The Benefits of Low-Earth Orbiting Satellite Technology for the International Community: Can the Potential be Realized

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The Benefits of Low-Earth Orbiting Satellite Technology for the International Community: Can the Potential be Realized?

MARK Nogueira

I. INTRODUCTION

The wait is almost over. In 1998, the first low-earth orbiting (LEO) satellite systems will begin to provide services. The LEO technology, which grew out of advances made in trying to develop the aborted "star wars" defense system, will allow users to make and receive telephone calls from anywhere in the world through a single, small, hand-held transmitter. The LEO systems will provide global coverage by employing multiple satellites which orbit the earth at a relatively low altitude. LEOs are different than the traditional geostationary (GEO) satellites which remain at a fixed point higher above the earth. The LEO satellites may route the signals through ground stations or they may use intersatellite linking to pass the signal from satellite to satellite in order...
to keep a constant connection. In addition to voice services, the LEO systems will also be able to provide data, fax, and paging services. Thus, this technology will soon make it possible to quickly, easily, and relatively cheaply place a call from a village in sub-Saharan Africa to an office in New York; or to access the Internet from a laptop computer in a South American rain forest. After years of rhetoric, there is now the possibility for a truly global "information superhighway."

The possible applications of LEO technology for the international community are encouraging. Perhaps the most promising aspect of the LEO systems is the potential benefits they present for developing countries. LEOs have been heralded as a way for "poor nations to leapfrog into the 21st century." Indeed, at the World Telecommunication Policy Forum (WTPF) conducted in Geneva in October 1996, the Chairman's Report noted "that developing countries may stand to benefit from these advanced services and in particular where terrestrial infrastructure is limited or non-existent" and "that GMPCS has the potential of narrowing the existing gap in the provision of telecommunications services between developed and developing countries."

However, that same report noted "that while the benefits and potential of GMPCS have not been challenged, nevertheless some countries have concerns about the political, economic, social, and cultural impacts of the emerging new systems."

This comment will discuss the potential benefits and concerns that the LEO technology raises for the international community. Part II will provide a brief explanation of the LEO system technology. Part III will discuss the potential benefits of these systems for the international community. Part IV will analyze the concerns raised by the introduction of the LEO systems. Finally, Part V will discuss whether the international community can realize the potential advantages of the LEO technology, arguing that the International

8. Id.
9. Id.
Telecommunication Union (ITU or Union) must take a more proactive role if this is to be accomplished.

II. TECHNOLOGICAL EXPLANATION

Before discussing the international legal and political implications of the LEO systems, a brief explanation of this new technology is helpful. Each of these systems has three basic components: (1) the mobile terminals; (2) the LEO satellites; and (3) the terrestrial gateways and earth stations.

The mobile terminals may be transported virtually anywhere in the world and still maintain communication with the LEO satellite in the closest orbit to the terminal. Once the signal is received by the satellite, one of two things may occur: the signal may either be transmitted to the nearest earth station or it may be passed from satellite to satellite and transmitted to the earth station closest to the end user. In either situation, the signal is then passed from the earth station to the gateway. The gateway interconnects the satellites to the public switched telephone networks so that the call can be completed to the end user. The earth stations and gateways may or may not be located together.

Most of the LEO systems will have regional gateways that will serve several countries in its region. Thus, a single gateway located in one country will be responsible for interconnecting the satellite signals to the national telephone networks of several countries. While the number of gateways that will be used is different in each system, all the LEO systems intend to use these regional gateways to at least some extent.

Besides the ability to provide communications on a global basis, LEOs have other advantages over their geostationary counterparts. Because the LEO satellites orbit at a distance of 500 to 1,500 kilometers above the earth's

10. For a more detailed explanation, see Le Goueff, supra note 5.
11. Id. at 420.
12. See id. at 421 (discussing the differences between the Iridium system, in which the earth station and gateway functions are conducted by the same facilities, and others, such as the Odyssey, in which the earth stations and gateways are separate).
13. In reality, the coverage will not be completely global. The LEO systems will be able to service the entire United States and probably about 75% of the rest of the world. Vineta Shetty, To the Far Ends of the Earth, COMM. INT'L, Oct. 1, 1996, at 8, 9, available in 1996 WL 11260151.
III. POTENTIAL BENEFITS OF LEO SYSTEMS FOR THE INTERNATIONAL COMMUNITY

A. "Instant Infrastructure" for Developing Countries

The benefits provided to developing countries are perhaps the most advantageous aspect of LEO technology. At a U.N. sponsored telecommunications expo in 1995, Nelson Mandela noted that half the world's population has no access to a telephone and that the technology gap between the developed and developing nations is actually widening. The potential for LEO technology in developing countries, where the costs of developing traditional telecommunications infrastructure has led to this gap, is very attractive.

Indeed, each of the "Position Papers" prepared by the major LEO developers for the WTPF discussed at length the potential benefits of their systems for the developing world. These systems provide a way for countries with underdeveloped communications infrastructures to have state of the art communications systems without having to go through the costly process of installing infrastructure. This allows developing countries to avoid, as one South African telecom company official put it, "go[ing] through the growing pains the First World went through." The installation of infrastructure is often prohibitively high, especially to rural areas. In many countries, only the large cities and densely populated areas have communications technology. However, these wireless telephone systems can bridge the gap between large metropolitan areas and remote towns and villages without the need to install telephone lines.

In this era of the "information superhighway", a modern telecommunications infrastructure is necessary to compete economically on the
international level. Vice President Al Gore has identified telecommunications development "as an essential factor in economic growth and development, and not as a luxurious result of growth." However, even though many governments of developing countries realize the importance of communications technology, they are often slow in responding to this need. It is often difficult to justify spending billions on telecommunications when more pressing needs such as starvation, disease, and poverty are present. Political expediency often dictates that money be spent on other matters. For this reason, the privately funded LEO systems are seen as a potential boon for the economies of the developing world. The developing countries can realize the benefits of a modern telecommunications infrastructure almost overnight without having to front the capital investment to achieve a "traditional" infrastructure.

B. Improved Education and Health Care

The advantages of these systems to developing countries are not limited to the economic sphere. There are also several social benefits that these systems can provide such as improved education and medical services to remote regions. For example, the Internet is already being used in many parts of the world to provide "telemedicine." Telemedicine allows "patients and doctors in rural or economically depressed areas... [to] immediately access specialized services that their communities lack, thereby increasing convenience, diagnostic


24. Id.

ability, and the overall quality of local medical care."\textsuperscript{26} Today's information technology allows health care providers to consult with colleagues anywhere in the world. These consultations may include such advanced services as examinations of X-rays, EKGs, and biopsy samples (reduced to computer data) by experts across the globe.\textsuperscript{27} Thus, improved communications services are an important element of improving health services.

Similarly, the LEO systems may be used to improve access to quality education. The Internet can be used to facilitate the growth of virtual schools, bring together teachers and students from anywhere in the world,\textsuperscript{28} and access virtual libraries. The Internet is a promising tool enabling governments to provide education and skills training to residents of rural and economically depressed areas.\textsuperscript{29} LEO technology will make the proliferation of these health care and education services cheaper and easier for governments to pursue and will be a critical tool in improving the quality of life for people living in these isolated areas.

\textbf{C. Promotion of Political Globalization}

By enabling countries with underdeveloped communications infrastructures to have modern telecommunications services, the LEO technology will promote the process of "political globalization."\textsuperscript{30} This term embraces the idea that, as globalization occurs, there will be greater understanding among different cultures resulting in a more homogenous and peaceful international system. The globalization of the international community

is an important source of common economic and political values for humanity. Globalization is simultaneously a cause and a consequence of the convergence of basic economic and

\textsuperscript{26} Id. at 147.
\textsuperscript{28} See Mary Beth Marklein, \textit{Computers Allow a Virtual Shift in Higher Learning}, \textit{USA TODAY}, Dec. 8, 1996, at 7D.
political systems among nations . . . . Momentously, the convergence of these systems is leading to the convergence of fundamental values—deeply held beliefs about what is right and wrong . . . . The convergence of basic economic and political values among nations is a pivotal event because it is a necessary, though not sufficient, condition for the eventual emergence of a consensus among human beings that there is but one human race.31

Political globalization is at least partially responsible for the increase in democratic governments throughout the world and the acceptance of human rights norms in a greater number of countries.32 LEO technology, which could potentially link millions of people together and facilitate communication and understanding amongst different cultures, will be a major factor in promoting political globalization and, hopefully, in promoting peace and stability in the international system.

D. Control of Global Health Problems

In today's globalized economy, international trade and travel has reached an unprecedented rate. One unfortunate effect of the increase in global travel and commerce is that an outbreak of an infectious disease in any area of the world threatens virtually the entire international community.33 The LEO systems may be used to aid international efforts in controlling and limiting these outbreaks. The World Health Organization, for example, hopes to harness the telecommunications revolution to help monitor and contain the outbreak of infectious diseases.34 Surveillance has been recognized as one of the most important elements of any strategy for controlling the spread of infectious

31. Id. at 431.
32. See id. at 447-48.
33. See David P. Fidler, Return of the Fourth Horseman: Emerging Infectious Diseases and International Law, 81 Minn. L. Rev. 771, 794-800 (1997).
diseases. The global reach of the LEO systems would allow for more timely access to information on outbreaks of infectious diseases and allow the international community to more effectively control these outbreaks.

E. Emergency Communications

The LEO systems can also be used to provide emergency communications in the aftermath of floods, hurricanes, earthquakes, and other natural disasters. These events often render telecommunications services inoperable at precisely the time when they are most needed. Because the LEO systems do not rely on massive infrastructure, they can continue to provide service in the wake of a natural disaster. This ability of the LEO systems could be utilized by all countries of the world, not just those with underdeveloped communications.

IV. CONCERNS

While the benefits of the LEO systems to the international community are certainly promising, there are some important concerns that must be addressed before these benefits can be realized. Many of these concerns are voiced most strongly by developing countries.

A. Background

Although the potential commercial success of LEO systems is being debated by industry experts, heavyweights such as Motorola, Microsoft, and General Electric are betting billions on the fact that there will be a big market for these services. However, analysts seem to agree on one fact: the market will not

35. See Fidler, supra note 33, at 822-26.
36. See Odyssey Position Paper, supra note 22.
38. The estimated costs for Big LEO systems range from a low of $2.2 billion to a high of $9 billion. See WTPF Fact Sheet, supra note 1. The Communications Center consulting firm in Clarksburg, Maryland estimates the cost of implementing a LEO system as approximately $43 billion. See David J. Lynch, Satellite Firms Aim High, USA TODAY, Nov. 21, 1995, at B1.
support all the LEO systems that are being planned. There are currently five major Big LEO systems in the works: Iridium, Globalstar, Odyssey, ECCO, and Kokson. The analysts predict that, at most, the market will support two or three of these systems. For this reason, the race to capture a chunk of the market has been described as "a very expensive game of musical chairs." In an effort to be one of the players left with a chair when the music stops, these LEO service providers are developing their marketing strategies.

Iridium, for example, led by its major investor, Motorola, plans to target upscale business travelers. The Iridium system will use "intersatellite linking" to route calls (i.e., passing the signal from satellite to satellite), resulting in higher quality at a higher cost. Iridium's service costs are predicted to be three dollars a minute, the highest in the industry. Iridium is hoping that there will be enough customers willing to pay for the higher quality. Other systems, such as Odyssey and Globalstar, are planning to use fewer satellites and will route the calls through ground stations. These systems will be cheaper than Iridium but the quality may not be as high. Only time will tell which strategies will be successful and which of the service providers, if any, will survive in the market.

While all of these systems hope to attract the international traveler, perhaps the market with the biggest growth potential is developing countries. In fact, Pyramid Research, Inc. of Cambridge, Massachusetts, predicts that by the year 2010 there will be as many as thirty-five million LEO customers in developing countries. Other studies by C.A. Ingley & Co. and Ovum, a London-based consulting firm, also predict that developing countries will be a big market for

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40. See WTPF Fact Sheet, supra note 1.
41. See, e.g., Foley, Upwardly Mobile, supra note 2; Skinner, supra note 39.
42. Lynch, supra note 38, at B1.
44. See Foley, Iridium, supra note 37.
45. See id.
46. See Skinner, supra note 39.
47. Some analysts argue that the LEO consortia are underestimating the amount of competition they will get from cellular networks. See Foley, Iridium, supra note 37. The cellular industry has been expanding rapidly and, with its lower costs, may prove to be a major threat to LEO service providers. Id.
48. See Gerding, supra note 14, at 35.
49. See id.
these services. Obviously, a major marketing target for these LEO service providers will be developing countries.

The LEO consortia must be licensed in each country in which they plan to offer services, and getting these local licenses will not be easy, particularly from developing countries. In order to secure these service agreements, the service providers must be able to assure the developing countries that all of their concerns will be addressed. The technical feasibility of the LEO systems has already been demonstrated. The primary obstacle to achieving LEO service on a global basis is no longer technological, but political. The service providers must now turn their attention to the diplomatic process of securing these agreements. While the service providers have been successful in negotiating relationships with many nations, there are still some concerns about these systems. These concerns, as well as the efforts taken by the service providers and the ITU's World Telecommunication Policy Forum to deal with them, will be discussed in turn.

B. The Question of Cost

The LEO service providers have paid much lip service to the many benefits of their systems to developing countries. Obviously, however, these companies are not spending billions on these systems solely for philanthropic reasons—they want to make money. While the positive aspects of this technology to the global system cannot be denied, questions remain regarding the tension between the objectives of the profit-seeking service providers and the interests of the developing countries. Perhaps the most significant question is

51. See Skinner, supra note 39.
52. See Foley, Upwardly Mobile, supra note 2.
56. See, e.g., Position Papers, supra note 16.
whether the residents of poor countries will be able to afford the services. The price for these services will range from about fifty cents to three dollars per minute, hardly an affordable price for most of these residents. The question remains whether developing countries will see the benefits of LEO systems.

The WTPF addressed this concern over the cost of LEO services. The Forum Report stated "that while GMPCS systems provide telecommunication infrastructure opportunities to the global community, particularly where terrestrial infrastructures are limited or [non]existent, utilization cost should be set at a level that would make this service widely available, especially to developing and least developed countries." The Report went on to say "that there is concern that the charges for access and utilization of GMPCS services may well be beyond the means of the local populace in developing countries, particularly those that live in rural and remote areas", and it urged "GMPCS system operators and service providers to consider including as part of their corporate mission the commitment to offer their services as a further means to contribute to the attainment by developing countries of the goal of universal access."

The LEO developers, for their part, recognize the concerns of developing countries regarding the affordability of their services. Globalstar, for example, in its Position Paper for the WTPF pointed out that "the ultimate success of GMPCS will depend on the affordability of the various proposed systems and their flexibility to adapt to the unique needs of many different nations." The Globalstar paper then went on to point out the obvious: "A host of issues associated with this challenge must be addressed if GMPCS is to be made a reality." The strategy the service providers are pursuing to alleviate the concerns of developing countries is to work closely with national regulators and form partnerships with foreign service providers so that the unique needs of

57. See Sherer, supra note 14.
60. Id.
61. Id.
63. Id.
each country may be met. To make their sales pitch more politically palatable, the LEO service providers have undertaken to improve both service accessibility and affordability to the mass of the global population.

C. The Effect on Infrastructure Development

Another concern raised by LEO systems is the effect that the use of this technology will have on the development of more traditional telecommunications infrastructure. Experience has shown that national control of telecommunications is not the most efficient way to develop infrastructure. Therefore, many developing countries, and indeed, even some developed countries, have turned to privatization and have sought foreign investment to help build their national communications systems. Although investment may come from public institutions such as the World Bank, the Inter-American Development Bank, or the Asian Development Bank, the private sector has increasingly become the main source of foreign capital in developing countries. Thus, developing countries are becoming increasingly reliant upon the private sector to provide the requisite financing for the development of their telecommunications infrastructures. Many countries have shown a willingness to loosen their communications regulations in hopes of attracting foreign investment. Nonetheless, private foreign investment may be threatened if the LEO systems are successful in capturing the market in these countries. That is, private companies may be less willing to invest in these markets if their return is jeopardized by competition from LEO service providers. Thus LEO services may hinder the development of communications infrastructure in developing countries. That being said, it is not likely that this possibility will be a major concern. It is simply too attenuated and the immediate benefits of these systems are too great for governments to worry about the possibility of long term negative effects. Most developing countries seem to be welcoming the use of LEO technology and only time will tell if this has an effect on the long term development of communications infrastructure.

64. Id.
65. Shetty, supra note 13.
66. See generally Sozzi, supra note 19.
67. Id. at 439-45.
68. Id. at 443.
69. Ayer, supra note 43.
D. Will Developing Countries Miss Out on Revenue?

Many developing countries have expressed fears that the LEO service providers will divert revenues from their public switched telephone networks (PSTN). Because these systems rely on satellites to connect the calls, they can bypass the PSTN at one end of each call or, with systems like Iridium that use mobile satellite links, at both ends. The calls from the LEO handsets will usually be routed through the PSTNs. This is done with the use of terrestrial gateways. While each system will employ a different number of gateways, each one is planning on using a far smaller number of gateways than there are countries. Many governments, then, will have no direct control over these gateways. Countries worry that the ability of these systems to bypass the PSTN will cause them to miss out on revenue from long distance telephone calls. This concern was one of the major focuses of the WTPF.

There are two different scenarios in which this concern is raised. The first is where the service provider actually has a service agreement with the country. That is, countries want assurances that they will not miss out on these revenues because they allow the LEO technology to be used in their territory. Many industry analysts, most notably the service providers themselves, argue that the LEO technology will not divert revenue from local markets. In fact, it is argued, these systems will actually stimulate new traffic on the PSTN and, thereby, increase revenues to developing countries. While some traffic is diverted this will most likely be more than offset by the increase in new traffic.

The service providers have a strong interest in seeing that the developing countries fears concerning loss of revenue are placated. If the service providers want service agreements with these countries they must assure them that they will not be missing out on profits. The operators are seeking a marketplace with as few regulations as possible and they want to make access into markets

75. Shetty, supra note 13.
as easy and inexpensive as possible.\textsuperscript{76} Thus, these companies have been willing to work with officials from developing countries and to make concessions when necessary to assure that the regulatory landscape is clear and that they will be able to establish service agreements. Motorola, for example, initially intended for its Iridium system to bypass domestic terrestrial systems altogether.\textsuperscript{77} This proposal, however, was criticized by the international community so Motorola revised its plan so that five percent of the revenue from each call would be apportioned to domestic telecommunications operators.\textsuperscript{78} Globalstar, on the other hand, intends to sell access to its system to local service providers and let them market the services in their country or region.\textsuperscript{79} Globalstar has also stated that it will use triangulation to locate the position of its customers (within one to five kilometers) so that the call is handled by the domestic network and the user is billed correctly.\textsuperscript{80}

The second concern countries have regarding loss of revenue is that there is really no effective way for them to stop LEO companies from providing services in countries where they have no service agreement. A customer who has service provided by Iridium, for example, may try to use the mobile telephone in a country where Iridium is not authorized to provide service. There is no effective way to monitor this.\textsuperscript{81} Thus, it is possible for these service providers to "steal minutes" from national telephone companies.\textsuperscript{82}

For the most part, the WTPF was successful in dealing with the concerns of developing countries regarding the potential loss of revenue and the unauthorized use of LEO technology.\textsuperscript{83} Most developing countries seem to agree with both of the service providers and the other experts who contend that the increase in traffic will offset the loss in profits from calls that bypass the PSTN. As far as unauthorized use of the systems is concerned, the developing countries seem willing to take the service providers' word that they will not permit unauthorized use. This may not be as big a leap of faith as it may seem.

\textsuperscript{77} \textit{LEO Faces Plethora of Financial Obstacles}, supra note 72.
\textsuperscript{78} Id.
\textsuperscript{80} Shetty, supra note 13.
\textsuperscript{81} Id.
\textsuperscript{82} Id.
The service providers want to avoid a situation where the developing countries mistrust them because that can only jeopardize their negotiations for service agreements. The Memorandum of Understanding (MoU) from the WTPF attempted to establish an agreement whereby both sides would benefit and mutual trust would be fostered. The MoU started out by "fully recognizing the sovereign right of each state to regulate its telecommunications" and went on to state the goal of establishing free flow of LEO user terminals and other provisions for setting up a mutually beneficial regulatory framework. This MoU was meant to spur the development of this regulatory framework and it has been successful to some degree.

While it is true that most countries have signed onto the MoU from the WTPF, there were some developing countries who refused to give their support. Delegates from China, India, Pakistan, and Bangladesh were not willing to support the MoU without further study. Some developing countries were wary of the service providers and the developed countries' urgency in resolving these issues. An anonymous observer from a developing country commented that, "operators think they need quick solutions so they can dominate the market." Despite the general acceptance of the work of the WTPF, developing countries are still "uncertain over whether they [will] be drawn into a process dominated by powerful voices in the developed world." Work still needs to be done in order for the developing countries to be comfortable enough to permit the loose regulations that the service providers seek.

85. Molony, supra note 83.
86. Memorandum of Understanding, supra note 84.
87. See id.
89. Molony, supra note 83.
90. Id.
91. Id.
92. Id.
E. The Sovereignty Issue

The concern over national sovereignty is not unique to LEO satellite technology nor is it only expressed by developing countries. Indeed, the issue of potential violations of national sovereignty has been raised with nearly every advance in satellite technology. This concern has been raised in regards to satellite technologies such as GEOS,93 direct satellite broadcasting,94 and remote sensing.95 Many countries are wary of the influence of the dominant voices in the global communications market and some countries are reluctant to allow their citizens to become part of the information revolution.96 While LEOs raise concerns common to other technology, there are some sovereignty issues that are unique to LEO technology.

Some countries worry that having these LEO satellites outside of their control will threaten their national security.97 What makes this issue all the more complicated is that these satellites are controlled by private companies and not by governments.98 Thus, agreements cannot be reached on a diplomatic, intergovernmental level. The governments and the LEO service providers must deal with each other in addressing this issue. The national officials will attempt to ensure that their national sovereignty is protected in negotiating the service agreements with the providers.

Countries have expressed additional concerns about LEO technology and national sovereignty. China, for example, seeks assurances that it will be able to control the LEO network in a crisis.99 What exactly constitutes a "crisis" for the Chinese government is an issue that may prove to be contentious. Other countries have similar concerns. Another issue of sovereignty that countries

96. Skinner, supra note 39.
97. Foley, Upwardly Mobile, supra note 2. Although these concerns are not voiced solely by developing countries, they have been the most vocal in their dissent. Id.
Worry about is information security. This covers issues such as whether national officials, like the police, may intercept the calls on the services. Cultural differences may cause disagreement between the service providers, their customers, and the governments of developing countries, many of which have non-democratic regimes.

Perhaps the most substantial sovereignty concern that arises from the use of LEO technology relates to the terrestrial gateways that are used to connect the calls to domestic PSTN. As noted above, many countries will not have a gateway within their territory. Globalstar will use the most gateways in the industry, approximately one hundred, arguing that the higher number of gateways provides "at least a perception of local involvement and control." Iridium, on the other hand, will use only eleven gateways, a strategy that will minimize costs but may not be the most politically expedient thing to do. The reason a small number of gateways is not desirable for some countries is that they will have to rely on neighboring countries in order for calls to be routed through their PSTN. This could be a serious problem in areas where neighboring countries are not on friendly terms. For example, consider the possibility of Iraq having to rely on an Israeli gateway for routing signals to and from Iraq. The political ramifications could be severe.

Another concern governments have in the debate over the placement of gateways is the fact that a country "will generally have a greater ability to influence the operation of the overall [LEO] system and the provision of service if it has a gateway." A country that has physical control over the gateway will have more power to affect the actions of the service providers. Thus, the decision on how many gateways to use and, more importantly, where to put them could have important implications for the LEO service providers' efforts to establish service agreements.

100. Foley, Operators Tangle with Loose Ends, supra note 76.
101. Id.
102. See supra note 73 and accompanying text.
103. Id.
104. Id.
The WTPF attempted to deal with these concerns over national sovereignty. The Forum Report recognized "the sovereign right of each Member to regulate its communications." Indeed, the documents from the Forum are replete with references to the sovereignty of countries. However, the Forum was not successful in providing clear answers to these questions. For example, the MoU stated that the satellite operators should obey the laws of the countries where they are authorized to operate. However, the language of this provision is vague and could be subject to a wide range of interpretations. There simply was not enough agreement among the participants to have specific answers to these sovereignty questions. Instead, they had to settle for more general language requiring future negotiation and compromise.

V. CAN THE POTENTIAL BE REALIZED?

Having discussed these concerns facing the LEO systems, the question remains: will the potential benefits of these systems ever be a reality? As one commentator noted, LEO systems "are the most 'socially complex' communications systems because they require so many individual license approvals, from so many countries, in order to achieve their goals of worldwide communications." Thus, the key to LEO technology lies in the ability of the service providers to secure these licensing agreements with individual countries.

A. ITU Must Facilitate Agreement Between Service Providers and Developing Countries

In order for LEO technology to be most beneficial to the international community, certain issues must be addressed including: cost, infrastructure development, loss of profits, and national sovereignty. The service providers still have the daunting task of negotiating the regulatory, legal, political,
logistic, and financial hurdles in each country in which they hope to operate.\textsuperscript{111} Although the companies have seen success in negotiating some agreements, there are still some hurdles that stand in the way of providing global coverage. The service providers realize that if this goal is to be reached, "diplomatic skills will be as valuable as fat bankrolls."\textsuperscript{112}

The ITU can play a key role in facilitating agreement and compromise between developing countries and the service providers. It has already taken a positive step with the WTPF. The Forum was successful in getting the ball rolling towards establishing a workable regulatory framework for LEO systems. Few countries had begun to establish regulations governing LEO systems prior to the WTPF.\textsuperscript{113} Despite the success of the WTPF, there is still more work to be done. While negotiations between the LEO operators and individual countries are progressing, the pace has been slow and the ITU should continue to act as a mediator between the two "sides." LEO technology is inherently international and many international issues are implicated. The ITU must work with the LEO consortia and government officials in order to expedite the development of the necessary regulatory framework and agreements in order to make LEO technology available on a global basis.

The ITU is the oldest international organization in the world. It was established in 1865 after twenty European countries met to organize the European telegraph network.\textsuperscript{114} Today, the ITU consists of over 160 countries. Over the years, the ITU has seen many developments in communications technology and has adapted to meet the needs of the global community. Traditionally, the ITU focused on facilitating the development of international telecommunication by providing a forum for world coordination and cooperation, standard setting, spectrum management, frequency recordation,

\textsuperscript{111} LEO Faces Plethora of Financial Obstacles, supra note 72.
\textsuperscript{112} Lynch, supra note 38.
and protection from harmful interference.\textsuperscript{115} While the ITU continues to serve these basic functions, its purposes and functions have evolved in recent years.\textsuperscript{116}

One example of the ITU's evolving functions is the emphasis the Union has placed on addressing the needs of developing countries.\textsuperscript{117} As membership in the ITU increased over the years, the Union changed from an organization dominated by developed states into one dominated by developing states.\textsuperscript{118} As their numbers and influence in the Union grew, the developing countries attempted to shape ITU policy to their benefit.\textsuperscript{119} The first example of this growing influence was in 1959 when the Union adopted Article 4 which amended its purposes to create, develop, and improve telecommunication infrastructure in developing countries.\textsuperscript{120} In 1982 the controversial phrase "special needs of developing countries" was included in the ITU's Convention, obligating the Union to take these needs into account.\textsuperscript{121} The developing countries pushed for policies such as setting up technical assistance funds financed through the regular ITU budget\textsuperscript{122} and creating an arm of the ITU to raise outside funds and mobilize development programs.\textsuperscript{123} However, these efforts have led to little success as is evidenced by the fact that the technology gap has been steadily widening.

Although the ITU has evolved into a more political organization, some commentators have criticized the ITU for being "full of engineers terrified of controversy and terrified of the press,"\textsuperscript{124} and that the "black letter" regulations

\textsuperscript{115} Audrey L. Allison, Meeting the Challenges of Change: The Reform of the International Telecommunication Union, 45 FED. COMM. L.J. 491, 504 (1993).
\textsuperscript{116} Id.
\textsuperscript{119} Codding, supra note 114, at 504-07; White & Lauria, supra note 117, at 8; Harris, supra note 118, at 87-89.
\textsuperscript{120} Harris, supra note 118, at 87.
\textsuperscript{121} Id. at 88.
\textsuperscript{122} Codding, supra note 114, at 505.
\textsuperscript{123} Allison, supra note 115, at 522.
\textsuperscript{124} Will You Keep My Space?, THE ECONOMIST, Sept. 29, 1979, at 18; Delzeit & Wahl, supra note 94, at 273.
that govern the ITU render it "politically powerless."\textsuperscript{125} While these criticisms may be a bit harsh, the ITU must respond to the challenge to be more active in the LEO context because the concerns of the international community must be dealt with in a forceful and politically adept manner.

At the 1994 Kyoto Plenipotentiary Conference, the ITU took important steps toward reforming itself. It created a strategic plan for the period 1995-1999.\textsuperscript{126} The most important provision of this plan, at least in the context of LEO policy, was a recognition of the need for increased participation of the private sector in the Union.\textsuperscript{127} The ITU is in the process of reshaping itself by giving industry representatives the right to participate in conferences such as the WTPF on more equal footing with government officials.\textsuperscript{128} This is a critical development because, in the LEO context, the private companies are the ones who must reach agreements with these countries. This development should continue as the ITU transforms itself to meet the needs of the telecommunications environment of the next century "when private companies replace governments as the dominant force."\textsuperscript{129} We are living in a world where transnational corporations are becoming more powerful and are beginning to influence the international system in profound ways.\textsuperscript{130} By recognizing this and making provisions so that LEO service providers have a voice in the Union, the ITU can better facilitate agreement and compromise and help establish a regulatory framework that is beneficial to both the service providers and the developing countries.

In order for the ITU to be a major impetus in the development of a regulatory framework for LEO satellites, it must not only change its structure and practices by involving the private sector in Union policymaking, it must also change its basic philosophy. As the dynamics of the international system are changing, the old "developing countries v. developed countries" dichotomy that has characterized the ITU is no longer a useful distinction, if indeed it ever

\begin{thebibliography}{99}
\bibitem{125} Delzeit \& Wahl, supra note 94, at 273.
\bibitem{126} Coddington, supra note 114, at 509.
\bibitem{127} Id.
\bibitem{128} Id.
\bibitem{129} Theresa Foley, Satellite: An End to Smoke-Filled Rooms, COMM. WEEK INT'L, Oct. 21, 1996, available in 1996 WL 8647342.
\bibitem{129} Id.
\end{thebibliography}
was. The ITU must continue to evolve into an organization that represents the interests of the international system including the nations of the world and the private sphere. The context of the international issues surrounding LEO technology is the primary area in which the ITU must show that it can continue to be an effective instrument of international policymaking.

VI. CONCLUSION

We are on the brink of a new era in global telecommunications. LEO satellite systems have the potential to revolutionize not only the communications industry, but the entire international system as well. By providing "instant infrastructure" to developing countries, improving health care and education in isolated areas, promoting the achievement of "political globalization," and assisting in global health initiatives and emergency situations, LEO technology can be a key instrument in improving the development of the international system. However, the benefits of LEO systems will only be realized if the service providers and national governments, particularly those from developing countries can work out a regulatory framework whereby both sides are placated. The ITU will have to play an integral part in these negotiations if this framework is to be realized. The WTPF was a good start. Now, the ITU should begin to act in a more politically proactive manner in order to continue to facilitate this process. The ITU must continue to evolve to meet the needs of the international system in regards to LEO satellites. The potential benefits, and potential profits, are too great for it not to do so.