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United Nations/Thailand Workshop on the Contribution of Space Communication Technology to Bridging the Digital Divide

(Bangkok, 1-5 September 2003)

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I. Introduction

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in particular through its Vienna Declaration on Space and Human Development, recommended that activities of the United Nations Programme on Space Applications promote collaborative participation among Member States at both the regional and the international levels, emphasizing the development of knowledge and skills in developing countries.[1]

2. At its forty-fifth session, in 2002, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2003.[2] Subsequently, the General Assembly, in its resolution 57/116 of 11 December 2002, endorsed the United Nations Programme on Space Applications for 2003.

3. In its resolution 56/183 of 21 December 2001, the General Assembly welcomed the organization of the World Summit on the Information Society; invited the International Telecommunication Union (ITU) to assume the leading managerial role in its preparation; and encouraged effective contributions from and the active participation of all relevant United Nations bodies and of other intergovernmental organizations and the private sector in the intergovernmental preparatory process of the Summit and the Summit itself. The World Summit will address a broad range of questions concerning the information society and move towards a common vision and understanding of that societal transformation. It is expected to adopt a declaration of principles and an action plan to facilitate the effective growth of the information society and to help bridge the digital divide. It aims to bring together representatives of the highest levels of government, the private sector, civil society and non-governmental organizations and will offer a unique opportunity for the world community to discuss and give shape to the information society.

4. A reduction of the digital divide will not only bring opportunities to all countries, but will also create the conditions necessary for them to derive benefits from the implementation of new services and applications. The emergence of an environment and entrepreneurial approaches conducive to providing services and wider access to cost-effective technologies may provide an opportunity for more rapid deployment of telecommunication services in rural and remote areas. Community access to information and communication technologies is one of the most cost-effective ways of achieving universal access in many developing countries.

5. However, there are many challenges to making effective use of information and communication technologies in developing countries in Asia and the Pacific. One of the most important challenges is the limited technological infrastructure. The current level and type of connectivity in many developing countries cannot maintain effective networks to support educational initiatives, for instance.

6. Fortunately, developments in satellite communication technology may help alter certain elements of that situation in the short term. Rapid technological innovations enhance the availability of low-cost broadcast and two-way satellite services. Those technologies are built on the history and experience of using satellite-based technology to support a range of broadcast and telecommunication services.

7. Improvements in technology make satellites worth reconsideration in cases where previous attempts have proved unsuccessful. Improvements have been made to satellite-based solutions in both the space segments and the ground segments of systems. In recent years there have been major advances, allowing satellite technology to deliver a broad range of communication services to both individual users and groups.

8. In some cases, satellite technology is the only technology that can be used to provide a means of communication. There is thus an opportunity to exploit recent developments in satellite communication systems, beginning with an assessment of how they might be applied in the context of sustainable development. The international nature of satellite communication services would benefit from greater international harmonization in the use of frequencies, market access policies and open and interoperable standards for user terminal equipment.

9. In order to fulfil the promises of satellite communication technology, three major issues need to be addressed: (a) how to maintain satellite infrastructure at affordable prices; (b) how to develop satellite-based applications for local markets and with local content; and (c) how to build local capacity to understand and run those applications.

A. Objectives

10. Workshops conducted in the framework of the United Nations Programme on Space Applications and activities carried out at the United Nations-affiliated regional Centre for Space Science and Technology Education in Asia and the Pacific have determined that the training of personnel competent in satellite-based communications is one of the main problems that developing countries face in establishing telecommunication infrastructures.

11. In line with the aims of the World Summit on the Information Society, the Office for Outer Space Affairs and the Government of Thailand organized the Workshop on the Contribution of Space Communication Technology to Bridging the Digital Divide in Bangkok from 1 to 5 September 2003 for the benefit of developing countries in Asia and the Pacific. The objective of the Workshop was not just to find a way to provide more access via satellite communication networking, but to determine how to extend access to information and to focus on how networks could be used to achieve broader social and economic goals, such as electronic learning (e-learning) and telemedicine, or electronic health (e-health). This particular objective for the Workshop was selected in accordance with the priorities established by UNISPACE III.

12. Similarly, all of the regional ministerial meetings held so far in preparation for the World Summit on the Information Society have acknowledged the close link between the availability of a large-scale broadband infrastructure and the provision of public education and health. Such infrastructure, inter alia, can be provided by geostationary communication satellites.

13. The Workshop was the second on the subject organized within the framework of the United Nations Programme on Space Applications by the Office for Outer Space Affairs. The first, organized jointly by the United Nations and the

Government of Malaysia, was the Workshop on Bridging the Digital Divide: Space Technology Solutions, held in Kuala Lumpur from 20 to 24 November 2000. The Workshop in Thailand was thus part of an ongoing effort by the United Nations to promote wider use of space technology and greater cooperation in an attempt to bridge the digital divide between developed and developing countries and within developing countries.

14. The aim of the Workshop was twofold: firstly, to draft a contribution to the World Summit on the Information Society from the point of view of the satellite communication sector and, secondly, to review the status and future of various aspects of satellite communication technology.

B. Programme

15. The programme of the Workshop was developed by the Office for Outer Space Affairs, in cooperation with the Geo-Informatics and Space Technology Development Agency (GISTDA) of Thailand. The five-day programme consisted of some 30 technical presentations by speakers from 25 countries and organizations on satellite communication systems and on the various applications of that technology. Brief national reports were presented by representatives of Cambodia, Indonesia, Kazakhstan, Samoa, Tajikistan and Viet Nam. Three thematic working groups discussed the following issues: universal access systems; applications in e-learning; and applications in e-health. A chairperson was designated for each group and given the tasks of leading discussion on issues concerning the implementation of applications in e-learning and e-health; suggesting recommended solutions for more effective use of the technology; and preparing a short report to be presented at the concluding session of the Workshop on observations and recommendations.

16. An exhibition organized together with the Workshop demonstrated the iPSTAR broadband satellite system and GISTDA equipment and products to participants and visitors. A technical visit was also organized to the Thaicom Teleport, situated 30 kilometres from Bangkok.

17. Technical documentation received from speakers was distributed to individual participants in hard copy as well as on CD-ROM, together with promotional materials provided by the private sector and international organizations.

C. Attendance

18. More than 100 participants attended the Workshop and included decision makers and senior programme managers with decision-making authority in their national institutions and representatives of private industry from the following countries and organizations: Austria, Cambodia, France, Germany, India, Indonesia, Japan, Kazakhstan, Malaysia, Myanmar, Republic of Korea, Samoa, Tajikistan, Thailand, United States of America and Viet Nam; Office for Outer Space Affairs, Economic and Social Commission for Asia and the Pacific (ESCAP) and ITU, Asia Pacific Telecommunity (APT), European Space Agency (ESA), Global VSAT Forum (GVF), International Telecommunications Satellite Organization (INTELSAT) and the International Mobile Satellite Organization (IMSO).

19. Funds allocated by the United Nations and the Government of Thailand were used to defray the cost of air travel and daily subsistence allowance of 14 participants from Asia and the Pacific. The Government of Thailand, through GISTDA, provided board for all participants, local hospitality and logistical and technical support.

II. Summary of presentations

20. It was reported that the major programmes of the ITU Telecommunication Development Sector correspond to the six programmes of the Istanbul Action Plan, adopted by the World Telecommunication Development Conference in March 2002, which charted a course for developing countries to transform the digital divide into digital opportunities, covering regulatory reform, telecommunication network development, electronic strategies and services, economics and finance, capacity-building and a special programme for least developed countries. In addition, underlying that work was a programme of information-sharing, notably through the joint publication, with the Strategy and Policy Unit, of the *World Telecommunication Development Report*, *Trends in Telecom Reform* and other publications and databases. Some of the Telecommunication Development Bureau actions of most relevance to the information society included the work on electronic strategies and applications, the country case studies on Internet access and the work of the Sector Reform Unit in assisting developing countries to develop enabling regulatory frameworks. In addition, the Telecommunication Data and Statistics Unit produced a number of publications that attempted to measure the spread of information and communication technologies.

21. The ESCAP/Asia-Pacific Satellite Communications Council Workshop on Digital Satellite Broadcasting and Digital Multimedia Broadcasting, held in March 2003, had concluded that satellite broadband would be affordable for least developed countries in the ESCAP region. The objectives of that Workshop had been to explore cooperation opportunities for United Nations entities and organizations in the use of satellite broadband services with a view to bridging the digital divide and to provide a forum for both individual satellite operators and service providers and international user organizations to understand each other's concerns and requirements. The Workshop had concluded that there was a need to prepare the region for satellite broadband to meet urgent requirements in the development and applications of information and communication technologies. Preparation should be at the technical, institutional and policy levels, and cooperation with all stakeholders at the various levels was critical.

22. The Graz University of Technology (Austria) presented the capabilities of telemedicine and tele-education services via satellite. The importance of understanding complementary technologies such as wireless local area network (WLAN), free space optics (FSO) and digital cellular phone networks was stressed, given the fact that currently in many cases only very small aperture terminal (VSAT) system solutions were available and these could be very expensive. Other potential complementary or "hybrid" solutions, such as the digital video broadcasting (DVB)-return channel system or the FSO technology system, could be considered. For example, FSO, based on laser communications, was a new technology that currently did not require a licence.

23. The Centre national d'études spatiales of France reported on a wide range of satellite-based projects that were operational or under development, for example, a number of configurations using one-way satellite feeds under the DVB format, coupled with a variety of return links. The Franco Indian Cyber-University in Sciences (FICUS) project, which used satellite links between universities in France and India for the exchange of information on research and development, education, training and technology transfer, was described. A programme of the French language-based Virtual Medical University, which provided an opportunity for telemedicine, was also presented.

24. Telemedicine was crucial for India because of the limited availability of health-care specialists, especially in rural areas. A VSAT-based project for telemedicine and distance learning for rural India was presented. Telemedicine applications included not only video conferencing, but also transfer of data such as medical images and audio/video clips. A short documentary showing actual examples of telemedicine was screened. All the hospitals participating in the telemedicine project were Government-owned and all diagnoses were currently free. In addition, all the computer equipment and terminals installed were made available free of charge. In the future, when the project expanded and included more hospitals and specialists, some charges might be applied. The satellite-based distance learning programme Edusat, an important instrument in bridging India's large educational gap, was also described.

25. The National Space Development Agency of Japan presented the results of pilot experiments of the Engineering Test Satellite VIII/Wide-band InterNetworking Engineering Test and Demonstration Satellite (ETS-VIII/WINDS), which provided field education and university e-learning in Asia and the Pacific. The university e-learning experiment featured cooperation in distance education among universities, using a mesh-type satellite network that made possible the active participation of students from widely separated classes. The distance lectures were provided along with web-based training to enhance the learning experience of the students.

26. The National Space Agency of Malaysia outlined the plan for the development of information and communication technologies in Malaysia and its current status. A VSAT-based project for rural schools in East Malaysia, developed under the Universal Service Provision programme, was described. Given East Malaysia's topography, satellite technology was the only possible solution. In the next phase, the Universal Service Provision programme would expand to cover broader rural communities, such as libraries and health centres. Locally relevant content was being developed as part of the programme. Other projects involving local content would be developed in the framework of the Rural Development Programme.

27. The mandate of GISTDA, Thailand's public organization in space technology and geo-informatics, was reported as: (a) to develop space technology and geo-informatics applications; (b) to develop the satellite database and natural resource information centre; (c) to provide data services; (d) to provide technical services and develop human resources; and (e) to conduct research and development, including the development of small satellites for natural resource surveys. Its activities in providing remote sensing and geo-informatics data to benefit the country were presented, as also its research and development work in space technology and geo-informatics.

28. A presentation was made of the SchoolNet programme of the National Electronics and Computer Technology Centre of Thailand, set up to promote use of the Internet in classroom activities. The Digital Library and Digital Archive project, using iPSTAR technology as supporting infrastructure, was also described. Over the past eight years, $2.5 million had been spent on the project, not including the cost of network infrastructure.

29. The Tele-education Programme of Thailand was presented by the Cornell/Foundation House Experiments in Distance Learning. Classes and other educational programmes were being broadcast by 14 television channels for schools nationwide. In addition, class videos were also available on the Internet. Cultural programmes were also broadcast to Thai communities living abroad. The project focused on providing educational opportunities to people in rural and poor areas free of charge.

30. ESA introduced its Telecommunications Programme and e-learning and tele-medicine projects. Tele-medicine and e-learning were two extremely important applications within ESA Telecom. Since 1996, ESA had supported more than 20 tele-medicine projects. The development of communication satellites at ESA, including such recent programmes as the Advanced Relay and Technology Mission Satellite (ARTEMIS) and the European Satellite Navigation System (GALILEO), was also introduced. The I-DISCARE project had contributed greatly to the establishment of medical care centres in remote regions, often after disasters. Another project, SkyMED, was proving to be instrumental in interactive tele-education.

31. It was reported that APT members had for several years been concerned about the backlog in the ITU satellite coordination and notification process. APT had put forward a number of proposals to successive ITU World Radiocommunication Conferences to streamline the process. In 2003, APT had facilitated training of staff from developing countries of the region with two courses on satellite technology. APT also continued to support the Advanced Satellite Test-Bed project as a practical way of encouraging technological improvements. While APT did not have a dedicated satellite development programme, satellite issues were of major concern and would continue to be an integral part of all its work, including its preparation for the World Summit on the Information Society.

32. GVF was an independent, non-profit organization with 160 members from more than 50 countries. The broad-based membership represented every major world region and every sector of the satellite industry. GVF provided a unified voice for the global satellite industry. Its Regulatory Working Group played an instrumental role in that connection by bringing together regulatory experts to share their experience concerning international satellite communication policy and regulation. The Regulatory Working Group had analysed and compared a wide variety of policy and regulatory frameworks, legal structures and licensing procedures in order to be in a position to recommend the most effective and proven approaches for the benefit of policy makers, regulatory administrations, industry and the end-user community.

33. The new Inmarsat Regional Broadband Global Area Network (R-BGAN) service would, it was stated, bring reliable high-speed data communications to developing countries. R-BGAN was a communication system that enabled users to

surf the web, send e-mail and transfer data from anywhere within the satellite footprint. The cost-effective service was delivered through a portable satellite Internet protocol (IP)-modem the size of a notebook computer. The connectivity offered by the R-BGAN ran at more than twice the speed of current terrestrial general packet radio service (GPRS) mobile phone networks. The satellite footprint covered more than 99 countries, stretching from Western Europe and the northern half of Africa, across Central and Eastern Europe and the southern countries of the Commonwealth of Independent States to the Middle East and the Indian subcontinent.

34. INTELSAT reported that it had launched an initiative to bring broadband via satellite to less developed regions. The approach of the broadband initiative, which the Organization planned to present to the World Summit on the Information Society, was to encourage industry to participate along with Governments in offering services to underserved areas. The incentives to do so involved three elements that satellite companies might find attractive: the first element was a 1-gigahertz (GHz) block of spectrum that would be made available worldwide by ITU; the second was a global standard for terminal equipment; and the third was a pro-competitive and harmonized regulatory framework in countries that participated in the initiative. Memorandums of understanding would allow national service providers to be granted licences based on minimum common licensing requirements.

35. WorldSpace had created its broadcasting system expressly to serve the developing world. The company described how its satellite networks could be used to overcome problems related to the digital divide in developing countries. WorldSpace networks transmitted digital audio broadcasting and multimedia programmes to compact portable receivers over most of Africa, the Middle East and Asia (and additionally reached much of Europe). Its two satellites reached a potential audience of over 3 billion people. The digital output of the receivers could be used to provide a one-way digital link capable of downloading hundreds of megabytes daily for a variety of applications, especially for e-learning. That capability for data connectivity was of critical importance in places where Internet access was expensive, unreliable or simply non-existent.

36. The presentation by the company Northern Sky Research pointed out that communication satellites could contribute to bridging the digital divide by means of the following services and applications: (a) international and domestic trunking services for rural backbone connectivity; (b) caching services for rural “points-of-presence” and mirror sites; (c) direct broadband Internet access for classrooms in rural and underserved areas; and (d) direct broadband Internet access for public access points. It was concluded that: (a) in the new economy, the voice was still important, but data were critical; (b) prices for satellite services needed to be lowered in order for such services to move from a niche into the mainstream and thus help bridge the digital divide; (c) development aid agencies could and should implement satellite-based projects; and (d) government support was critical at the early stages of market development.

37. Detecon concluded that the cost of VSAT hardware varied greatly depending on network architecture and other factors. Starting up a low-cost VSAT provider included five elements that covered everything from planning and building to running a VSAT network: (a) regulation and licence application; (b) the commercial plan; (c) the technical plan; (d) the business plan; and (e) implementation.

38. iPSTAR was presented as a cost-effective broadband satellite system to be commissioned into service in 2004. Its technology and innovative business approach allowed its services to be provided at lower cost. Its unique technological solutions for both space and ground segments were described. iPSTAR built its terminals with a proprietary standard. In particular, participants were hopeful that the iPSTAR project would offer services that challenged price offerings for terrestrial digital subscriber lines (DSL) and cable modems. Currently the wholesale price that the company would charge would be about $1,000 per megabit per month. That price should enable small Internet service providers to offer broadband satellite service at prices that were competitive with DSL or cable.

39. Since January 2003, Lufthansa had offered its FlyNet service, which was broadband Internet access on board scheduled flights. The system used a Ku-band satellite feed to and within the aircraft. Overall, performance had been excellent and had encouraged the airline to undertake a programme to equip all long-haul aircraft with the service. One of the applications was to use two in-flight medical monitoring kits to test the effectiveness of remote medical consultation. Medical data on board had been successfully exchanged with medical experts on the ground. A video demonstrating Lufthansa's FlyNet service was screened.

40. The advantages of DVB-return channel system (RCS) applications were presented by PentaMedia. The company's open RCS digital video broadcasting constituted a cost-effective solution for 2-way satellite systems. Applications of the system included monitoring of waterways, roads and forest fires, and weather and scientific observations. The portable VSAT of about 40 kilograms could be handcarried and activated in 20 minutes for video-conferencing applications.

41. The reports by the chairmen of the three thematic working groups showed that every session had been interactive and rich in technical content. The discussion groups had been effective as they had allowed all participants to draw attention to the problems, concerns and issues they had encountered in their respective countries in using applications in e-learning and e-health, as well as to interact with each other.

III. Observations and recommendations

42. Participants in the Workshop made observations and recommendations as to which steps needed to be taken next to improve Internet access for e-learning and e-health applications in their respective countries in Asia and the Pacific. Participants agreed that prices for equipment and services needed to be lowered substantially in order to allow satellite technology to play a vital role in delivering Internet access and other communication services to many rural communities. Government initiatives also needed to be undertaken as private sector-led efforts would only contribute to the already widening divide.

43. The observations and recommendations made by participants were communicated to the secretariat of the World Summit on the Information Society for possible inclusion in the documents of the Summit (see annex). An ad hoc panel of internationally known satellite experts will be organized by the Office for Outer Space Affairs during the Summit (Geneva, 12 December 2003).

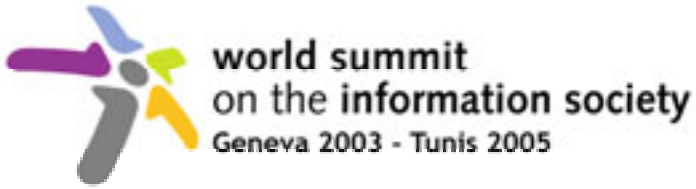
44. The proceedings of the Workshop are accessible to the international community on the GISTDA web site (www.gistda.or.th/Gistda/HtmlGistda/Html/HtmlTraining/HtmlEn/W030901_WSIS_UN.htm) and also on the web site of the Office for Outer Space Affairs (www.unvienna.org/SAP/act2003/…/presentations/index.html).

Notes:

[1] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space*, chap. I, resolution 1, part I, sect. 1 (e) (ii), and chap. II, para. 409 (d) (i).

[2] *Official Records of the General Assembly, Fifty-seventh Session, Supplement No. 20* (A/57/20), para. 56.

Annex*



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United Nations/Office for Outer Space Affairs submission to the secretariat of the World Summit on the Information Society on the Contribution of Satellite Communications Technology to Bridging the Digital Divide

PREAMBULE

United Nations Office for Outer Space Affairs (UN/OOSA) believes that satellites can service rural/remote areas today in a cost-effective manner, and with minimal infrastructure investment compared to conventional terrestrial systems. There is an opportunity to exploit recent developments in satellite communications systems, beginning with an assessment of how these might be applied in the context of sustainable development.

In line with the World Summit on Information Society (WSIS) initiative, the UN/OOSA organized a Workshop on the Contribution of Satellite Communications Technology to Bridge the Digital Divide for benefit of developing countries in the Asia-Pacific region.

All of the regional ministerial meetings so far conducted in preparation for the WSIS acknowledged the close link between the availability of a large-scale broadband infrastructure and the provision of public education and health. Such infrastructure, inter alia, can be provided by the geostationary communication satellites.

BACKGROUND

Representatives of various governmental institutions and private industry from developed and developing countries were briefed on the latest developments in

* The present annex has not been formally edited.

satellite solutions to deliver broadband Internet during a five-day Workshop. The aim of the United Nations/Thailand Workshop on Contribution of the Satellite Communications Technology to Bridge the Digital Divide (Bangkok, Thailand, 1-5 September, 2003) was to familiarize the participants from the Asia and Pacific region with both practical and cost effective space-based solutions which are currently available and provide additional options for areas with underdeveloped telecommunications infrastructure.

The Workshop considered ways in which developing countries can use space communication techniques such as Internet delivery via satellite, to enable e-learning and e-health and thus contribute to the social betterment and economic success of the region. The main advantage of educational broadcasting via satellite and two-way interactive e-learning is the system's distributive power or the ability to reach a large number of potential students wherever they may be living or working. For many developing countries, satellite-based distance education is the only practical alternative for providing quality instruction to an increasing number of geographically dispersed students.

The Workshop on this subject was the second organized within the framework of the United Nations Space Applications Programme by the Vienna-based United Nations Office for Outer Space. The Workshop is part of an ongoing effort by the United Nations to promote wider use of space technology and greater cooperation in an effort to bridge the Digital Divide between developed and developing countries and within developing countries.

The workshop assisted participants from developing countries in understanding how to use satellite-based communications networks for enhancing access to cost-effective communications, education, healthcare and other socio-economic services and applications. The aim of the workshop was two-fold: firstly to elaborate a possible contribution to the World Summit on the Information Society (WSIS) from the satellite communications sector's viewpoint, and secondly to review the status and future of various aspects of satellite communications technology. These aspects include: (i) the satellite market in the Asia-Pacific region, (ii) new satellite service opportunities for applications such as e-health and e-learning, (iii) satellite communications for disaster relief, iv) remote and rural multimedia/Internet services (v) local user access, (vi) marketing satellite services solutions, (vii) development of regional and international co-operation, and viii) advances in broadcast and two-way Very Small Aperture Terminal (VSAT) technology.

Participants developed observations and recommendations on which next steps are needed to be taken to improve Internet access and e-learning and e-health applications in their respective countries and in the Asia-Pacific region. These observations and recommendations are contained in the annex to this Information Note.

The participants agreed that the cost of equipment and services need to decline further in order for satellite technology to play a vital role in delivering Internet access and other communications services to many rural communities. Government initiatives also need to be undertaken as private sector-led efforts alone are not likely to address rural communities and would contribute to the already widening divide.

In particular, the participants were optimistic since the iPSTAR project (the most powerful communications satellite to date and which will be commissioned into service by Thailand next year) will offer services that challenge terrestrial digital subscriber line (DSL) and cable modem price offerings. This important step will lead to greater affordability and penetration of satellite communications services in sparsely populated rural areas.

More than 100 participants, including decision-makers and programme managers from governmental institutions and private industry from the following countries and organizations, attended the Workshop: Austria, Cambodia, France, Germany, India, Indonesia, Japan, Kazakhstan, Malaysia, Myanmar, Republic of Korea, Samoa, Tajikistan, Thailand, the United States of America, Viet Nam, International Telecommunication Union, United Nations Economic and Social Commission for Asia and the Pacific, Asia-Pacific Telecommunity, the European Space Agency, International Telecommunications Satellite Organization, Global VSAT Forum, INMARSAT and the United Nations Office for Outer Space Affairs.

OBSERVATIONS AND RECOMMENDATIONS of the United Nations/Thailand Workshop on Contribution of the Satellite Communications Technology to Bridge the Digital Divide organized in cooperation with and hosted by the Government of Thailand

OBSERVATIONS

The Workshop took note that:

1. Satellite communications services offer many advantages as compared to the terrestrial telecommunications solutions;

2. In recent years there have been major advances allowing satellite technology to deliver a broad range of communications services to individual users and groups. Improvements to satellite-based solutions have occurred in both the satellite and the terrestrial segments of the system. These improvements, together with reducing costs, make satellites worthwhile for reconsideration again for cases where previous attempts were unsuccessful;

3. Satellite communications technology, in its current state-of-the-art, has the potential to accelerate the availability of high-speed internet services in developing countries, including the least developed countries, the land-locked and island countries, and countries with economies in transition;

4. WSIS represents a historic opportunity for governments to recognize the provision, on a global basis, of satellite high-speed internet services through low-cost user terminals;

5. Governmental support during the early stages of the satellite communications services development plays a critical role;

6. The international nature of satellite communications services would benefit from greater international harmonization in the use of frequencies, market access policies, and open and interoperable standards for user terminal equipment;

7. There is a trend in changing national satellite communications regulations in the ESCAP region;

8. Factors that contribute to the successful provision of satellite communications services include low-cost VSAT equipment and earlier definition of potential user needs. Necessary success factors also include availability of local human resources and a favorable legal framework;

9. There is no single standard for user terminals in satellite communications industry. Regional and national standardization groups are currently evaluating a number of standards for broadband satellite services;

10. One of the major barriers to satellite services development is the ITU backlog of so-called "paper satellites". (ITU upholds the right of all nations—rich or poor—to equal affordable access to satellite orbit space. However, there is an urgent need to reduce an avalanche of applications for satellite "slots", many for systems that will never leave the Earth. These "speculative" systems are known as "paper satellites");

11. "Hybrid" satellite communications systems (i.e. satellite technology combined with the wireless technology for the "last mile" access to the end user) provide even more cost-effective solutions;

12. Business models, such as developed, for example, for the PSTAR project will provide services at more affordable cost;

13. INMARSAT will continue to provide service in the events of disasters or emergency free of charge;

14. Introduction of e-learning and e-health services are on the development agenda of many governments;

15. The social and economic benefits of e-learning and e-health via satellite have been demonstrated in many pilot projects and are now considered as space-based applications with very important benefits for the people;

16. Developing countries would benefit from a set of guidelines addressing the satellite infrastructure development to facilitate the deployment of e-learning and e-health applications.

RECOMMENDATIONS

The Workshop recommended that:

1. The countries from Asia-Pacific region should give high priority to bridging the Digital Divide;

2. Broadband services should be recognized as an important engine for economic and social development;

3. Governmental institutions should encourage the growth of satellite services;

4. To fulfil the promises of satellite communications technology, three issues are to be addressed: (i) to maintain satellite infrastructure at affordable price; (ii) to develop the content of satellite-based applications in a manner that is appropriate

for local conditions; (iii) and to create local human resources to understand and operate these applications;

5. A harmonized standard for broadband communications system is highly desirable as it could be a contributing factor in bridging the Digital Divide;

6. To make satellite broadband services affordable for the least developed countries in the ESCAP region, preparations at technical, institutional and policy levels should be conducted;

7. Necessary actions should be taken to allow development, in time for the second phase of the Summit (Tunis, 16-18 November 2005) of the conditions that would enable the emergence of a global broadband satellite system for high speed internet applications, in particular for developing countries and remote and rural areas;

8. Viable and innovative business models for satellite services should be developed;

9. Free bandwidth for regional pilot and humanitarian should be provided by the satellite communications operators. Special arrangement for e-learning projects should be encouraged;

10. The minimum data rate for e-learning applications should be 128 Kbps. This is taking into account: (i) the minimum data rate available on VSAT applications; (ii) cost of bandwidth and the current performance of a web page delivery.