2005

OPICETS is a technology trial satellite that will test optical communications between satellites separated by tens of thousands of kilometers (optical communications between satellites) using laser. Since laser, unlike radio waves, does not cause interference, stable communications is possible. Since the on-board equipment can be compact and lightweight and the

transmission speed is improved, this offers the advantage of allowing the smooth transmission/reception of large volumes of data.

This test will advance the development of basic technologies that support space development and space utilization, such as allowing the acquisition of global data from earth observation satellites and securing communications with manned space stations.

In addition, through international cooperation with the European Space Agency (ESA), OICETS is scheduled to conduct orbital tests between satellites with ESA's ARTEMIS advanced data relay satellite centeredon acquisition, tracking and direction technologies.

8. Engineering Test Satellite-VIII (ETS-VIII)

Japan's first 3-ton class geostationary satellite

Schedules launch: fiscal 2006

This is an engineering test satellite intended to realize mobile communications using hand-held terminals, 40 meter in total length and 40 meter in total widthwhen the solar array antenna reflectors (as large as a tennis court) are deployed.

The purpose of ETS-VIII is the development and acquisition of mobile communications technologies using hand-held terminals and future positioning satellite technologies. ETS-VIII is equipped with two 19 x 17 m antennas (among the largest in the world), high power transponders, on-board processors, and an atomic clock.

In addition, it uses a satellite us that can be shared with large geostationary satellites in the future. Thisgeostationary satellite will cover all of the Japanese archipelago and Asia Pacific region, enabling direct communication from terminals that are same size as today's mobile handsets and providing a system that allows communications 'anytime and anywhere' with hand-held terminals.

This system is expected to function as an important communications method,

such in allowing a location to be confirmed when an accident occurs by directly receiving GPS data, or in enabling information transmission without depending on terrestrial networks when a disaster takes place and ground-based wireless communications are disabled.

Although a PDA-type terminal is currently under development, moving pictures can be transmitted at a date rate of 1.5 Mbps with a portable terminal that has already been developed.

A practical drill in rescuing and protecting the victims of a distant disaster using this terminal was held at the hospital this January this year. The Ministry of Internal Affairs and Communications (MIC) invitedapplications for participants in tests for the purpose of verifying this satellite communications technology and developing new satellite applications, resulting in 22 test projects. (21 projects in Japan and one in China) We are expecting more project proposals from Asia Pacific region countries.

9. Wideband InterNetworking engineering test and Demonstration Satellite (WINDS)

Toward bridging digital divide

Scheduled launch: fiscal 2007

WINDS is an ultra-high speed communications satellite being developed in cooperation with the National Institute of Information and Communications Technology (NICT) based on the priority policy plan for Japan's (ICT society.). The objective is the formation of a world-level advanced information network. It is hoped that by taking advantage of satellitessimultaneous communications capability over a wide range this will help in bridging the digital divide as infrastructure of a broadband environment not only in Japan but also in Asia Pacific region. The WINDS system will enable high-speed (maximum 155 Mbps from the satellite to the home, maximum 1.5-6 Mbps from the home to the satellite) Internet access even from homes using a small

(about 45 cm in a diameter) dish antenna. Further, for enterprise utilization, ultra high-speed Gigabit interactive communications is possible by installing a ground station with an antenna dish about 5 m in diameter.

WINDS will use the Ka-band and be equipped with the following three new technologies.

a) Multiport amplifier

"@Power combiner/divider consisting of 8 high-output amplifiers with 8 input and 8 output ports capable of smoothly distributing power for 8 input signals.. Stable communications can be maintained by increasing the output for signals that have been attenuated by rain etc.

b) Active phased array antenna (APAA)

This enables free, high-speed (500times/sec) switching of the emission direction of transmit/receive radio waves. This will enable communications in a wide area of Asia Pacific region.

c) Onboard high-speed base band switching router

Router will enable high-speed (155 Mbps x 3 channels) information switching on the satellite.

Domestic and overseas broadband communications test using WINDS

Plans call for utilization tests using WINDS to be conducted for aperiod of five years after launch and tests of various applications, such as an international disaster network and a distance learning network. By means of an antenna for the Southeast Asia region, the satellite will be usable from the major cities in the region. MIC is planning to solicit themes for tests using WINDS from both Japan and foreign countries.

High-Accuracy Positioning Experiment System Using Quasi-Zenith Satellite System

Scheduled launch: fiscal 2008

The orbit of a quasi-zenith satellite differs from that of a geostationary

satellite; by inclining the orbit toward the equator, the satellite passes near the zenith of Japan. The quasi-zenith satellite system consist of a combination of satellites and since one or more satellites can be seen directly above Japan at all times, easy high-speed communication from moving vehicles and by individuals and high-accuracy positioning without any effects from building or mountains is possible from any point near Japan.

The high-accuracy positioning test system consists of the equipment on board the satellite, such as devices to generate and send the positioning signal, and ground equipment, such a monitor station that estimates the orbit and timing of the quasi-zenith satellites and a master control station.

Japan's development of space is putting energy into joint business academic-government cooperation activities and the creation of new business markets. One example of this, for the transfer of WINDS technologies to the private sector, isthe emergence of private enterprises such as in growing new satellite businesses. Space is infrastructure that can be used by the world.

In order to bridging digital divide, we should have more collaboration and cooperation for building of space infrastructure.

10. Implementation of common benefit from space communication

Article 1, para. 1, of the Outer Space Treaty of 1967, calls for exploration and use of outer space to be carried out for the benefit and in the interests of all countries irrespective of their degree of economic or scientific development. Over the past thirty years we raised issues concerned for compliance of the duties in the Treaty especially for space powers. One of the benefits of space communication is the radical transformation of international telecommunications by satellite networks. Most countries, including developing countries use satellites as information and communication

infrastructures for international and even for domestic purposes for all forms of telecommunication services.

In order to bridging digital divide the benefit from the space communications can and should be increased and expanded in the interest of developing countries through existing or new mechanisms within the international cooperation and collaboration, such as the International Telecommuication Union(ITU).

ITU duties as to space communications have had important schemes added to them, requiring particular attention to be given to the needs and interests of the developing countries. Withoutmaking space part of the common heritage of mankind these additions have moved things on. The particular example of the common heritage concept in action is the UN Law of the Sea Convention of 1982, as amended by the 1994 Protocol. Of course, common heritage concept has been included in the Moon Agreement of 1979. The International Sea-Bed Authority has been set up, and is now active. This scheme can certainly be presented as an analogue to space. However, it is still far away from an effective Space Authority. Even though, in relationto space communications, especially in the fields of radio frequency and GOS, it might be that the ITU could serve as such an Authority for limited purposes. If the ITU were to be given jurisdiction to regulate the use of orbits and radio frequencies in the general world public interest, a considerable step would be taken towards augmenting the common benefit of space for all nations.

In order to implement the common benefit of space for all nations, there have been several proposals such as 'resource allocation fee', auction for licensing to use various parts of the radio frequency spectrum.

All countries benefit from space communications. In last thirty years space communications have been developed and commercially profitable. Those profits derived by space communication providers could be shared by the world at large. Thus increasing compliance with the principle that the use of outer space shall be for the benefit of all could be augmented. States have been profiting from entrepreneurs willingness to pay a fee or auction for the

rights to use spectrum space in national level. This willingness should be exploited for the benefit of all by extending it to space systems. However, it should not benefit only some countries.

Such benefit could be increased by the payment of a fee for the use of the limited natural resources of orbit and radio frequency spectrum which commercial enterprises use. Of course this raises various questions and doubtless opposition from those who would see it as an unlawful tax on enterprise. Even though second paragraph of Article 1 of the Outer Space Treaty says about the use of space being free, it could include a scheme of fee within the framework of free. ITU should administer such systems for common benefit, because it is already maintaining the sort of register and procedures which would be needed to operate any system.

11. Concluding remarks

We recognize the augmentation of common benefit from space communication could contribute to bridge the digital divide issues in developing countries in Asia Pacific region. Accordingly, space- infrastructure building would be very important to implement common benefit among countries concerned through international cooperation and collaboration as I mentioned in the first part.

Especially it is very important for both Japan and Korea to have close cooperation and collaboration in space communication and other activities in space, including space law and policy.

Reference

Levin, H.J., The invisible Resource: Use and Regulation of the Radio Spectrum(Baltimore MD:Johns Hopkins Press,1971)

Rosston,G.L. and Steinberg,J.S."Using Market-based Spectrum Policy to promote the Public Interest", 1997 FCC LEXIS 384

Ryan,P.S., "Application of the Public-Trust Doctrine and Principles of Natural Resource Management to Electromagnetic Spectrum, 2004 10 Mich.Telecomm. Tech.L.Rev. 285-372

Kosuge,T., "IT Revolution and the Pacific Islands Nations", Pacific Island Seminar, 2000, Tokyo

Kosuge,T., "Digital Divide and Space Law", Colloquium of IISL, 2001, Toulouse

Abstract

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Article 1, para. 1, of the Outer Space Treaty of 1967, calls for exploration and use of outer space to be carried out for the benefit and in the interests of all countries irrespective of their degree of economic or scientific development.

The augmentation of common benefit from space communication could contribute to bridge the digital divide issues in developing countries in Asia Pacific region. Accordingly, space- infrastructure building would be very important to implement common benefit among countries concerned through international cooperation and collaboration

국문 요약

아시아 태평양 지역에서의 디지털 격차를 극복하기 위해서, 일본은 아시아 광대역 계획을 주도하고 있으며, 이는 E-Japan과 U-Japan 계획과 연계되어 아시아 국가들과의 협력하에 추진되고 있다.

본 논문은 일본, 싱가폴 및 중국과 공동으로 추진되고 있는 실험에 대해서 다루고 있다. 아울러 디지털 격차를 극복하기 위해서 아시아 태평양 지역에서 구축되고 있는 위성 인프라에 대해서도 다루고 있다.

1967년 우주조약 제1조는 우주활동이 전 국가의 편익과 이익을 위해서 수행될 것을 규정하고 있으며, 이러한 국제적 공동 노력은 분명히 디지털 격차를 극복하면서 우주조약 제1조를 이행하는 중요한 역할을 수행하고 있다고 본다. 위성 통신인프라는 그러한 차원에서 국가간 협력과 노력하에 공동의 이익을 도모하는 디딤돌 역할을 할 것이다.

주제어 : 디지털격차, 우주개발, 국제협력, 우주물체, 광대역 통신, 우주조약

Key Words: digital divide, space exploration, international cooperation, space object, broadband communication, space treaty