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SATMED: Legal Aspects of the Physical Layer of Satellite Telemedicine

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STUDENT NOTE

SATMED: LEGAL ASPECTS OF THE PHYSICAL LAYER OF SATELLITE TELEMEDICINE

*Stephen Rooke**

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INTRODUCTION

In 2003, Paul Hunt, the U.N. Commission on Human Rights' Special Rapporteur on the Right to Health,¹ presented a report on the global

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1. The Special Rapporteur's full title is the Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health. *See*

availability of health care.² Special Rapporteur Hunt argued that states are obligated to implement a right to health.³ Included in this right is the obligation “to ensure that no international agreement or policy adversely impacts upon the right to health, and that . . . international organizations take due account of the right to health, as well as the obligation of international assistance and cooperation, in all policy-making matters.”⁴ One area Hunt left unexplored in his report was the effect of international telecommunications law on the right to health, particularly with regard to satellite technologies that have the capacity to greatly improve the accessibility, availability, acceptability, and quality of care in developing countries, especially in rural areas.

Article 25 of the Universal Declaration of Human Rights (UDHR)—together with the International Covenant on Economic, Social and Cultural Rights (ICESCR), the Convention on the Rights of the Child (CRC), and the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)—encapsulates an individual right to health care and corresponding state obligations to ensure the availability of health facilities and technologies.⁵ As this Note will demonstrate, however, international telecommunications law protects state sovereignty and explicitly authorizes states to erect barriers to satellite-based telemedicine,⁶ a technology that could provide access to medical professionals on a nondiscriminatory and cost-effective basis to patients otherwise lacking access to health care.⁷ Despite the international community’s recent recognition that space technologies contribute to the realization of economic, social, and cultural

Human Rights Council Res. 6/29, Rep. of the Human Rights Council, 6th Sess., Sept. 10–28, Dec. 10–14, 2007, U.N. GAOR, 63d Sess., Supp. No. 53, A/63/53, at 49, 51 (Dec. 14, 2007). Originally under the auspices of the Commission on Human Rights, the Human Rights Council overtook responsibility for the position in 2007. *See id.*

2. Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health, *Rep. of the Special Rapporteur, Paul Hunt, Submitted in Accordance with Commission Resolution 2002/31*, Comm’n on Human Rights, U.N. Doc. E/CN.4/2003/58 (Feb. 13, 2003) (by Paul Hunt) [hereinafter *Hunt Report*].

3. *Id.* ¶ 28.

4. *Id.*

5. Convention on the Rights of the Child art. 24(1), Nov. 20, 1989, 1577 U.N.T.S. 3 [hereinafter CRC]; Convention on the Elimination of All Forms of Discrimination Against Women art. 12, Mar. 1, 1980, 1249 U.N.T.S. 13 [hereinafter CEDAW]; International Covenant on Economic, Social and Cultural Rights art. 12, Dec. 16, 1966, 993 U.N.T.S. 3 [hereinafter ICESCR]; Universal Declaration of Human Rights, G.A. Res. 217 (III) A, art. 25, U.N. Doc. A/RES/217(III) (Dec. 10, 1948) [hereinafter UDHR]. For an extensive list of international agreements relating to the right to health, see *International Standards*, U.N. OFF. HIGH COMMISSIONER FOR HUM. RTS., <http://www.ohchr.org/EN/Issues/Health/Pages/InternationalStandards.aspx> (last visited Nov. 5, 2012).

6. The American Telemedicine Association defines telemedicine as “the use of medical information exchanged from one site to another via electronic communications to improve patients’ health status.” *Telemedicine Defined*, AM. TELEMED. ASS’N, <http://www.americantelemed.org/i4a/pages/index.cfm?pageid=3333> (last visited Nov. 5, 2012).

7. *See infra* Part I.

rights,⁸ it has failed to reconcile the right to health care and the authority of states to exclude the underlying technology necessary for telemedicine and telehealth.⁹ Thus, the international community has not fulfilled its obligation to avoid adverse conflicts between other areas of international law and the right to health.

This Note argues in favor of an international undertaking that corrects these inconsistencies by ensuring that patients, particularly those in rural areas, have access to the telecommunications infrastructure necessary to receive the health care benefits of telemedicine technologies. Part I identifies parallel gaps in the availability of health care and telecommunications that perpetuate limited access to health care. This Part also introduces the concept of satellite telemedicine (SATMED) and its promise for bridging these divides. Part II provides a primer on telemedicine and satellite technologies and explains why and how states seek to regulate the physical “layer” of satellite-communication infrastructure. Part III expounds on the tension between the availability of SATMED and state sovereignty by evaluating the right to health care and international law regulating telecommunications. Finally, Part IV proposes a solution for reconciling the competing and inconsistent international norms of national sovereignty and the right to health care.

I. SATELLITE TELEMEDICINE AS A SOLUTION TO THE RURAL-URBAN HEALTH CARE & TELECOMMUNICATIONS DIVIDES

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including . . . medical care

—Article 25, Universal Declaration of Human Rights, 1948¹⁰

In an ideal world, the pronouncement of Article 25 of the UDHR would be realized. Unfortunately, significant disparities in the availability of health care exist, particularly between urban and rural areas:

Workers in rural health care, who serve most of the population, are usually isolated from specialist support and up-to-date information because of poor roads and scarce access to information technologies. Many developing countries have a shortage of health care

8. G.A. Res. 66/71, pmbll., ¶¶ 20, 23, U.N. Doc. A/RES/66/71 (Jan. 12, 2012).

9. See *infra* Part III.

10. UDHR, *supra* note 5, art. 25; see also International Conference on Primary Health Care, Alma-Ata, USSR, Sept. 6–12, 1978, *Declaration of Alma-Ata* (Sept. 12, 1978), available at http://www.who.int/publications/almaata_declaration_en.pdf (“The existing gross inequality in the health status of the people particularly between developed and developing countries as well as within countries is politically, socially, and economically unacceptable and is, therefore, of common concern to all countries.”).

workers and most of the doctors, specialists and services are concentrated in the main cities.¹¹

In India, three-quarters of the population live in rural villages, but three-quarters of doctors are based in cities.¹² The concentration of doctors in urban areas leaves the majority of the 620 million rural Indians without access to essential health care facilities.¹³ Sub-Saharan African countries average less than one doctor per ten thousand people, and fourteen of those countries have no radiologist. The few specialists are concentrated in urban areas, which leaves many without access to necessary health care.¹⁴ In Tanzania, fifty-two percent of doctors work in and around Dar es Salaam, the largest city.¹⁵ The number of doctors per capita in Dar es Salaam is six times the national average.¹⁶ By comparison, fourteen rural regions, which constitute the majority of the country, average less than one doctor for every one hundred thousand people.¹⁷ In Urambo, a rural area with a population of 447,281, there are no doctors and only four assistant medical officers.¹⁸ In neighboring Kenya, the concentration of physicians is 17.8 times higher in urban Nairobi than in rural Kilifi, a relatively large district;¹⁹ the concentration of specialists is a starker 147 times higher in Nairobi.²⁰

11. Walter H. Curioso, *New Technologies and Public Health in Developing Countries: The Cell PREVEN Project*, in *THE INTERNET AND HEALTH CARE: THEORY, RESEARCH, AND PRACTICE* 375, 377 (Monica Murero & Ronald E. Rice eds., 2006); Sunitha Kuppaswamy & Vidya Pandian, *Impact of Satellite Based Telemedicine Systems in Rural Areas of Tamilnadu*, *CALICUT MED. J.* 3 (Oct.–Dec. 2008), <http://calicutmedicaljournal.info/2008/4/e5.pdf>; see also *Hunt Report*, *supra* note 2, ¶ 96 (discussing the problem of brain drain and the rural-to-urban migration of medical professionals).

12. Sanjit Bagchi, *Telemedicine in Rural India*, *PLOS MED.* 297 (Mar. 7, 2006), <http://www.plosmedicine.org/article/fetchObjectAttachment.action?uri=info%3Adoi%2F10.1371%2Fjournal.pmed.0030082&representation=PDF>.

13. *Id.*

14. Hamish S.F. Fraser & St. John D. McGrath, *Information Technology and Telemedicine in Sub-Saharan Africa: Economical Solutions Are Available to Support Health Care in Remote Areas*, 321 *BRIT. MED. J.* 465, 465 (2000).

15. TANZ. MAINLAND MINISTRY OF HEALTH & SOC. WELFARE ET AL., *TANZANIA SERVICE AVAILABILITY MAPPING: 2005–2006*, at 21 (2007) [hereinafter *TANZANIA SAM*], available at <http://apps.who.int/healthinfo/systems/datacatalog/index.php/ddibrowser/8/download/27>.

16. *Id.*

17. *Id.*

18. *Id.* at 126.

19. There are a reported 28.5 doctors per one hundred thousand people in Nairobi versus only 1.6 doctors per one hundred thousand people in Kilifi. KENYA MINISTRY OF HEALTH & WORLD HEALTH ORG. [WHO], *SERVICE AVAILABILITY MAPPING 40* (2007), available at <http://apps.who.int/healthinfo/systems/datacatalog/index.php/ddibrowser/4/download/39>. By population, Kilifi is in the top quintile of districts and is the largest district in the Coast Province. See *id.* at 3.

20. The WHO reports an average of 44.1 specialists per one hundred thousand persons in Nairobi but only 0.3 specialists per one hundred thousand persons in Kilifi. *Id.* at 40.

Telemedicine has been touted as an effective solution for bridging the urban-rural health care divide.²¹ The American Telemedicine Association defines telemedicine as “the use of medical information exchanged from one site to another via electronic communications to improve patients’ health status.”²² Telemedicine has the potential to give rural patients and medical professionals global access to doctors and specialists located in cities and elsewhere around the globe.

The advancement of telemedicine, however, is a double-edged sword. On one hand, broadband Internet and other means of communication have opened new frontiers for treating patients. On the other, disparities in the availability of telecommunications threaten to widen existing gaps in the quality and accessibility of health care. While a patient in France with access to dedicated broadband Internet can have his gallbladder removed remotely by a doctor more than four thousand miles away in New York,²³ these same technologies are not available to disconnected hospitals. In Tanzania, for example, over seventy-eight percent of geographic subregions and eighty percent of the health-management teams, those responsible for overseeing the management of health services, lack Internet access.²⁴ The unavailability of telecommunications is particularly pronounced in rural regions. Eighty-one percent of health care facilities in the rural Misungwi district “have no communications equipment.”²⁵ In Namtumbo, a region to the south with a population of 191,508, there are no doctors, and none of the medical facilities have access to any type of telephone connection.²⁶

The divides in rural-urban health care and telecommunications are the result of naturally existing market forces. Economic activity, including medicine and telecommunications, gravitates toward economies of scale.²⁷ Wireline telecommunications infrastructure tends to be built only where there is a sufficiently dense population to support the investment. A dramatic increase in costs per customer eliminates the commercial feasibility of these investments as service expands to rural areas.²⁸ Satellites, however, are indifferent as to where a user is located and have the capacity to fill the gap

21. Kuppuswamy & Pandian, *supra* note 11, at 18.

22. *Telemedicine Defined*, *supra* note 6.

23. S.K. Mishra, *Application of Telemedicine in Surgery*, in INDIAN SPACE RESEARCH ORG., *TELEMEDICINE MANUAL* 83, 86 (2005), available at http://laico.org/v2020resource/files/application_surgery.pdf.

24. See TANZANIA SAM, *supra* note 15, at 18–19.

25. *Id.* at 49.

26. *Id.* at 18, 125.

27. See *Hunt Report*, *supra* note 2, ¶ 96 (noting that poor terms of employment cause doctors to migrate to cities); BRUCE L. EGAN, *IMPROVING RURAL TELECOMMUNICATIONS INFRASTRUCTURE 1* (1996), available at <https://www.uky.edu/Ag/AgEcon/pubs/tva/egan96.pdf>.

28. See EGAN, *supra* note 27, at 3 (discussing the higher costs of deploying wireline communications infrastructure to rural areas).

where telecommunications infrastructure is not available.²⁹ Further, satellites can serve a large geographic footprint, thus simultaneously serving urban and rural communities for the same cost.³⁰

For these reasons, satellites are uniquely positioned to bridge the divide between developed and developing countries and the divide between urban and rural communities. In 1994, the U.N. Development Programme set up the Education and Research Network using a satellite connection to provide communication services to facilitate global research and development.³¹ In South Asia, satellites played a central role in the introduction of the Internet to the region.³² For example, Internet service providers used satellite connections to offer access to the Internet in Bangladesh as early as 1996.³³ In Afghanistan, the Central Asia Development Group and Insyndia are using satellites to provide Internet access in twenty provinces.³⁴ Satellites have also played an integral role in providing Internet connectivity across Africa.³⁵ For the forty-five African countries not connected to the Internet via submarine fiber-optic cables, satellites serve as the essential link between African networks and the rest of the globe;³⁶ nearly all international Internet communications are transmitted via satellites in the vast majority of African states.³⁷

While unseen by patients, satellites have long played a role in the distribution of health care services. In 1971, the United States conducted an experiment in Alaska to provide health care training and communication services via satellite to rural *health aides* (health care professionals with limited training and experience).³⁸ Health aides were an integral part of Alaska's health care system, providing medical services in isolated villages

29. Phillip L. Spector, *Bridge over Troubled Skies: Satellite Broadband and the Digital Divide*, ONLINE J. SPACE COMM. (Fall 2003), http://spacejournal.ohio.edu/issue5/persp_broad.html.

30. *Id.*

31. Mandanmohan Rao, *Struggling with the Digital Divide: Internet Infrastructure, Policies and Regulations*, 34 ECON. & POL. WKLY. 3317, 3317 (1999).

32. *Id.* at 3317–18.

33. *Id.* at 3317.

34. James Barton, *New ISP Launches VSAT Network in Afghanistan*, DEVELOPING TELECOMS (June 14, 2011, 10:31 AM), <http://www.developingtelecoms.com/new-isp-launches-vsate-network-in-afghanistan.html>.

35. See SEAN MORONEY & PAUL HAMILTON, AITEC AFRICA, SATELLITE AND VSAT: INNOVATIVE USES FOR RURAL TELEPHONY AND INTERNET DEVELOPMENT 1 (2002), available at <http://www.itu.int/osg/spu/ni/ipdc/workshop/presentations/Moroney.doc>.

36. *See id.*

37. *Id.* (indicating that ninety-five percent of such Internet traffic is carried by satellites).

38. F.W. Norwood, *The Satellite Technology Demonstration and Health-Education Telecommunications Experiments on ATS-6*, 345 PROC. ROYAL SOC'Y LONDON (ser. A) 541, 547–48 (1975); see also Albert Feiner, *Health Care and Education: On the Threshold of Space*, 186 SCIENCE 1178, 1178–79 (1974) (detailing the ATS-1 and Lister Hill programs in the early stages of their introduction to Alaska).

to the state's growing population. To supplement their medical expertise, health aides relied on inconsistent radio communications with doctors located in cities to determine how to treat patients.³⁹ As part of the experiment, satellite ground stations were introduced in twenty-six remote villages providing health aides with better and more effective means of communicating with doctors at urban hospitals.⁴⁰ Physician contact increased by fourfold and "the availability of the satellite communications system was responsible in several emergency situations for lives having been saved."⁴¹ More recently, other government-sponsored trials have used satellites to bring telemedicine applications to rural communities. Pakistan began a pilot project using PAKSAT-1 to provide live, consultative services to twelve rural hospitals.⁴² Other organizations have used satellites to provide medical care in Canada, India, Australia, South Africa, Morocco, Burundi, and Burkina Faso.⁴³

Despite their proven track record and unique capacity, satellites play only a limited role in global telemedicine.⁴⁴ National restrictions on the use of terrestrial satellite technology perpetuate barriers to entry for satellite technologies that could facilitate SATMED.⁴⁵ National licensing regimes also inhibit the aggregation of a global market of remotely located medical

39. Norwood, *supra* note 38, at 548.

40. *Id.*

41. *Id.*

42. Mudassar Hussain, Dir. Telecom, Pak. Ministry of Info. Tech., Presentation to the U.N. Office for Outer Space Activities on Expanding Healthcare Through Telemedicine in Pakistan (Aug. 30, 2006), http://www.oosa.unvienna.org/pdf/sap/2006/india2/presentations/5_6.pdf.

43. See, e.g., Int'l Telecomm. Union [ITU], Telecomm. Dev. Bureau, *Telemedicine and Developing Countries*, at 45, ITU Doc. 2/155(Rev.2)-E (Sept. 7, 1997); Namgyal T. Sherpa, Consultant & Head, STNM Hosp. Gangtok, Presentation to the U.N. Office for Outer Space Activities on Telemedicine Experience in Sikkim (Aug. 30, 2006), http://www.oosa.unvienna.org/pdf/sap/2006/india2/presentations/5_5.pdf; Press Release, Intelsat Corp., Telemedicine in Morocco (Aug. 2010), available at <https://pages.email.intelsat.com/page.aspx?QS=3935619f7de112ef8fbd5036a78a1b9d863d8cb138dc88ab79956c96051d992e>; Press Release, Intelsat Corp., Children's National Medical Center Implements International Telemedicine Network with Intelsat, iDirect (Mar. 4, 2008), available at <http://www.intelsat.com/press/news-releases/2008/20080304.asp>; Press Release, Intelsat Corp., Intelsat and Mindset Network Join Forces to Deliver Education to Africa (Oct. 19, 2007), available at http://www.intelsat.com/_files/resources/knowledge/case-study/cs-delivering-education-to-africa.pdf; Press Release, Intelsat Corp., Intelsat and the Global Digital Solidarity Fund Join Forces to Fight AIDs in Burundi and Burkina Faso (Mar. 13, 2007), available at http://www.intelsat.com/_files/resources/knowledge/case-study/cs-education-to-fight-aids.pdf.

44. See *Satellite's Role in Telemedicine*, EUR. SPACE AGENCY (May 29, 2003), http://www.esa.int/esaCP/SEM2SHS1VED_Improving_0.html ("[P]articipants agreed that although a promising start had been made in many areas, [satellite telemedicine's] expansion was hindered by a lack of universal standards.").

45. See *id.*; see also *infra* Part III.

providers to justify a commercial SATMED industry.⁴⁶ As the United Nations recognized in the Vienna Declaration on Space and Human Development, “action should be taken . . . [t]o improve public health services by expanding and coordinating space-based services for telemedicine”⁴⁷

II. A BRIEF PRIMER ON WHY AND HOW STATES REGULATE SATELLITES

A. *Understanding the Layered Interconnection of Information Technologies and Telemedicine Applications*

As the American Telemedicine Association’s definition indicates, telemedicine involves the integration of information technology and telecommunications networks with health care systems.⁴⁸ Digital-communication, information-technology, and telecommunications networks are often modeled as layered infrastructure with overlapping, but discrete, layers representing the different elements of communication.⁴⁹ Layer models enable engineers to develop flexible mechanisms to facilitate Internetwork or transnetwork communication. Engineers can innovate within a certain layer without having to modify the functionality of the other layers.⁵⁰ Layer models also serve as a useful tool for evaluating how communication technologies, like satellites, are regulated by states. This Section will break telemedicine into layers to identify and understand the applicability of particular legal regimes to telemedicine.

Neuchterlein and Weiser offer a generalized layer model for understanding digital communications, including telemedicine services.⁵¹ They divide digital communications into four separate layers: a content layer, an application layer, a logical layer, and a physical layer.⁵² The

46. See *infra* Part III.

47. Third United Nations Conference on the Peaceful Uses of Outer Space, Vienna, Austria, July 19–30, 1999, *The Space Millennium: Vienna Declaration on Space and Human Development*, ¶ 1(b), U.N. Doc. A/CONF.184/6 (July 30, 1999), available at http://www.oosa.unvienna.org/pdf/sap/hsti/UNISPACE_report.pdf.

48. See *supra* text accompanying note 22.

49. JONATHAN E. NEUCHTERLEIN & PHILIP J. WEISER, *DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE* 31–68 (2005).

50. *Id.*

51. *Id.* at 116–21.

52. *Id.* at 120–22. This four-layer model is similar to other layer models used to describe digital communications. For example, the Internet Protocol Suite (TCP/IP model), a toolkit of Internet standards, employs a similar, layered model. In the application layer of the TCP/IP model, engineers can develop methods for exchanging particular types of information, like the Hypertext Transfer Protocol (HTTP) for websites and Simple Mail Transfer Protocol (SMTP) for sending email, without reengineering the other layers. *Comparison Between TCP/IP and OSI*, OMNISECU.COM, <http://www.omnisecu.com/tcpip/tcpip-model.htm> (last visited Nov. 5, 2012). The other layers in the TCP/IP model are agnostic as to how the application layer functions and will communicate the information it provides regardless of

content layer represents the words, images, and information being communicated.⁵³ Below the content layer is the application layer, which includes the software used to communicate, such as a web browser or telesurgical application.⁵⁴ The logical layer, which includes the fundamental protocols necessary to enable devices to communicate with one another, supports the application layer.⁵⁵ The Internet Protocol Suite⁵⁶ is an example of the logical layer because it defines common protocols that facilitate the exchange of information between elements on the network.⁵⁷ Finally, Neuchterlein and Weiser define the physical layer as the “physical characteristics—copper wires, fiber-optic cable, or the airwaves—of the medium over which the information is transmitted.”⁵⁸

An understanding of layered models helps disentangle telemedicine applications from the underlying information-technology infrastructure. Although telemedicine is generally viewed as an integrated service, the foregoing highlights how telemedicine is a bundling of several wholly insulated services operating independently of, and agnostically toward, the others. Health information, such as a patient’s medical history, heart rate, blood-oxygen concentration, and x-ray images, occupy the content layer. Medical software and health-care-specific technology that measure and store health information form the application layer. Network protocols at the logical layer facilitate the exchange of health information with remotely located professionals by providing standardized methods for transmitting information across a diverse set of interconnected networks. Finally, a combination of wireline and wireless communication networks like fiber-optic cables, cellular-telephone towers, microwave transmitters, and satellites provides the physical layer for the information to be transmitted.

The importance of these layers becomes readily apparent when one addresses the legal impediments to telemedicine technologies. Each layer in the telemedicine bundle is subject to its own legal rules and regulations.⁵⁹ The content layer is regulated by a wide array of legal regimes, such as the First Amendment to the U.S. Constitution, patient-physician confidentiality, professional ethics, international human rights law, and national censorship.

content. For more information about the TCP/IP and Open Systems Interconnection models, see *id.* See generally Douglas C. Sicker & Lisa Blumensaadt, *Misunderstanding the Layered Model(s)*, 4 J. ON TELECOMM. & HIGH TECH. L. 299 (2006) (discussing the layered model); *The TCP/IP Model*, MICROSOFT, [http://technet.microsoft.com/en-us/library/cc786900\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc786900(v=ws.10).aspx) (last updated Jan. 21, 2005).

53. See NEUCHTERLEIN & WEISER, *supra* note 49, at 121.

54. See *id.* at 120–22.

55. *Id.* at 121.

56. See *supra* note 52.

57. See NEUCHTERLEIN & WEISER, *supra* note 49, at 121.

58. *Id.* at 120.

59. *But see* Sicker & Blumensaadt, *supra* note 52, at 302–05 (discussing the silo model as an alternative explanation for how the United States has regulated certain information and communication technologies).

Regulations affecting information and data security, antitrust and competition regimes, commercial licensing, and domestic and international copyright and patent regimes govern the control layer. The logical layer is arguably the least regulated because many of its parts, like the Internet Protocol Suite,⁶⁰ are designed to be used freely. Nevertheless, governments, including the United States and China, manipulate the logical layer to divert or otherwise impede information to promote national security.⁶¹ A growing chorus of intellectual property rights holders and concerned legislators have also called for greater legal regulation of the logical layers to reduce infringing activities and the spread of child pornography.⁶² Lastly, the physical layer is widely regulated by national telecommunications laws, competition regimes, and international law. Satellites in particular are subject to extensive international legal regimes that enable states to restrict the availability of satellite terminals necessary for SATMED.⁶³

B. An Introduction to Satellites

To understand why satellites are subject to extensive regulation, we briefly turn our attention to the technical nature of communication satellites (COMSATs), which provide the means for distributing health information in SATMED. COMSATs are artificial satellites placed in Earth's orbit to facilitate telecommunications, the transmission of information over long distances.⁶⁴ COMSATs function by reflecting radio signals from one user to

60. See *supra* note 52.

61. See, e.g., CAROLYN PEARSON, THE "GREAT FIREWALL" OF CHINA: A REAL NATIONAL STRATEGY TO SECURE CYBERSPACE? 12 (Global Information Assurance Certification Paper, 2004), available at <http://www.giac.org/paper/gsec/3841/great-firewall-china-real-national-strategy-secure-cyberspace/106206>; David E. Sanger & John O'Neil, *White House Begins New Effort to Defend Surveillance Program*, N.Y. TIMES (Jan. 23, 2006), <http://www.nytimes.com/2006/01/23/politics/23cnd-wiretap.html>; Sui-Lee Wee & Sabrina Mao, *Beijing Leaps to Defense of "Great Firewall of China,"* REUTERS, Oct. 20, 2011, available at <http://www.reuters.com/article/2011/10/20/us-china-internet-idUSTRE79J1PU20111020> (mentioning China's claim to be protecting its national interests consistently with international law).

62. See, e.g., Anti-Counterfeiting Trade Agreement, Dec. 3, 2010, 50 I.L.M. 243, available at http://www.mofa.go.jp/policy/economy/i_property/pdfs/acta1105_en.pdf; Protecting Children from Internet Pornographers Act of 2011, H.R. 1981, 112th Cong. (2011), available at <http://www.gpo.gov/fdsys/pkg/BILLS-112hr1981rh/pdf/BILLS-112hr1981rh.pdf>; Stop Online Piracy Act, H.R. 3261, 112th Cong. (2011), available at <http://www.gpo.gov/fdsys/pkg/BILLS-112hr3261ih/pdf/BILLS-112hr3261ih.pdf>; Protect IP Act of 2011, S. 968, 112th Cong. (2011), available at <http://www.gpo.gov/fdsys/pkg/BILLS-112s968rs/pdf/BILLS-112s968rs.pdf>; Conor Friedersdorf, *The Legislation That Could Kill Internet Privacy for Good*, ATLANTIC (Aug. 1, 2011, 11:53 AM), <http://www.theatlantic.com/politics/archive/2011/08/the-legislation-that-could-kill-internet-privacy-for-good/242853/>.

63. See *infra* Part III.B.

64. *Communications Satellite*, OXFORD DICTIONARIES, <http://oxforddictionaries.com/definition/english/communications%2Bsatellite> (last visited Nov. 5, 2012). The prefix "tele-" means "distant." *Tele-*, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/dictionary/tele-> (last visited Nov. 5, 2012).

another.⁶⁵ The first user sends a radio signal on a particular frequency from a satellite terminal—typically, but not necessarily, located on Earth—to the satellite.⁶⁶ A transponder tuned to that frequency on the satellite receives the signal, processes it, amplifies it, and transmits the signal to the recipient.⁶⁷ COMSATS operate at various altitudes extending from low-Earth orbit to geostationary orbit.⁶⁸

65. For more information about how communication satellites (COMSATS) function, see *Satellite Basics: How It Works?*, INTELSAT, <http://www.intelsat.com/resources/satellite-basics/how-it-works.asp> (last visited Nov. 5, 2012).

66. *Id.*

67. *Id.*

68. *Id.* The orbits of satellites are generally subdivided into four general classifications: low-Earth orbit (LEO), medium-Earth orbit (MEO), geosynchronous (GEO), and high-Earth orbit (HEO). Nat'l Aeronautics & Space Admin. [NASA], *Orbit*, GLOBAL CHANGE MASTER DIRECTORY, <http://gcmd.nasa.gov/User/suppguide/platforms/orbit.html> (last visited Nov. 5, 2012). LEO satellites occupy an altitude between eighty and two thousand kilometers above the earth's surface. *Id.* Previous law articles have defined LEO as any orbit up to 5,500 kilometers. Joseph S. Imburgia, *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean up the Junk*, VAND. J. TRANSNAT'L L. 589, 601 (2011); Michael W. Taylor, *Trashing the Solar System One Planet at a Time: Earth's Orbital Debris Problem*, 20 GEO. INT'L ENVTL. L. REV. 1, 5 (2007). These numbers are derived from the NAT'L SCI. & TECH. COUNCIL, COMM. ON TRANSP. RESEARCH & DEV., INTERAGENCY REPORT ON ORBITAL DEBRIS 4 (1995), available at http://www.orbitaldebris.jsc.nasa.gov/library/IAR_95_Document.pdf. The discrepancies between these two are of minimal effect, and the lower altitude is of greater use because, as Taylor states, "[f]ew satellites operate at the higher LEO orbits because of the radiation problem." Taylor, *supra*, at 5 n.25 (citation omitted). MEO satellites operate at an altitude between two thousand and 35,786 kilometers. GEO satellites operate at an altitude of 35,786 kilometers, because satellites orbit once every twenty-four hours at this distance. NASA, *supra*. Thus, a satellite located over the earth's equator at the GEO altitude will remain positioned over that point because it will complete one orbit as the planet rotates once. Such satellites are called geostationary (GSO) because they appear to be stationary in relation to the earthbound viewer. HEO satellites are those above 35,786 kilometers. *Id.* LEO and GSO are widely used for satellite communications. Taylor, *supra*, at 5.

GSO satellites form the backbone of most satellite communications. In certain respects, GSO satellites are easier to communicate with because they remain fixed at certain positions in the sky. Therefore, the antenna used to transmit and receive signals from a GSO satellite does not need advanced telemetry and tracking technology to adjust to the satellite's movements. Furthermore, because of its distance from Earth, a single GSO satellite can service a large geographic footprint.

Several satellite companies have also sought to place COMSATS in LEO. The close proximity of LEO enables companies like Inmarsat and Iridium to provide communication services with little perceived time delay. Unlike their GSO counterparts' wide footprint, however, LEO satellites have a much narrower reach. To overcome this limitation, LEO satellite operators launch constellations of multiple satellites. Having many satellites in orbit helps ensure that at least one satellite is always overhead to provide communication services. Although the costs of launching each satellite are less than launching a satellite to GSO, a constellation of LEO satellites is an expensive undertaking. Iridium NEXT, Iridium's next-generation LEO constellation, is expected to cost \$2.9 billion to manufacture and another \$492 million to launch. Peter B. de Selding, *Space X, Iridium Ink \$492 Million Launch Services Deal*, SPACE NEWS (June 16, 2010), <http://spacenews.com/contracts/061610spacex-iridium-ink-492-million-launch-services-deal.html>.

Service providers have traditionally divided satellite services into two overarching categories: fixed-service satellite (FSS) and mobile-service satellite (MSS).⁶⁹ FSS is “[a] radiocommunication service between earth stations at given positions, when one or more satellites are used”⁷⁰ Thus, the defining feature of FSS systems is the stationary position of the end terminals. One popular subclass of FSS terminals that would be particularly well suited for SATMED applications is the very small aperture terminal (VSAT).⁷¹ VSATs, as the name suggests, utilize small diameter arrays and operate primarily in the shorter wavelength Ku-Band for uplink and downlink communications with geostationary satellites.⁷² VSATs’ smaller size and lower power demands make them “low-cost earth stations.”⁷³

For these reasons, VSATs are an attractive satellite technology for rural development projects, particularly where there is limited road or telecommunications infrastructure. Until recently, many regions in Africa were disconnected from the transcontinental-seabed Internet cables: “only [countries in] North Africa, plus Djibouti and South Africa had cable links to the rest of the world.”⁷⁴ The rest of Africa was dependent on satellite backhaul to connect to the Internet.⁷⁵ Many African ISPs relied on VSAT systems to provide backhaul for global Internet access for their subscribers. For example, as of 1998, over eighty-five percent of Dar es Salaam’s Internet service providers employed satellite connections to Internet-capable ground stations

69. See generally KEITH BARKER ET AL., SPACE-BASED COMMUNICATIONS INFRASTRUCTURE FOR DEVELOPING COUNTRIES (NASA Contractor Report No. 198371, 1995), available at http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19960002984_1996102984.pdf. European satellite operators and the United Nations also distinguish between fixed-service satellites and direct-broadcast satellites, but that is outside the scope of this Note.

70. 47 C.F.R. § 25.201 (2011) (providing technical definitions for satellite communications); *ITU Radio Regulations—Article 1, Definitions of Radio Services*, ICT REG. TOOLKIT, <http://www.ictregulationtoolkit.org/en/PracticeNote.2824.html> (last updated Oct. 24, 2012).

71. See JOHN EVERETT, VSATS: VERY SMALL APERTURE TERMINALS I (1992). It must also be noted that several very small aperture terminal (VSAT) operators have begun to implement tracking technology in their terminals to enable them to work in mobile-service satellite applications. Tracking enables a VSAT to remain connected to a GEO satellite even though the terminal is moving. Because satellite companies like Intelsat and SES operate large global fleets of geostationary satellites, such VSAT systems could be construed to fall under the Global Mobile Personal Communications by Satellite (GMPCS) definition, but they are generally not viewed as GMPCS technologies.

72. *Id.* at 2 (noting that the C-band of the electromagnetic spectrum can also be used, but that the Ku-band is increasingly used); MICHAEL HEGENER, INTERNET VIA SATELLITE IN AFRICA: AN OVERVIEW OF THE OPTIONS AVAILABLE 3 (2002).

73. David A. Howe, *High-Accuracy Time Transfer via Geostationary Satellites: Preliminary Results*, 37 IEEE TRANSACTIONS ON INSTRUMENTATION & MEASUREMENT 418, 418 (1988), available at <http://tf.nist.gov/general/pdf/770.pdf> (“Ku-band satellite transponders in the 14/12-GHz band permit the use of small, low-cost earth stations.”).

74. HEGENER, *supra* note 72, at 1.

75. *Id.*

in Europe or the United States.⁷⁶ Similarly, a rural health clinic could install a VSAT on its roof to provide a connection for video, audio, and data telemedicine applications as well as general Internet access.

MSS systems, as the name suggests, involve any system in which one or more of the end terminals is mobile. Although MSS applications take many forms, one of the most prominent is Global Mobile Personal Communications by Satellite (GMPCS).⁷⁷ The 1996 Final Report of the World Telecommunications Policy Forum defines GMPCS systems as “any satellite system . . . providing telecommunication services directly to end users from a constellation of satellites.”⁷⁸ Although this definition is sufficiently broad to include nearly every satellite-communication service, GMPCS systems are synonymous with “satellite telephones and other portable transceivers operated by end users for communication”⁷⁹ GMPCS systems require minimal setup; can be easily carried and operated while on the move; and can be used for data, voice, and video services. Because of this flexibility, health workers use GMPCS devices when responding to natural disasters affecting remote areas or where communications infrastructure has been damaged or destroyed.⁸⁰ A medical professional operating a remote

76. *Id.* at 2. Altobridge, an Irish telecommunications company specializing in satellite-network architecture, illustrates the increasingly advanced capabilities of VSATs to serve rural communities. *Altobridge Lite-Site: Satellite Backhauled, Solarpowered, 2G/3G Solution for Remote Communities*, ALTOBRIDGE, <http://www.altobridge.com/solutions/altobridge-lite-site™/> (last visited Nov. 5, 2012). Altobridge’s VSAT-based cellphone and internet technologies are widely used in developing countries including Niger, Malaysia, Indonesia, Iraq, Kenya, Oman, the Solomon Islands, Tonga, and Mongolia. *Id.* The company’s AltoPod technology serves as a local switch for telephone and data connections, and its Altobridge Lite-Site technology provides VSAT backhaul for remote connections. *Id.* Both solutions can be powered via solar power, negating the need for energy infrastructure or a backup generator where power is inconsistently available. *Id.* The local routing of local telephone and data traffic minimizes the amount of satellite bandwidth necessary to serve the community. *Id.* This efficiency allows a single Lite-Site to serve as many as 1200 users. *Id.*

77. For more information about GMPCS, see *GMPCS-MoU*, INT’L TELECOMM. UNION, <http://www.itu.int/osg/gmpcs/> (last visited Nov. 5, 2012).

78. Amendments of Parts 2 & 25 to Implement the Global Mobile Pers. Commc’ns by Satellite (GMPCS) Memorandum of Understanding, 14 FCC Rcd. 5871 (1999) (notice), available at <http://transition.fcc.gov/Bureaus/International/Notices/1999/fcc99037.txt>; see also Streamlining the Equip. Authorization Process; Implementation of Mut. Recognition Agreements and the GMPCS MOU, 64 Fed. Reg. 4984, 4993 n.24 (Fed. Commc’ns Comm’n Feb. 2, 1999) (final rule).

79. Amendment of Parts 2 & 25 to Implement the Global Mobile Pers. Commc’ns by Satellite (GMPCS) Memorandum of Understanding & Arrangements, 18 FCC Rcd. 24,423 (2003) (second report and order).

80. Org. of Am. States [OAS], Measures to Ensure Availability of GMPCS During Emergencies and Natural Disasters, PCC.II/Rec.20 (VIII-06), OAS Doc. CCP.II-RADIO/doc. 1221/06 (2006), reprinted in OAS, INTER-AM. TELECOMM. COMM’N, FINAL REPORT 31 (2006), available at http://web.oas.org/citel/en/SiteAssets/PCCII/Final-Reports/P2!R-1241r1c1_i.pdf; PAN AM. HEALTH ORG., NATURAL DISASTERS: PROTECTING THE PUBLIC’S HEALTH 71 (Scientific Publ’n No. 575, 2000), available at http://www.preventionweb.net/files/1913_VL206114.pdf; *Iridium and Isatphone Pro Satellite Phone Information*, EXPEDITION2010.ORG BLOG (Aug. 30,

hospital, mobile clinic, or medical facility in a refugee camp could use GMPCS technology to communicate and share medical information with remotely located doctors.

Radio spectrum used by COMSATS to communicate is subject to the tragedy of the commons. The tragedy of the commons arises when a limited public good is overconsumed by market participants that do not internalize the cost of externalities they impose on the rest of the market.⁸¹ As a result, users exhaust the good or render it unusable. In the context of radio communications, spectrum is a limited public good.⁸² If two broadcasters in close geographical proximity simultaneously broadcast on the same frequency, their signals will interfere with one another, rendering the frequency unusable. This is referred to as *harmful interference*.⁸³ Further complicating matters, weather and other atmospheric phenomena interfere with satellite communications.⁸⁴ Thus, only certain bands of frequencies are usable, increasing the complexity of satellite communications and the problems associated with the limited public good. States seek to avoid the tragedy of the commons by licensing and regulating satellites and terminals at the national and international level.⁸⁵ States have reserved set bands of frequencies and preserved substantial regulatory discretion, a manifestation of national sovereignty, through repeated rounds of negotiations and coordination at the International Telecommunication Union (ITU).⁸⁶

Aside from avoiding harmful interference, some states, like Iran, seek to regulate the use of satellite equipment because it bypasses national cen-

2011, 7:38 AM), <http://expedition2010org.blogspot.com/2011/08/iridium-and-isatphone-pro-satellite.html> (“One of the biggest users of satellite phones are disaster response organizations. Since most mobile phone networks operate close to capacity during normal times, when a widespread emergency occurs, the call volumes spike. Unfortunately this is when the phone lines are needed most. Also, during natural disasters cell towers can be severely damaged bringing the network down. Therefore, satellite phones allow emergency response teams, disaster relief organizations, journalists and reporters communicate [sic] over long distances.”).

81. Garrett Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243, 1244 (1968).

82. *Radio Frequency Spectrum Is a Scarce, Natural Resource*, *FIN. EXPRESS* (Feb. 12, 2003), <http://www.financialexpress.com/news/radio-frequency-spectrum-is-a-scarce-natural-resource/64215/0>.

83. See INST. OF ELEC. & ELECS. ENG'RS-USA, COMM. ON COMM'NS POLICY, CLARIFYING HARMFUL INTERFERENCE WILL FACILITATE WIRELESS INNOVATION 7 (IEEE-USA White Paper, 2012), available at <http://www.ieeeusa.org/policy/whitepapers/IEEEUSAWP-HarmfulInterference0712.pdf>.

84. Asoka Dissanayake et al., *A Prediction Model That Combines Rain Attenuation and Other Propagation Impairments Along Earth-Satellite Paths*, *ONLINE J. SPACE COMM.* 2 (Fall 2002), http://spacejournal.ohio.edu/issue2/pdf/paper_asoka1.pdf; Athanasios D. Panagopoulos et al., *Satellite Communications at Ku, Ka, and V Bands: Propagation Impairments and Mitigation Techniques*, *IEEE COMM. SURVS. & TUTORIALS* 2–6 (2004), <http://morse.uml.edu/Activities.d/Summer-05/PAPERS/KC/panagopoulos-satt-comm.pdf>.

85. See, e.g., FCC Procedures to Be Followed in the Event of Harmful Interference, 47 C.F.R. § 25.274 (2011).

86. See, e.g., FCC Table of Frequency Allocations, 47 C.F.R. § 2.106 (2011); *id.* § 25.274; see also *infra* Part III.B.

sors.⁸⁷ These states cite the importance of national security to justify rigorous restrictions on the availability of satellite technology.⁸⁸ In the case of Iran, the government went as far as to jam—that is, deliberately induce harmful interference against—European COMSATS to try to prevent the distribution and consumption of Western media by its citizens.⁸⁹

C. Background on Telemedicine Technologies

Telemedicine comes in two primary varieties: *store and forward* and *real time*.⁹⁰ In store and forward, information about the patient is recorded and then later transmitted to the remote health care professional.⁹¹ A basic example of store and forward is a health care worker taking a picture of a patient's skin lesion and then sending the image to a remotely located specialist for consultation. The remote specialist would evaluate the image and send his or her diagnosis and recommended treatment back to the health care worker or recommend that the patient be transported to a central hospital for further evaluation.⁹² Other examples of store and forward include the transmission of a patient's medical history for a differential diagnosis or x-ray for consultation.⁹³ Store and forward can also involve the gathering of health statistics for tracking the effectiveness of health care and the spread of disease.⁹⁴ Because store-and-forward applications do not require real-time interactions between local and remote health care professionals, the information can be transmitted over slower connections and during off-peak times when satellite bandwidth is at its lowest demand.⁹⁵

Real-time telemedicine involves instantaneous exchanges between patients, local medical professionals, and remote professionals.⁹⁶ Such applications could include live video consultations between a patient and a remote physician. More advanced real-time applications involve supervision and instruction during medical procedures. Where telesurgical technologies are available, a remote surgeon can conduct the surgery with minimal

87. See, e.g., Golnaz Esfandiari, *Nothing Comes Between Iranians and Their Satellite Dishes—Not Even the Police*, RADIO FREE EUR. RADIO LIBERTY: PERSIAN LETTERS (Mar. 13, 2012), http://www.rferl.org/content/persian_letters_satellite_dishes_iran_police/24514665.html.

88. *Id.*

89. Paul Sonne & Farnaz Fassihi, *In Skies over Iran, A Battle for Control of Satellite TV*, WALL ST. J. (Dec. 27, 2011), <http://online.wsj.com/article/SB10001424052970203501304577088380199787036.html>.

90. *Telehealth 101: What is Telehealth?*, U. MIAMI HEALTH SYS., <http://telehealth.med.miami.edu/what-is-telehealth> (last visited Nov. 5, 2012).

91. *Id.*

92. *See id.*

93. *See id.*

94. *See id.*

95. *See id.*

96. *See id.*

assistance or intervention by a local doctor.⁹⁷ Because of the cost of such systems and the need for high-bandwidth communications, telesurgical applications are likely infeasible for patients in remote clinics located in poor and developing countries. However, several countries, including India via the Indian Space Research Organization, have conducted studies involving the application of real-time telesurgical technology for remotely located patients.⁹⁸

III. THE COMPETING LEGAL REGIMES GOVERNING SATMED

On January 12, 2012, the international community, via the U.N. General Assembly, reiterated that it is

[d]eeply convinced that the use of space science and technology and their applications in areas such as telehealth, tele-education, [and] disaster management . . . contribute to achieving the objectives [of the United Nations addressing] various aspects of economic, social and cultural development⁹⁹

This statement is a positive declaration by the international community recognizing that SATMED technologies offer a valuable means by which states can pursue the fulfillment of individual rights, including the right to health care. Nevertheless, the body of law governing these important technologies remains at odds with this goal.

The law governing SATMED reflects a tension between an individual's right to "the highest attainable standard of . . . health"¹⁰⁰ and the preservation of state sovereignty. On one hand, international law recognizes certain economic, social, and cultural rights. The ICESCR seeks to protect individual health and impose obligations on states to facilitate access to health care.¹⁰¹ On the other hand, a separate thread of international law relating to the movement and use of telecommunications equipment indicates that national sovereignty circumscribes states' obligations to provide these economic, social, and cultural rights. States are free to restrict the availability of technologies that would provide efficient and cost-effective means to attain these rights, including the right to access health care.¹⁰² Even during humanitarian disasters, international law recognizes the right of states to exclude relief workers and technologies that would provide effective and inexpensive health services consistent with an international right to health.¹⁰³ The following Part surveys the various international agreements

97. Mishra, *supra* note 23, at 84–86.

98. *See, e.g., id.* at 87; Bagchi, *supra* note 12, at 298.

99. G.A. Res. 66/71, at 2, U.N. Doc. A/RES/66/71 (Jan. 12, 2012).

100. ICESCR, *supra* note 5, art. 12.

101. *Id.*

102. *See infra* Part III.B.

103. *See infra* Part III.B.2.

relating to the international right to health and the availability of telecommunications.

A. Health Care Under International Law

The international community has adopted several instruments that provide for an individual right to health care. Article 25 of the UDHR states that “[e]veryone has a right to a standard of living adequate for health and well-being . . . including . . . medical care”¹⁰⁴ Although the UDHR is widely regarded as aspirational and not binding,¹⁰⁵ the right to health care enumerated in Article 25 serves as a launching point and has been incorporated into other binding agreements. The most notable are the ICESCR, CEDAW, and the CRC.¹⁰⁶ The right to health care in these agreements is couched within a general and amorphous right to health. As the World Health Organization clarifies, however, the right to health is necessarily dependent on state obligations: “The right to health means that governments must generate conditions in which everyone can be as healthy as possible. Such conditions range from ensuring availability of health services, healthy and safe working conditions, adequate housing and nutritious food.”¹⁰⁷ This state-obligation approach is most succinctly summarized in the pronouncement of the U.N. Committee on Economic, Social and Cultural Rights (CESCR) that states must “respect, protect and fulfil” the right to health care.¹⁰⁸

The ICESCR and its commentary serve as an invaluable source regarding the scope and specificities of the right to health care. The ICESCR was adopted as a U.N. General Assembly resolution.¹⁰⁹ To date, the resolution has been signed and ratified by over 160 countries, elevating its status from nonbinding resolution to an operative and binding international agreement.¹¹⁰ Although the United States is notably a nonparty, the vast majority

104. UDHR, *supra* note 5, art. 25.

105. *See id.* pmbi.

106. Several regional agreements also address a right to health services. These include the European Social Charter, the African Charter on Human and People’s Rights, and the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights. *Hunt Report*, *supra* note 2.

107. WHO & Office of the U.N. High Comm’r for Human Rights, *Joint Factsheet, The Right to Health*, at 2, WHO/OHCHR/323 (Aug. 2007), http://www.who.int/mediacentre/factsheets/fs323_en.pdf.

108. Comm. on Econ., Soc. & Cultural Rights, Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights: The Right to the Highest Attainable Standard of Health, General Comment No. 14, 23d Sess., Apr. 25–May 12, 2000, ¶ 33, U.N. Doc. E/C.12/2000/4 (Aug. 11, 2000) [hereinafter 2000 General Comment] (emphasis removed); *see, e.g.*, ICESCR, *supra* note 5, art. 17(2).

109. G.A. Res. 2200 (XXI), U.N. Doc. A/RES/2200(XXI) (Dec. 16, 1966).

110. 1 UNITED NATIONS, MULTILATERAL TREATIES DEPOSITED WITH THE SECRETARY-GENERAL, at 182, U.N. Doc. ST/LEG/SER.E/26, U.N. Sales No. E.09.V.3 (2009).

of developing countries, including those most likely to benefit from SATMED, are ICESCR members.¹¹¹

Article 12 of the ICESCR creates a right for individuals to have access to “the highest attainable standard of physical and mental health.”¹¹² This provision has been recognized to enshrine an expansive right to health.¹¹³ The CESCR—which was created to provide individuals with an international forum in which to seek redress for violations of their economic, social, and cultural rights, including their right to health care¹¹⁴—has clarified that the right under Article 12 incorporates four elements of satisfactory health care and facilities: availability, accessibility, acceptability, and quality.¹¹⁵ These four elements coalesce to support “the creation of conditions which would assure to all medical services and medical attention in the event of sickness,” as required under Article 12(2).¹¹⁶

The first of these elements, availability, requires that a “sufficient quantity” of medical facilities and services are available.¹¹⁷ There is no precise standard against which to measure the sufficiency of available facilities, and this prong’s requirements are also qualified by a state’s level of development.¹¹⁸ However, an inadequate number of health care facilities and trained medical professionals are necessarily inconsistent with this international obligation. Where gaps in health care exist, states should invest in facilities and services, like SATMED, that can ensure that medical services are available to all persons.

Accessibility requires that hospitals and other medical facilities be accessible to all persons without discrimination.¹¹⁹ The scope of this prong covers three core areas: physical accessibility, economic accessibility, and information accessibility.¹²⁰ Physical accessibility requires that health care facilities and services be within a safe proximity for all persons.¹²¹ Thus, physical accessibility necessitates eliminating barriers to care such as the need to travel significant distances to hospitals and prohibitively expensive methods of transportation.¹²² Economic accessibility requires that “health

111. *See id.* at 182–84.

112. ICESCR, *supra* note 5, art. 12.

113. 2000 General Comment, *supra* note 108, ¶ 4.

114. *See* Optional Protocol to the International Covenant on Economic, Social and Cultural Rights, G.A. Res. 63/117, art. 2, U.N. Doc. A/RES/63/117 (Dec. 10, 2008).

115. 2000 General Comment, *supra* note 108, ¶ 12.

116. ICESCR, *supra* note 5, art. 12(2).

117. 2000 General Comment, *supra* note 108, ¶ 12(a).

118. *Id.*

119. *Id.* ¶ 12(b).

120. *Id.*

121. *Id.*

122. U.N. Comm. on the Elimination of Discrimination Against Women, Rep. on Its 20th and 21st Sess., Jan. 19–Feb. 5, June 7–25, 1999, ¶ 21, U.N. Doc. A/54/38/Rev.1; GAOR, 54th Sess., Supp. No. 38 (1999).

facilities, goods and services . . . be affordable to all.”¹²³ This requires that poor, vulnerable, or otherwise disadvantaged persons are neither discouraged from accessing health services as a result of cost nor required to pay an unreasonably disproportionate share of their income or other resources toward health care.¹²⁴ Direct costs, such as paying for transportation, and indirect costs, such as lost wages and labor, resulting from persons having to travel significant distances or otherwise access health care must be accounted for in the evaluation of economic accessibility.¹²⁵ Lastly, information accessibility relates to the right of individuals “to seek, receive and impart information and ideas concerning health issues.”¹²⁶

The final two prongs, acceptability and quality, demand that health facilities and services are sufficiently adequate and fit for their intended medical purposes and staffed by skilled medical professionals with access to necessary equipment.¹²⁷

The CESCR has identified a litany of state responsibilities related to implementing the right to health care’s four elements. States are obligated to “pro-actively engage in activities intended to strengthen people’s access to and utilization of resources and means to ensure their livelihood”¹²⁸ The committee explains that “[a]s a general rule, States parties are obliged to fulfill (provide) a specific right in the Covenant when an individual or group is unable, for reasons beyond their control, to realize the right themselves by the means at their disposal.”¹²⁹ The affirmative duty to provide for the welfare of those unable to provide for their own health care, especially in light of the general rule enunciated in the CESCR’s comments on the right to food, requires states to construct medical facilities, to train and pay doctors to serve rural communities otherwise without access to medical services, and to ensure access to medical technology that can support these ends, including SATMED.¹³⁰ Financially, states must use all available means and the maximum resources to expeditiously facilitate the progressive

123. 2000 General Comment, *supra* note 108, ¶ 12(b).

124. *See id.*

125. *See id.*

126. *Id.* While the ICESCR does not elaborate further, it is evident from the language that information accessibility also falls within the scope of the right to information enshrined in Article 19 of the Universal Declaration of Human Rights. *Compare* UDHR, *supra* note 5, art. 19, with ICESCR, *supra* note 5, art. 12.

127. 2000 General Comment, *supra* note 108, ¶ 12(c)–(d).

128. Comm. on Econ., Soc. & Cultural Rights, Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights: The Right to Adequate Food, General Comment No. 12, 12th Sess., Apr. 26–May 14, 1999, ¶ 15, U.N. Doc. E/C.12/1999/5 (May 12, 1999).

129. Comm. on Econ., Soc. & Cultural Rights, Implementation of the International Covenant on Economic, Social and Cultural Rights: The Right to Education, General Comment No. 13, 21st Sess., Nov. 15–Dec. 3, 1999, ¶ 47, U.N. Doc. E/C.12/1999/10 (Dec. 8, 1999), *noted in* 2000 General Comment, *supra* note 108, at 20 n.3.

130. 2000 General Comment, *supra* note 108, ¶ 36 (explaining the obligation to fulfill in the context of health care).

realization of the right to health;¹³¹ it is a violation of the right to provide insufficient financial or other state resources to support it.¹³² State obligations also include cooperating to provide international medical assistance, especially in cases of humanitarian and environmental disasters and to internally displaced persons and refugees.¹³³ States are also strongly encouraged to provide technical assistance and are discouraged from imposing trade barriers and other restrictions that would limit the free movement of medical equipment.¹³⁴

In addition to general duties regarding the right to health, states are under specific obligations regarding women and children. Because of disparities in the availability of health care, women and children are afforded special protections under international law, including a more expansive right to health care.¹³⁵ CEDAW obligates member states to eliminate discrimination against women and to ensure equal access to health care services.¹³⁶ Discrimination includes any restriction on the basis of sex that impairs or nullifies the benefits of an individual's rights, including economic, social, and cultural rights, such as those enumerated in the ICESCR.¹³⁷ Included in the economic, social, and cultural rights protected by CEDAW is a right to pregnancy-related services: "States Parties shall ensure to women appropriate services in connection with pregnancy, confinement and the post-natal period, granting free services where necessary, as well as adequate nutrition during pregnancy and lactation."¹³⁸ The plain language of this provision indicates an unqualified obligation to ensure that access to health care services and facilities for preterm and postnatal care is available, services that could be supported by SATMED. CEDAW also expressly recognizes the rural-urban divide in health care and imposes additional obligations on states to cure disparities affecting rural women. Article 14 creates two such obligations. First, it obligates states to "take all appropriate measures" to ensure that women benefit from rural development on an equal basis with men.¹³⁹ Second, states must ensure that rural women have access to health care facilities, services, and, presumably, technologies that serve as a means to both ends.¹⁴⁰

131. ICESCR, *supra* note 5, art. 2.

132. 2000 General Comment, *supra* note 108, ¶ 52.

133. *Id.* ¶ 40.

134. ICESCR, *supra* note 5, art. 2; 2000 General Comment, *supra* note 108, ¶ 41.

135. *Cf.* CRC, *supra* note 5, pmb. ("[C]hildhood is entitled to special care and assistance . . ."); CEDAW, *supra* note 5, pmb. ("Concerned that in situations of poverty women have the least access to . . . health . . ."); UDHR, *supra* note 5, art. 25(2) (declaring that mothers and children "are entitled to special care and assistance").

136. CEDAW, *supra* note 5, art. 12(1).

137. *Id.* art. 1.

138. *Id.* art. 12(2).

139. *Id.* art. 14(2).

140. *Id.*

Like CEDAW, the CRC creates binding legal obligations on states regarding the health and treatment of children. The CRC protects children by setting minimum health care standards. Article 24 creates a right for children to have access to “the highest attainable standard of health facilities and to facilities for the treatment and rehabilitation of health.”¹⁴¹ This obligation includes developing primary health care services and the use of “readily available technology”¹⁴² Member states also agree to cooperate to facilitate the realization of children’s right to health care.¹⁴³

SATMED applications fall within the scope of the right to health care because they have the capacity to provide a cost-effective means for states to satisfy their obligations under the ICESCR, CEDAW, and the CRC.¹⁴⁴ SATMED applications accomplish this by increasing the availability, accessibility, acceptability, and quality of patient care. With regard to availability and accessibility, SATMED enables patients lacking access to general practitioners and specialists, such as those in many rural areas, to connect with and receive care under the supervision of qualified medical professionals.¹⁴⁵ Patients that would have previously needed to travel significant distances to receive care at urban hospitals may avoid the associated health risks and economic costs by being treated locally under the direction of remotely located medical professionals.¹⁴⁶ Telemedicine also has the capacity to increase the acceptability and quality of patient care. It accomplishes this through two avenues. First, patients would receive the benefit of having their condition evaluated by specialized medical professionals. Second, general practitioners, nurses, and other health care professionals, such as rural

141. CRC, *supra* note 5, art. 24(1).

142. *Id.* art. 24(2)(b)–(c).

143. *Id.* art. 24(4).

144. Certainly, satellite telemedicine (SATMED) would have attendant costs that cannot be ignored or wished away, and satellite communications have been traditionally more expensive than the use of wireline or cellular infrastructure. Nonetheless, the cost of satellite bandwidth must be considered against the cost savings from not having to construct wireline infrastructure to fill in the gaps and not having to pay additional doctors to live in isolated and rural areas. Store-and-forward technologies would enable doctors to employ data-compression technologies to minimize data needs and to utilize satellite bandwidth during periods of off-peak demand, thus dramatically undercutting the costs required to provide service. Moreover, there is no reason to suspect that public-private partnerships between existing, wholesale satellite operators, governments, and medical professionals would be unable to aggregate sufficient economies of scale (for example, patients) to make SATMED viable. In fact, SATMED would likely increase the availability of volunteer medical professionals by enabling doctors unable to uproot from their practices for extended periods of time to volunteer with organizations like Doctors Without Borders. See *History & Principles*, DOCTORS WITHOUT BORDERS, <http://www.doctorswithoutborders.org/aboutus/?ref=main-menu-about> (last visited Nov. 5, 2012).

145. See *supra* Part I.

146. Kuppuswamy & Pandian, *supra* note 11, at 6.

health aides, could receive additional medical training via satellite and through repeated interaction with more qualified doctors.¹⁴⁷

Lastly, SATMED would help states fulfill their obligation toward refugees and otherwise displaced persons. As the CESCR notes, states and the international community have a joint responsibility to provide medical assistance to refugees and internally displaced persons.¹⁴⁸ This is perhaps one of the areas where SATMED would have its greatest impact because satellite technologies increase relief worker mobility, supplement gaps in infrastructure and services, and can provide access to a global network of physicians to help meet the needs of displaced persons. It also enables states to more effectively utilize their resources by providing nationwide access to centralized medical professionals without delay or the need for them to travel to affected areas.

B. *International Telecommunications Law*

While SATMED falls within the scope of the right to health care, states retain the right to regulate the use of satellite terminals within their territory, including the right to exclude equipment essential to the physical layer of SATMED. Despite the fact that states have ceded some of their national sovereignty to the ITU, international law recognizes “the sovereign right of each country to regulate its telecommunication”¹⁴⁹ As the ITU and Article 9 of the Tampere Convention illustrate, states retain broad discretion with regard to the import and export of satellite terminals, as well as the allocation, assignment, and use of electromagnetic spectrum.¹⁵⁰

1. The Legal Regime of the International Telecommunication Union

As Part II recounted, COMSATs use electromagnetic spectrum, colloquially referred to as radio spectrum, to transmit and receive communications.¹⁵¹ Although the electromagnetic spectrum is infinitely renewable, it is also a limited resource: there are a limited number of frequencies useful for radiocommunication, and simultaneous use of a frequency by two or more users causes interference that degrades or prevents

147. See, e.g., *Tele-Education Projects by ESA Telecom Applications*, EDUNews (Eur. Space Agency, Paris, Fr.), July 24, 2004, at 11, available at http://www.esa.int/esapub/edu/edu6/edu6_10.pdf (discussing SkyNurse, a tele-education program to train nurses in Romania); see also Press Release, U.N. Info. Serv., United Nations to Hold Training Course on Satellite Technology for Telehealth/Telemedicine, U.N. Press Release UNIS/OS/354 (June 22, 2007), available at <http://www.unis.unvienna.org/unis/pressrels/2007/unisos354.html> (referencing “[t]ele-education for medical professionals”).

148. 2000 General Comment, *supra* note 108, ¶ 40.

149. International Telecommunication Convention pmb., Oct. 25, 1973, 28 U.S.T. 2495, 1209 U.N.T.S. 255 [hereinafter ITC].

150. See *infra* Part III.B.1–2.

151. See *supra* Part II.B.

communication.¹⁵² National governments mitigate harmful interference by imposing bureaucratic regulations and licensing requirements for public and private use of the radio spectrum.¹⁵³ To solve extraterritorial issues, the international community established the ITU to harmonize and coordinate international telecommunications.¹⁵⁴ The ITU is an intergovernmental organization headquartered in Geneva, Switzerland.¹⁵⁵ It was first established as the International Telegraph Union on May 17, 1865.¹⁵⁶ Although it operates according to its constitution, the ITU has become an agency of the United Nations.¹⁵⁷ It has the independent legal authority to enact binding international regulations governing telecommunications.¹⁵⁸ The ITU has 193 member states and more than seven hundred sector members and associates, which are nongovernmental entities with technical knowledge, expertise, and interests in telecommunications.¹⁵⁹ The ITU Constitution allocates states' rights and obligations related to telecommunications, including those related to COMSATs, under international law.

The ITU Constitution abrogates the earlier International Telecommunication Convention but retains many of the rights and obligations of states.¹⁶⁰ States have the authority to regulate public and private communications within their borders.¹⁶¹ Central to this authority is the right to stop or suspend communications inconsistent with a country's laws, public order, or

152. Constitution of the International Telecommunication Union art. 44(2), Dec. 22, 1992, 1825 U.N.T.S. 331 [hereinafter ITUC]; ITC, *supra* note 149, art. 33(2).

153. See, e.g., FCC Table of Frequency Allocations, 47 C.F.R. § 2.106 (2011).

154. Atilla Matas, ITU Radiocomm'n Bureau, ITU Radio Regulations Related to Satellite Services, http://groups.itu.int/Portals/20/activeforums_Attach/ITU-BR.pdf (noting that the ITU Mission is "[t]o ensure rational, equitable, efficient and economical use of the radio frequency spectrum by all radiocommunication services—including those using geostationary satellite orbit or other satellite orbits—and to carry out studies on radiocommunication matters . . ."); cf. ITUC, *supra* note 152, art. 1(2)(b) ("[The ITU] shall . . . coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of that radio-frequency spectrum for radiocommunication services and of the geostationary-satellite and other satellite orbits . . .").

155. Matas, *supra* note 154.

156. *Id.*

157. *Id.*

158. *Id.*

159. *Id.*

160. ITUC, *supra* note 152, art. 58. Compare, e.g., *id.* art. 1, with ITC, *supra* note 149, art. 4. A notable revision of the ITU Constitution is the greater inclusion of goals related to development. The preamble to the Constitution suggests that the creation of the ITU was done with "regard to the growing importance of telecommunication for the preservation of peace and the economic and social development of all States . . ." Compare ITUC, *supra* note 152, pmb., with ITC, *supra* note 149, pmb. Consistent with this goal and General Assembly Resolution 1721 is the addition of the express purpose of extending "the benefits of the new telecommunication technologies to all the world's inhabitants." Compare ITUC, *supra* note 152, art. 1(d), with ITC, *supra* note 149, art. 4.

161. ITUC, *supra* note 152, pmb. ("[R]ecognizing the sovereign right of each State to regulate its telecommunication . . .").

decency.¹⁶² For example, China has implemented the “Great Firewall” to censor information that it views as harmful to national security and the rule of law.¹⁶³ Many Islamic countries also regulate communications that they perceive as undermining the morals legislated under religious law.¹⁶⁴ States also retain the right to restrict the use of particular frequencies to certain uses.¹⁶⁵ National sovereignty, however, is not absolute under the ITU Constitution. For instance, ITU members must create means for international correspondence and recognize a right for individuals to communicate via public telecommunications.¹⁶⁶ States must also grant priority to communications concerning the protection of life and urgent medical communications.¹⁶⁷ The ITU Constitution also compels member states to ensure that mobile stations are capable of interconnection and interoperability.¹⁶⁸

Member states are also bound by the other legal texts of the ITU. The primary mechanism by which the ITU creates new laws and policies is the Plenipotentiary Conference.¹⁶⁹ The Plenipotentiary Conference occurs every four years, with the most recent conference occurring in Guadalajara, Mexi-

162. ITUC, *supra* note 152, arts. 34(2), 35; ITC, *supra* note 149, art. 19(2).

163. See, e.g., *China Toughens Internet Rules*, AGENCE FRANCE-PRESSE, Feb. 24, 2010, available at http://www.google.com/hostednews/afp/article/ALeqM5jszpWaaIx9ZzDt_UC7T03sSZusNw.

164. HELMI NOMAN, IN THE NAME OF GOD: FAITH-BASED INTERNET CENSORSHIP IN MAJORITY MUSLIM COUNTRIES 2 (2011), available at http://opennet.net/sites/opennet.net/files/ONI_NameofGod_1_08_2011.pdf. Article 22 of the Cairo Declaration on Human Rights in Islam provides that while information is critical to a well-functioning society, it cannot be used to denigrate religious prophets, to undermine public morals, or to attack or otherwise weaken the Islamic faith. Preparatory Comm. of the World Conference on Human Rights, 4th Sess., Apr. 19–May 7, 1993, *Cairo Declaration on Human Rights in Islam*, U.N. Doc. A/CONF.157/PC/62/Add.18 (June 9, 1993). Consistent with this, “[r]eligion-based Internet censorship bars the free flow of information in many majority Muslim countries by means of regulatory restrictions and ISP-level technical filtering that blocks objectionable web content.” NOMAN, *supra*. In Sudan, for example, the Islamic concept of *Hisbah*—the duty of promoting good and forbidding evil—serves as the basis for Internet filtering to prevent the spread of vices inconsistent with the *Qur’an*. *Id.* at 4–5.

165. ITC, *supra* note 149, art. 34(3).

166. ITC, *supra* note 149, art. 18; *id.* art. 21(1). This obligation, however, does not require states to provide access to all channels of communication, only to “take . . . steps,” an inherently amorphous and ambiguous obligation. ITUC, *supra* note 152, art. 38(1).

167. ITUC, *supra* note 152, art. 40 (“International telecommunications services must give absolute priority to all telecommunications concerning safety of life at sea, on land, in the air or in outer space, as well as to epidemiological telecommunications of exceptional urgency of the World Health Organization.”).

168. See ITC, *supra* note 149, art. 34(1). However, this obligation has limits and does not guarantee the interoperability of mobile telecommunications equipment. *Id.* art. 34(2).

169. *About ITU Plenipotentiary Conferences and the ITU Constitution and Convention*, ITU, <http://www.itu.int/en/history/plenipotentiaryconferences/Pages/aboutPPC.aspx> (last visited Nov. 5, 2012) [hereinafter *About ITU Plenipotentiary Conferences*].

co, in 2010.¹⁷⁰ The objectives of the quadrennial conference are to set ITU policies and lay out a roadmap for the future actions of the organization.¹⁷¹ The final acts of the Plenipotentiary Conference, voted on by the Union's members, are binding international instruments amending the ITU Constitution and Convention.¹⁷² Previous conferences amending the ITU Constitution took place in Kyoto (1994), Minneapolis (1998), Marrakesh (2002), and Antalya (2006).¹⁷³ Many of the articles and provisions of the ITU Constitution relevant to COMSATS and SATMED were drafted or amended at Plenipotentiary Conferences.¹⁷⁴

In addition to the acts of the Plenipotentiary Conferences, the greatest concession of national sovereignty under the ITU Constitution is the requirement for states to adhere to the Administrative Regulations.¹⁷⁵ The Administrative Regulations, which include provisions governing satellite communications known as "Radio Regulations," are binding legal instruments;¹⁷⁶ thus, states are obligated to adhere to their terms and to implement domestic regulations consistent therewith.¹⁷⁷ The Radio Regulations are revised every three to four years at the World Radiocommunication Conference.¹⁷⁸ The Radio Regulations fulfill several goals of the ITU, including harmonizing global allocation of the electromagnetic spectrum and the avoidance of international harmful interference.¹⁷⁹ For example,

170. See *Guadalajara Plenipotentiary Conference*, ITU, <http://www.itu.int/plenipotentiary/2010/index.html> (last visited Nov. 5, 2012).

171. *About the Plenipotentiary Conference*, ITU, <http://www.itu.int/plenipotentiary/2010/about.html> (last visited Nov. 5, 2012).

172. See *About ITU Plenipotentiary Conferences*, *supra* note 169.

173. *Complete List of Plenipotentiary Conferences*, ITU, <http://www.itu.int/en/history/plenipotentiaryconferences/Pages/ListofPlenipotentiaryConferences.aspx> (last visited Nov. 5, 2012).

174. See, e.g., ITUC, *supra* note 152, arts. 44, 45, 47, 48(1). Amendments made at the Plenipotentiary Conference are reflected in the ITU Constitution available on the ITU's website. *Basic Texts of ITU*, ITU, <http://www.itu.int/net/about/basic-texts/index.aspx> (last visited Nov. 5, 2012). These notations appear under the paragraph number, such as "PP-98" for the 1998 Plenipotentiary Conference.

175. Cf. ITUC, *supra* note 152, art. 4(4); *Radio Regulations—An Introduction*, ITU, <http://www.itu.int/en/history/radioregulations/Pages/radioregulations.aspx> (last visited Nov. 5, 2012).

176. ITC, *supra* note 149, art. 42(1).

177. ITUC, *supra* note 152, arts. 4(3), 6(2) ("Member States are . . . bound to take the necessary steps to impose the observance of the provisions of . . . the Administrative Regulations upon operating agencies authorized by them to establish and operate telecommunications and which engage in international services or which operate stations capable of causing harmful interference to the radio services of other countries.").

178. ITUC, *supra* note 152, art. 13(2). The Radio Regulations were last amended following the 2012 World Radiocommunication Conference and will be published in November 2012. *Radio Regulations*, ITU, <http://www.itu.int/pub/R-REG-RR/en> (last visited Nov. 5, 2012).

179. See, e.g., ITUC, *supra* note 152, art. 1(2). Article 1(2) states:

spectrum allocations are recorded in a centralized table, which is reproduced in the Radio Regulations.¹⁸⁰ National governments are obligated to implement corresponding frequency allocations in their national laws.¹⁸¹

While the acts of the Plenipotentiary Conference and Administrative Regulations, including the Radio Regulations, are binding on states, the impact of these instruments is limited by national sovereignty. Article 54(2) of the ITU Constitution contemplates the need for state ratification of revisions to the ITU's legal texts.¹⁸² Until the deposit of an instrument indicating ratification, revisions are only provisionally binding on states—although there is a presumption that states agree to be bound if they fail to deposit ratification instruments or reservations within thirty-six months.¹⁸³ The ITU Constitution also allows states to attach reservations to their ratifications, including those from the Plenipotentiary Conference, and to the Administrative Regulations.¹⁸⁴ States use reservations to preserve their national sovereignty. For example, sixty-five countries deposited reservations to the Final Acts of the most recent Plenipotentiary Conference.¹⁸⁵ In some cases, such as that of Indonesia, reservations carve out broad discretion to national governments to act in accordance with the ITU regime only when compliance promotes their interests.¹⁸⁶ Such reservations undermine the binding intent of the ITU.

To this end, the Union shall in particular:

- (a) effect allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies and the registration of radio-frequency assignments and, for space services, of any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to avoid harmful interference between radio stations of different countries;
- (b) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio-frequency spectrum for radiocommunication services and of the geostationary-satellite and other satellite orbits;
- (c) facilitate the worldwide standardization of telecommunications, with a satisfactory quality of service

Id.

180. *Radio Regulations—An Introduction*, *supra* note 175.

181. ITUC, *supra* note 152, art. 6(2); *see, e.g.*, FCC Table of Frequency Allocations, 47 C.F.R. § 2.106 (2011).

182. ITUC, *supra* note 152, art. 54(2).

183. *Id.* art. 54(3), (5).

184. *Id.* art. 54(2).

185. *See* ITU, FINAL ACTS OF THE 2010 PLENIPOTENTIARY CONFERENCE 21–79 (2011), available at http://www.itu.int/dms_pub/itu-s/oth/02/01/S020100003A4002PDFE.pdf.

186. Indonesia reserved

the right for its Government to take any action and preservation measures it deems necessary to safeguard its national interests should any provision of the Constitution, the Convention and the Resolutions, as well as any decision of the Plenipotentiary Conference of the ITU . . . , directly or indirectly affect its sover-

Reservations also enable states to object to emerging norms, thus avoiding being bound by customary international law. Others, such as that of Rwanda, illustrate a gentleman's agreement in which states agree to be bound by the Convention only insofar as other countries comply with international law.¹⁸⁷

If the framework of the ITU recognizes the right of states to restrict telecommunications and to make reservations to the Administrative Regulations and acts of the Plenipotentiary Conferences,¹⁸⁸ how should the scope of the obligation to provide access to international channels of communication and equipment be understood? The Tampere Convention, a recent agreement regulating the provision of telecommunications services in the aftermath of natural and humanitarian disasters, serves as a useful metric against which to measure the boundaries of national sovereignty.

2. The Tampere Convention: A Clear Metric of State Sovereignty

The ITU heralds the Tampere Convention as a "life-saving international treaty."¹⁸⁹ The international agreement is intended to streamline the provision of telecommunications equipment to countries affected by disasters, thus improving the availability of communication services essential to relief workers.¹⁹⁰ The Convention defines disaster broadly as "a serious disruption of the functioning of society, posing a significant, widespread threat to human life, health, property or the environment, whether caused by accident,

eignty or be in contravention to the Constitution, Laws and Regulations of the Republic of Indonesia as well as the existing rights acquired by the Republic of Indonesia as a party to other treaties and conventions and any principles of international law

Id. at 25.

187. Rwanda reserved

for its Government the right to take any action it deems necessary to protect its interests under the national legislation and international treaties to which Rwanda has subscribed if some Member States of the ITU did not observe any manner whatsoever, the provisions of the Constitution and Convention of the International Telecommunication Union, or if reservations by other countries were against its interests.

Id. at 24.

188. ITUC, *supra* note 152, art. 54(2); *cf.* International Telecommunication Regulations, ITU Res. 79 (1998), reprinted in ITU, FINAL ACTS OF THE 1998 PLENIPOTENTIARY CONFERENCE 234 (1999), available at http://www.itu.int/dms_pub/itu-s/oth/02/01/S02010000254002PDFE.pdf ("[R]ecognizing . . . that consistent with the sovereign right of each State to regulate its national telecommunications, many Member States have national regulatory regimes and laws that restrict their ability to direct recognized operating agencies in the conduct of their commercial activities").

189. *The Tampere Convention: A Life-Saving Treaty*, ITU, <http://www.itu.int/ITU-D/emergencytelecoms/tampere.html> (last visited Nov. 5, 2012) [hereinafter *A Life-Saving Treaty*].

190. *Id.*

nature or human activity, and whether developing suddenly or as the result of complex, long-term processes.”¹⁹¹ The Convention creates a central coordinator that states can notify and through which they can request assistance from third parties.¹⁹² State parties and nongovernmental entities are urged to cooperate to provide telecommunications services in the affected state, including “the installation and operation of reliable, flexible telecommunication resources to be used by humanitarian relief and assistance organizations.”¹⁹³ Such services include the networks underlying SATMED applications.¹⁹⁴ The Tampere Convention also defines certain rights for telecommunications relief workers, such as protection against the seizure of telecommunications equipment.¹⁹⁵ These protections encourage the free flow of equipment and persons responding to emergencies.¹⁹⁶ To date, forty-six nations have deposited ratification instruments for the Tampere Convention.¹⁹⁷

One of the primary objectives of the Tampere Convention is to eliminate national regulatory barriers barring the entry and use of telecommunications equipment. As the ITU explains, “the trans-border use of telecommunication equipment by humanitarian organizations was often impeded by regulatory barriers that make it extremely difficult to import and rapidly deploy telecommunications equipment for emergency without prior consent of the local authorities.”¹⁹⁸ To remedy this problem, the Convention creates a waiver of regulatory barriers including frequency allocations and licensing, import and export restrictions on equipment, and the movement of relief workers.¹⁹⁹

A close reading of the Convention reveals, however, that while the Tampere Convention does promote international telecommunications cooperation, it ultimately recognizes and preserves the strong (and seemingly unassailable) sovereignty of states over telecommunications.²⁰⁰ Article 9 of Convention further clarifies the scope of national sovereignty by enumerating a nonexhaustive list of accepted regulatory barriers that states are free to

191. Tampere Convention on the Provision of Telecommunications Resources for Disaster Mitigation and Relief Operations art. 1(6), June 18, 1998, 2296 U.N.T.S. 5 [hereinafter Tampere Convention].

192. *Id.* arts. 2(1), 3, 4, 6, 8, 9.

193. *Id.* art. 3(2)(d); *accord id.* art. 3(1)–(2).

194. *Cf. id.* art. 3(2)(a).

195. *Id.* art. 5.

196. *Tampere Convention Eases International Emergency Telecommunications*, ARRL LETTER, Jan. 28, 2005 (Am. Radio Relay League, Hartford, Conn.), available at <http://www.arrl.org/arrlletter?issue=2005-01-28>.

197. *A Life-Saving Treaty*, *supra* note 189.

198. *Id.*

199. *Id.*

200. Even the ITU concedes that the Tampere Convention recognizes “the right of a State to direct, control and coordinate assistance provided under the Convention within its territory.” *A Life-Saving Treaty*, *supra* note 189.

impose on telecommunications.²⁰¹ States may enact regulations restricting the use of equipment and radio spectrum and the cross-border movement of telecommunications stations, operators, and technicians.²⁰² By codifying common state practices, the Convention provides further evidence of *opinio juris* that is necessarily inconsistent with the right to health care. Moreover, Article 4 expressly states that the Convention does not supersede a state's right to "direct, control, coordinate and supervise telecommunication assistance provided . . . within its territory."²⁰³ Article 4 also only provides that a member "may" request telecommunications assistance, not that it "must" or "shall."²⁰⁴ Once assistance begins, the requesting state retains the right to determine the scope of assistance and to terminate the assistance provided.²⁰⁵ The preservation of states' authority, even in cases of humanitarian disasters, demonstrates the gravitas of sovereignty; if states can exclude telecommunications when facing humanitarian disasters, then, *a fortiori*, they can also exclude SATMED under ordinary circumstances even if they are failing to satisfy the requirements of the right to health care.

Despite this conclusion, however, the Tampere Convention remains a useful tool for identifying several means for overcoming the broad scope of national sovereignty. Article 9 of the Convention lists recognized means for eliminating or mitigating the impact of regulatory barriers. These include regulatory exemptions for certain devices, *ex ante* approval of equipment, mutual recognition of foreign licenses or type approvals, expedited regulatory review, and waivers for certain uses.²⁰⁶ Thus, although Article 9 codifies accepted regulatory barriers to telemedicine and SATMED, it also provides a roadmap for possible international undertakings that could fulfill Special Rapporteur Hunt's call for states to harmonize international law with the right to health care.

3. The GMPCS Memorandum of Understanding

Although not focused on health care, the Memorandum of Understanding to Facilitate Arrangements for Global Mobile Personal Communications by Satellite, Including Regional Systems (GMPCS-MoU) embraces some of the remedying actions listed in Article 9. The GMPCS-MoU represents an

201. Tampere Convention, *supra* note 191, art. 9.

202. *Id.*

203. *Id.* art. 4(8).

204. *Id.* art. 4(1).

205. *Id.* art. 4(2) ("A State Party requesting telecommunication assistance shall specify the scope and type of assistance required . . ."); *id.* art. 4(5) ("No telecommunication assistance shall be provided pursuant to this Convention without the consent of the requesting State Party. The requesting State Party shall retain the authority to reject all or part of any telecommunication assistance offered pursuant to this Convention in accordance with the requesting State Party's existing national law and policy."); *id.* art. 6(1) ("The requesting State Party or the assisting State Party may, at any time, terminate telecommunication assistance received or provided under Article 4 by providing notification in writing.")

206. *Id.* art. 9(3).

important and substantial effort seeking to create a liberalized market allowing for the free movement of satellite-communication equipment. The 1990s were marked by the emergence of an international movement to privatize and liberalize the COMSAT market, which was dominated by intergovernmental satellite organizations.²⁰⁷ The emergence of private satellite companies, such as PanAmSat, fostered a sense that inexpensive, private satellite services, including telemedicine, were just around the corner. The Action Plan developed at the 1998 World Telecommunication Development Conference in Valletta, Malta, called for the formation of public-private partnerships to promote, *inter alia*, the development of satellite-based telemedicine applications.²⁰⁸ Likewise, in response to the incorporation of GMPCS companies such as Orbcomm, Iridium, and Globestar, governments sought to pave the way for a more robust commercial-satellite market. At the first World Telecommunication Policy Forum in 1996, nearly two hundred ITU member states and sector members discussed how to facilitate the availability of new satellite-communication services.²⁰⁹ These countries drafted the GMPCS-MoU.²¹⁰

The GMPCS-MoU reflects an international effort to address regulatory barriers that affect the commercial availability of portable satellite commu-

207. The satellite-communications industry grew out of agreements that created intergovernmental organizations (IGOs) charged with developing COMSAT networks. SUSAN J. BUCK, *THE GLOBAL COMMONS: AN INTRODUCTION* 157–61 (1998). The most well known of these organizations are the International Telecommunications Satellite Organization (INTELSAT), International Maritime Satellite Organization (INMARSAT), Intersputnik International Organization of Space Communications (INTERSPUTNIK), and European Telecommunications Satellite Organization (EUTELSAT). *Id.* The INTELSAT and INMARSAT joint ventures provided satellite-communication services to a large conglomerate of African, European, Asian, and South and North American countries. *Id.* INTERSPUTNIK—the Soviet Union’s response to INTELSAT and INMARSAT—served the Soviet Union, Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, Mongolia, Poland, and Romania. *Id.* EUTELSAT operated as a regional satellite IGO in Western Europe. *Id.*

The role of the IGOs was greatly diminished in the late 1990s and early 2000s. During this period, the core functionality of the SATCOM IGOs was privatized, and the IGOs transformed into vestigial organizations operating primarily to ensure that the satellite networks remained accessible to the member states on a commercial basis. *See, e.g.*, U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-04-891, *TELECOMMUNICATIONS: INTELSAT PRIVATIZATION AND THE IMPLEMENTATION OF THE ORBIT ACT 5–8* (2004), available at <http://www.gao.gov/new.items/d04891.pdf>. *See generally* 11 FCC REP. TO CONGRESS AS REQUIRED BY ORBIT ACT (2010), reprinted in 25 FCC Rcd. 7834 (2010) (describing the progress of privatization of satellite communication).

208. *The Valletta Action Plan*, ITU, <http://www.itu.int/ITU-D/conferences/wtcd/1998/VAP.html> (last visited Nov. 5, 2012).

209. *GMPCS-MoU: Role of the ITU*, ITU, <http://www.itu.int/osg/gmpcs/> (last visited Nov. 5, 2012).

210. ITU, *Memorandum of Understanding to Facilitate Arrangements for Global Mobile Communications by Satellite, Including Regional Systems*, Feb. 14, 1997, <http://www.itu.int/newsarchive/wtcf96/gmpcs-mou/mou.html> [hereinafter GMPCS-MoU].

nication.²¹¹ The GMPCS-MoU was drafted against the background of “national laws and regulations, including those concerning licensing and frequency assignments.”²¹² To mitigate the effect of these laws on GMPCS terminals, the memorandum promotes several goals, including the free movement of terminals across international borders and mutual recognition of telecommunications equipment licenses.²¹³

As Article 9 of the Tampere Convention indicates, states use import and export laws and restrictions to create barriers to entry for telecommunications equipment.²¹⁴ The GMPCS-MoU addresses these limitations by promoting the adoption of exemptions for GMPCS terminals. Article 4 states that “[s]ignatories will develop recommendations to their competent authorities proposing exemptions of GMPCS terminals from customs restrictions when brought into a country on a temporary or transitory basis.”²¹⁵ At a minimum, the GMPCS-MoU encourages states to allow individuals to bring GMPCS terminals into a country, but not to use them.²¹⁶ Eliminating trade barriers to GMPCS terminals would significantly affect the free movement of terminals, particularly in the context of the World Trade Organization. The most favored nation principle in Article I of the General Agreement on Tariffs and Trade would extend any liberalization of import and export restrictions on GMPCS terminals by a World Trade Organization member to all other members on a nondiscriminatory basis.²¹⁷

The GMPCS-MoU also seeks to eliminate barriers that restrict the use of telecommunications equipment. Articles 1 and 2 encourage states to adopt class or blanket licensing of GMPCS terminals.²¹⁸ Without such reforms, each terminal must be licensed by the national regulatory agency. By granting a blanket license for a class or particular make and model of terminal, states would reduce the need for terminal licensing. Articles 1 and 2 also encourage mutual recognition of licenses issued by other states.²¹⁹ Mutual recognition would reduce the redundant costs and delays associated with national licensing regimes, which ultimately discourage the

211. Cf. David Sagar, Events of Interest, *Mobile Satellite Communications: Challenging the Regulatory Barriers*, 25 J. SPACE L. 150, 150 (1997) (“A new dimension has been added to this issue by the availability of global mobile personal communications by satellite (GMPCS). These systems have much to offer to the developed and developing world alike, but their potential will only be fully realized if the myriad of differing national licensing regimes can be replaced by a truly international regulatory framework.”).

212. GMPCS-MoU, *supra* note 210, pmbl.

213. *Id.*

214. See Tampere Convention, *supra* note 191, art. 9(1)(a), (c), (d).

215. GMPCS-MoU, *supra* note 210, art. 4.

216. *Id.* pmbl.

217. See General Agreement on Tariffs and Trade art. 1, Oct. 30, 1947, T.I.A.S. No. 1700, 55 U.N.T.S. 194.

218. GMPCS-MoU, *supra* note 210, arts. 1, 2.

219. *Id.*

development and availability of satellite services.²²⁰ Article 3 encourages states to adopt marking standards to physically indicate the technical specifications of each terminal and assist mutual recognition and type approvals.²²¹ Marking enables customs agents to more easily determine whether a device can operate within national standards and eliminates the need for unnecessary and redundant testing of GMPCS terminals prior to granting a license.

As a memorandum of understanding, the GMPCS-MoU is not a legally binding instrument. Rather, it is a statement encouraging signatories to pursue further arrangements fulfilling its goals and to implement domestic legislation toward that end.²²² For example, in 2003, the U.S. Federal Communications Commission (FCC) published rules implementing the GMPCS-MoU.²²³ These regulations reflect a multiyear effort by the U.S. government to develop a licensing regime for GMPCS terminals and to negotiate mutual-recognition agreements with foreign governments.²²⁴ The licensing scheme created by the FCC allows “travellers to carry a limited number of GMPCS transceivers that have not been certified . . . into the United States as personal effects.”²²⁵ However, such travellers can use uncertified terminals only if the manufacturer has received a blanket authorization for the device.²²⁶ The United States also entered into mutual-recognition agreements intended to assist mutual recognition and type approvals with the European Union, the Asian Pacific Economic Cooperative, and the International Commission for Telecommunications of the Organization of American States.²²⁷ Likewise, the FCC adopted an international effort to mark devices with an ITU GMPCS Mark.²²⁸ Manufacturers pursuing blanket licensing from the FCC can undergo an additional licensing procedure through which the U.S. government will certify a device according to ITU standards—entitling them to use an ITU Mark printed directly on the terminal.²²⁹ The ITU Mark does not confer any legal status on the devices in other countries by itself, but it does allow the manufacturer to use a recognized

220. For examples of the cost of licensing fees and other efforts to reduce the regulatory barriers to satellite communications in Africa, see ATOS ORIGIN, CATALYSING ACCESS TO ICTS IN AFRICA (CATIA) 6 (2007), available at <http://www.uk.atosconsulting.com/NR/rdonlyres/E8DF0560-9D1B-41AC-9973-F0492DFDDA99/0/AOCATIA8pp.pdf>.

221. GMPCS-MoU, *supra* note 210, art. 3.

222. *See id.* pmb1.

223. Amendment of Parts 2 & 25 to Implement the Global Mobile Pers. Commc'ns by Satellite (GMPCS) Memorandum of Understanding & Arrangements, 18 FCC Rcd. 24,423 (2003) (second report and order).

224. *Id.* at 24,426–27.

225. *Id.* at 24,425.

226. *Id.* at 24,426–27.

227. *Id.* at 24,428–29.

228. *Id.* at 24,428.

229. *Id.* at 24,427.

symbol that foreign governments can use to determine whether equipment conforms to their own national regulatory standards.²³⁰

While in many regards the GMPCS-MoU has resulted in a more liberalized GMPCS market, it is incapable of ensuring that SATMED terminals can be used globally. The nonbinding nature of the GMPCS-MoU requires states to expend significant effort to realize its intended benefits—the U.S. government spent five years conducting regulatory rulemaking.²³¹ Moreover, states continue to restrict GMPCS devices. For example, despite the GMPCS rulemaking, U.S. law still prevents the use of unlicensed terminals and requires that any device operating in the United States be licensed.²³² The benefits of the GMPCS-MoU relating to the free circulation of terminals are also limited to a temporary or transitory basis, which would be inapplicable to a rural clinic's extended use of a GMPCS terminal for SATMED applications.²³³ Finally, the GMPCS-MoU only concerns a limited segment of the satellite market and ignores other satellite technologies like VSATs, which could have an equal or greater impact on health care. As a result, national rules for market access are unnecessarily fragmented. The failure to include VSATs has forced the satellite industry to create a parallel initiative called the Global VSAT Forum to promote market liberalization for VSAT technology. To date, the Global VSAT Forum has not succeeded in achieving the adoption of a memorandum of understanding, let alone a binding agreement.²³⁴

4. The Global Broadband Satellite Infrastructure Initiative

The Global Broadband Satellite Infrastructure Initiative (GBSI Initiative) is another international effort to expand and liberalize the satellite market. Compared to the GMPCS-MoU, the GBSI Initiative represents a less fragmented step toward the realization of global access to satellite communications on an inexpensive basis. The GBSI Initiative is a public-private partnership with a goal of providing “affordable access to high-speed Internet services to underserved, remote and sparsely populated areas by leveraging the power of satellite technology.”²³⁵ Unlike the GMPCS-MoU, which only addresses one type of satellite technology, the GBSI Initiative

230. Cf. GMPCS-MoU, *supra* note 210, art. 3.

231. See 18 FCC Rcd. 24,423, 24,426.

232. *Id.* at 24,466.

233. GMPCS-MoU, *supra* note 210, art. 4.

234. See generally GLOBAL VSAT FORUM, REGULATORY WORKING GRP., VSAT POLICY DECLARATION: REGULATORY RECOMMENDATIONS & GUIDELINES (1999), available at http://www.gvf.org/images/regulatory/gvf_document.doc.

235. Global Broadband Satellite Infrastructure Initiative (GBSI), WORLD SUMMIT ON INFO. SOC'Y, <http://www.itu.int/wsis/stocktaking/scripts/documents.asp?project=1201773844> (last visited Nov. 5, 2012).

aims to affect all satellite technologies.²³⁶ The Initiative was first proposed by the International Telecommunications Satellite Organization at the World Summit on the Information Society held in 2003 and 2005.²³⁷

The GBSI Initiative involves a three-pronged, market-driven approach: eradicate proprietary segmentation of the satellite market, standardize frequency allocations, and harmonize and eliminate regulatory barriers.²³⁸ The first prong aims to do away with proprietary differences across satellite networks by creating universal standards for satellite terminals.²³⁹ Existing variations in technical standards diminish the market size for individual terminals and materially inflate the design and manufacturing costs for COMSAT-terminal manufacturers.²⁴⁰ Because manufacturers must accommodate a fragmented and proprietary market, they are less able to distribute their fixed costs, particularly with regard to research, design, manufacturing, marketing, and national licensing. The result is that the cost of satellite terminals is prohibitively high, which discourages adoption of satellite technology in poor and rural areas.²⁴¹ Harmonizing technical standards across satellite networks would mitigate the adverse effects of market segmentation by enabling terminal manufacturers to leverage larger economies of scale. Interoperability would also result in increased price competition in both the terminal and COMSAT markets.

The second GBSI prong is to identify a common frequency band for distributing high-speed Internet access via satellite on a global basis.²⁴² By designating a worldwide broadband frequency allocation, the GBSI Initiative would mitigate the risk of fragmentation caused by national and

236. Jose Toscano, *Satellite Industry Takes Another Step to Shape Future of Satellite Broadband*, INT'L TELECOMM. SATELLITE ORG., http://www.itso.int/index.php?option=com_content&view=article&id=313%3A-satellite-industry-takes-another-step-to-shape-future-of-satellite-broadband&catid=98%3Anews-autopopulate-list&Itemid=29&lang=es (last visited Nov. 5, 2012) (discussing the goal of creating a single standard for all satellite broadband services).

237. *Id.*; see also Ahmed Toumi, Dir. Gen. & CEO, Int'l Telecomm. Satellite Org., Presentation on the Global Broadband Satellite Infrastructure Initiative, Workshop on Satellites in IP & Multimedia (Dec. 9–11, 2012), <http://www.itu.int/itudoc/itu-t/workshop/sat/ks-004.pdf>.

238. Yasmine Hammamet, Global Broadband Satellite Infrastructure (GBSI) Initiative, Presentation at the Global Symposium for Regulators (Nov. 14–15, 2005), http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR05/Documents/S-I-Toumi_ITSO.pdf; see Toumi, *supra* note 237.

239. See Hammamet, *supra* note 238.

240. See *id.* (referring to lowering regulatory measures to increase market scope).

241. See generally *id.* (discussing lowering prices and increasing availability).

242. Ahmed Toumi, Dir. Gen. & CEO, Int'l Telecomm. Satellite Org., Presentation to the European Institute Roundtable on Telecommunications, E-Commerce & Audiovisual Policies (Feb. 25, 2004), http://www.itso.int/index.php?option=com_content&view=article&id=332%3Aglobal-broadband-satellite-infrastructure-initiative-european-institute-roundtable-on-telecommunications-e-commerce-a-audiovisual-policies-25-february-2004&catid=105%3Aspeeches&Itemid=29&lang=en.

regional differences.²⁴³ This would increase the ability of satellite operators and terminal manufacturers to serve a uniform global market.

The final prong of the GBSI Initiative is to harmonize and eliminate national regulatory barriers. As the Tampere Convention and GMPCS-MoU also address, discrepancies in national regulatory barriers limit the global use of satellite technology and substantially increase the costs of terminals by requiring licensing at a national level.²⁴⁴ Harmonizing satellite licensing and technical standards would reduce the cost and increase the flexibility of the global satellite market. The GBSI Initiative also suggests shifting the emphasis of national regulations away from technical standards toward market-oriented regulation.²⁴⁵ Market competition as a metric would still enable governments to address the problem of harmful interference while also diminishing the problems associated with technical standards, namely the need to project future telecommunications capabilities and the market's future.

IV. A PROPOSED INTERNATIONAL LEGAL REGIME FOR SATMED

Despite the capacity of SATMED to facilitate the realization of the right to health care and efforts by some members of the international community to liberalize the global satellite market, international law permits national restrictions that hamper the availability of telemedicine. As Special Rapporteur Hunt suggested, the international community's failure to remedy the adverse effect of international telecommunications law necessarily violates state obligations under the right to health. To remedy this, this Note proposes a four-pronged, binding international undertaking to eliminate unnecessary barriers to the free movement and use of satellite equipment for SATMED.²⁴⁶ The four prongs of the proposal are as follows:

- (1) harmonized technical standards, including an interoperability requirement, for SATMED terminals;

243. Hammamet, *supra* note 238.

244. *See supra* Part III.B.2–3.

245. Mr. Ahmed Toumi Director General—PowerPoint PPT Presentation, POWERSHOW.COM, http://www.powershow.com/view/280a2-MWQxZ/Mr_Ahmed_Toumi_Director_General_flash_ppt_presentation (last visited Nov. 5, 2012) (“Governments would be required to create a favorable market environment for the development of a global broadband satellite infrastructure that allows affordable, universal, two-way, high-speed Internet service through a low-cost, small-dish platform.”); *id.* (noting that the international community would need to undertake a “[c]ommitment to set-up a pro-competitive and harmonized regulatory framework for GBSI services”).

246. Considering the layered nature of SATMED, many of the following proposals will, in fact, be consistent with prior endeavors, such as the GMPCS-MoU and the GBSI Initiative, insofar as they apply to generic COMSAT terminals being used for SATMED applications. Thus, while the focus of this undertaking is on SATMED, the result would also affect traditional COMSAT technology being used for telemedicine.

- (2) a global frequency band for the unlicensed or type-licensed use of SATMED terminals;
- (3) the mutual recognition of national licensing or ITU licensing of SATMED terminals; and
- (4) the elimination of trade barriers preventing the free movement of SATMED terminals.

A. *Harmonized Technical Standards for SATMED Terminals*

Echoing the first prong of the GBSI Initiative, any legal effort to liberalize the SATMED market should create harmonized technical standards for SATMED terminals.²⁴⁷ Harmonized standards would make the global licensing of SATMED technology easier, cheaper, and more predictable by eliminating fragmentation in national licensing requirements. Harmonized standards would also encourage mutual recognition of licenses and reduce the ability of states to impose unnecessary or differing standards that render SATMED technology unusable (or unlawful) within their borders.

Any harmonized technical standard governing SATMED terminals should embrace interoperability. Because SATMED applications can employ generic COMSAT terminals,²⁴⁸ the international community should ensure that technical standards would enable interconnection with existing commercial-satellite networks. Interoperability with existing GMPCS, VSAT, and other COMSAT networks will eliminate the need to launch purpose-built SATMED satellites, an expensive and complicated undertaking.²⁴⁹ This will decrease the cost and complexity of quickly and flexibly deploying SATMED technology on a global basis.

B. *Global SATMED Frequency Allocation*

Under the second prong, the international community should allocate SATMED frequencies on a primary and global basis.²⁵⁰ To be consistent

247. Iridium, an international satellite-communication company, is an example of a private company working to promote harmonized licensing standards. See Donna Bethea-Murphy, *Regulatory Engineering for Iridium*, IRIDIUM EVERYWHERE (Iridium Satellite LLC, McLean, Va.), July 2009, at 1, 2, available at http://www.iridiumeverywhere.com/IE_VolumeIV_IssueII.pdf (“For satellite operators to secure landing rights . . . we must go to individual countries. To address these licensing challenges, Iridium continues to collaborate with the international regulatory community to harmonize or streamline license processes and to ensure that devices that commonly cross country borders can be used where and when they are needed.”).

248. See *supra* Part II.B.

249. See *Commercial Space Transportation Study: Communications Market*, NAT’L AERONAUTICS & SPACE ADMIN., <http://www.hq.nasa.gov/webaccess/CommSpaceTrans/SpaceCommTransSec3/CommSpacTransSec3.html> (last visited Nov. 5, 2012).

250. Just like the concern regarding interconnection and interoperability in the previous Section, the harmonized frequency allocation should be consistent with other mobile-service satellite and fixed-service satellite COMSAT allocations. This will enable generic COMSAT

with the right to health care and provisions under the ITU Constitution granting absolute priority to health-related communications, frequency allocations for SATMED should be made on a primary basis. A primary allocation would require all other, nonprimary communications to yield to those related to SATMED or be liable for causing harmful interference.

Furthermore, the frequency allocation should be conducted on a global basis via the ITU Radio Regulations. While allocations could be made at the national or regional level, global allocation is the only sure way to avoid fragmentation resulting in increased costs and complexity for satellite operators and terminal manufacturers serving a global audience. Considering that the target audience of SATMED is primarily rural and poor, avoiding geographic barriers is essential. A harmonized global band for SATMED would help guarantee that the health care needs of developing countries and rural communities are met by reducing costs and ensuring that technical innovations can be deployed in every rural clinic and hospital around the globe.

C. Mutual Recognition of Licenses

Consistent with the GMPCS-MoU, recommendations of the Tampere Convention, and other efforts to liberalize the COMSAT market, any international SATMED undertaking should include mutual recognition of national licenses or an international licensing regime under the ITU. Mutual recognition would eliminate unnecessary costs and delays arising from pursuing licenses from each national government. This will increase the speed and flexibility with which innovative SATMED technologies can be deployed to meet global health care demands. Mutual recognition will also encourage states to adopt only the minimum necessary regulatory barriers and fees. The rationale for this is that equipment manufacturers and service providers—knowing that a license in one country will be recognized elsewhere—will license their technology where it is easiest and cheapest. Thus, countries are likely to compete for licensing.²⁵¹ This competition could result in a race to the bottom that eliminates unnecessary regulations and promotes simpler, cheaper, and more efficient licensing regimes.

To minimize fragmentation of regulatory barriers, mutual recognition or an ITU licensing regime should include both generic COMSAT and specialized SATMED terminals. In this regard, the obligation of states to recognize other governments' licenses, including blanket and type licenses, is expansive because it includes the recognition of generic COMSAT terminals that have non-SATMED capabilities. However, mutual recognition of generic terminals can be limited exclusively to SATMED applications, similar to limitations under the Tampere Convention that restrict use to

terminals to be used to provide SATMED. This would further the goal of creating a competitive market, further reducing costs and increasing the availability of SATMED technologies.

251. Cf. Sacha Wunsch, *Electronic Services: Its Regulatory Barriers and the Role of the WTO* 8–10 (July 2001) (unpublished doctoral paper, Universität St. Gallen), available at <http://www.cid.harvard.edu/cidtrade/Papers/wunsch.pdf>.

emergency-related purposes.²⁵² Use of SATMED equipment for non-SATMED purposes would inherently fall outside the scope of the mutual recognition and would need additional licensing.

D. *Elimination of Barriers to Entry and Exit*

Barriers to entry and exit of SATMED terminals should be eliminated. Although certain customs duties may be justifiable in the context of commercial COMSAT applications, customs duties and other barriers affecting SATMED have the adverse effect of decreasing the availability of telemedicine services and are thereby inconsistent with state obligations under the right to health care. Moreover, liberalizing trade barriers would have a beneficial, cascading effect on the global market under the General Agreement on Tariffs and Trade's most favored nation principle.

However, many states may oppose eliminating all trade barriers because of a perception that this will allow doctors from other countries to unfairly compete with indigenous medical professionals. During the GMPCS-MoU negotiations, several countries raised similar concerns that satellite telephones would enable international callers to bypass national regulations that subsidized infrastructure development.²⁵³ Traditionally, governments collected a fee for every international call that terminated on their national network, which they used to subsidize the costs of the network.²⁵⁴ When satellite telephones were introduced, states worried that this would enable users to bypass paying fees, thus shifting greater costs to the government or national telecommunications company.²⁵⁵ Likewise, developing countries may view SATMED as a means for outside doctors to usurp patients and compete unfairly with local medical professionals. While this concern is legitimate, the ultimate goal is to expand health care to areas where there is an existing market failure. Thus, any concern regarding competition would be unjustified.

Lastly, exemptions to barriers to entry and exit should be granted broadly in order to maximize the availability and variety of SATMED services. Unlike the GMPCS-MoU, which only accommodates temporary imports and exports of satellite technology, any SATMED agreement must eliminate barriers to permanent imports and exports of specially tailored SATMED and generic COMSAT terminals. This will help promote a stable SATMED market and reduce the costs associated with telemedicine services. Moreo-

252. For example of an international regime promoting mutual recognition for limited uses, see Tampere Convention, *supra* note 191, arts. 5(7), 9(3)(d).

253. EUR. RADIOCOMM'NS COMM., EUR. CONF. OF POSTAL & TELECOMM. ADMIN., ERC REPORT NO. 60, GLOBAL CIRCULATION OF IMT-2000 TERMINALS 3 (1998), available at <http://www.ero-docdb.dk/docs/doc98/official/pdf/Rep060.pdf>.

254. See *GMPCS: The Regulatory Dilemma*, ITU, <http://www.itu.int/newsarchive/wtpf96/feat4.html> (last visited Nov. 5, 2012) (discussing international accounting rates).

255. EUR. RADIOCOMM'NS COMM., *supra* note 253.

ver, it will ensure that rural clinics and medical professionals have long-term access to mobile and fixed SATMED terminals.

CONCLUSION

It is necessary to recognize the trepidation with which states view efforts to liberalize satellite communications when proposing an international legal undertaking to promote SATMED. While individuals could potentially use the COMSAT layer of SATMED for nonhealth purposes, circumventing a state's laws, these risks should not be overstated or used to prevent a cost-effective and efficient means for dramatically expanding the availability and accessibility of health care—especially when the divide between urban and rural health care is so stark. Although the recommendations of Part IV would limit a state's sovereignty, the effects can be confined to SATMED. Moreover, the costs to national sovereignty would be greatly outweighed by the benefits of complying with the international obligation to provide access to health care. Healthy workers tend to be economically productive and less dependent on government programs.²⁵⁶

SATMED fulfills a long-term objective of using satellites to improve economic, social, and cultural rights. The international community has declared that telecommunications is essential to the realization of economic, social, and cultural rights²⁵⁷ and to bridging gaps between developed and developing countries and rural and urban communities.²⁵⁸ In this regard, satellites and SATMED are uniquely positioned to facilitate the fulfillment of state obligations to provide access to health care, particularly among rural populations. Thus, the international community should embrace satellites as a necessary means of ensuring that "everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including . . . medical care . . ." ²⁵⁹

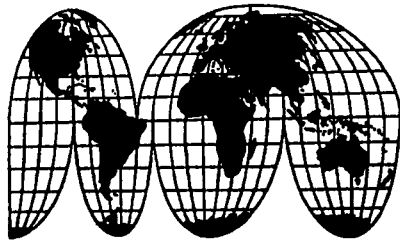
256. See generally WHO, COMM'N ON MACROECON. & HEALTH, MACROECONOMICS AND HEALTH: INVESTING IN HEALTH FOR ECONOMIC DEVELOPMENT (2001), available at <http://www.fao.org/righttofood/KC/downloads/v1/docs/macroeconomics%20and%20health.pdf>.

257. World Telecommunication Development Conference, Buenos Aires, Arg., Mar. 21–29, 1994, *Buenos Aires Declaration on Global Telecommunication Development for the 21st Century*, ¶ 9(a), available at <http://www.itu.int/itudoc/itu-d/wtdc/wtdc1994/badecle.txt>.

258. *Id.* ¶ 9(b).

259. See *supra* note 10 and accompanying text.

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